

Assessing the Impact of Trade Reforms on Informality in Egypt

Irène Selwaness[†]

Chahir Zaki^{*}

Abstract

This paper proposes an empirical investigation of the effect of trade liberalization on informality in Egypt. Trade reforms are likely to expose formal firms to a fiercer foreign competition. Consequently, such firms try to reduce labor costs by cutting workers benefits, replacing permanent workers with part-time labor and not providing workers with formal contracts or social security. This effect of trade liberalization on the informal sector has been widely discussed at both empirical and public policy levels but was never done empirically in Egypt. Thus, combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with some macroeconomic variables (tariffs), we try to assess to what extent trade reforms affected the informal sector in Egypt. Our main findings show that trade reforms increased informality in Egypt. Yet, these findings change over time. The degree of labor market flexibility associated to the labor reform of 2003 is likely to be one of the reasons behind this change.

JEL Classification: F10, F26

Keywords: Trade Liberalization; Informality; Egypt.

[†] Assistant Professor, Faculty of Economics and Political Science, Cairo University, Cairo, Egypt. Email: irene.selwaness@fepe.edu.eg

^{*} Assistant Professor, Faculty of Economics and Political Science, Cairo University, Cairo, Egypt. Email: chahir.zaki@fepe.edu.eg

1. Introduction

Trade liberalization policies and the labor market are not dissociated. There are many claims that trade openness and markets' exposure to foreign competition could widen the wage inequality and increase labor movements towards informal sector. This is why trade openness can increase the share of informality in the labor market through several mechanisms. After trade reforms, formal firms can be more likely to get exposed to a fiercer foreign competition. Consequently, in order to keep their competitiveness, firms try to reduce labor costs by cutting workers benefits, replacing permanent workers with part-time labor and not providing workers with formal contracts or social security. They can also layoff some of their workers. The latter may seek informal employment afterwards if they cannot afford unemployment and if formal employment opportunities are limited. Moreover, firms can also outsource to the informal sector, such as subcontracting to home-based or self-employed micro-entrepreneurs.

The Egyptian case is quite interesting since Egypt experienced an increase in both trade openness and informality. During the Economic Reform and the Structural Adjustment Program (ERSAP) introduced since the early 1990s, trade reforms in Egypt were adopted in order to liberalize the trade regime, described as being highly restrictive by this period. Through reductions in tariff and non-tariff barriers over two decades, Egypt has significantly liberalized its external trade. Specifically, the maximum tariff rate has decreased from 110% at the end of the 1980s to reach 40% by the end of 1990's. In 2004, the government of Egypt launched the second wave of liberalization. Its objectives were twofold: first, to reduce tariffs and rationalize the tariff structure; and second, to reduce the number of products subject to non-tariff barriers. Both nominal and effective protections have declined in the manufacturing sector from 21.3% to 12.1% and from 23.3% to 14% respectively after the 2004 reform. Consequently, exports and imports in Egypt experienced significant increases since early 1990s and in a more pronounced way after 2004, where, on average, exports increased annually by 5% before 2004 vs. 24% after this date, while imports by 2% and 24% respectively.

In addition, the Egyptian labor market has experienced an increase in informality during the 1990s, also associated with the economic reform and structural adjustment program (ERSAP). There was a significant increase in the share of informal employment in total employed drawing on recent Egyptian studies. Earlier studies have shown that the majority of the jobs created between 1988 and 1998 were unprotected by legal contracts and that the share of growth of the unprotected regular jobs was the highest in the private sector non-agricultural sector (Assaad, 2009).

The empirical literature on the impact of trade reforms on the informal sector is not very abundant despite the prominence of this question in public debate. In their seminal work, Currie and Harrison (1997) found that, in Morocco, firms started hiring more temporary workers after the completion of a comprehensive trade liberalization program. In addition, Goldberg and Pavcnik (2003) found that, in Brazil, there is no evidence of a relationship between trade policy and informality. Yet, in Colombia, they argued that there is an evidence of such a relationship, but only for the period preceding a major labor market reform that increased the flexibility of the Colombian labor market. The effect of trade liberalization on the informal sector was never done empirically in Egypt.

This paper proposes an empirical investigation of the impact of trade liberalization on informality In Egypt. Thus, through combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with macroeconomic variables (tariffs), we try to assess to what extent different trade reforms have affected the prevalence of informal jobs in the manufacturing sector in Egypt . Therefore, two approaches are followed. The first approach consists of a one-step analysis that estimates the probability of informal employment while including worker and job characteristics, industry indicators, and tariffs. This first approach serves as a direct assessment of the effect of trade on the probability of working in an informal job. In the second approach, a two-step estimation procedure is followed as in Goldberg and Pavnick (2003) where the change in the probability of informal employment in each industry, and each year, is being related to trade reforms and explained by tariffs. In the first step, the probability of informal employment is estimated including worker and job characteristics in addition to industry indicators, without the tariffs variable. Then, in the second step, the coefficients of the industry indicators extracted out of the first step are regressed on the tariff variable. This second-step analysis determines the impact of different trade reforms on what's called the "informality premia". Our main findings show that trade reforms increased informality in Egypt. Yet, these findings change over time. The degree of labor market flexibility associated to the labor reform of 2003 is likely to be one of the reasons behind this change.

This paper is organized as follows. Section 2 reviews briefly the literature related to the theoretical and empirical contributions on trade and informality. Section 3 presents some stylized facts on trade and informality in Egypt. Section 4 describes the methodology. Section 5 summarizes the data sources. Section 6 displays the results and section 7 concludes.

2. From Theory to Empirics

2.1. Theoretical Models

As it was mentioned before, after trade reforms, formal firms can be more likely to get exposed to a fiercer foreign competition. Consequently, in order to keep their competitiveness, firms try to reduce labor costs by cutting workers benefits, replacing permanent workers with part-time labor and not providing workers with formal contracts or social security. They can also layoff some of their workers. The latter may seek informal employment afterwards if they cannot afford unemployment and if formal employment opportunities are limited. Moreover, firms can also outsource to the informal sector, such as subcontracting to home-based or self-employed micro-entrepreneurs.

The theoretical literature does not provide a clear relationship between informality and trade liberalization. While some studies found that it is more profitable to enter the formal sector rather to remain informal when trade openness increases, others argued that trade liberalization may lead to an increase in informality.

For the first group of studies, we can cite 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 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. Yet, according to Fugazza and Niess (2008), considering that all goods are tradable is a strong assumption. If some goods are allowed to be non-tradable, the impact of trade liberalization on informality will additionally depend on the reaction of the real exchange rate and/or relative sector productivities. For instance, if the informal sector is equated with the non-tradable goods sector, and, if non-tradable goods are only for consumption, then the relationship between trade openness and informality could become negative. In this context, trade liberalization would lower the price of the non-tradable good in terms of the tradable good (i.e. a real depreciation) and this would decrease the size of the informal sector.

The second group of theoretical models show, by contrast, that trade liberalization will increase informality. For instance, Paz (2012) developed a theoretical model in which both domestic and foreign import tariffs affect two industry-level labor market outcomes: the share of informal workers and the formal-informal wage gap. His predictions show that a decrease in domestic import tariffs increases both the informality share and the formal-informal wage gap, whereas a decrease in foreign tariffs has the

opposite effect. A distinct feature of this model is the introduction of a realistic labor market distortion, payroll taxes, which endogenously generates informal jobs in the economy. He tested his model on Brazilian data (1989-2002) and found a significant negative impact of own liberalization on informality with a percentage point decrease in import tariffs leading to a 0.8 percentage point increase in informality share and a 0.4 percentage point increase in the wage gap. In the same line, Heid et al (2011) developed a heterogeneous-firm model with imperfect labor markets that captures the differences between maquila and non-maquila manufacturing plants and the existence of an informal sector. It is worth to mention that one of the key drivers behind Mexico's impressive export growth has been the maquila sector. Maquila plants, or maquiladoras for short, focus on assembling imported intermediate inputs which are then reexported either for further assembly or as finished goods, mostly to the US . They found that the expansion of the maquila sector during the 1990s was a mixed blessing for Mexico since the skill premium decreased by 2.7%, informality increased by 0.9% and overall welfare decreased by 3.7%.

Moreover, if pre-trade reform formal wages are determined by labor regulation (e.g. a binding minimum nominal wage), upward pressures on formal wages post trade reform might be slightly undermined; this would increase the chance to observe more informality as a consequence of trade liberalization. Finally, the fiscal environment can also influence the relationship between trade liberalization and informality. Existing models generally assume that public expenditures fully adapt to fiscal revenues without specifying how fiscal adjustment is actually achieved. Fiscal consolidation may require higher taxes or new fiscal instruments and both are likely to affect firms' incentives to extend informal inputs and workers' choices to become informal.

2.2. Empirical Evidence

Similarly to theoretical models, empirical studies have been inconclusive on the effect of trade liberalization on informality. They suggest that informality can respond to trade liberalization either positively or negatively, depending on country and industry characteristics.

