THE IMPACT OF TRADE OPENNESS ON EMPLOYMENT AND WAGES IN EGYPT'S MANUFACTURING SECTOR

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1. INTRODUCTION

One of the issues that have recently been given great importance in economic literature is *inclusive growth*. Inclusive growth refers to a growth process that is sectorally and geographically broad-based and inclusive of the largest part of the country's labor force (Ianchovichina and Lundstrom 2009). As growth in most developing countries has shown to be not necessarily favorable to income equality and poverty reduction (see, for example, Kuznets (1955), Deininger and Squire (1996) and Forbes (2000)), a central policy question has become not only *how to generate rapid growth* but also *how to make growth beneficial to all*.

Meanwhile, for several decades, developing countries have been going through a gradual process of trade liberalization in goods and services. There has been intense controversy in the literature about the impact of trade and trade policy on growth.[1] Though the debate over the impact of trade on absolute growth remains open, economists have started to integrate the notion of inclusive growth into this line of research. It is very important nowadays to question the effect of trade liberalization on employment, wages, skills upgrading, output structure, SME development, poverty reduction, etc.

This question gains particular importance in the case of Egypt, given the economic reasons that triggered the Revolution of January 25, especially counter-poor growth, unemployment and income inequality. Some recent works that tackle aspects of the question have attempted to fill this gap. For instance, Said (2012) studies the impact of trade policy on wages in the manufacturing sector using the labor surveys of 1998 and 2006 and using tariffs as the main policy variable. She finds a positive impact of tariff reduction on wages. Zaki (2011a) also explores the effect of trade policy on wage disparity in the manufacturing sector, but focusing on non-tariff trade barriers, using the 2006 labor survey. He deepens the analysis by disentangling that effect according to gender, region and qualification of workers. He generally finds that trade liberalization raises wage disparity and the effect of reducing non-tariff barriers is greater than that of tariff barriers. In another study, Zaki (2011b) explores the nexus between trade, employment and gender. He finds that at the macroeconomic level exports exert a positive effect on employment over the period 1960–2009. At the individual

1 See, for example, a review and critique of some of this literature in Rodríguez and Rodrik (1999). See also Baldwin (2003).

level, while exports affect males' wages, they increase females' probability of working. As the author notes, "the adjustment on females' labor market is done through quantities and the one on males labor market is done through prices." Yet he does not explain the reason behind this difference between males and females. On the contrary, imports are always insignificant.

The present paper adds to this literature by studying the effect of exports and imports on employment and wages, focusing on the manufacturing sector. Contrary to previous studies that relied on individual data from labor surveys, the present one relies directly on CAPMAS industrial data classified by sector, with a distinction between the public and private sectors, and also between technology intensive and non-technology intensive industries based on value added per worker. By simultaneously integrating exports and imports into the analysis, the paper attempts to provide a comprehensive view of trade and eliminate the possibility of influence of one of them via the other. It uses direct measures of exports and imports in absolute values reflecting the outcome of policy changes, surmounting possible endogeneity problems by using the appropriate techniques.

The main findings of the paper show that exports increase employment in both the public and the private sectors with no effect on average wages. Imports, in turn, are insignificant. Yet, when we split the sample according to technology intensity, results differ between technology intensive and low technology, between private and public and between employment and wages, as will be shown and interpreted in the paper.

The remainder of the paper goes as follows. Section 2 reviews the theoretical foundations of the effect of trade on employment and wages and their empirical validity. Section 3 runs the empirical model after presenting a brief description of the data's main features. Section 4 concludes.

2. THE THEORETICAL FOUNDATIONS AND THEIR CORRESPONDENCE WITH EMPIRICAL EVIDENCE

The impact of trade liberalization on economic growth has been extensively debated in the literature over the past two decades. However, as trade can have a positive impact on growth while a small share of the population benefits from that growth, this has put an emphasis on the effect of trade on employment and wages. The relationship between trade and employment and wages was often tackled in international trade theory, but due to mixed

empirical evidence, it remained subject to controversy. This section sheds some light on the evolution of this theoretical literature and its correspondence with empirical evidence.

Building on the Ricardian comparative advantage theory,[2] the Heckscher-Ohlin (H-O) model stipulates that relative endowments of factors of production (land, labor and capital) determine a country's comparative advantage. Countries undertaking trade liberalization will specialize in the goods and services that use their relatively abundant factor of production. Similarly, they will import goods and services that are intensive in their relatively scarce factor. This implies that developing countries, relatively labor-abundant, will specialize in labor-intensive products while importing capital-intensive products. Consequently, with trade liberalization, employment would increase in developing countries while the use of capital will decrease, and vice-versa in developed countries. Nevertheless, there can be important deviations from these theoretical bases, for instance if capital is subsidized in a labor abundant country this will change the pattern of specialization in favor of capital-intensive industries.

The Stolper-Samuelson theorem (1941) (S-S) is a corollary of the H-O model that considers what happens to factor returns. It relates the prices of goods to wages and return to capital. The theorem states that a rise in the relative price of a good will lead to a rise in the return to the factor that is used most intensively in the production of the good, and conversely, to a fall in the return to the other factor. This implies that a developing country, as it exports labor-intensive goods and imports capital intensive goods, under the assumption of full employment, will witness a rise in wages and a fall in the return to capital.

