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ABSTRACT

International Trade and Labor Markets: Evidence from the Arab Republic of Egypt[*]

Since the early 1990s, some developing countries have experienced a coincidence of rising exports – especially those related to global value chains – and improved labor market outcomes. During 2000–10, rising trade was associated with falling poverty and inequality in many developing countries. However, the Arab Republic of Egypt was not one of these countries, although it signed several trade agreements. The lack of trade-related improvements in labor market outcomes – including poverty, inequality, average wage levels, informality, and female labor force participation – could be explained by at least two possibilities. First, it is possible that trade agreements did not produce the same increase in trade for Egypt as for other countries. Second, it is possible that exports do not generate the same kinds of changes in labor market outcomes as experienced in other countries. After presenting the trends in key labor market outcomes over 2000–19, this paper evaluates both hypotheses. Using a gravity model approach, the results suggest that the changes in Egypt's exports following trade agreements are above internationally estimated averages. Second, the results from a Bartik approach find no significant relationship between rising exports and wages, informality, or female labor force participation. Additional analysis shows that Egypt's average wage levels are among the highest among countries that export the same goods exported by Egypt, possibly suggesting that Egypt has a relatively weak comparative advantage in currently exported goods, and thus might need to rethink its export basket.

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1. Introduction

The past two decades were marked by the increasing integration of the developing world into global trade and global value chains (GVCs). This trend has renewed the interest of policy makers and academics in understanding the labor market impacts of global integration, and it has led to a burgeoning literature that analyzes the relationship between trade and local labor market outcomes (Topalova 2010 and others[1]). The results vary significantly across countries, suggesting that individual country studies are necessary.

This study provides a first assessment of the link between Egyptian exports and labor market outcomes. The Arab Republic of Egypt offers an excellent opportunity to contribute to a broader understanding of trade and labor markets for several reasons. First, it is an important country within the Middle East North Africa (MENA) region, whose countries tend to experience high economic volatility relative to industrial ones, whether measured by aggregate output, private consumption, or investment (World Bank, 2012). In addition, most MENA countries remain relatively undiversified and dependent on a few commodities that often experience substantial fluctuations in relative prices. And security issues continue to affect them not only due to impacts in the tourism industry – a key economic sector in Egypt – but also prospects for foreign investment and labor markets.

Second, within this challenging environment, Egypt has tried to encourage trade by signing trade agreements. In the first decade of the 2000s, it concluded free trade agreements (FTAs) with the European Union (EU); Turkey, Jordan, Morocco, and Tunisia (the Agadir Agreement); and members of the European Free Trade Association (EFTA), which include Iceland, Liechtenstein, Norway, and Switzerland. It also has joined 11 preferential or regional trade agreements (RTAs)[2] since becoming a World Trade Organization (WTO) member in 1995. And the volume of exports after the FTAs were signed has dramatically increased, providing an excellent context to assess the impacts of trade.

Third, despite Egypt's recent success in undertaking bold economic reforms, its labor market is rife with challenges, including lagging private-sector employment growth, rising informal employment, and increasing wage inequality. There is also a widespread and persistent regional divide in employment growth and job quality between Upper and Lower Egypt, according to the latest round of the Labor Force Survey (LFS). In addition, while employment shares of labor-intensive manufacturing sectors (like garments and furniture) have steeply declined, those in low-end non-traded services (like construction, storage, and communication) have expanded.

One potential solution to these challenges could be greater trade because of the observed robust positive relationship between trade and development (Dollar and Kraay, 2004; Bhagwati and Srinivasan, 2002). More specifically, trade has been linked to falling poverty by generating new employment opportunities (Lopez-Acevedo 2012) and falling prices of goods and services for poor consumers (Bartley Johns et al., 2015). Since some of these results vary across countries, an obvious question is whether Egypt has been able to reap the benefits of the trade-enhancing effects

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[1] Autor, Dorn and Hanson 2013 McCaig and Pavcnik, 2018; Erten and Leight, 2017; Dix-Carneiro and Kovak, 2017a.
[2] See http://rtais.wto.org/UI/PublicSearchByMemberResult.aspx?MemberCode=818&lang=1&redirect=1 for the WTO's list of Egypt's regional trade agreements that are in force.

of trade agreements (Baier and Bergstrand 2007). A related question is how different groups of workers might benefit from rising exports.

Answering these questions requires an understanding of both trade performance and labor market conditions. In the past two decades, non-oil exports have failed to take off in Egypt, and similar countries have surpassed Egypt's participation in GVCs. Egypt has yet to reach the stage of a medium-technology manufacturing exporter. Not encouragingly, exports remain concentrated in products that are weakly traded in global markets and remain limited to traditional markets. The export activity also continues to remain heavily concentrated in a small number of governorates of the country, with the poorest ones appearing to have no linkages to overseas markets. The barriers – such as a high level of trade and non-trade barriers, low export competitiveness, low domestic competition, and low labor mobility – indicate the potential opportunities forgone in generating income earnings for the poor and vulnerable groups, such as women.

Our papers ask two key questions:

- First, do trade agreements produce the same increase in exports in Egypt as has occurred in other countries? To answer this, we present gravity-model[3] estimates of Egypt's trade and trade agreements. The results suggest that although trade agreements tend to enhance trade, Egypt has gotten more "bang for its buck" with its trade agreements. That is, exports following these agreements have been above internationally estimated averages.
- Second, do higher exports generate better local labor market outcomes as has occurred in other countries? To answer this, we present Bartik (1991)-like estimates for Egypt. The results suggest that trade impacts labor market outcomes in the short run, but the effects quickly dissipate throughout the country and remain statistically insignificant for most types of workers.

The reasons for the broken link between trade and labor markets, we argue, are (i) the composition of Egypt's export basket, and (ii) the fact that wage levels are among the highest in countries that export the same goods as Egypt. Further, in the past two decades, non-oil exports have failed to take off in Egypt, and similar countries have surpassed Egypt's participation in GVCs.

Our paper proceeds as follows. Section 2 provides a comprehensive description of Egypt's labor market challenges and its trade situation. Section 3 describes the data and the empirical methodology to assess the impact of trade agreements and shocks on its labor markets. Section 4 presents our results. And section 5 concludes and provides policy implications of our results.

2. Labor Market Outcomes and Trade in Egypt

The concern about Egypt's lack of improvement in labor market outcomes following trade agreements comes from a lack of improvement in several key labor market outcomes, which other countries have experienced.

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[3] Some previous work has been done to assess the impact of such trade agreements on trade flows using gravity models for the MENA region and specifically Egypt. Helmy et al (2018) examine the impact of the Egypt-EU trade agreement on bilateral trade. They also introduce other trade policy variables – such as the Grain and Free Trade Association (GAFTA), Agadir, EU-Egypt Association, and the Common Market for Eastern and Southern Africa (COMESA) agreements – and find that the three agreements are positive and significant, with GAFTA showing the highest coefficient, followed by Agadir and the EU-Egypt Association. More recently, Youssef and Zaki (2019) use a gravity model analysis to show that Egypt continues to trade less than expected with many countries compared to its potential.

Labor Market Outcomes

When most people think about labor market outcomes that matter for workers, they usually think of unemployment, FLFP, informality (often conflated with job quality), and real wages – all of which help boost welfare, including poverty and inequality. Our study looks at changes in each of these four key measures for Egypt – and compares them to those in neighboring countries in the region – to provide context and motivation for our subsequent empirical work.