First, Aleman-Castilla (2006) uses 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, Aleman-Castilla (2006) findings suggest that lower import tariffs are related to lower informality in tradable industries. Results also suggest that informality decreases less in industries where import penetration is high and more in industries with greater export orientation

Second, Pavcnik and Goldberg (2003) use 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. Pavcnik and Goldberg (2003) report that prior to labor market reform, when costs of firing formal workers were high, an industry-specific tariff reduction has been associated with a greater likelihood of becoming informal. After labor market reform, however, industry-specific tariff reductions have been associated with smaller increases in the probability of becoming informal. In these studies, Pavcnik and Goldberg (2003) and Aleman-Castilla (2006) use a similar two-step estimation approach. In a first step, a linear probability model of informal employment is estimated. Explanatory variables include worker characteristics and industry dummies capturing workers' industry affiliation. Coefficients of the latter are defined as industry-informality differentials. These differentials are then used as the dependent variable in the second-step estimations. They are regressed against import tariffs across years and resulting coefficients are taken as measures of the impact of trade liberalization on informality.

Bosch, Goni and Maloney (2007) study gross worker flows to explain the rising informality in Brazil's metropolitan labor markets from 1983 to 2002. This period covers two economic cycles, several macroeconomic stabilization plans, a far-reaching trade liberalization, and changes in labor legislation through the Constitutional reform of 1988. Secular movements in the levels and the volatility of gross flows suggest that the rise in informality during that period was largely caused by a reduction in job finding rates in the formal sector. Part of the remainder is linked to the constitutional reform which contributed to rising labor costs and reduced labor market flexibility; only a small fraction of the observed rise in informality is explained by trade liberalization. In other words, trade liberalization accounts for roughly 1% of the increase in informality, while the constitutional reforms account for 40-50%.

Andersen (2004) , using a four-sector, two-factor general equilibrium model of a small, open developing economy, showed that the existence of an informal sector in the model, where wages are more flexible in the short run than they are in the formal sector, may significantly lower short-term adjustment costs from trade liberalization, as the informal sector may quickly absorb some of the labor released from the sectors adversely affected by the trade liberalization.

In an earlier study, Currie and Harrison (1997) assess the impact of trade reform on employment in manufacturing firms in Morocco in the 1980s. They found that firms started hiring more temporary workers after the completion of a comprehensive trade

liberalization program. They argue that government-controlled firms behaved quite differently from privately-owned firms since the former actually increased employment in response to tariff reductions, mostly by hiring low-paid temporary workers.

3. Stylized Facts

3.1. Informality in Egypt

The informal sector is mainly characterized by employment relationships that do not comply with labor regulations i.e. not protected by legal contracts or not covered by social security. Likewise, informality in the broader definition can be expressed by many terms such as informal enterprises, informal sector, informal jobs and informal employment. Informal sector is the sum of all informal enterprises, whose size does not exceed a determined threshold (5-10 workers depending on the national context) and are not registered/licensed or not subject to tax legislation, social protection or labor regulations. Jobs described as informal are own-account workers (self-employed), employers, employees in informal enterprises, subsistence workers (whose goods' production are for household consumption purposes), unpaid or contributing family workers, and employees in formal enterprises whose employment relationship are not subject to labor regulations, social protection systems, and/or taxation, for certain reasons. Informal employment includes all these types of informal jobs whether inside formal or informal establishments. This paper uses the lack of both legal contracts and social security coverage as indicators of informality.

In Egypt, the share of the manufacturing sector workers among all workers were about 12.91% in 1998 and 11.84% in 2006 (a sample of 1,071 and 1,699 workers). It employs around 16.95% and 12.95% in 1998 and 2006, respectively of overall informal employment in the Egyptian labor market.

From 1998 to 2006, in the manufacturing sector, the proportion of workers who do not have neither a contract or a social security coverage, i.e. informal, increased from 44.44% to 51.61%. The manufacturing sector was not the only sector experiencing an increase in informal employment, but also the construction, the whole and retail trade, the transportation and storage, the real estate and business were also among the sectors in which the proportion of informal workers increased during 1998 to 2006 (Figures 1 and 2)¹.

[Figures 1 and 2 about here]

¹ These data are calculated based on the ELMS 1998 and the ELMPS 2006, described in Section 3.4

The share of informal workers is examined by gender, age, educational attainment, region, size of the firm in terms of workers, and employment status as given in Table 1. It shows that the increase in informal employment in the manufacturing sector between 1998 and 2006 was prevalent across almost all different groups of workers. For instance, the proportion of informal men workers increased from 42.1 to 50.1% of total working men in the 88-06 period. Informality has also increased across age groups, educational levels, different regions and different size of the establishment (in terms of workers). The only exception was the young who experienced a decline in the share of those who are informally employed among them from 68.4 to 65.5%. The share of informal workers among females also declined slightly. Those who work in firms with more than 50 workers become less likely to be informal (proportion of informal ones went down to 23.6% in 2006 from 29.7%, in 1998, of all workers in the 50+ firms).

[Table 1 about here]

Informal workers in the manufacturing sector generally have the known characteristics of informal workers as presented in the first two chapters of this thesis. Females are more likely to be informal than males. Moreover, the older the worker, the less likely he could be informal. Specifically, the percent of informal workers among the 15 to 29 workers is the highest as compared to their percent among the 30 to 49 or the 50 to 64 workers. Being married or head of the household reduces the incidence of informal employment. In addition, the share of informal workers declines with higher educational levels. Informal workers represent around 17.1% and 26.7% of those with above intermediate education level as compared to 60% and 70.9% among non-educated workers in 1998 and 2006, respectively. Workers living in Alexandria and Suez cities are the least likely to be informal relative to workers living in other areas. In 1998, the most likely to be informal were the workers living in rural lower Egypt. This has changed in 2006 where the workers living in rural upper become the most likely to be informal than workers in all other regions (68.7% of all workers in rural upper Egypt are informal). Needless to observe that rural workers are more likely than their urban peers to be informal. As expected, informal workers are heavily concentrated in firms with less than 10 workers where around three quarters of these firms work force are informal.

It is worth observing that the majority of the self-employed and the unpaid family workers are informal (75 and 86.7%, respectively in 1998 and 85.9 and 98.1%, respectively in 2006). In 1998, 40.9% of wage workers were informal against 35.6% of employers, suggesting that the former were more likely to be informal. In 2006, both categories of workers witnessed an increase in informality, yet employers were more exposed to informality with a share of 54.2% as compared to 45.9% of wage workers.

Table 2 presents the percent of informal workers in each industry within the manufacturing sector. In 1998, informality was mainly prevalent in the wood production, the furniture, the garments, leather products and metal production industries. In other words, workers in these industries were the most likely to be informal. Between 1998 and 2006, the share of informal workers in these sectors, mainly wood production, furniture, metal production, and leather products continues to grow. Also, the share of informal workers in food and beverage industries increased from 41.3% to around 45% of its total workers. There was also an increase in informality in sectors such as the textiles, paper production, chemical production, medical production, non-metal minerals, and other transportation production. On the other hand, the percent of informal workers in garments sector has declined to around 61%. In addition to the garments industry, tobacco, coke and petroleum production; publishing and printing, machinery and equipment experienced a decline in their share of informal workers.

[Table 2 about here]

The characteristics of informal workers by individual, household and job characteristics using the two waves 1998 and 2006 of the Panel data are presented in Table 3, showing similar trends as in Table 2.

[Table 3 about here]

Using the panel dimension, it is interesting to look at the transition patterns. Across all sectors, there are around 25.4% of the individuals working in the informal sector who shifted to the formal one between 1998 and 2006 as compared to 10.3% who shifted from formal to informal jobs (Table 4). Concerning the manufacturing sector, around 21.5% of informal workers have become formal as compared to around 9.2% of formal workers who have shifted to informal jobs in 2006. This suggests - in a descriptive and not empirically tested - that workers were more likely to shift to formal jobs than to informal ones in 2006.

[Table 4 are about here]

Furthermore, Table 5 describes the transition to the manufacturing sector in 2006, from five different states in 1998: informal job in the manufacturing sector, formal job in the manufacturing sector, informal job in any other economic activity sector, formal job in any other sector, and not working. It is shown that around two-third of those who did not work in 1998 (64.2%) became informal workers in the manufacturing sector in 2006. It is worth noting that this table only focuses on the manufacturing sector as being the entry state. This means that if those without jobs in 1998 got a job in the manufacturing

sector in 2006, 64.2% of them will be informal. This can indicate that the new entrants in 1998 are more likely to get informal jobs in the manufacturing sector in 2006. Those who were not working in 1998 or were informal in other sectors than manufacturing are more likely to move to informal jobs in the manufacturing sector in 2006 than those who are in the formal sectors including the manufacturing.