Nevertheless, the empirical evidence for the H-O model and the S-S theorem is strongly ambiguous. Although some studies confirm the H-O predictions, such as Bernhofen and Brown (2011) for Japan during the 19th century, others do not. For instance, Bowen, Leamer and Sveiskaus (1987), testing the predictions of the model on the trade of 27 countries in 1967, found no support for these predictions. Similarly, Trefler's (1995) empirical tests reject the generalized HOV[3] model. The author finds important deviations from the pattern

[2] The Ricardian Model assumed one factor of production in all countries (labor) while assuming that technology varies between countries exogenously. The Heckscher-Ohlin development assumed an identical technology function everywhere but added another factor of production, namely capital, making the variation of labor productivity endogenous to the model.

[3] The generalization of the model was made by Vanek (1968). Vanek predicted that a country's factor content of trade vector is predicted by a linear function of the country's endowment vector. The HOV theorem in its generalized form states that a capital abundant country exports capital (Trefler 1995).

predicted by the model, which he calls *the missing trade* referring to the part of actual trade that cannot be explained by the HOV model. Davis et al. (1997) remark that "the strict H-O-V model performs poorly because it cannot explain the international location of production […]. However, when we relax the assumption of universal price equalization, results improve dramatically." A key assumption of the HOV theorem is that both countries face the same commodity prices, because of free trade in commodities and use of the same technology for production. Relaxing these assumptions allows different countries to use different production techniques, thus helping explain real trade patterns in the framework of the HO model concepts. This is why Trefler and Zhu (2000) reach the conclusion that the model is useful in cases where trade patterns are solely determined by factor endowments and useless in cases where technology differences play an important role.

A similar controversy arose about the S-S theorem. Tests were made on the difference between wages of skilled versus unskilled labor as two distinct factors, with the underlying assumption that developing countries are abundant in unskilled labor. In many instances, the S-S predictions were realized. This is the case of Mexico (Robertson 2001) and Brazil (Gonzaga, Filho and Terra 2006). In Mexico, for example, following adherence to the GATT in 1986, the relative price of skill-intensive goods rose and the relative wage of skilled workers rose as well. When Mexico further liberalized trade with Canada and the United States in the NAFTA framework in 1994, which are two nations that are skilled-labor abundant relative to Mexico, the relative price of skill-intensive goods fell and wages of skilled labor fell subsequently, consistent with the S-S predictions.

On the contrary, in some countries the S-S predictions failed to be realized. This is for instance the case of Bangladesh (Munshi 2008) and Chile (Beyer, Rojas and Vergara 1999) where trade was not found to have an effect on skilled-unskilled wage gap. On the contrary, in Chile it was found to widen it.

Therefore from the above paragraphs, we conclude that trade openness effects vary a lot according to the context in which they occur.

Recent developments in the international trade theory, such as the works of Melitz (2003) and Yeaple (2005) emphasize the role of firm heterogeneity within industries. The impact of liberalization on employment and wages, according to this line of models, depends on the level of productivity at the plant level. Liberalization will force the least productive

firms to exit and resources will be allocated towards the most productive ones that will continue in the market. However, this line of models has yet to be empirically tested.

3. Quantitative Assessment of the Impact of Trade Openness on Employment and Wages in Egypt

The aim of this section is to analyze the effect of trade openness, as reflected in the increase in imports and exports, on employment and wages in the manufacturing sector. But first, we present some description of the data.

3.1. Metadata

The data for sectoral employment, wages, production, value added and exports are drawn from the CAPMAS Annual Industrial Statistical Bulletin and they are available for both the public and the private sectors. They are provided in ISIC classification revision 3.1 before 2007 and revision 4 starting 2007. The necessary concordance was made between the two classifications. Data for sectoral imports are based on the CAPMAS Foreign Trade Statistics, available on CAPMAS website. We use a panel of 18 subsectors of the manufacturing sector across the period 2005-2010. The manufacturing index number (base year 2002) was used as a deflator to nominal figures. Table 1 shows summary statistics of our variables.