Unemployment. Egypt has experienced significant swings in unemployment rates at different points in time over the past 15 years, similar to Tunisia and Algeria, but in contrast to Libya and Saudi Arabia, which have experienced stable unemployment rates (Figure 1, Panel A). Although Egypt's long-run average unemployment levels are about in the middle of the MENA distribution – about 10 percent – the average for the second half of the period shown is higher (reaching close to 13 percent) than in the first half. And youth face the problem of long-term unemployment, with rates reaching almost 30 percent in 2020. Such persistent unemployment is a significant challenge for Egypt and the rest of the region. For comparison, in Latin American countries, the youth unemployment rate is about 18 percent (ILO, 2020).

Figure 1: Unemployment and FLFP rates for Egypt and other MENA countries

Panel A. Problem of Unemployment is persistent

Panel B. Female labor force participation rates remain low
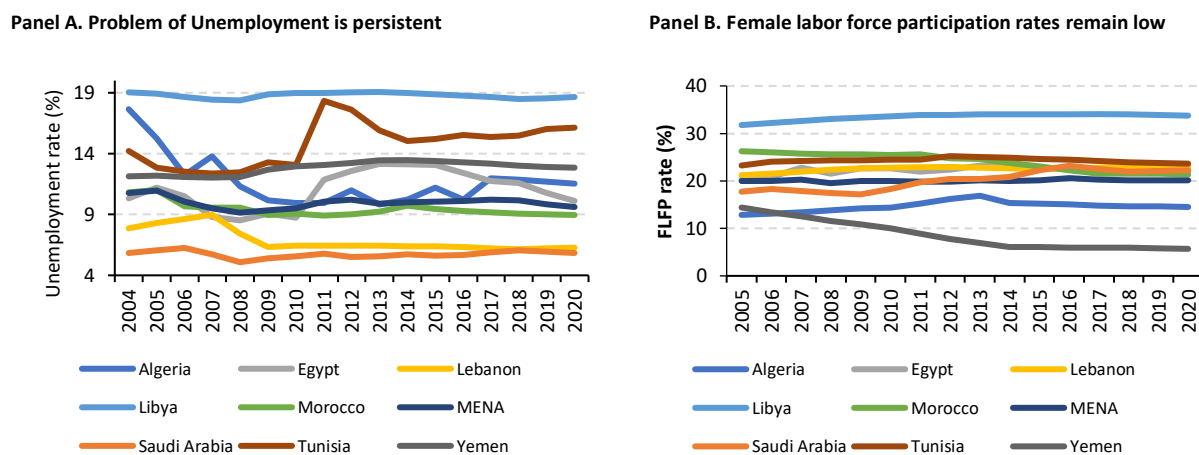
Source: World Bank Databank, ILO's estimations.

FLFP. In Egypt, FLFP rates are oscillating at about 22 percent, with a decline in recent years (Figure 1, panel B). This trend is similar to that of MENA, where on average, one out of five women are outside the labor force – a rate that has shown no significant change over the past 15 years, except for the Republic of Yemen, which has seen a steady drop. As for FLFP among youth, similar to its neighboring country, Jordan, the rate is low, increasing during prime-age (peaking around ages 40-45) and decreasing again as retirement approaches (World Bank, 2020).

Informality. In Egypt, informality rates have increased from 58 percent in 2008 to 66.7 percent in 2017, similar to the estimates for a typical MENA country.[4] But there remains significant

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[4] Comparing informality rates within MENA countries can be problematic, given that many of them have either lagged in their capacity to generate data or have prevented access to their data (Amatanov, et al. 2020). The World Bank (2012) estimates that a typical MENA country employs 67 percent of its labor informally – and that informal production might be as high as a third of GDP. In some MENA countries, informality spreads across more income groups than in others in the

heterogeneity concerning gender. Our estimates using annual Labor Force Surveys show that while the informality rate for males has oscillated around 63 percent, it has risen from 58 percent in 2009 to almost 65 percent in 2017 for females (figure 2). There is also considerable variation in informality rates across Egypt's four regions (Nile Valley and Delta, Eastern Desert, Western Desert, and the Sinai Peninsula) – and within them, the 27 governorates.[5] In 2008, the lowest informality rate was 8 percent in the New Valley governorate, with the highest in the Beni-Suefa and Menia governorates, at 80 and 79 percent, respectively. By 2017 more people had entered the informal market. The informality rate in New Valley was up to 31 percent, the governorate with the lowest rate was the Red Sea at 21 percent, and at least two out of every three governorates in Egypt had an informality rate above 50 percent.

Wages. There has been a steady increase in average wages in Egypt since 2009, although wages fell in 2017. However, salaries for female workers have been consistently lower than those for males, and the gender wage gap has not decreased significantly (figure 3). Comparing average monthly wages, male wages were 8 percent higher than female's in 2008, but this difference increased to 20 percent in 2017. Estimating a Mincerian wage equation and controlling for educational attainment, hours worked, and employment industry, we find the wage differential peaked in 2012 when women earned 23 percentage points less than males (Table 4). For the following years, the wage gap followed a downward trend that reached 7.6 percentage points in 2017, only 2 percentage points lower than in 2008. Thus, there has been no considerable improvement in the evolution of the gender wage differential.[6]

We also observe that the returns for higher education have decreased over time. In Egypt and most MENA economies, the public sector employs a significant share of workers with higher education. Given the generous conditions that public employment provides (such as job security and non-monetary benefits), more than half of young job seekers prefer to work in the public sector (World Bank, 2012). In fact, for women in Upper Egypt, government jobs are the only "acceptable" form of employment due to flexible working hours, leave, and job security, which are valued the most for their compatibility with family life[7] (World Bank, 2011). The significant role of the public sector in Egyptian labor markets might help explain the decreasing explanatory potential of human capital in wage differentials.

Regional differences between Upper and Lower Egypt are stark. For example, Cairo is the governorate with the most employees (about 10 percent of total workers), followed by Behira (at about 8 percent) over the 2008-2015 period. But bigger employment numbers do not imply higher wages. We observe that average monthly wages vary widely across governorates. New Valley and Suez showed the highest average weekly real wages in 2008 (at 670 and 610 Egyptian pounds, respectively). Still, later in 2015, North Sinai surpasses both with a higher average real wage of 730 Egyptian pounds. In general, governorates with the highest average real wages are almost double that of those with the lowest ones.

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region. In the Republic of Yemen, Morocco, the Syrian Arab Republic, and Lebanon informality rates range from higher than 95 percent for the poorest quintiles to 30 percent in the fifth quintile (World Bank, 2012). In Yemen, in particular, informality is higher than 80 percent for the richest quintile.

[5] 1 Alexandria; 2 Asyout; 3 Aswan; 4 Behira; 5 Beni-Suef; 6 Cairo; 7 Dakahlia; 8 Damietta; 9 Fayoum; 10 Gharbia; 11 Giza; 12 Ismaelia; 13 Kafr-El-sheik; 14 Kalyoubia; 15 Luxor; 16 Matrouh; 17 Menia; 18 Menoufia; 19 New Valley (El-wadi El-Gidid); 20 North Sinai; 21 Port Said; 22 Qena; 23 Red Sea; 24 Sharkia; 25 South Sinai (no data available); 26 Suez; 27 Suhag.