[Table 5 is about here]

3.2. Trade Reforms

Both exports and imports in Egypt experienced significant increases since early 1990s and in a more pronounced way after 2004. Figure 3 plots the evolution of exports and imports from 1990 to 2009. On one hand, both exports and imports increase after 2004 are much higher than those before 2004. On average, exports increased annually by 5% before 2004 vs. 24% after this date, while imports by 2% and 24% respectively. These facts are confirmed by Figure 4 that depicts the share of exports and imports to GDP over the same period. It follows a U-shaped curve showing the increases in the share of exports and imports following the ERSAP until 1992, and then the slope is downward until early 2000 after which it becomes upward again after the 2004 reform. The same analysis applies for imports. On the other hand, Egypt trade balance has been continuously in deficit throughout the period of the study. Imports exceed exports as a result of the upsurge in the volume of imports that are mainly concentrated in raw materials, investment goods or semi-finished products that are used in the production process.

[Figures 3 and 4 are about here]

Despite the widened deficit in the trade balance, the surplus on the current account (before the financial crisis) was an outcome of the rise in the services surplus and net unrequited transfers. In addition, the net inflow realized by the capital and financial account was due to the fact that foreign direct investment (FDI) increased in recent years (especially in petroleum, manufacturing and financial services).

In order to explain the burst in exports and imports, it is important to present how tariffs and other trade barriers have evolved over time. Over two decades, Egypt has significantly liberalized its external trade. The maximum tariff rate has decreased from 110% at the end of the 1980s to reach 40% by the end of 1990's. In 2004, the government of Egypt launched the second wave of liberalization. Its objectives were twofold: first, to reduce tariffs and rationalize the tariff structure; and second, to reduce the number of products subject to non-tariff barriers. The number of tariff bands was narrowed from 27 tariff brackets to 6, tariff dispersion measured by standard deviation declined from 16.1

in 2000 to 12.7 in 2004 and tariff lines were reduced from 8,000 to 6,000. Both nominal and effective protections have declined in the manufacturing sector from 21.3% to 12.1% and from 23.3% to 14% respectively after the 2004 reform. All those measures should in turn simplify procedures, minimize tariff evasion, and remove possibilities of discretion and corruption (Zaki, 2011). Therefore, the increase in exports and imports can be attributable to these trade reforms. Valdes and Foster (2011) have found that trade liberalization since the late-1990s has had a considerable impact on reducing protection of some industries. Yet, some sectors, such as the food and tobacco sectors, remain highly protected, due to tariff escalation and non-tariff barriers on the trade side, and due to energy subsidies on the input side. The effective rate of protection (ERP) has decreased from 85.6 percent in 1999 to 45 percent in 2009 for private business and from 122.5 percent to 37 percent for public enterprises over the same period. In addition, they argued that the dispersion of effective rate of protection fell between 1999 and 2009 from 192 to 57 percent, but it remains higher than the low dispersion of nominal tariffs due to first tariffs and output subsidies and second to energy subsidies.

Nearly 99% of Egypt's tariff lines are bound at the WTO. MFN tariffs on non-agricultural products are generally lower, with an average of 12.8%. Tariffs on agricultural goods remain high, with an average of 66.4%. The higher average on agricultural goods is strongly determined by average tariffs of over 1,000% on beverages and spirits. Table 6 presents both applied and most favored nation (MFN) tariff rates². It is noteworthy that the simple (weighted) average³ of applied tariffs has declined significantly, in particular between 2002 and 2004 reaching 20.3% (13.1%) down from 47.9% (23.7%). Despite a significant liberalization of the manufacturing sector, the primary sector remains relatively protected given the fact that in 2009, its simple average of MFN tariffs is 41% while the manufacturing's one is 9%. Finally, the difference between applied and weighted tariff rates is much larger for the primary sector (37.5% and 6% respectively) than for manufacturing (9.3% and 9.12% respectively). This is due to the fact that some products in the primary sector are subject to high tariffs (such as tobacco and alcohol) whereas their weights in international trade are significantly low.

[Table 6 is about here]

² MFN tariffs are what countries promise to impose on imports from other members of the WTO, unless the country is part of a preferential trade agreement (such as a free trade area or customs union), applied. This means that, in practice, MFN rates are the highest (most restrictive) that WTO members charge one another. Applied tariff rates are the average of effectively applied rates for all products subject to tariffs calculated for all traded goods

³ Weighted mean tariff is the average of tariff rates weighted by the product import shares corresponding to each partner country. Simple mean tariff is the unweighted average of tariff rates for all products subject to tariffs calculated for all traded goods

Table 7 shows both imports penetration rate and exports performance for agriculture, manufacturing and services. It is quite clear that the picture has changed between 2006 and 2011. In 2006, the highest imports penetration rate is the one of services, followed by fuels, manufactures and agriculture. Yet, services and fuels exports performance are much higher than imports penetration making Egypt a net exporter of oil and services. Between 2006 and 2008, exports performance of agriculture, fuel, manufactures and services has been steadily increasing until the international financial crisis in 2008 and the popular uprising that demanded the overthrow of Mubarak's regime in 2011 have negatively affected Egypt's international trade. For this reason, in 2011, Table 7 shows that for services and fuel, exports performance is still higher than their imports penetration ratios. In contrast, for manufactures and agriculture, imports penetration is almost twice exports performance.

[Table 7 is about here]

Figure 5 presents tariffs structure in manufacturing sectors. It is quite clear that tobacco, garments, and leather products have a high tariff rate while paper manufacturing, basic metal, and transport equipment are characterized by a low protection. At the same time, we notice that, with the exception of the tobacco sector, workers in the garments and leather products are more likely to be informal than workers in the paper production, basic metal or transport equipment (Table 2). Between 1997 and 2005, food and beverages, textiles, garments, leather products, motorized vehicles production, and paper production experienced important declines in applied tariff rates. Looking at the evolution of the percent of informal workers in these sectors, Table 2 shows that these sectors were also among the ones whose workers were more prompt to informality in 2006, with the exception of motorized vehicles.

[Figure 5 is about here]

Along with these unilateral trade liberalization efforts that took place since the 1990s, Egypt has signed many bilateral and multilateral free trade agreements (FTA). On the bilateral front, Egypt has concluded free-trade agreements with the European Union (2004), the members of EFTA (the Republic of Iceland, the Principality of Liechtenstein, the Kingdom of Norway, the Swiss Confederation, 2004), Turkey, and other Arab countries. At the regional level, Egypt has concluded to the Greater Arab Free Trade Area (GAFTA), the Common Market of Eastern and Southern Africa (COMESA) and the Agadir Free Trade Agreement (with Tunisia, Jordan and Morocco). It has also some framework agreements that should turn into free trade ones such as the agreement with the MERCOSUR countries and the one with the UEMOA (Union Economique et Monetaire Ouest Africaine). Finally, Egypt has also signed the Qualified Industrial Zones

(QIZ) Protocol⁴ in December 2005 with the United States and Israel. All these agreements have contributed to the boom of exports and imports in Egypt starting 2004.

At the sectoral level, Figures 6 and 7 present exports performance (defined as the ratio of exports to total output) and import penetration (defined as the ratio of imports to domestic absorption which is output minus exports plus imports) for manufacturing sectors in Egypt. Sectors characterized by an important comparative advantage have a high export performance such as textiles, garments and leather. Yet, between 1997 and 2005, many sectors experienced significant increases in terms of their exports performance especially food and beverages, metal products, machines and equipments and furniture. On the other hand, import penetration has increased for several sectors such leather goods, machines and professional equipments.

[Figures 6 and 7 are about here]

According to these stylized facts related to the informal market and trade reforms, the change in trade variables between 1998 and 2006 might potentially influence the level of informality in the manufacturing sector in Egypt. That's why in order to verify such correlation, it is worthy to empirically assess the impact of such trade reforms on informality in this sector.

4. Methodology

4.1. A One-Step Analysis

To directly assess the effect of trade policy/reforms on informality, the probability of working in an informal job is being regressed on on some individual, household, regional characteristics in addition to trade variables and to sector dummies.

$$Informal_{ijt} = \beta_0 + \beta_1 X_{ijt} + \beta_2 H_{ijt} + \beta_3 R_{ijt} + \beta_4 Tar_{jt} + \beta_5 IP_{jt} + \varepsilon_{ijt} \quad (1)$$

where ε_{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 in the informal sector and 0 otherwise. The regressors 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 than intermediate levels), and a dummy for

⁴ Qualifying Industrial Zones (QIZ) are designated geographic areas, within Egypt, that enjoy a duty free status with the United States. Companies located within such zones are granted duty free access to the US markets, provided that they satisfy the agreed upon Israeli component of 10.5%, as per the pre-defined rules of origin.

membership in a trade union. The household characteristics H_{ijt} are mainly captured by the household size, a dummy for being head of household, share of dependents aged 0 to 14 or above than 65 years old in the household, and 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} . The trade impact will be captured by the tariffs level Tar_j . Finally, industry indicators IP_{jt} are added to control for the non-observed specific-industry characteristics. The coefficient of the industry dummy is considered as being “the informality premium”, capturing the part of the variation in the probability of being informal that cannot be explained by the worker characteristics, but rather by the workers’ industry affiliation.