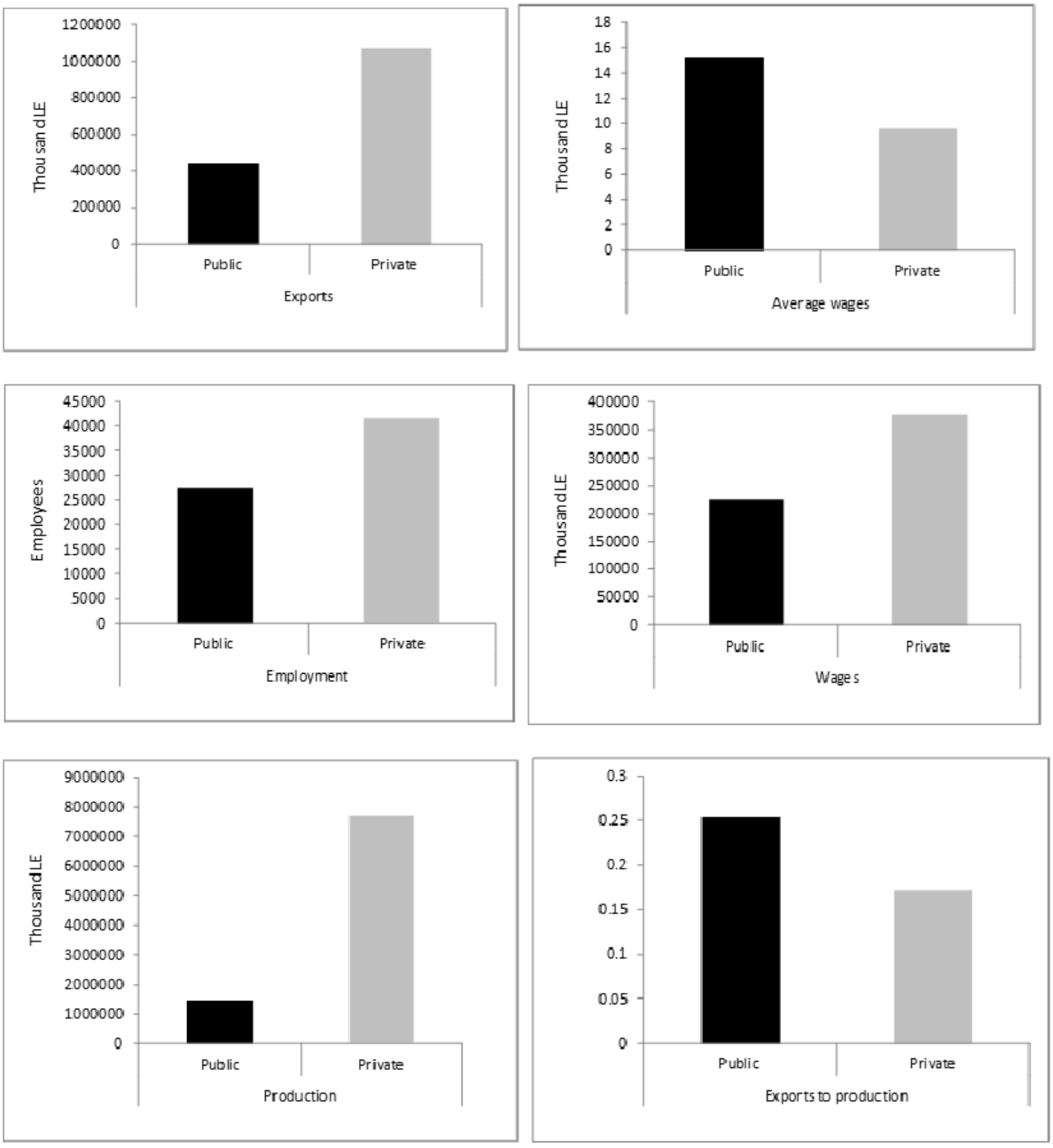
Table 1. Summary Statistics, 2005-2010, in Thousand LE at 2002 Prices (Except Employment, in Number of Employees)

	Production	Employment	Wages	Average wages	Net value added per employee	Exports	Imports
Mean	4836669	35603.73	310221.2	12.1	.481	782655.8	3362314
St. deviation	7942521	52573.48	387870.2	7.4	.626	1236911	4809279
Min.	1878.792	55	1003.693	.758	.002	0	28856.47
Max.	4.42e+07	330696	2451746	43.4	5.7	6479910	2.93e+07

Source: Author's reporting based on CAPMAS data.

Table A1 in the appendix shows summary statistics for the public and the private sectors separately. Figure 1 below displays the disaggregation of the mean of the preceding variables in the public and the private sectors.

Figure 1. Mean Variables in the Public Sector vs. the Private Sector, 2005-2010[4]

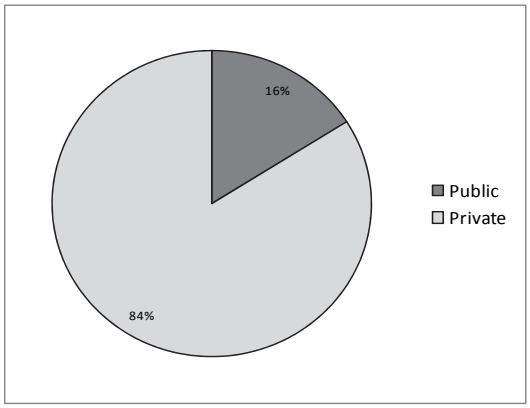


Source: Author's illustration based on sample.

[4] The reader can notice that the ratio of exports to production is higher for the public sector than for the private sector. This is due to the fact that the majority of the private sector being SMEs, which do not export in most cases. This is the same reason why total wages in the private sector are higher than in the public sector, while it is the opposite for average wages. The private sector is mostly constituted of SMEs and SMEs' employment is mostly informal, which makes average wages in the private sector lower than in the public sector.

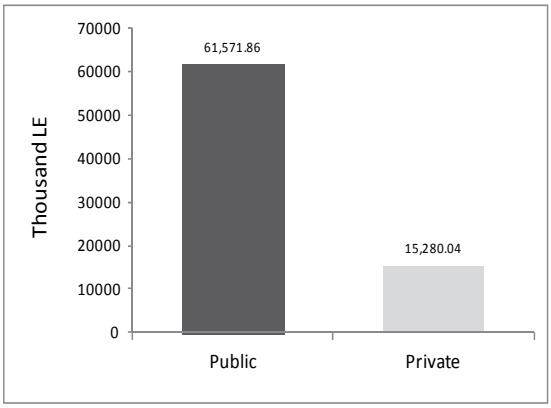
Figure 2 portrays the share of the public and private sectors in production, which shows dominance of the private sector, due to the large share of SMEs in production, which are all private (El-Ghamrawy and Amer 2011). When we calculated the average production by firm, it was much larger in the public sector, as illustrated in Figure 3, which gives a comparison about the average size of firms in each sector.

Figure 2. Share of the Public and Private Sectors in Production



Source: Author's illustration based on sample.

Figure 3. Average Production by Firm



Source: Author's illustration based on sample.