[6] Based on Mincerian wage equations. For results, see table 4 in the Appendix.

[7] Among all regions of the world, women in MENA are more likely to prefer the role of full-time domestic work than working for pay (World Bank 2013).

The significant wage gap among them reflects limited geographical mobility, a problem that is also highlighted by other studies. For example, Herra and Badr (2012) show a declining trend in Egypt's internal migration rates between the 1970s and 2010 – rates that remain low by international standards. This issue is exacerbated by the concentration of better-paid jobs in some geographical regions (primarily metropolitan areas) and the low mobility between informal and formal occupations. Between 2008 and 2009, an informal worker in Egypt had only a 4 percent chance of moving to a private sector formal job and a 5 percent chance of moving to a public sector job (Gatti et al. 2012). In addition, few young people find can transition from the end of schooling to a stable formal job (Barsoum, Ramadan, and Mostafa, 2014).

Figure 2: Still high levels of informality for both males and females in Egypt
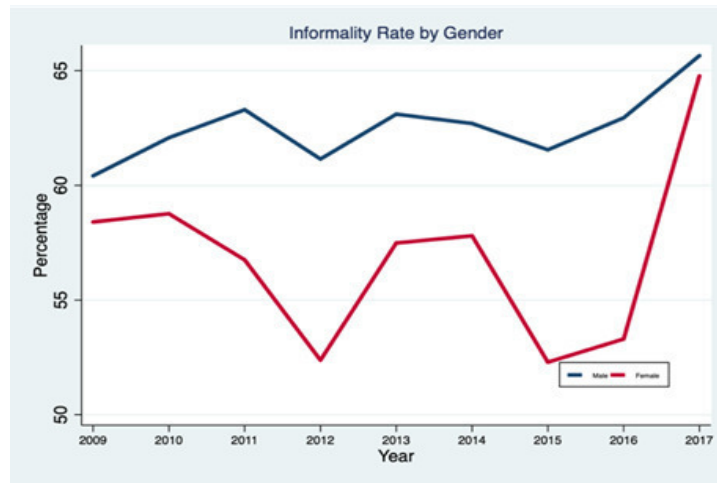
Source: Authors' elaboration using Labor Force Surveys (2009-2017)

Figure 3. Rising wages until recently but no narrowing of the gender gap
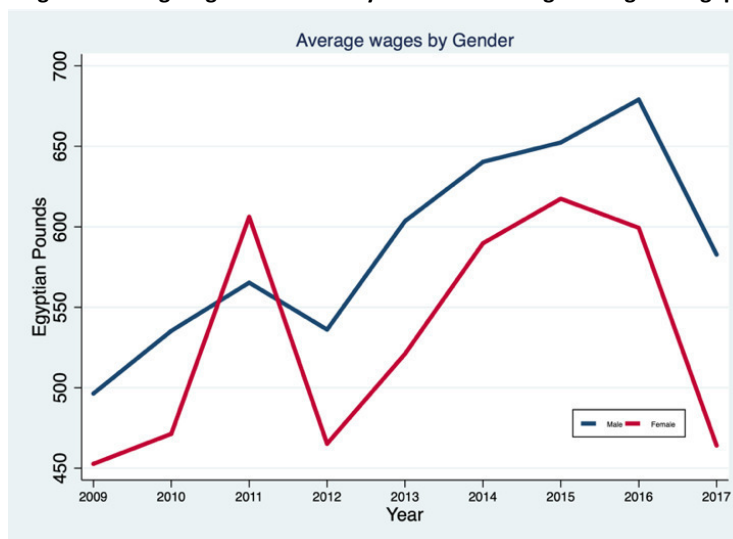
Source: Authors' elaboration using Labor Force Surveys (2009-2017)

There is also a tendency for production to be geographically concentrated, which results in trends being geographically localized. Estimates based on the recent round of the Labor Force Survey highlight a steep decline in employment shares of labor-intensive manufacturing sub-sectors (like

garments and furniture), while employment in low-end services (like construction, storage, and communication) has been expanding. If workers avoid moving between governorates or relocation costs are significant, any effect of demand shocks such as trade would be highly localized in export-concentrated production areas.

Trade Patterns

Like many developing countries, Egypt has implemented several policies designed to foster trade growth. In the late 1990s, it reduced the maximum tariff rate to 40 percent from 110 percent in the late 1980s (Zaki, 2010). Then in 2003-2004, it again reduced tariffs, simplified the tariff structure and red tape costs, and implemented reforms to improve the business environment. As a result, after 2004, both imports and exports accelerated – almost tripling in the following years (Figure 4, panel A). And Egypt's economic growth rate rose to 7.2 percent in 2008, before the world financial crisis.

Figure 4: Importing and Exporting Activity

Panel A. Imports and exports of goods and services, constant 2010 $ US.

Panel B. Top non-oil exports are apparel and fertilizers

Panel C. Imports and Exports of goods and services, as % of GDP
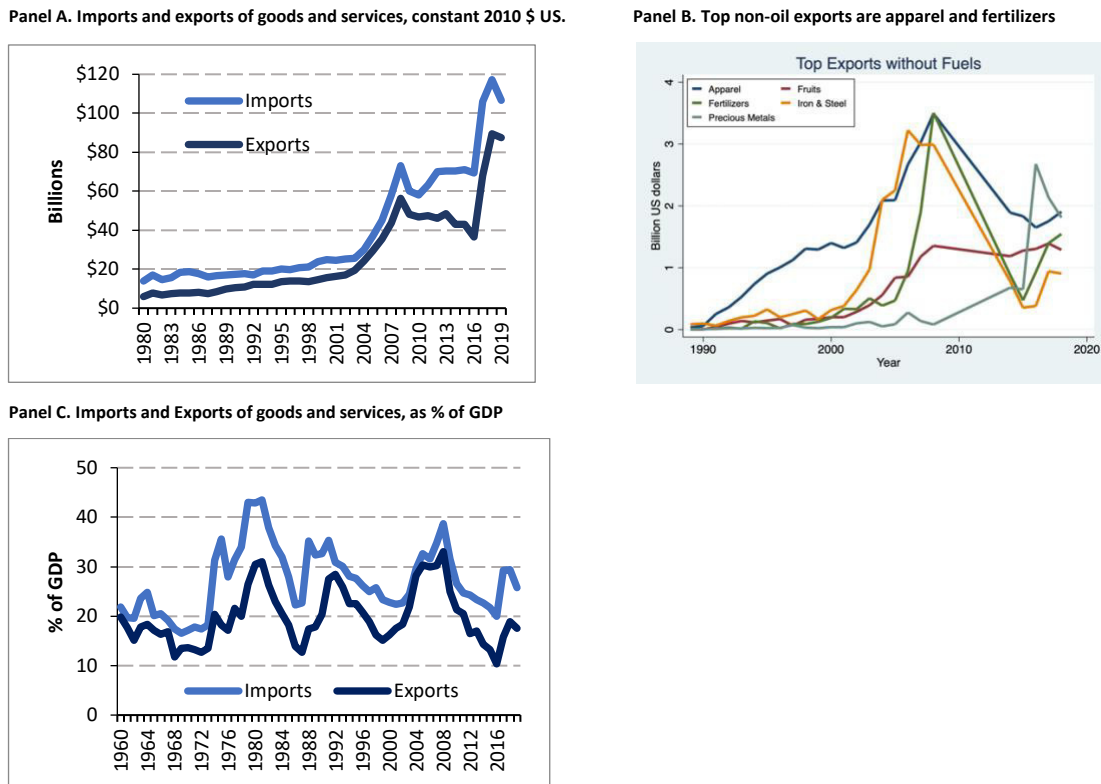
Source: Authors' elaboration, UNCOMTRADE data

The escalation in trade was fostered by the signature of multiple FTAs in the early 2000s with: (i) the EU; Turkey; members of EFTA; and with Tunisia, Jordan, and Morocco (the Agadir Agreement). However, Egyptian exports of goods and services per capita remain low compared to other countries in MENA (like Morocco and Tunisia) and outside MENA (like Turkey and Thailand).