This one-step analysis allows us to assess the direct impact of trade reforms - captured by tariffs - on the probability of being informally employed in the manufacturing sector. The estimations are fit separately on the cross sectional-sample for 1998 and for 2006. Likewise, the two waves of the panel data will be used to estimate fixed and random effect models.

It is worth mentioning that merging aggregate data (the tariffs) with micro observations in order to measure the impact of the former on the latter implies that tariffs are the same for each industry. This may violate the assumption that observations are independent and identically distributed since individuals within the aggregated level such as economic activity are in fact more similar to one another than individuals from another economic activity. Consequently and according to Moulton (1990), the classical estimation methods may result in standard errors that are biased downward. For this reason, in the probit estimations for 1998 and 2006, errors are clustered by the economic activities to correct for the variance covariance matrix.

Finally, contrarily to Goldberg and Pavnick (2003) who included lagged values of trade flows (both exports and imports) with tariffs, we opt to measuring trade policy by applied tariffs only since exports and imports depend upon tariffs, and hence might lead to an endogeneity bias.

4.2. A Two-Step Analysis: Industry Informality Differentials

As per another method to understand the impact of trade effect on labor market informality, a two-step analysis approach is adopted, following Goldberg and Pavcnik (2003). In this approach, the “informality premia” are being regressed on the tariffs in order to determine the impact of different trade reforms on “informality premia”. It is

worth reminding that the informality premia is the change in the probability of informal employment that is only due to the industrial affiliation of the workers.

Two steps are undertaken in this approach. In the first step, the previous model (a probit model) is again estimated while controlling for the individual, household and regional variables, and the industry indicators. Tariffs are not included among regressors in this step. The first stage regressions are estimated separately for each year in our sample (1998 and 2006) as follows:

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

where v_{ijt} is the discrepancy term.

In the second step, the industry coefficients α_4 , retrieved from the first step regressions, are pooled over time (for 1998 and 2006) and being 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 differentials according to Goldberg and Pavnick (2003). Therefore, by regressing the tariffs on the informality differentials, such methodology permits explaining the change in informality in each industry by the 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.

The dependant variable IP_{jt}^* , used in the second step, is the estimated industry coefficients after transformed and expressed as deviations from the employment-weighted average informality 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 the both the coefficients and their standard errors are independent of the base industry choice (Haisken-DeNew and Schmidt, 1997). The normalization procedure of the industry coefficients and their standard errors are adopted following Haisken-DeNew and Schmidt (1997) and known as the two-step restricted least squares procedure (Haisken-DeNew and Schmidt, 1997). It consists of transforming each industry coefficient, estimated through equation 2, to a deviation from the employment-share weighted average of all other estimated industry coefficients. Thus, each industry coefficient turns to be not affected by the choice of the reference industry omitted. More specifically, each normalized informality differential (or industry dummy coefficient) IP_{jt}^* can, hereafter, be interpreted as the percentage point difference

in the probability of informal 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:p.22).

The Haisken-DeNew and Schmidt transformation is described as follows:

$$IP_j^* = W * \begin{bmatrix} IP_1 \\ IP_2 \\ \vdots \\ IP_{j-1} \\ 0 \end{bmatrix}$$

where IP_j^* are the normalized industry differentials and W is the weighting matrix defined as :

$$W = \begin{bmatrix} 1 - \bar{I}_1 & -\bar{I}_2 & -\bar{I}_3 & \dots & -\bar{I}_j \\ -\bar{I}_1 & 1 - \bar{I}_2 & -\bar{I}_3 & \dots & -\bar{I}_j \\ -\bar{I}_1 & -\bar{I}_2 & 1 - \bar{I}_3 & \dots & -\bar{I}_j \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ -\bar{I}_1 & -\bar{I}_2 & -\bar{I}_3 & \dots & 1 - \bar{I}_j \end{bmatrix}$$

The average industry employment share is given by \bar{I}_j ⁵. Thus, equation 3 is estimated using the normalized industry informality differentials not the raw estimated ones.

Similarly the variance-covariance matrix $VC(IP_j^*)$ can be derived from the $VC(IP_j)$ retrieved from the first-step regressions (2) as follows :

$$VC(IP_j) = W * VC * W' \quad (5)$$

where

$$VC = \begin{bmatrix} VC(IP_j) & 0 \\ 0 & 0 \end{bmatrix} \quad (6)$$

In addition, because our dependent variable in the second stage is estimated, we estimate equation 3 with weighted least squares (WLS) considering the inverse of the transformed variance of the informality coefficients $VC(IP_j^*)$ as weights. Goldberg and Pavcnik (2003) argue that using such weights puts more weight on industries with smaller variance in informality differentials.

Consequently, it is possible to determine the effect of trade variables on the inter-industry informality premium.

⁵ $\bar{I}_j = (n_j / \sum_j n_j)$, where n is the number of workers in industry j

5. Data

Trade policy variables have different sources. Tariff data come from the World Trade Organization Tariffs Profile based on the Egyptian customs authority data. The applied tariff levels are available for 1997 and at 2005 at the 2 digits level.

We relate the trade variable to household survey of the 1998 and 2006 panel and cross sectional waves from the Egyptian Labor Market Survey 1998 (ELMS 1998) and the Egyptian Labor Market Survey 2006 (ELMPS 2006). Both surveys were conducted by the Economic Research Forum in cooperation with the Central Agency for Public Mobilization and Statistics (CAPMAS). "ELMS 1998" and "ELMPS 2006" were carried out on a nationally representative sample of 4816 and 8349 households, i.e. 23,997 and 37140 individuals, respectively. The "ELMPS 2006" is a follow up survey to the ELMS 98, forming a periodic longitudinal survey that tracks the labor market and demographic characteristics of the households and individuals interviewed in 1998, and any new households that might have formed as a result of splits from the original households. Specifically, there are 3684 households from the original ELMS 98 who were followed and re-interviewed in 2006, in addition to around 2167 split households. In order to maintain the national representativity of the 2006 data, it also collects data on a refresher sample of households (2498).⁶ Both datasets provide information on individual and household demographic characteristics (age, gender, education level, parental background and household structure), job characteristics (hours-of work, wage earnings, occupation, economic activity, sector of employment, etc) and region. The available industry of employment related to the trade data are 22 industries per year in the manufacturing sector.

The one-step analysis, which is probit estimation of the probability of informality, is done using each of the cross-sectional samples of ELMS98 and ELMPS06. We also use the panel sample from ELMS98-ELMPS06 to estimate random and fixed effect models.

The two-step analysis relies on the cross-sectional samples from ELMS98 and ELMPS06. As explained above, the first stage of this two-step method entails the estimation of the probability of informal employment controlling for industry indicators, in addition to the individual, regional and household characteristics. Trade variables should not be included among the explanatory variables. Such estimation is done separately for 1998 and 2006. Then, coefficients of industry indicators from both years estimation are captured, normalized and then pooled and regressed on tariffs, year dummies and once again industry indicators. This is to explain such coefficients, the so-

⁶ See Assaad (2009), and Assaad and Roushdy (2009) for more details on data description

called industry informality differentials or the informality premia, by trade variables while taking into account the time effect but also the industry-specific unobservable characteristics captured in the industry indicators.

6. Empirical Results

6.1. One-Step Analysis

Table 8 shows the estimation results of the probability of being informally employed in the manufacturing sector, separately for 1998 and 2006, in addition to the random-effect results. Explanatory variables were mainly individual, household characteristics as well as industry dummies (21 dummies for which tariff level is available⁷). Including the latter allows to control for any industry-specific characteristic that can affect the probability of informality. Tariff was also added in order to capture the effect of trade policy on the likelihood of informal employment. The reference category is a male, not married, not head of household, illiterate or can read or write, living in greater Cairo, and working in the food and beverages production.

[Table 8 is about here]

Concerning the cross-sectional samples for 1998 and 2006, the estimated coefficients of the individual and household characteristics confirm the stylized facts of informal workers characteristics described in section 3 and are in line with the previous literature of the determinants of informal employment (Wahba, 2009; Wahba and Mokhtar, 2002). Results show that, in 1998, women, younger, and less educated workers whose region is not in metropolitan areas are more likely to be informal (Table 8). Regional dummies show that residing in Alexandria and Canal cities decreases the probability of informality relative to the reference region (Greater Cairo), even though the marginal effect is significant at the 5% significance level. Living in Rural Upper Egypt increases significantly the probability of informal employment. By contrast, the household structure did not have any impact on the probability of informal employment in 1998. Moving to the impact of trade reforms on informality, it is worthy to note that the tariff rate has negative impact on informality, suggesting that more liberalization (i.e. the reduction in tariffs) increases the probability of informal employment in 1998.