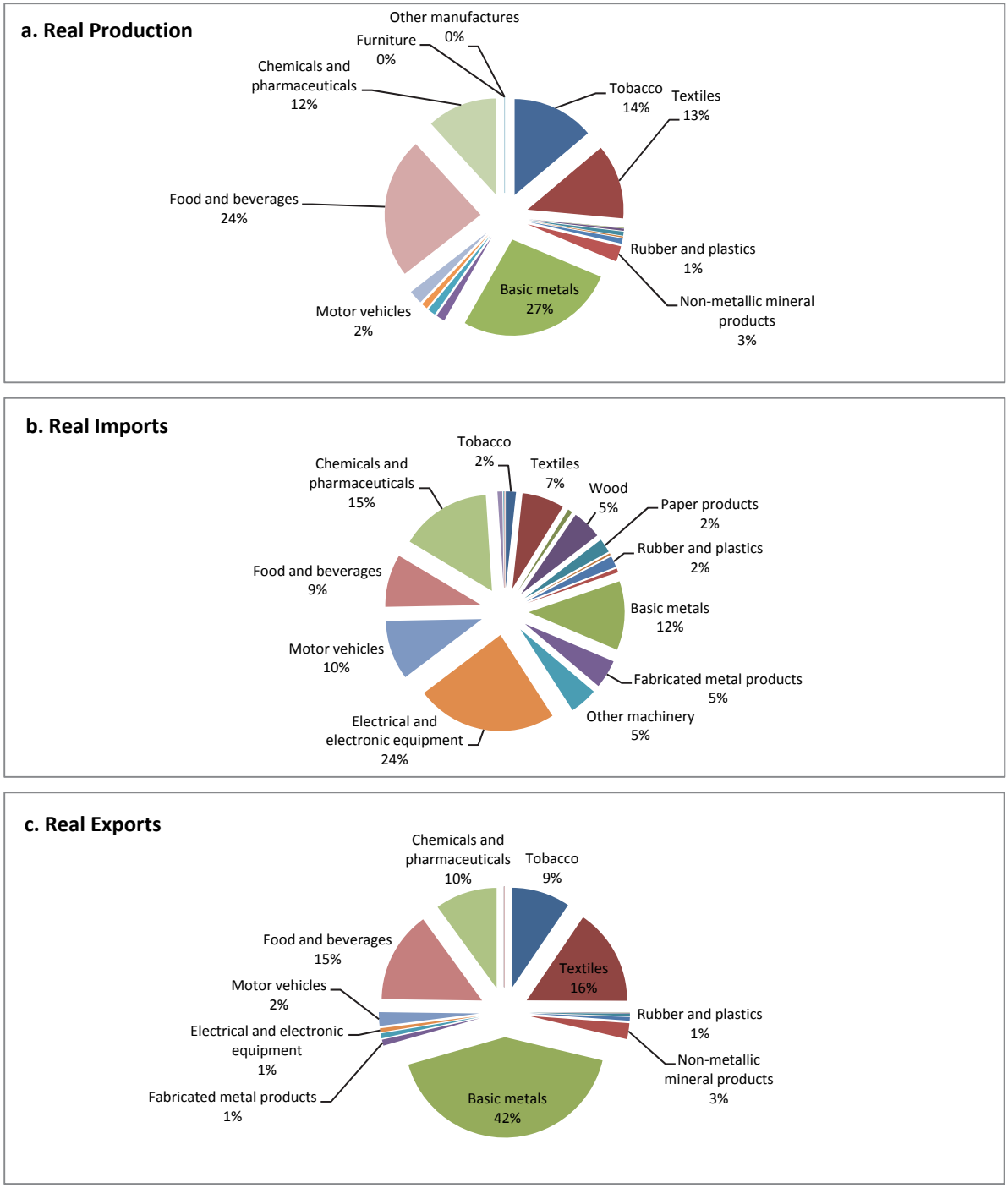
Figures 4 and 5 below compare the sectoral structure of production, imports and exports in the public and the private sectors respectively, illustrating the relationship between the three variables.

In both sectors, the structure of imports is different from that of production. Apart from some common sectors like pharmaceuticals, most of the other sectors have different shares in production compared to imports. For instance, while electronic equipment and motor vehicles have important shares in imports, they have minimal shares in production, whether in the public sector or the private sector. This implies that imports are coming at a different pattern with respect to production, which means little foreign competition to local production. Similarly, several sectors that have important shares in the public sector's production, such as tobacco and food and beverages, do not have as significant shares in imports. The same is true for the private sector, though differences are less strong in this case.

This weak competition from imports is confirmed by a correlation coefficient between sectoral production and sectoral imports of 0.35 in the public sector and 0.58 in the private,

respectively. A widely used measure of import competition is the import penetration rate,[5] which varies between 0 and 1 and is proportional with competition. The average penetration rate for our sample was found to be 0.5, which indicates relatively low competition.