Egypt's trade basket is also moderately diversified in terms of goods and partners. Its exports have historically been dominated by oil exports, although their weight has gradually declined from half to less than a third of total exports in favor of non-oil exports.[8] But non-oil exports have failed to take off (Figure 4, panel B), and exports continue to be concentrated in traditional or low value-added products. The products that Egypt exports most are not necessarily the ones that might be expected from the perspective of comparative advantage. Egypt seems to have a comparative advantage in carpets, fabrics, fertilizers, textiles, salt, sulfur, and stones, but exports of these products remain relatively low (Zaki 2016).

Exports in which Egypt specializes and expands are not necessarily those with growing global demand. For example, although Egypt's global trade share has been increasing in cotton, fertilizers, tobacco, and oilseeds in the past few years, global demand has been declining. And although Egypt's global trade share has been falling in textiles, cement, aluminum, ceramic, and chemical, global demand has grown.

Exports also remain limited to the traditional market. Egypt's top export market is the EU (notably Italy and Germany), followed by the United States, Turkey, and the United Arab Emirates, with a similar share as Italy (Figure 5, panel A). As for imports, they primarily come from China, the Russian Federation, the EU, and the United States. Chinese imported goods are more than double the share from the second and third importing markets (Figure 5, panel B).

Figure 5: EU is Egypt's biggest export partner, for imports, it is China

Panel A. Egypt's top exporting partners, 2018 | Panel B. Egypt's top importing partners, 2018
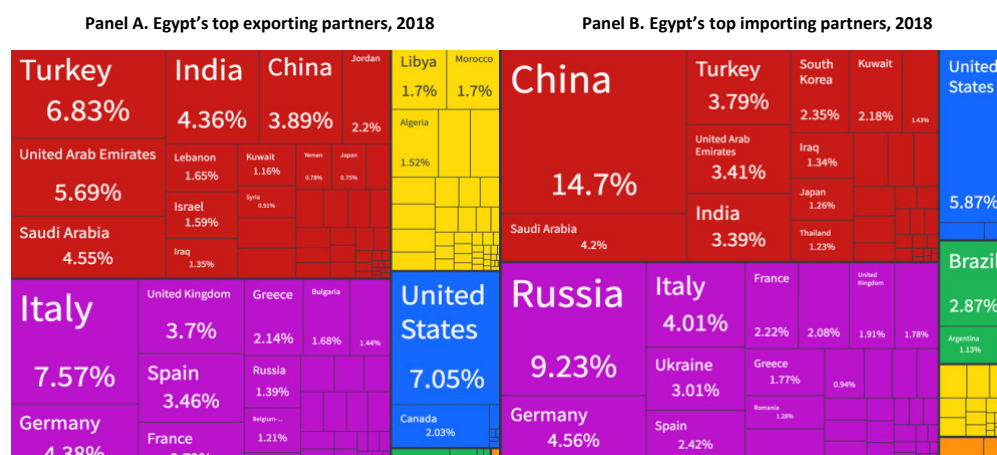
Source: OEC, UNCOMTRADE data

The export activity also continues to remain heavily concentrated in a small number of governorates, with the poorest ones appearing to have no linkages to overseas markets through exports. Further, local and regional turmoil, along with an economic slowdown in its main trading partners, have had an adverse effect on Egypt's economic activity and external balances. The severe shortages of foreign currency, for example, led in 2014 to an over-appreciation of the exchange rate, which undermined its competitiveness. For the following two years, exports declined, reaching their lowest level as a percent of GDP since the early 2000s (Figure 4, panel C).

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[8] Fuel and oil products do not represent more than 10 percent of imports.

In response, Egypt abandoned its currency peg and liberalized its exchange rate, which resulted in a 100 percent depreciation of the pound that boosted exports, although non-oil exports rose by only 16 percent in about a year (Youssef and Zaki, 2019). While currency depreciation was expected to boost exports in the short term, sustained export growth requires more than a price effect. In 2018, both imports and exports peaked, and with the pandemic altering global economic activity, Egypt now needs to reinvent the way it achieves sustained progress in export performance.

3. The Gravity Approach

This paper uses a gravity model to predict bilateral trade flows based on economic size, geographic distance, and other relevant characteristics that should typically facilitate trade and identify specific sectors and markets for which Egypt seems to have untapped potential.

The gravity model of international trade is the most common empirical tool used by economists to estimate the contribution of various factors to bilateral international trade flows. Tinbergen (1962) proposed the gravity model to illustrate the asymmetry of global trade flows. Trade flows between two countries are modeled as functions of each country's size (GDP or GDP per capita), the distance between them, and trade costs. Trade costs might include a wide range of variables, including bilateral, multilateral, and regional trade agreements. Comparing the change in trade of a particular trade agreement, while controlling for other variables often found in gravity models, is one heuristic way to estimate either the effectiveness of trade agreements that a country signs or the relative importance of policies and trade costs that are not included in an agreement.

Formally, trade costs can be roughly categorized into (i) transport costs, (ii) information costs, and (iii) trade barriers. Anderson and van Wincoop (2003) propose the following now widely adopted form for the gravity function:

$$X_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{\Pi_i P_j} \right)^{1-\sigma},$$

in which xij is imports by country j from country i; yi and yj are GDP per capita in each country; yw is nominal world income; tij is the cost in j of importing a good from i; σ is the elasticity of substitution across countries for a given good; and Πi and Pj represent exporter and importer ease of market access (Anderson 2011).

Trade costs can contain several variables. Shepherd (2016) defines trade costs as a function of distance (log τ_{ij} = log ($distance_{ij}$)). Other authors include additional variables, such as sharing a common currency, being members of the General Agreement on Tariffs and Trade (GATT) – which became the WTO in 1995 – and whether there is a signed trade agreement.

For many years the most common method in gravity model estimation was applying Ordinary Least Squares (OLS) to a log-linearized form of the gravity model. Recently, however, several scholars have argued that estimated OLS parameters might be biased in the presence of heteroskedasticity. In addition, many country pairs do not trade at all, causing a prevalence of zero values in the dependent variable. To address these concerns, gravity models are increasingly

estimated with a Poisson Pseudo Maximum Likelihood (PPML) estimator, which can overcome heteroskedasticity in the presence of many zeros in the dependent variable. Silva and Tenreyro (2011) compare the Poisson Pseudo Maximum-Likelihood (PPML) and Gamma Pseudo Maximum Likelihood (GPML) methods and conclude that the PPML estimator is generally well-behaved, even if the dependent variable has many zeros.