In 2006, while the education levels keep the same impacts as for 1998 (negative and significant on the probability of informal employment), gender and age impacts become insignificant. The likelihood of working informally still decreases in Alexandria

⁷ There are 22 industry sectors for which the data on tariff levels are available. In the estimation, the food and beverages are excluded as the reference industry dummy

and Canal cities as compared to the reference region. Moreover, only the rural part of lower and upper Egypt increases the likelihood of informal employment relative to the reference. The higher the share of inactive adults in the household is, the more likely the worker is formal (i.e. employed with contracts or with social security coverage). Inversely to the 1998 results, the tariff impact turns to be positive and significant, suggesting that the lower the tariffs in 2006, the lower the likelihood of informal employment is. The 2006 result implied that trade liberalization has a positive effect on the labor market in terms of decreasing informality⁸. This is in line with 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 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. Moreover, such a change in results might be imputed to the change in the degree of labor market flexibility introduced by the new labor law (12/2003). The positive impact of tariffs suggesting that the reductions in tariffs were accompanied with a similar reduction in the likelihood of informal employment, can be then in line with Goldberg and Pavnick (2003) findings. According to them, the relationship between trade and informality depends on the degree of labor market flexibility. In the Egyptian case, Wahba (2003) showed that the new law has had a positive impact on those who were employed in 1998 in the private non-agricultural sector and in the private non-agricultural waged sector. In other words, the labor flexibility induced by the 2003 labor law reform increased formal employment in Egypt. Yet, further investigation on this relationship is needed, so to ensure robustness.

Turning to the panel sample, since estimating a fixed-effect model for a binary variable (indicator for being informal) is not possible except with logit or log-linear models (Maddala,1987), we run a probit model only with random effects.

[Table 9 is about here]

The results of the latter show a negative impact of the tariff, at 10% significance level, albeit confirming the 1998 result. In addition, the other covariates effects in the panel estimations are in line with the cross-sectional estimation findings and the literature. It is noticed that residing in lower or upper Egypt, whether urban or rural areas is associated with higher coefficients and that the rural Upper Egypt is the most likely area of informal employment. The household structure also affects the formal status of

⁸ Since tariffs may suffer from an endogeneity problem, a Sargan test has been run. We concluded that tariffs are not endogenous. Even if endogeneity of tariffs is assumed, instrumenting them by the tariffs of the principal trade partner leads to the same results as found. The impact of tariffs remained negative and significant in 1998 and positive and significant in 2006.

the job where the head of the household and the share of inactive adults are negative and significant.

To have comparable fixed and random effects models, a logit estimation has been run since estimating a fixed-effect model for a binary variable is not possible for probit models. The idea of a fixed effect model is to control for the time-invariant unobserved individual characteristics. Results of the fixed-effect and the corresponding random-effect logit estimations are given in Table 9. In the random effects model, the coefficient of tariffs is negative and statistically significant suggesting that lower tariffs imply more informality. By contrast, in the fixed effects one, trade policy does not seem to have an impact on informality. Obviously, the results of the fixed effects estimations are not reliable since the number of observations is quite small. The reason behind is that the conditional logit, or fixed-effect logit drops all observations whose state did not change between the two years (i.e. all those remained informal in the two waves (98-06) or those remained formal). Thus, the resulting number of individuals over which the estimation could be fit was 60 persons (over two years), only leading to large standard errors⁹.

The panel results also suggest that unobserved individual characteristics explain an important part of the variation in the probability of being employed in the informal sector ($\rho = 0.68$).

6.2. Two-Step Analysis

Table 10 shows the second stage of the two-step analysis. As it was 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 for 1998 and 2006 separately. Moreover, we pool both years together including a year dummy among the regressors to take into account the fluctuations in business cycles that can affect simultaneously the tariff formation and informal employment. 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 it was presented above (Haisken-DeNew and Schmidt, 1997). The second one is the variance-weighted least squares which differs from ordinary least-

⁹ Even though the inefficiency of the fixed-effect model was suspected, a Hausman test between fixed-effect and random-effect logit was done. It failed to reject the null hypothesis that there is a systematic difference between both models, thus preferring the random-effect.

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 need not be constant across observations. This method treats the estimated variance as if it was the true variance when computing the coefficients standard errors.

[Table 10 is about here]

First, industry indicators in the first stage are statistically different from 0. This suggests that even conditional on worker characteristics, industry affiliation is an important determinant of the probability of working in the informal sector. From the second step, it is worthy to mention that the year 1998 is associated with lower industry informality differentials, suggesting that the informality levels in the manufacturing sector increased in 2006. Finally, the coefficient on tariff is significantly positive, yet small in magnitude. This finding suggests that the reductions in tariffs were accompanied with a similar reduction in the likelihood of informal employment. This positive relationship is likely to be explained by the degree of labor market flexibility thanks to the 2003 labor law reform.

7. Conclusion

This paper proposes a preliminary empirical investigation of the effect of trade liberalization on informality in Egypt. The relationship between the trade policy and the informal sector is ambiguous and heterogeneous between countries and across time within the same country. Some countries-based evidences show that trade reforms are likely to increase the share of informal employment in the labor market by exposing the formal firms to intense foreign competition. Others do not find traces for such relationship. Time might be an important factor in formulating this relationship, in addition to the business cycle and the degree of labor market rigidity. While the effect of trade liberalization on the informal sector has been widely discussed at both empirical and public policy levels, it was never done empirically in Egypt. Thus, combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with some macroeconomic data (tariff levels), we try to assess to what extent different trade reforms affected the informal employment and its prevalence in the Egyptian manufacturing sector. Our main findings show that trade reforms increased informality in Egypt. Yet, these findings change over time. Trade reforms increased informality in 1998 while the inverse was found in 2006 with lower tariffs leading to lower likelihood of informality (as shown by a positive coefficient). Random-effect estimation on the two wave panel conducted in 1998 and 2006 suggests that trade liberalization leads to rising informality. The degree of labor market flexibility

associated to the labor reform of 2003 is likely to be one of the reasons behind this change. Further investigation on this relationship is needed, so to ensure robustness.

As the informal sector is an important employer in the Egyptian labor market, new mechanisms have to be implemented to attract the informal sector into the mainstream business community. Such formalization should strengthen the competition in the Egyptian market since the informal sector represents a wasted opportunity. Among the mechanisms that may be adopted to raise the competitiveness of the informal sector and may push towards its formalization, the following can be proposed: simplifying the rigid regulations, boosting the spirit of entrepreneurship through widened vocational educational training or financial training, encouraging the micro-finance institutions, and reforming the tax systems for these medium and small enterprises. On the side of informal employment (i.e. informal jobs without contract or social security), the reduction in total cost for employer seem to be a necessity to formalize these workers. Finally, it is worthy to note that the informal sector should benefit from the trade openness effects when it is formalized.

References

- [1] Aleman-Castilla, B. The effect of Trade liberalization on Informality and Wages: Evidence from Mexico. CEP Discussion Papers dp0763, Centre for Economic Performance, LSE, Dec. 2006.
- [2] Andersen, T. W. Trade reforms and informality: The Role of Labour Market Imperfections in Macroeconomic Adjustments in Developing Countries. Master's Thesis, Institute of Economics, University of Copenhagen, 2004.
- [3] Assaad, R. Labor supply, Employment and Unemployment in the Egyptian Economy, 1988-2006. In *The Egyptian Labor Market Revisited*, R. Assaad, Ed. Cairo: American University in Cairo Press, 2009, ch. Labor Supply, Employment and Unemployment in the Egyptian Economy, 1988-2006.
- [4] Assaad, R., and Roushdy, R. An Analysis of Sample Attrition in the Egypt Labor Market Panel Survey. In *The Egyptian Labor Market Revisited*, R. Assaad, Ed. Cairo: American University in Cairo Press, 2009, ch. An Analysis of Sample Attrition in the Egypt Labor Market Panel Survey.
- [5] Barsoum, G. Egypt Labor Market Panel Survey 2006: Report on Methodology and Data Collection. Working Papers 0704, Economic Research Forum, 2007.

- [6] Bosch, M., Goni-Pacchioni, E., and Maloney, W. Trade Liberalization, Labor reforms and Formal-Informal Employment Dynamics. *Labour Economics* 19, 5 (2012), 653 – 667. Special Section on: Price, Wage and Employment Adjustments in 2007-2008 and Some Inferences for the Current European Crisis.
- [7] Currie, J., and Harrison, A. E. Sharing the Costs: The Impact of Trade Reform on Capital and Labor in Morocco. *Journal of Labor Economics* 15, 3 (July 1997), S44–71.
- [8] El Azzawi, S., and Said, M. Trade Liberalization, Inter-industry Wage Differentials and Job Quality in Egyptian Manufacturing. *Gender and Work in the Mena Region*, Working Paper Series 6, The Population Council, August 2009.
- [9] El-Hamidi, F. Trade Liberalization, Gender Segmentation, and Wage Discrimination: Evidence from Egypt. Working Papers 414, Economic Research Forum, June 2008.
- [10] Fugazza, M., and Fiess, N. M. Trade Liberalization and Informality: New stylized facts. Tech. Rep. 43, UN Policy Issues in International Trade and Commodities Study Series, 2008.
- [11] Goldberg, P., and Pavcnik, N. The Response of the Informal Sector to Trade Liberalization. *Journal of Development Economics* 72 (2003), 463–96.
- [12] Haisken-DeNew, J., and Schmidt, C. M. Inter-industry and Inter-region Differentials: Mechanics and Interpretation. *Review of Economics and Statistics* 79 (3) (1997), 516–21.
- [13] Heid, B., Larch, M., and Riaño, A. *Maquiladoras and Informality: A Mixed Blessing*. CESifo Working Paper Series 3689, CESifo Group Munich, 2011.
- [14] ILO. Decent Work and the Informal Economy. In Report VI, International Labour Conference, 90 st Session (2002).
- [15] Maddala, G. S. Limited Dependent Variable Models Using Panel Data. *Journal of Human Resources* 22, 3 (1987), 307–338.
- [16] Moulton, B. R. An illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Unit. *The Review of Economics and Statistics* 72, 2 (May 1990), 334–38.