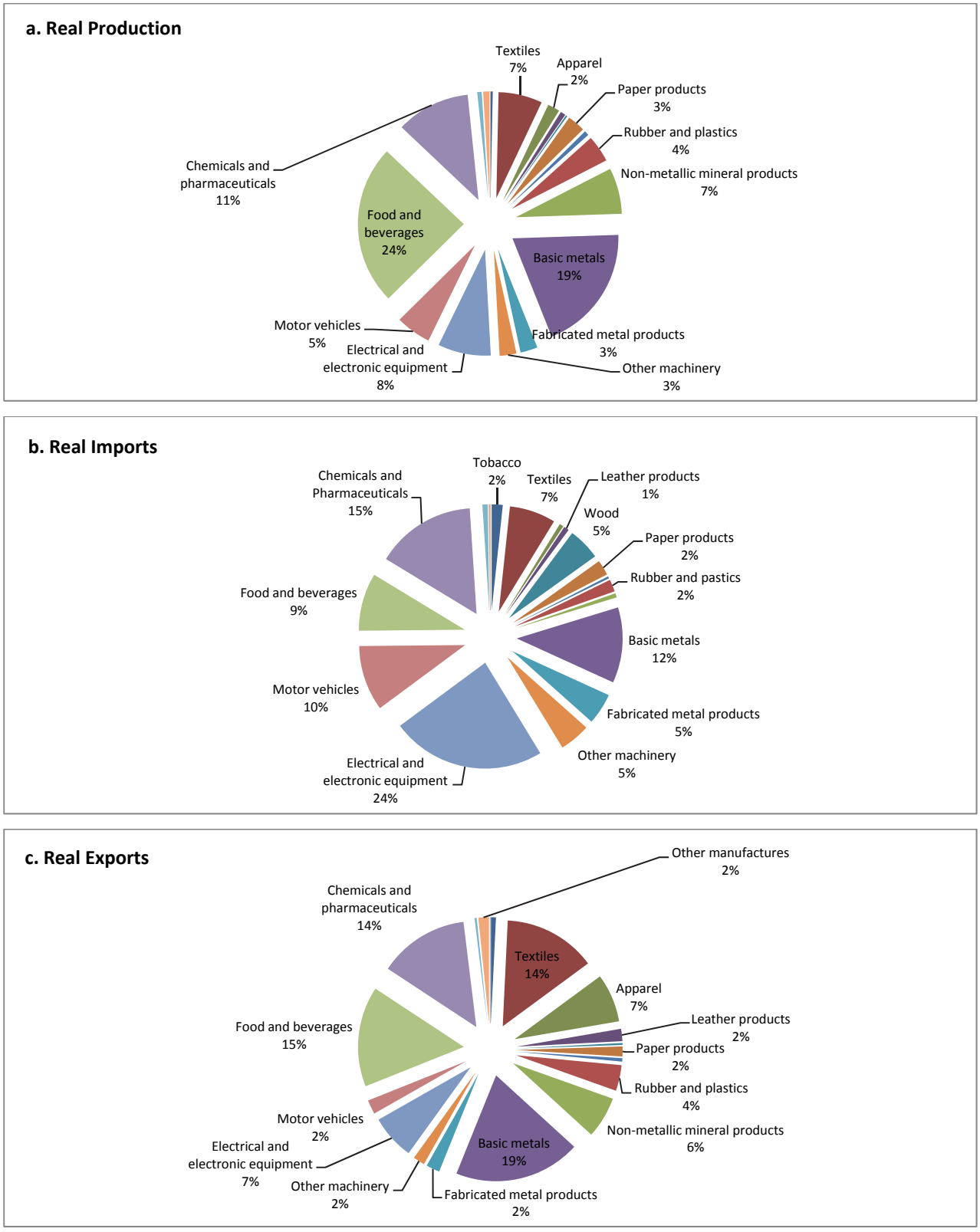
Figure 4. Structure of Production, Imports and Exports in the Public Sector



Source: Author's illustration based on CAPMAS data.

[5] The import penetration rate $= \frac{\text{Imports}}{\text{Production} - \text{Exports} + \text{Imports}}$.

Figure 5. Structure of Production, Imports and Exports in the Private Sector



Source: Author's illustration based on CAPMAS data.

In the same vein, comparing the structure of imports with that of exports, whether in the public or the private s, shows that Egypt's foreign trade is inter-industry, i.e., the sectoral structure of imports is different from that of exports. This derives from the evidence that production and imports are not similar and exports reflect production. The correlation coefficient between sectoral exports and imports is 0.34 in the public sector and 0.55 in the private.

Further, the Grubel-Lloyd index for intra-industry trade[6] has a value of 0.28 in the public sector and a value of 0.40 in the private sector. These figures represent the average of the index for all industries. An index value of 0 indicates inter-industry trade while a value of 1 indicates intra-industry trade. Therefore, our index values reflect low values which indicate that Egypt's foreign trade is rather *inter-industry*. Table A.2 in the appendix shows the index for each sector.

The previous findings that imports are different from production and exports make us expect that imports will not have an overall strong impact on employment or wages, though sectoral effects might differ from the overall impact. As for exports, the strong link between production and exports suggests that exports might affect employment, wages or both.

Besides, it is noticed that there is some duality in Egypt's production and export pattern. The latter combines technology-intensive industries like basic metals and pharmaceuticals along with less technology-intensive industries like textiles and rubber and plastic. The available proxy[7] of technology intensity in the framework of our data is the average value added per worker (VAW). We assume that the higher the latter the higher is technology intensity and we consider a sector to be technology intensive if its VAW exceeds the average VAW for the manufacturing sector over the whole sample (see the appendix for a classification of industries according to VAW). Although this duality is observable in the public and the private sectors, it can be seen that it is high technology industries that are

[6] The index is a measure of intra-industry trade of a particular good. It is calculated according to the following formula: $GL_i = \frac{(X_i+M_i)-|X_i-M_i|}{X_i+M_i} = 1 - \frac{|X_i-M_i|}{X_i+M_i} \quad ; \quad 0 \leq GL_i \leq 1$

where X_i are exports and M_i are imports of good *i*. The index takes values between 0 and 1. A value of 1 indicates fully intra-industry trade while a value of 0 indicates fully inter-industry trade.

[7] Indeed, a high VAW could reflect other factors than just technology intensity. Yet, technology intensity is an important factor in raising workers' productivity. Capital intensity would have been a good measure, had it been available.

dominant, namely, i) basic metals, ii) chemicals and pharmaceuticals, iii) motor vehicles, iv) tobacco, v) electrical and electronic equipment and vi) food and beverages.[8]

In an extension of the quantitative analysis, we will study the effect of trade on employment and wages in the group of technology intensive industries and the group of labor intensive industries separately.