Gravity Data

Our analysis employs a combination of data that measure (i) bilateral trade flows, (ii) various trade costs, (iii) membership in RTAs, and (iv) country characteristics. Annual bilateral trade flows from 1996 to 2018 come from the COMTRADE database. Bilateral information on transport costs, information costs, and tariff barriers come from the Centre d'Études Prospectives et d'Informations Internationales (CEPII) gravity data set.[9] We replace missing bilateral data with zeros, hence basically assuming that missing values are zeros rather than positive unreported values.

Data on trade agreements, which come from the WTO, cover several types of agreements[10] that cover goods, services, or both. Although there is some debate in the literature about the difference between RTAs, reciprocal trade agreements, and preferential trade agreements, we simply employ the WTO definition of trade agreements.

Table 1: Gravity Data Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Imports	348.22	4346.49	0.00	489073.70
GDP Importer	24.04	2.39	16.97	30.51
GDP Exporter	23.95	2.43	16.97	30.51
Contiguous Indicator	0.02	0.12	0.00	1.00
GATT Member Exporter	0.77	0.42	0.00	1.00
GATT Member Importer	0.78	0.41	0.00	1.00
Common Currency Indicator	0.01	0.11	0.00	1.00
Distance	8.78	0.76	4.11	9.89
RTA Indicator	0.17	0.37	0.00	1.00

Notes: The data consist of 733,786 observations for all variables with 189 exporters and 177 importers. The data span 1996 to 2018.

For annual GDP, we draw upon the World Bank's World Development Indicators. All monetary variables are in constant (2010) US dollars. Table 1 contains the summary statistics for our final data set. We end up with a panel data set with country pairs being the unit of observation. There are 177 importers and 189 exporters for a total of 733,786 observations. Each pair contains information on the volume of trade during the year, whether or not a trade agreement was in force,

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[9] http://www.cepii.fr/

[10] WTO trade agreements include (i) free trade agreement (FTA); (ii) customs union (CU); (iii) partial scope agreement (PSA); (iv) economic integration agreement (EIA); and combinations of each group.

the GDP of each country – and an indicator if the countries in the pair share a border, are members of the GATT, share a common currency, and the distance between them.

Gravity Results

Table 2 contains the baseline PPML gravity model results, which reflect the "normal" gravity results. GDP per capita of each country positively affects trade, and the estimates are reasonably close to the theoretically implied values of one. Contiguous countries trade more, and being a member of GATT increases trade when either country is a member. Having a common currency weakly increases trade. The normal gravity estimates match those in previous studies, at least qualitatively if not quantitatively, and are very stable across all specifications. And all equations include country and year fixed effects (although these are not shown to save space).

In column 2, we add the RTA indicator. The estimated coefficient is positive, relatively large, statistically significant, and roughly consistent with studies that use a similar variable and estimation approach. The results suggest that, on average, having an RTA increases trade by about 26 percent (=exp(0.232)-1).

Since our focus is on Egypt, in column 3, we include the Egypt indicator – which is equal to one if Egypt is either an importer or an exporter. The estimate of the Egypt coefficient indicates how much Egypt trades relative to all other countries. The negative and relatively large coefficient suggests that while holding other trade determinants constant, Egypt trades much less than other countries. However, this value is not statistically significant, so firm conclusions should not be drawn at this point. As for the role of distance, the estimated coefficient on this interaction term is small, negative, and not statistically significant, suggesting that distance (as a proxy for transportation costs) is not especially driving Egypt's lack of trade.

So, does Egypt trade more after joining an agreement than other countries? Picking up on the RTA result, we examine whether Egypt gets this "typical" increase in trade from its agreements. Table 3 shows the results from the PPML gravity model, using three different measures of Egypt's trade relationships: Egypt as either exporter or importer, Egypt as an importer, and Egypt as an exporter.

In column 1 of table 3, Egypt is modeled as either an exporter or importer. There are two main results to consider. First, the "main" effect ("Egypt Total") is negative but statistically significant at conventional levels. This suggests that Egypt trades less than other countries, holding the other gravity variables constant. Second, the interaction between Egypt and the RTA ("Egypt x RTA") is small, positive, and not statistically significant. This suggests that Egypt's total trade increases by about the "normal" amount from trade agreements.

These results, however, might differ depending on whether Egypt is an importer or exporter. Trade agreements might increase imports and exports in different amounts. In column 2, the estimate of the "Egypt as importer" coefficient is small, positive, and not statistically significant. This suggests that Egypt imports slightly more than other countries, holding all other gravity variables constant, but this amount is not statistically significant. When considering the interaction term ("Egypt x RTA" in column 2), the estimate is small, negative, and statistically insignificant. This suggests

that relative to the effects of trade agreements on average, Egypt's imports increase less than average, but once again, this estimate is not statistically significant.

Table 2: Baseline PPML Gravity Estimates

VARIABLES	(1) Baseline Gravity	(2) RTA Estimate	(3) Egypt Interactions
GDP Importer	0.896***	0.861***	0.896***
	(0.062)	(0.060)	(0.062)
GDP Exporter	0.791***	0.761***	0.791***
	(0.070)	(0.069)	(0.070)
Contiguity Indicator	0.497***	0.458***	0.497***
	(0.065)	(0.063)	(0.065)
Exporter GATT Member	0.267***	0.274***	0.267***
	(0.058)	(0.063)	(0.058)
Importer GATT Member	0.428***	0.438***	0.428***
	(0.049)	(0.050)	(0.049)
Common Currency	0.119*	0.110*	0.120*
	(0.063)	(0.059)	(0.063)
EGYPT			-1.094
			(1.138)
Distance (Log)	-0.814***	-0.755***	-0.814***
	(0.030)	(0.035)	(0.030)
Egypt x Distance			-0.065
			(0.123)
RTA Indicator		0.232***	
		(0.057)	
Constant	-31.248***	-30.402***	-31.252***
	(1.605)	(1.575)	(1.605)
Observations	906,060	906,060	906,060
R-squared	0.851	0.856	0.851

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. EGYPT is equal to one if Egypt is either an exporter or importer.

Finally, in column 3, we consider levels and changes in Egypt's exports. The results show that the estimated coefficient on "Egypt as Exporter" is large, negative, and statistically significant. This supports what others have mentioned in the literature: that Egypt exports less than might be expected. In our case, Egypt does not trade less due to the "normal" gravity factors—instead, lower exports are due to some other Egypt-specific factor.

Table 3: Egypt's Trade following Trade Agreements

VARIABLES	(1) Egypt Total	(2) Egypt as Importer	(3) Egypt as Exporter
GDP Importer	0.697***	0.697***	0.697***
	(0.056)	(0.056)	(0.056)
GDP Exporter	0.568***	0.568***	0.568***
	(0.066)	(0.066)	(0.066)
Contiguity Indicator	0.440***	0.440***	0.441***
	(0.064)	(0.064)	(0.064)
Exporter GATT Member	0.243***	0.243***	0.244***
	(0.055)	(0.055)	(0.055)
Importer GATT Member	0.351***	0.351***	0.351***
	(0.043)	(0.043)	(0.043)
Common Currency	0.029	0.029	0.030
	(0.064)	(0.064)	(0.064)
Distance (Log)	-0.763***	-0.763***	-0.763***
	(0.035)	(0.035)	(0.035)
Egypt Total	-0.794*		
	(0.457)		
Egypt as Importer		0.120	
		(0.435)	
Egypt as Exporter			-1.077**
			(0.445)
Regional Trade Agreement	0.249***	0.250***	0.248***
	(0.058)	(0.058)	(0.058)
Egypt x RTA	0.052	-0.152	0.480***
	(0.130)	(0.151)	(0.137)
Constant	-22.321***	-22.318***	-22.325***
	(1.780)	(1.781)	(1.779)
Observations	733,786	733,786	733,786
R-squared	0.873	0.873	0.873

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. RTA stands for Regional Trade Agreement. Egypt Total is a dummy variable equal to one if Egypt is either an importer or exporter.