- [17] Paz, L. The Impacts of Trade Liberalization on Informal Labor Markets: an Evaluation of the Brazilian Case. MPRA Paper 38858, University Library of Munich, Germany, Mar. 2012.
- [18] Valdes, A., and Foster, W. A Profile of Border Protection in Egypt: an Effective Rate of Protection Approach Adjusting for Energy Subsidies. Policy Research Working Paper Series 5685, The World Bank, 2011.
- [19] Wahba, J. The Impact of Labour Market Reforms on Informality in Egypt. Working Papers 3, The Population Council, 2009.
- [20] Wahba, J., and Mokhtar, M. Informalization of Labor in Egypt. In The Egyptian Labor Market Revisited, R. Assaad, Ed. Cairo: American University in Cairo Press, 2009, ch. The Egyptian Labor Market in an Era of Reform.
- [21] Zaki, C. On Trade Policies and Wage Disparities in Egypt: Evidence from Microeconomic Data. Gender and Work in the Mena Region, Working Paper Series 15, The Population Council.

Tables

Table 1 Characteristics of Informal Workers in the Manufacturing Sector, Working Age-Population (15-64), Repeated Cross-Sectional Samples ELMS98-ELMPS06

	1998	2006
Gender		
Male	42.06	50.07
Female	62.2	60.99
Age_Group		
15-29	68.39	65.54
30-49	30.94	43.61
50-64	20.37	26.13
Education		
Illiterate/Read and/or Write	60	70.9
Less Than intermediate	52.43	58.59
Intermediate	32.99	42.6
Above intermediate	17.09	26.67
Marital Status		
Married	29.34	43.07
Non Married	67.86	66.32
Household Position		
Head	28.25	39.35
Non-head	62.87	66.12
Household size (mean)	6.08	5.2
Household size (s.d.)	(2.72)	(2.25)
Region		
Gr. Cairo	30.77	40.63
Alx, Sz C.	20	25.41
Urb. Lwr.	48.78	55.82
Urb. Upp.	57.14	62.11
Rur. Lwr.	67.53	62.53
Rur. Upp.	56.7	68.75
<i>Urban</i>	37.18	44.14
<i>Rural</i>	63.92	64.59
Number of Workers		
0-4	76.25	75.79
5-9	78.2	73.81
10-29	55	65.55
30-49	35.9	44.07
50+	29.73	23.57
DK/miss	7.14	8.57
Employment Status		
Wage Worker	40.95	45.9
Employer	35.56	54.19
Self-Employed	75	85.95
Unpaid Family Worker	86.67	98.08
Proportion of Informal	44.44	51.61
Sample	476	818
Total	1,071	1,585

Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Table 2 Percent of Informal Workers by Economic Activities within the Manufacturing Sector, Cross-Sectional ELMS98 and ELMPS06

	1998		2006	
	Informal	Total	Informal	Total
Food and Bev.	41.32	167	44.96	278
Tobacco	9.09	11	0	8
Textiles	28.45	116	32.86	140
Garment	71.67	120	61.19	201
Leather Goods	62.5	24	68.75	32
Wood Prod.	79.1	67	87.64	89
Paper	12.5	8	50	20
Publish Print	35.48	31	34.88	43
Coke and Petro Prod	11.59	69	8.93	56
Chemical Production	3.33	30	24.44	90
Rub Prod	0	4	25	12
Non-metal Min.	48.39	62	53.98	113
Basic Metal	0	28	10.34	29
Metal. Prod.	63.29	79	65.45	110
Machinery and Equipment	22.22	54	8.77	57
Office Equip. and Comp.	0	4		
Electrical Equip.	0	19	42.86	7
Radio, TV, Com (Equip)	10	10	10	10
Medical Equip.	20	5	40	5
Motorized Vehicle	20	10	15.38	13
Other Trans. Equip.	17.65	17	28.57	7
Furniture	75.97	129	82.26	265
Total	476	1,071	932	1,699
	44.44	100	54.86	100

Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Table 3 Characteristics of Informal Workers by Individual, Household and Job Characteristics, Panel ELMS1998-ELMPS2006

	1998	2006
Gender		
Male	38.6	47.53
Female	63.33	59.09
Age_Group		
15-29	69.02	66.08
30-49	29.63	39.37
50-64	17.12	25.2
Education		
Illiterate/ReadWrite	55.25	67.26
Less Than intermediate	51.58	53.54
Intermediate	31.37	44.05

Above intermediate	14.56	26.24
Marital Status		
Married	26.35	38.13
Non Married	66.67	65.4
Household Position		
Head	24.74	33.94
Non-head	60.83	63.91
Region		
Gr. Cairo	23.53	34.95
Alx, Sz C.	19.2	24.85
Urb. Lwr.	46.85	52.08
Urb. Upp.	51.61	59.26
Rur. Lwr.	65.63	65.61
Rur. Upp.	62.07	68.18
Urban	33.71	40.63
Rural	64.52	66.56
Number of Workers		
0-4	74.88	73.32
5-9	76.09	73.4
10-29	51.02	60.61
30-49	26.09	33.33
50+	27.16	23.75
DK/miss	6.9	8.29
Employment Status		
Wage Worker	38.17	43.35
Employer	28.81	50.94
Self-Employed	76.27	84.13
Unpaid Family Worker	80	100
Proportion of Informal	42.95	49.37
Total	731	927

Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Table 4 Transition Probabilities between Formal and Informal Jobs, in the Manufacturing Sector

1998	2006		Total
	Informal	Formal	
All Sectors			
Informal	74.59	25.41	100
Formal	10.28	89.72	100
Transition Within the Manufacturing Sector			
Informal	78.49	21.51	100
Formal	9.24	90.76	100

Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Table 5 : Transitions Pattern to the Manufacturing Sector from 1998 to 2006

	Informal	Formal	Total
Informal Manuf.	146.00	40.00	186
	78.49	21.51	100
Formal Manuf.	23	226	249
	9.24	90.76	100
Informal Not Manuf.	35.00	31.00	66
	53.03	46.97	100
Formal Not Manuf.	8	38	46
	17.39	82.61	100
Not Working	237	132	369
	64.23	35.77	100
Total	449	467	916
	49.02	50.98	100

Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Note: Upper numbers shows the number of workers in each category.

Lower number shows share of workers moving from a status to the other

Table 6: Tariff Rate by Sector: 1995-2009

		1995	1998	2002	2004	2009
Total	Applied simple	24.3	19.65	47.92	20.29	12.56
	Applied weighted	16.65	14.17	23.69	13.1	7.98
	MFN simple	34.65	25.23	61.76	19.94	17.21
	MFN weighted	16.65	14.17	23.69	13.1	8.67
Primary	Applied simple	25.88	23.3	19.06	88.27	37.53
	Applied weighted	7.65	8.86	9.33	18.07	6.18
	MFN simple	52.88	34.79	18.56	41.61	41.05
	MFN weighted	7.65	8.86	9.33	18.07	7.22
Manufacturing	Applied simple	24.02	19.15	50.58	12.96	9.3
	Applied weighted	22.2	17.53	30.71	11.41	9.12
	MFN simple	28.92	22.1	72.79	13.53	9.95
	MFN weighted	22.2	17.53	30.71	11.41	9.63

Source: World Development Indicators, 2011.

Table 7 Imports Penetration Rate and Exports Performance at the Sectoral Level (2006-2011)

Year	2006	2007	2008	2009	2010	2011
Agricultural products						
Import Penet.	23.70%	27.70%	35.10%	29.00%	30.40%	34.50%
Export. Perf	6.70%	8.30%	14.10%	16.80%	15.90%	15.00%
Fuels and mining products						
Import Penet.	30.00%	28.30%	42.90%	23.20%	27.00%	32.60%
Export. Perf	44.90%	41.60%	49.40%	28.90%	26.50%	29.50%
Manufactures						
Import Penet.	28.90%	30.20%	50.30%	46.50%	44.40%	45.30%
Export. Perf	11.60%	10.20%	25.70%	22.70%	21.60%	25.70%
Service						
Import Penet.	49.30%	49.80%	50.90%	34.50%	31.10%	25.60%
Export. Perf	58.70%	58.90%	60.20%	45.70%	43.60%	32.70%

Source: World Development Indicators, 2011.