3.2. The Model

To assess the impact of foreign trade on employment and wages, we run panel regressions for 18 subsectors of the manufacturing sector over the period 2005–2010, where we regress each of our two variables of interest—employment and average wages—on exports and imports. The method used is the fixed effect method,[9] which assumes that there are specific effects, constant in time but varying across individuals (here the subsectors), that are correlated with the regressors and affect the dependent variable. The fixed effects in our case allow taking into account any specific features of the sectors that are constant in time.

The regression takes the following simple form:

$$lnZ_{i,t} = \beta_0 + \beta_1 lnX_{i,t-1} + \beta_2 lnM_{i,t-1} + e_i + \mu_{it} \qquad (1)$$

where Z is either employment or wages, X is exports, M is imports, e is the sectors' fixed effect and μ is the random error. Subscript i refers to sectors, while t refers to years. Variables are used in logarithms.

Since employment and wages can also affect exports and imports, we take the lagged values of exports and imports in order to avoid reverse causality from employment and wages to these variables. The rationale is that past values of these variables cannot be affected by present values of employment and wages, whereas simultaneous variables can affect each other. In all our regressions, we separate the public and private sectors to disentangle the effects of trade in the two sectors. As mentioned before, we start by running the regressions on the whole group of subsector, then on the high technology group of subsectors and the low technology group separately. It would have been ideal to run the regressions for each

[8] However, when we look at the sectoral structure of employment, we find it is concentrated in non-technology intensive industries. This discrepancy between the structure of production and that of employment is due to the low value added in the non-technology intensive industries.

[9] As per Hausman test results, which show that the fixed effects give the best estimators in our case.

subsector separately, but unfortunately data for each subsector bears only 5 or 6 observations, which does not allow an intra-sectoral analysis.

3.3. Aggregate Results

Results for the public and the private sectors are reported in Table 2.

Table 2. Effect of Trade on Employment and Average Wages

	Public		Private	
	(1) Employment	(2) Av. wage	(3) Employment	(4) Av. wage
$Exports_{t-1}$	0.0266*	-0.0198	0.0504*	0.00048
	(0.0147)	(0.0276)	(0.0254)	(0.0555)
$Imports_{t-1}$	0.0751	0.0271	0.0121	0.0954
	(0.0809)	(0.175)	(0.0318)	(0.0575)
$Avwage_{t-1}$		-0.113		0.351*
		(0.362)		(0.177)
Constant	7.636***	2.965	9.258***	0.124
	(1.263)	(1.684)	(0.528)	(0.788)
Observations	47	30	88	61
R-squared	0.077	0.032	0.047	0.309
Number of sectors	16	13	18	18

Source: Author's calculations.

Notes: All variables in logarithms. Robust standard errors in parentheses.
* Significant at 10%, ** significant at 5%, *** significant at 1%.

Employment

Columns 1 and 3 show that results for employment are similar for the public and the private sectors. As suggested by theory, exports have a positive effect on employment. Yet, imports do not have a significant effect on employment, implying that competition from imports does not threaten employment. This finding confirms the suggestion made in section 2 that competition from imports is not a threat, since the structure of imports is different from that of domestic production. As shown previously in Figures 4 and 5, sectors which dominate domestic production are different from those which dominate imports, so that foreign competition in each sector is weak. This was supported by the weak correlation coefficient between production and imports in each sector. It was also supported by the Grubel-Lloyd index, which showed that Egypt's foreign trade is rather inter-industry.

It is noteworthy that the coefficient of exports on employment is larger in the private sector than in the public sector. An increase by 10 percent in exports causes an increase by 0.5

percent on average in employment in the private sector and causes an increase by 0.26 percent on average in the public sector. This reflects a higher efficiency of the private sector in generating employment through the increase of exports, while the public sector is more rigid in employment variations. Our results are in line with the findings of Zaki (2011b) to the extent that he finds a positive impact of exports on employment at the macro level and insignificant coefficients of imports.

Average Wages

Columns 2 and 4 report the results on average wages for the public and the private sectors. Neither exports nor imports have an effect on average wages. The effect of exports was exerted through the employment channel. As for imports, they do not have an impact on wages because of the reasons mentioned above.

3.4. Results by Technology Category

As noted in section 3.1, we split our group of industries into two categories: technology-intensive and non-technology-intensive, aiming to assess whether trade has a different impact on these two groups. The technology intensive group comprises electrical and electronic equipment, motor vehicles, chemical and pharmaceuticals, food and beverages, basic metals and tobacco. The non-technology intensive group comprises the rest of the industries. Tables 3 and 4 show the results for employment and wages, respectively.

Table 3. Effect of Trade on Employment by Sector and by Technology Category

	EMPLOYMENT			
	PUBLIC		PRIVATE	
	High VAW	**Low VAW**	**High VAW**	**Low VAW**
$Exports_{t-1}$	0.076*	-0.0313	0.137	0.059**
	(0.0435)	(0.0268)	(0.0836)	(0.0270)
$Imports_{t-1}$	0.179	-0.111	0.114	-0.051**
	(0.1253)	(0.112)	(0.0723)	(0.0262)
Constant	6.354***	10.09***	6.681***	9.946***
	(2.1193)	(1.724)	(1.569)	(0.405)
Observations	21	27	29	47
R-squared	0.234	0.107	0.186	0.117
Number of sectors	6	10	6	12

Source: Author's calculations.

Notes: All variables in logarithms. Robust standard errors in parentheses.
* Significant at 10%, ** significant at 5%, *** significant at 1%.