However, when considering the changes in trade, the estimated coefficient on the "Egypt x RTA" variable – which measures how Egypt's exports change following a regional trade agreement – is large, positive, and statistically significant. This suggests that Egypt's trade increases much more than the "average" increase due to a trade agreement. Why might this occur? One possibility is that the lack of a link between trade agreements and improved labor market outcomes is not because Egypt gets less from trade agreements than expected. Instead, it might be possible that trade does not connect to labor markets in the same way it does in other countries.

4. **Trade to Egyptian Labor Markets: A Bartik Analysis**

Overview of the Bartik Approach

How does trade connect or not connect with labor markets in Egypt? To answer this question, we employ a geography based Bartik (1991) approach to quantify exogenous import demand shocks from the US and EU countries for Egyptian exports. Under this approach, we can compute the change in exports per worker driven by an exogenous demand shock originating from outside. We use a two-stage econometric analysis. The change in industry i exports of Egypt to the US and EU countries (or imports of the US and EU from Egypt) between time t and t + n can be expressed as $Q_{t+n}^i - Q_t^i$. Then the change in exports per worker for industry i is equal to $(Q_{t+n}^i - Q_t^i)/(\sum_r L_t^{i,r})$. Thus, we can calculate the effective change in exports to the US and EU weighted by the labor shares for each region as

$$x_{t,t+n}^r = \sum_i \frac{L_t^{i,r}(Q_{t+n}^i - Q_t^i)}{(\sum_j L_t^{j,r})(\sum_d L_t^{i,d})}$$

Alternatively, we can express the exposure formula as in ADH

$$x_{t,t+n}^r = \sum_i \frac{L_t^{i,r}(Q_{t+n}^i - Q_t^i)}{L_t^r L_t^{i,Egypt}}$$

where L_t^r is the total number of workers assigned to any industry in district r and $L_t^{i,Egypt}$ is the total size of industry i. The trade exposure variable $x_{t,t+n}^r$ can be interpreted as the change in exports per worker in district r measured in real US dollars.

First stage: We estimate the contribution of the US and EU import demand to the increase in Egypt's exports. To ensure the true exogeneity of our instrument, we need a variable that predicts imports from Egypt based solely on the US and EU internal demand growth, rather than supply-side determinants like changes in production volumes for garments from other export-competing countries. Hence, we construct our instrument using time-series regressions of Egypt's exports to the US and EU on the US and EU GDP by industry at the four-digit level, from 1991 to 2018 annually. Predicted values from these regressions would serve as a proxy for Egypt's exports to the US and EU explained exclusively by the latter's domestic aggregate demand. This variable is,

by construction, orthogonal to every supply-side factor in the international garments market and every local market condition in Egypt.

Second stage: We estimate the effect of an increase in exports on local economic outcomes. These economic outcomes would include informality rates, real wages for different worker types (male, female, rural, urban, skilled, unskilled, young, and old), and FLFP rates. And we define four periods according to the LFS data available: 2009 to 2010, 2009 to 2012, 2009 to 2015, and 2009 to 2017.

Figure 6. Exports per workers are concentrated in some governorates more than others

Panel A: Concentration of non-oil exports per worker 2009-2010	Panel B: Concentration of non-oil exports per worker 2009-2012
Panel C: Concentration of non-oil exports per worker 2009-2015	Panel D: Concentration of non-oil exports per worker 2009-2017
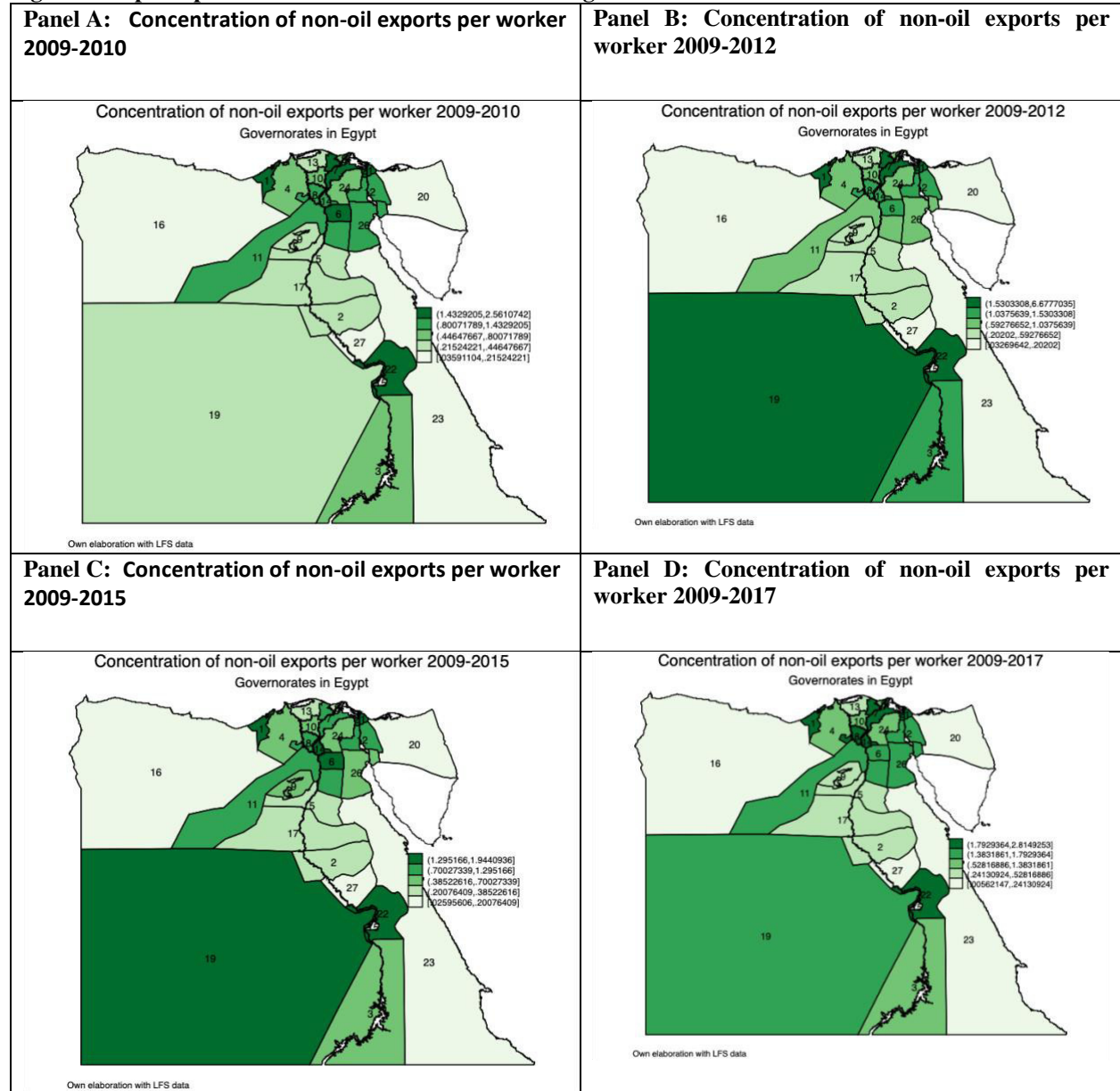
Note: There are 259 (municipal) kizm and markaz within the 27 governorates: 1 Alexandria; 2 Asyout; 3 Aswan; 4 Behira; 5 Beni-Suef; 6 Cairo; 7 Dakahlia; 8 Damietta; 9 Fayoum; 10 Gharbia; 11 Giza; 12 Ismaelia; 13 Kafr-El-sheik; 14 Kalyoubia; 15 Luxor; 16 Matrouh; 17 Menia; 18 Menoufia; 19 New Valley (El-wadi El-Gidid); 20 North Sinai; 21 Port Said; 22 Qena; 23 Red Sea; 24 Sharkia; 25 South Sinai (no data); 26 Suez; 27 Suhag.
Source: Authors' elaboration using Labor Force Surveys (2009-2017)