Notes: (i.) Trade data come from the World Trade Organization.

(ii.) Production data come from the Egyptian national accounts.

(iii.) Exports performance is defined as the ratio of exports to production.

(vi.) Imports penetration rate is defined as the ratio of imports to domestic absorption being the sum of production and imports minus exports.

Table 8 Probit Estimation of Being Informal, The Manufacturing Sector, ELMS 98 -

Variables	1998	2006	Random Probit
Female	0.409*** (0.139)	0.153 (0.199)	0.620** (0.251)
Married	-0.330 (0.222)	-0.0877 (0.140)	-0.431* (0.226)
Age	-0.122*** (0.0343)	-0.0233 (0.0464)	-0.129*** (0.0405)
Age Sq.	0.00114*** (0.000373)	-0.000158 (0.000537)	0.000916** (0.000464)
Less Interm.	-0.273** (0.121)	-0.432*** (0.104)	-0.701*** (0.214)
Intermediate	-0.725*** (0.174)	-0.837*** (0.112)	-1.328*** (0.242)
Above Interm.	-0.739*** (0.199)	-0.965*** (0.157)	-1.624*** (0.315)
Alex.	-0.393** (0.185)	-0.367** (0.147)	-0.310 (0.245)
Urban Lower	0.159 (0.208)	0.140 (0.179)	0.586** (0.247)
Rural Lower	0.467*** (0.166)	0.315*** (0.107)	0.831*** (0.278)
Urban Upper	0.683*** (0.165)	0.0736 (0.179)	0.812*** (0.249)
Rural Upper	0.700** (0.278)	0.500** (0.208)	1.418*** (0.328)
HH Head	-0.205	-0.333*	-0.433*

	(0.168)	(0.198)	(0.248)
HH Size	-0.0161	-0.0114	-0.0228
	(0.0289)	(0.0209)	(0.0354)
Share of OLF dep. (0-14)	-0.173	0.0171	-0.527
	(0.319)	(0.336)	(0.458)
Share of OLF dep. (15-64)	-0.348	-0.594**	-0.875**
	(0.242)	(0.272)	(0.418)
Share of OLF dep. (65+)	-1.016*	-0.0633	-0.939
	(0.552)	(0.687)	(0.906)
Tariff	-0.894***	0.136***	-0.0321*
	(0.0480)	(0.00412)	(0.0181)
Industry Dummies	Yes	Yes	
Constant	22.57***	-0.00559	4.421***
	(1.037)	(0.840)	(0.944)
LnSigma			0.763**
			(0.311)
Observations	1,007	1,574	1,654
LL	-426.3	-745.8	-690.1
Pseudo R2	0.388	0.316	

Notes: (i.) Robust standard errors in parentheses.

(ii.) Random-effects have been estimated for the panel sample.

(iii.) Errors are clustered by economic activities.

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

Table 9 Random-Effect and Fixed-effect Logit Estimation of the Probability of Informal Employment, Panel Data ELMS98-ELMPS06

Variables	Random	Fixed
Female	1.054** (0.448)	
Married	-0.658* (0.399)	-0.741 (1.901)
Age	-0.265*** (0.0733)	-0.737** (0.293)
Age Sq.	0.00198** (0.000832)	0.00792** (0.00338)
Less Interm.	-1.458*** (0.392)	-0.953 (1.206)
Intermediate	-2.579*** (0.447)	-1.006 (2.149)
Above Interm.	-3.169*** (0.580)	-17.35 (1,975)
Urban	1.276*** (0.320)	-15.89 (2,752)
Share of OLF dep. (0-14)	-1.091 (0.810)	1.443 (1.510)
Share of OLF dep. (15-64)	-1.705** (0.746)	-0.295 (2.164)

Share of OLF dep. (65+)	-1.719 (1.615)	-4.437 (5.544)
HH Head	-0.656 (0.441)	1.503 (2.277)
HH Size	0.00705 (0.0623)	-0.0509 (0.158)
Tariff	-0.0595* (0.0322)	-0.0943 (0.0598)
Constant	9.095*** (1.713)	
LnSigma U	1.961*** (0.306)	
Observations	1,654	120
Number of indid	1,228	60
LL	-703.3	-30.56

Notes: (i.) In order to use a Hausman Test, the random effect model was fit excluding the industry dummies since the fixed-effect model did not converge if they were included. This led to a positive coefficient of tariff in the random effect model.

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

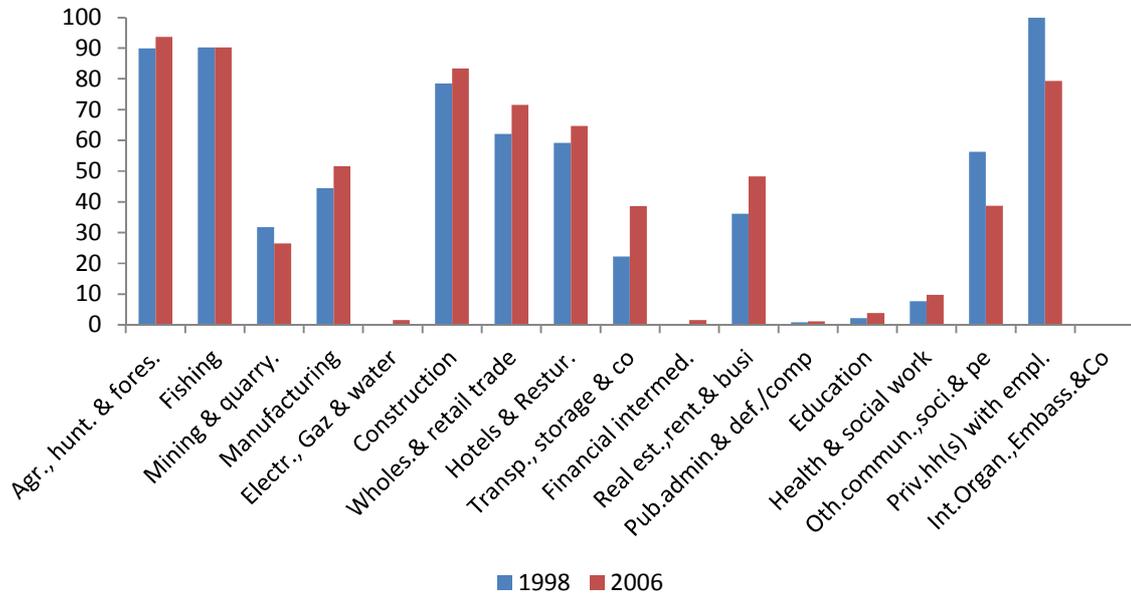
Table 10 Two-Step Analysis Results - Weighted Regression of Industry Informality differentials

	1998		2006		Pooled	
	WLS	VWLS	WLS	VWLS	WLS	VWLS
Tariff	0.0147 (0.0134)	0.0198*** (0.000978)	0.0102 (0.0128)	0.0301*** (0.00124)	0.0434* (0.0218)	0.0395*** (0.00352)
2006 dummy					0.399** (0.169)	0.190*** (0.0287)
Industry dummies	No	No	No	No	Yes	Yes
Constant	-0.785*** (0.240)	-0.507*** (0.0203)	-0.308 (0.195)	-0.767*** (0.0185)	-1.035* (0.570)	-1.019*** (0.0792)
Observations	22	22	22	22	44	44
R-squared	0.057		0.031		0.859	
Chi squared		409.3		589.5		5571

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

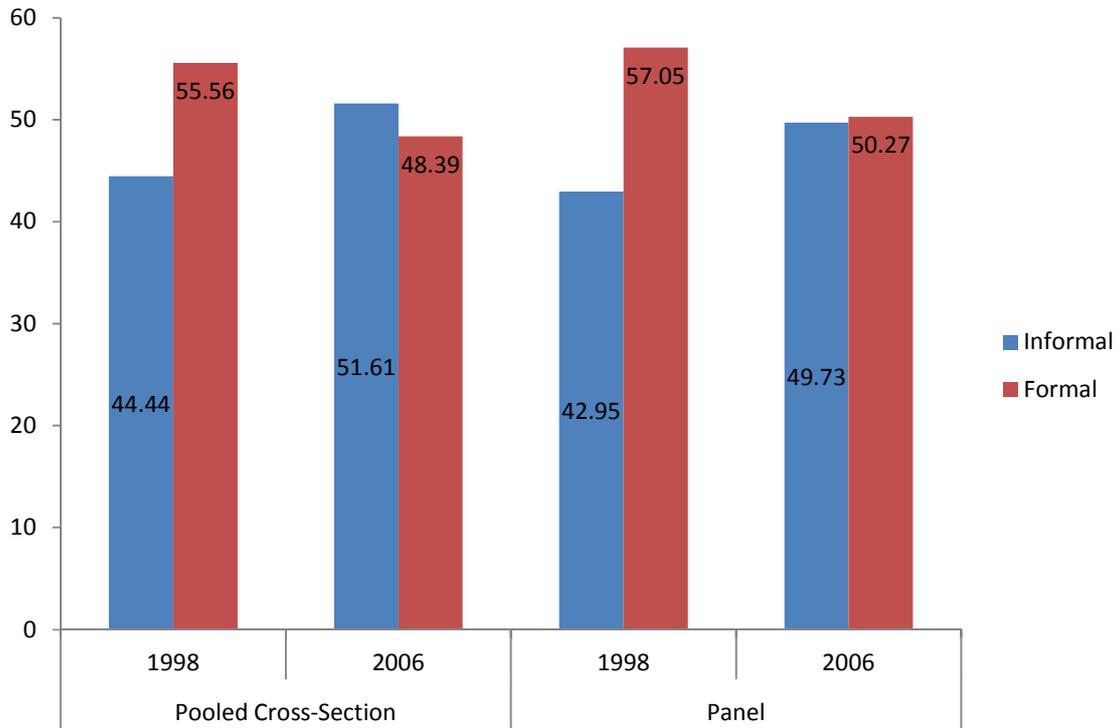
Figures

Figure 1 The distribution of Informal Workers by Economic Activity Sector in 1998 and 2006