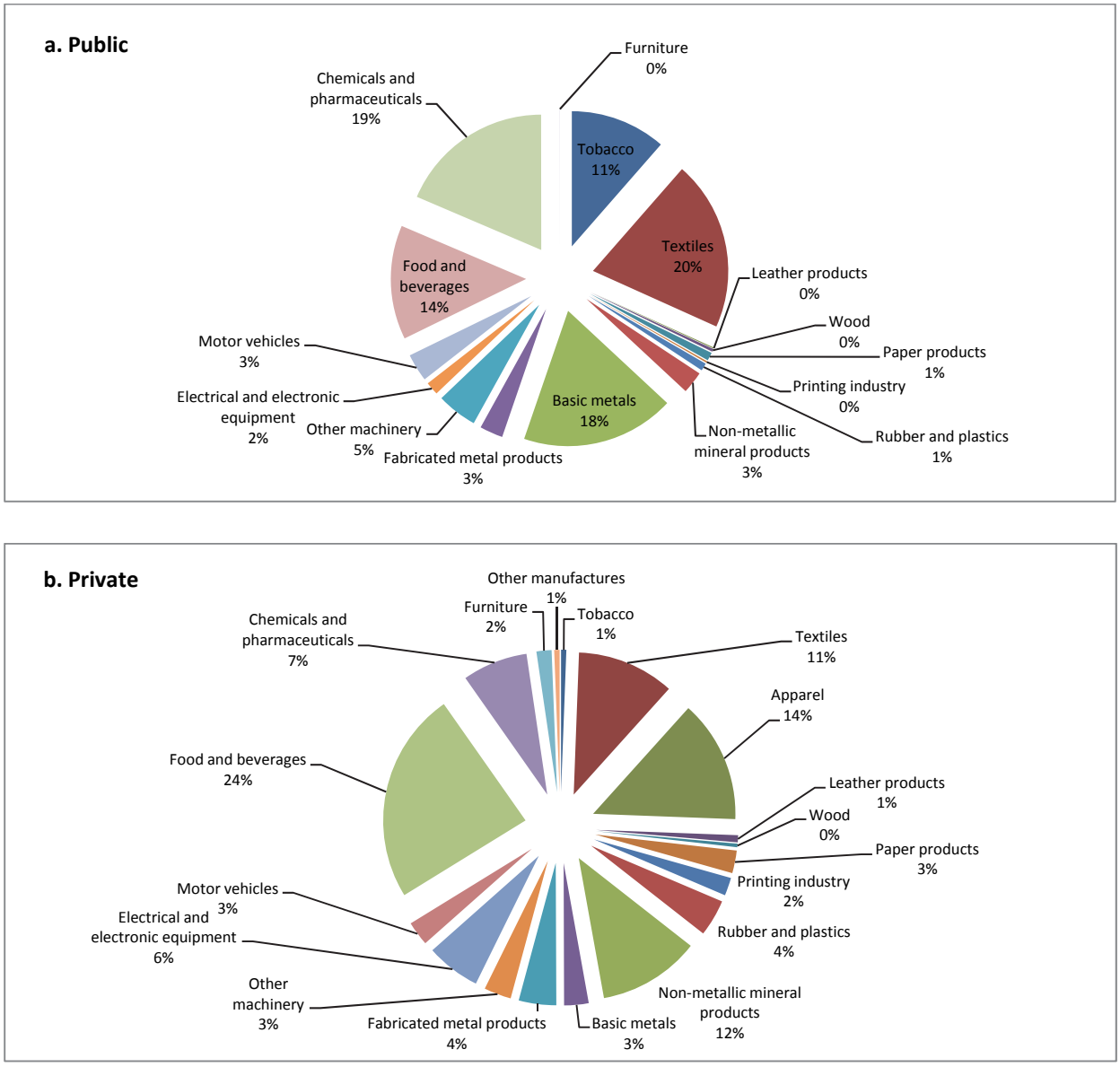
Table 4. Effect of Trade on Average Wages by Sector and by Technology Category

	AVERAGE WAGES			
	PUBLIC		PRIVATE	
	High VAW	Low VAW	High VAW	Low VAW
$Exports_{t-1}$	0.00824	0.0960	0.135	-0.111**
	(0.0310)	(0.0849)	(0.0878)	(0.0576)
$Imports_{t-1}$	-0.268**	0.150	0.111	0.126**
	(0.108)	(0.312)	(0.0870)	(0.0573)
$Avwage_{t-1}$	0.508	0.238	0.646***	0.205
	(0.365)	(0.560)	(0.179)	(0.130)
Constant	5.532***	-0.749	-2.676	1.394**
	(0.863)	(3.789)	(1.703)	(0.712)
Observations	15	20	28	47
R-squared	0.391	0.171	0.589	0.306
Number of sectors	5	9	6	12

Source: Author's calculations.
Notes: All variables in logarithms. Robust standard errors in parentheses.
* Significant at 10%, ** significant at 5%, *** significant at 1%.

Table 3 shows that exports have a positive effect on employment in the public technology intensive subsector and the private low-technology intensive subsector. This reflects the sectoral distribution of employment. In the public sector, employment is mostly concentrated in technology intensive industries and vice-versa in the private sector, as shown in Figure 6. Therefore, the positive effect of exports on employment in the public sector is greater in the technology-intensive group than in the low technology group, and the opposite is true for the private sector. This also indicates that the public sector is more efficient than the private sector in employing skilled workers who specialize in technology intensive activities, since on average it has higher technology. This is due to the aforementioned large share of SMEs in the private sector, which rely in most cases on low technologies.

Figure 6. Distribution of Employment in the Public and the Private Sectors



Source: Author's illustration, based on CAPMAS data.