The regressions are run at the (municipal) kizm and markaz level (Egypt has 259 kizms and markaz). Figure 6 plots trade openness, defined as exports (excluding petroleum oil) per worker, for 26 governorates in Egypt. It shows significant spatial differences among the governorates, which can stem from intranational trade costs and regional comparative advantages. The biggest concentration of exports per worker is in Luxor, Cairo, Alexandria, Port Said, and Dakahlia. At the same time, New Valley (also called El-Wadi El-Gidid) has experienced a considerable increase in its share in recent years.

Bartik Results on Trade and Labor Market Outcomes

How did an increase in exports affect wages in Egypt? The results show that kizm and markaz that are more exposed to trade experience a decrease in average real wages relative to less exposed sub-districts in the short run, but this outcome dissipates over time (table 5 in the Appendix). This holds for both males and females, although for women it is not statistically significant. Specifically, between 2009 and 2010, a $100 increase in exports per worker leads to a statistically significant decline in average wages by 317 Egyptian pounds, which declines to a zero by 2017 (figure 7). This dissipating and negative wage trend in average wages is observed economy-wide, except for textile and apparel workers.

A focus on trade exposure on textiles and apparel, which makes up 7 percent of Egypt's export basket, reveals a sustained increase in average wages after the first period, although not statistically significant. Average wages of these workers fall 235 Egyptian pounds between 2009 and 2010 – which is more than compensated by a 900-pound increase between 2009 and 2012, a 400-pound increase between 2009 and 2015, and a 674-pound increase between 2009 and 2017.

The more vulnerable groups in Egypt are the most affected by trade in terms of wages. Average wage decreases in sub-districts that are more exposed to the trade shock are substantially higher for high-skilled workers relative to low-skilled ones, older relative to less-experienced workers, and urban workers relative to rural workers.

How did an increase in exports affect informality in Egypt? Informality rates in Egypt have been relatively stubborn, with an upward trend since 2009 (Table 6 in the Appendix). Consistent with this, we do not find any improvement in informality rates after a trade shock in the EU and US exports demand. On the contrary, between 2009 and 2010, there is a small and statistically insignificant positive effect on the informality rate of all workers – which shifts to a negative between 2009 and 2012, a positive between 2009 and 2015, and a negative between 2009 and 2017. However, all of these are statistically insignificant. As for women, there is a small and constant negative effect for the first three periods, which later on reverses sign and is consistent with the upward trend of informality rates in 2017. Old, low-skilled, and male workers are also among the workers that experience a higher informality rate after a $100 increase in exports in the period 2009 to 2010 – although in the following periods, their informality rate decreases (figure 8).

How did an increase in exports affect Egypt's FLFP rate? The evolution of FLFP in Egypt is not encouraging. It has not surpassed the 32 percent threshold for the past decade and has shown an

upward trend in recent years. Nevertheless, exports seem to be helping more women enter the labor market. Although in the periods 2009-2010 and 2009-2012, a $100 increase in exports per worker had a negative effect on FLFP (table 7 in the Appendix). The following period (2009-2015) saw a positive and statistically significant effect, which has continued. Thus, overall, exports seem to be helping contain the downward trend. In addition, young and high-skilled workers, compared to older and low-skilled ones, show a starker and statistically significant decrease in FLFP in districts that are more exposed to exports.

Figure 7: Higher exports do not translate into higher wages

Change in the average annual real wages after a $100 increase in exports per worker (2010 Egyptian pounds)
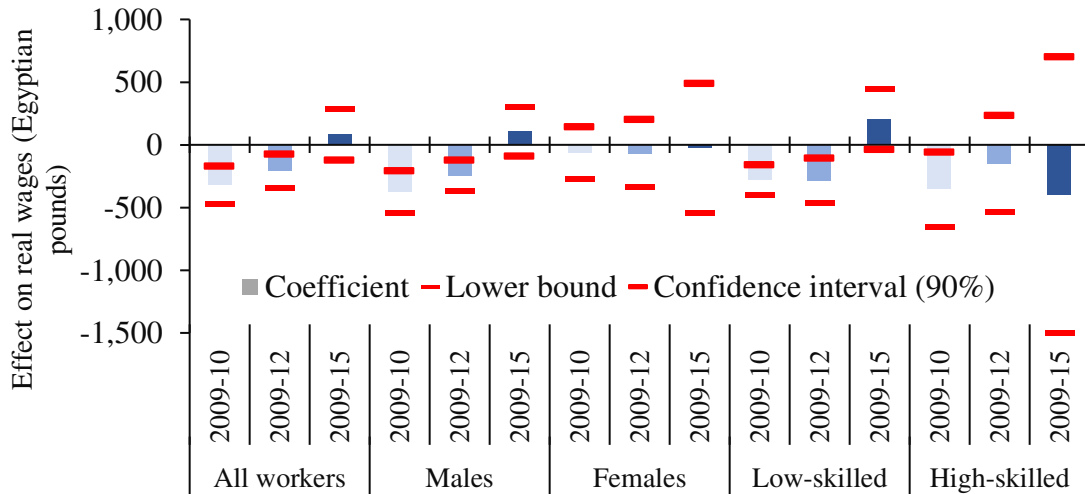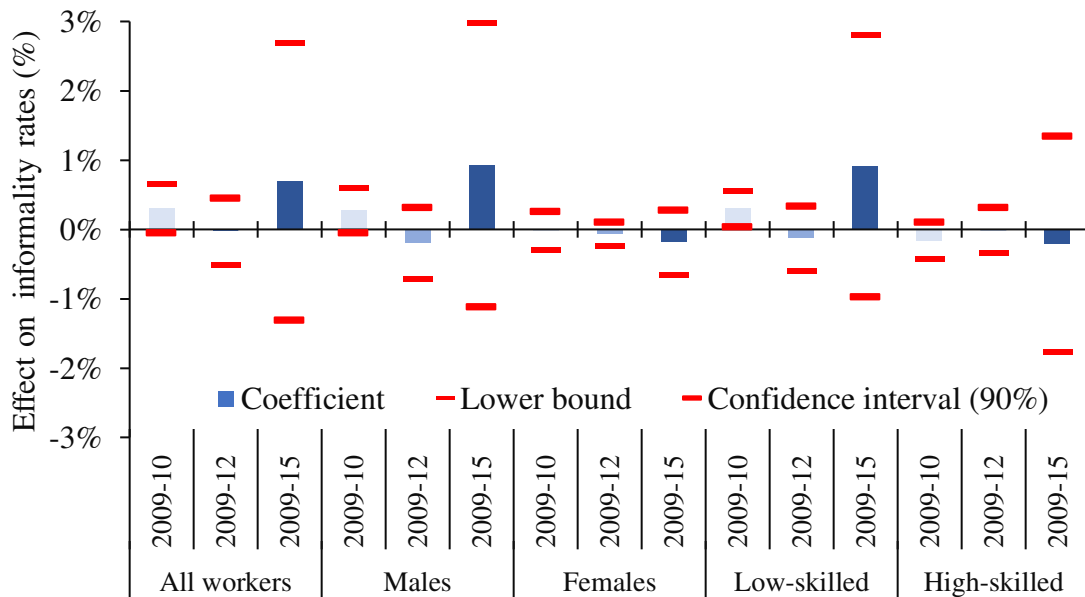