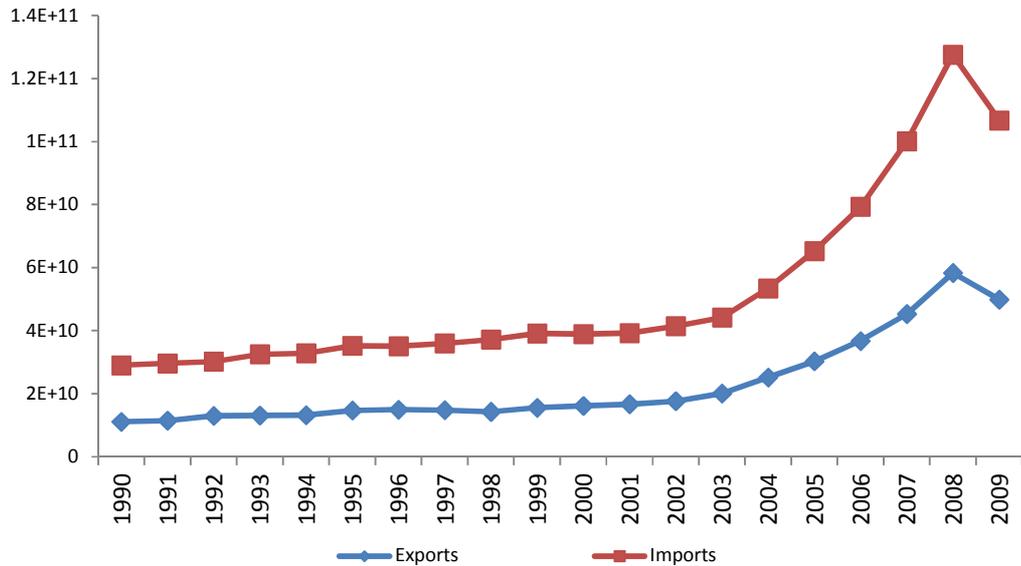
Source: Constructed by the authors using the ELMS98 and the ELMPS06.

Figure 2 The distribution of Manufacturing Sector Workers, by Formality Status in 1998 and 2006



Source: Constructed by the authors using the ELMS98 and the ELMP06.

Figure 3 Exports and Imports Evolution (in billion USD)



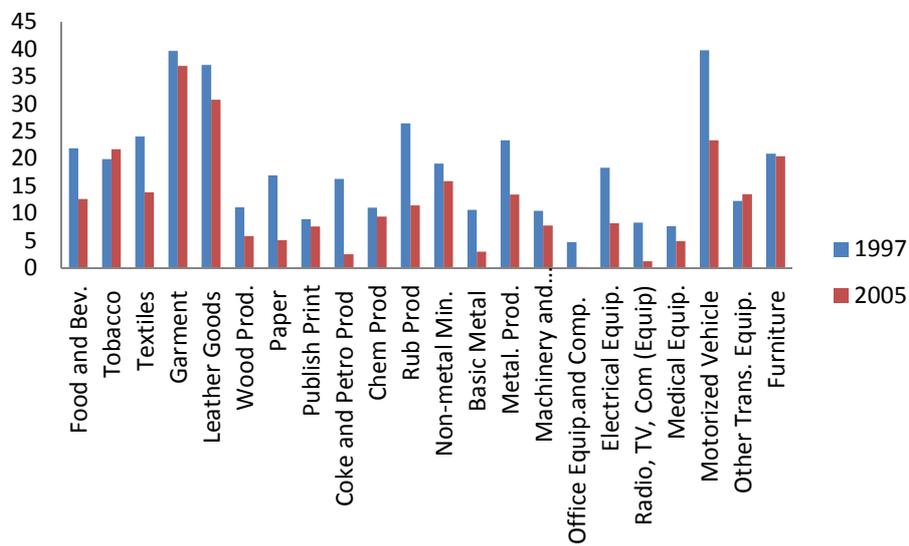
Source: Constructed by the authors using the Central Bank of Egypt datasets

Figure 4 Exports and Imports as Share to GDP (%)



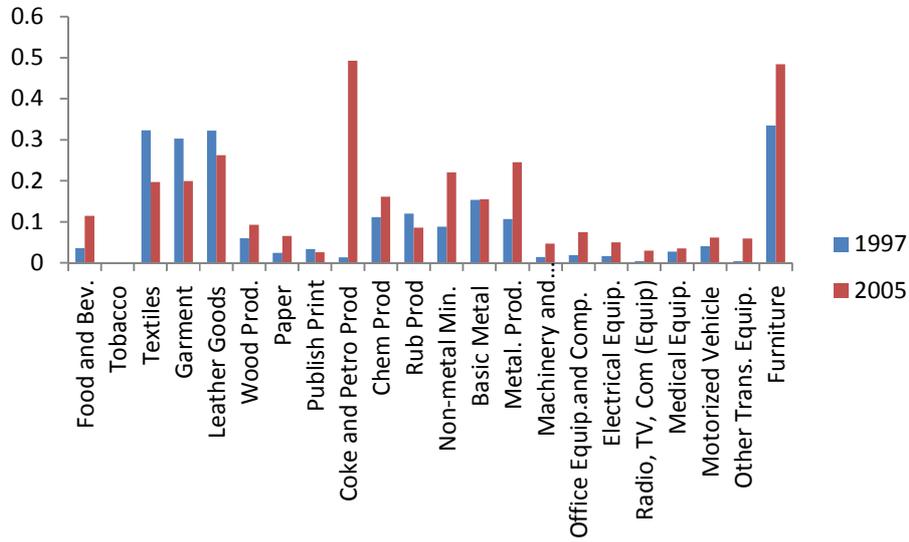
Source: Constructed by the authors using the Central Bank of Egypt datasets.

Figure 5 Tariffs in Manufacturing Sector (in percentage)



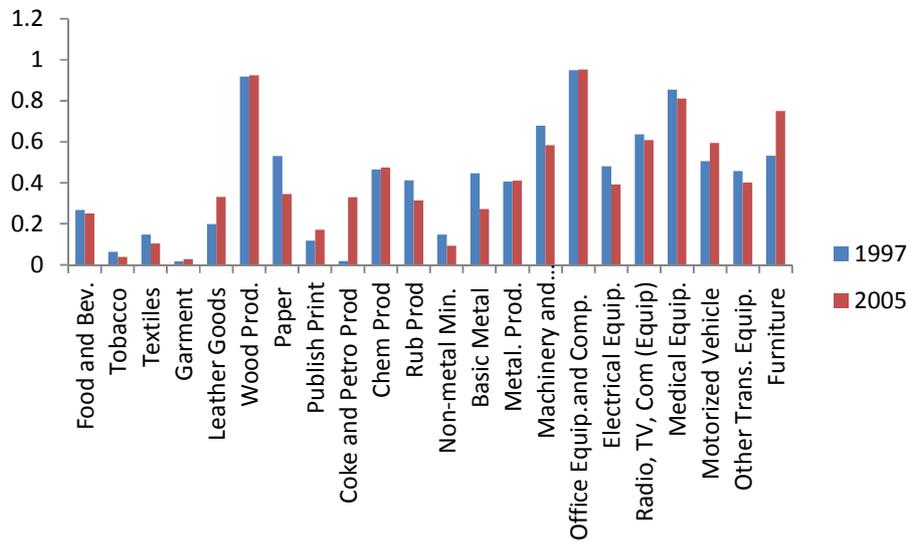
Source: Constructed by the authors using the Ministry of Industry and Foreign Trade datasets.

Figure 6: Export Performance in Manufacturing Sector



Source: Constructed by the authors using the Ministry of Industry and Foreign Trade datasets.

Figure 7: Import Penetration in Manufacturing Sector



Source: Constructed by the authors using the Ministry of Industry and Foreign Trade datasets.