Besides, imports have a negative coefficient on employment in the private low technology group, reflecting a degree of import competition in this cluster, contrary to the case in the aggregated sample, where there was no import competition on average. Within this cluster, it is noticeable that the coefficients of exports and imports on employment are close (0.059 and -0.051) though the coefficient of exports is slightly larger in absolute terms, reflecting a net positive effect of foreign trade on employment by around 0.008, which is however a tiny impact: a 10 percent increase of exports and imports in the private low technology group would entail an increase of employment by 0.08 percent.

As for average wages, they are negatively affected by imports in the public technology intensive group, indicating the presence of import competition with domestic production within this cluster, contrary to the low technology group.

In the private sector, imports increase average wages while exports decrease them. These effects stem from the effects on employment. Regarding imports, partial regressions[10] showed that with imports, employment in worker categories "admins," "workers" and "specialists" declines whereas it stays the same in the category "others," making the relative share of the category "others" increase. This category comprises mostly seasonal workers often with special skills like ginning workers.[11] Though they are not highly skilled, these workers are highly demanded by manufacturing firms. Their seasonality coupled with their special skills makes their average wage relatively high compared to other workers. Therefore, the increase of their share renders average wages higher.

In the same vein, exports in this cluster decrease average wages, because they cause an increase in the number of workers and admins, which are two low-waged categories. Since this is a low technology group, its expansion comes at the expense of high skilled categories. Therefore, the weight of these categories increases with exports at the detriment of specialists, decreasing the average wage as a whole.

These findings imply that exports in this cluster (private low tech) would be beneficial to workers in particular. This is likely to occur in SMEs, which represent the majority of the low technology private sector, and which are characterized by a high degree of flexibility in wages and employment because of the large share of informal employment, as mentioned before.

Yet it is also interesting to note here that the coefficients of exports and imports on average wages in this cluster are very close, with different signs, reflecting an aggregate net null effect of foreign trade on average wages in this cluster.

[10] Regressions unreported.

[11] According to CAPMAS staff.

4. CONCLUDING REMARKS

Results can be summarized as follows:

Table 5. Summary of the Impact of Exports and Imports on Employment and Average Wages in the Manufacturing Sector

			Employment	Average wages
Exports	Public	Technology intensive	+	
		Low technology		
	Private	Technology intensive		
		Low technology	+	-
Imports	Public	Technology intensive		-
		Low technology		
	Private	Technology intensive		
		Low technology	-	+

Source: Author's calculations.

In line with theory, exports have a positive impact on employment in the public sector technology intensive group and the private sector low technology group. This is due to the fact that labor is concentrated in these two groups. This implies that there is good potential in these two groups to capitalize upon. Policy should aim at increasing the competitiveness of these two groups. This is broadly in line with Zaki (2011b).

Meanwhile, this increase in employment in the private low-technology group entails a change in the structure of employees' skills and makes some less skilled categories more demanded, which renders the average wage slightly lower. This implies that exports in this group of sectors do not narrow the wage gap between sectors or between skills, in contradiction with the S-S theorem and in line with Zaki (2011a) as well as new trends in trade theory, which take into account the impact on skills. In order to narrow the gap, policy should aim at upgrading skills through vocational education and training, hence raising less skilled workers' productivity and pay. This is in line with the voluminous literature on the cruciality of upgrading education and training within the Egyptian labor market (see, for instance, Reda 2012). This is also consistent with the fact that the lack of skills is already often reported as a major problem in the Egyptian labor market (ECES Business Barometer, various issues)

Regarding imports, it has been found they negatively affect average wages in the public high-technology group, reflecting a degree of import competition therein. They also cause a negative effect on employment in the private low technology sector, indicating competition in

this sector comprising mostly of SMEs. This makes it all the more urgent to make this sector more competitive vis-à-vis imported products, which requires significant reform of SMEs.

Finally, effective policies have to be put in place to assimilate employees who incurred losses from trade. Opportunities should be made available for those employees to acquire skills and be able to compete in the job market. A partnership between the government and the private sector is one way to provide such opportunities. The government could offer privileges to firms that conduct training programs for their employees instead of replacing them with new labor.

APPENDIX

Table A.1. Summary Statistics for the Public and the Private Sectors Separately, 2005-2010, in Thousand LE at 2002 prices (Except Employment, in Number of Employees)

Public (93 obs.)

	Production	Employment	Wages	Average wages	Net value added per employee	Exports	Imports
Mean	1515280	28465.34	231807.9	14.96	0.32	453089	2161091
Std. Dev.	2105609	58555.94	305093.5	8.60	0.40	1101682	2628068
Min.	1878.792	55	1003.693	0.76	0.00	0	28856.47
Max.	9384656	330696	1136618	43.38	1.99	6479910	1.26E+07

Private (108 obs.)

	Production	Employment	Wages	Average wages	Net value added per employee	Exports	Imports
Mean	7696753	41750.67	377743.7	9.62	0.62	1066449	4396701
Std. Dev.	9811041	46214.16	437290.7	4.94	0.75	1280806	5912655
Min.	110128.3	2318	9362.691	1.65	0.05	1801.926	67331.77
Max.	4.42E+07	206351	2451746	26.13	5.70	5413912	2.93E+07

Table A.2. Grubel-Lloyd Index for Inter-Industry Trade

Sector	**Grubel-Lloyd Index**
Tobacco	0.24
Textile	0.615
Apparel	0.381
Leather	0.216
Wood	0.019
Paper	0.184
Printing	0.276
Rubber and plastic	0.445
Non-metallic minerals	0.509
Basic metals	0.626
Fabricated metals	0.193
Other machinery	0.19
Electrical and electronic equipment	0.07
Motor vehicles	0.123
Food & beverages	0.426
Chemicals and pharmaceuticals	0.295
Furniture	0.098
Other manufactures	0.461

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