Figure 8: Higher exports do not translate into lower informality

Change in the average annual informality rate after a $100 increase in exports per worker (percentage)

5. Conclusions and Future Work

Against a backdrop of greater integration of developing countries into GVCs over the past 20 years, there has been heightened interest in the links between trade and labor market outcomes. Many studies have shown that rising exports to industrial countries, for instance, reduced poverty and spurred reallocation of labor from informal to formal jobs in several developing countries like India, Vietnam, and China. This paper extends the existing literature by estimating the effects of a positive demand shock and labor market outcomes for Egypt, which provides an excellent case study.

The problem for Egypt has been that despite its success in undertaking bold economic reforms and signing several free-trade agreements that accelerated its imports and exports – its labor market is still rife with challenges—notably, rising informal employment and increasing wage inequality. This situation indicates that either Egypt's benefits from trade are relatively modest or that trade does not connect to domestic local labor markets in the same way it does in other countries.

To shed light on this issue, we take a two-pronged approach:

- The first approach uses gravity model estimates to understand if trade agreements produce the same increase in exports in Egypt as has occurred in other countries. The results suggest that although trade agreements tend to enhance trade, Egypt has gotten more "bang for its buck" with its trade agreements. That is, exports following these agreements have been above internationally estimated averages.
- The second approach uses Bartik (1991) estimates to analyze if higher exports generate better local labor market outcomes as has occurred in other countries. The results suggest that trade does impact labor market outcomes in the short run. Still, the effects quickly dissipate throughout the country and remain statistically insignificant for most types of workers.

The reason for the broken link between trade and labor markets, we argue, are: (i) the composition of Egypt's low diversified export basket in goods, with eroding global demand -a good reason for Egypt to rethink its export basket; and (ii) the fact that wage levels are among the highest in countries that export the same goods as Egypt. Also, in the past two decades, non-oil exports have failed to take off in Egypt, and similar countries have surpassed Egypt's participation in GVCs.

Looking ahead, future research is needed in three important areas to gain more insight into the relationship between greater exports and local labor market outcomes in Egypt. First, more work is required to provide a theoretical framework to identify firm-level effects and short-run industry-specific effects separately. Egypt is likely exporting more to countries with the same income than to wealthier ones. This matters because the most technologically demanding goods come from wealthier countries, which would push firms to upgrade.

Second, the paper currently uses the rise in exports of final goods. Still, given that Egypt's imports are more than double the value of its exports, future work should distinguish between imports of parts and imports of final goods. Third, firm- and industry-specific effects might not spill over to otherwise identical workers in different regions—even in the same industry, region, or country.

Similarly, workers of the same age, education, and occupation might earn different amounts based on their gender or industry-specific or firm-specific experience. Thus, it is essential to sort out the different kinds of trade links to wages and which dimensions of earnings would be affected in each case.

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Appendix

Table 4. Egypt - Mincerian Equation Results with Sector Variables[11]

	2009	2010	2011	2012	2013	2014	2015	2016	2017
female	-0.094***	-0.191***	-0.087***	-0.232***	-0.165***	-0.136***	-0.126***	-0.078***	-0.076***
	(-15.18)	(-28.26)	(-12.74)	(-17.00)	(-24.39)	(-19.32)	(-18.54)	(-13.40)	(-14.41)
sector4	-0.062***	-0.146***	0.006	-0.718***	-0.112***	-0.048***	-0.030*	-0.097***	-0.117***
	(-4.22)	(-9.23)	(0.34)	(-20.63)	(-6.49)	(-2.91)	(-1.73)	(-5.94)	(-7.51)
fem_text	-0.049	-0.129***	-0.092**	0.095	-0.035	-0.140***	-0.167***	-0.196***	-0.144***
	(-1.57)	(-4.06)	(-2.49)	(1.36)	(-1.01)	(-4.38)	(-4.91)	(-6.26)	(-4.60)
age	0.011***	0.025***	0.014***	0.038***	0.018***	0.017***	0.017***	0.010***	0.007***
	(9.28)	(19.55)	(10.45)	(14.34)	(13.55)	(12.87)	(12.35)	(9.32)	(8.04)
age2	0.000	-0.000***	-0.000***	-0.000***	-0.000	-0.000*	-0.000**	0.000	0.000**
	(1.04)	(-8.22)	(-3.40)	(-5.45)	(-1.27)	(-1.75)	(-2.41)	(0.30)	(2.28)
high_skill	0.224***	0.206***	0.229***	0.307***	0.209***	0.203***	0.233***	0.194***	0.153***
	(41.28)	(35.10)	(38.74)	(25.75)	(35.18)	(32.95)	(37.86)	(33.87)	(27.95)
hours	-0.094***	-0.191***	-0.087***	-0.232***	-0.165***	-0.136***	-0.126***	-0.078***	-0.076***
	(-15.18)	(-28.26)	(-12.74)	(-17.00)	(-24.39)	(-19.32)	(-18.54)	(-13.40)	(-14.41)
_cons	-0.062***	-0.146***	0.006	-0.718***	-0.112***	-0.048***	-0.030*	-0.097***	-0.117***
	(-4.22)	(-9.23)	(0.34)	(-20.63)	(-6.49)	(-2.91)	(-1.73)	(-5.94)	(-7.51)
N	-0.049	-0.129***	-0.092**	0.095	-0.035	-0.140***	-0.167***	-0.196***	-0.144***

t statistics in parentheses ="* p<0.1, ** p<0.05*** and p<0.01"

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[11] Coefficients of all other sectors are not reported for simplicity of reading.

Table 5. Change in the average annual real wages after a US$100 increase in exports per worker (Egyptian pounds of 2010)

Type of worker		2009-2010	2009-2012	2009-2015	2009-2017
		(1)	(2)	(3)	(4)
All	Coefficient	-317.41***	-207.85**	85.15	-0.30
	t-statistic	(-3.49)	(-2.55)	(0.68)	(-0.00)
	N	249	250	248	246
Manufacturing	Coefficient	-386.22**	-195.71	-241.50	291.39
	t-statistic	(-2.17)	(-0.56)	(-0.82)	(0.91)
	N	121	119	114	110
Textiles and Apparel	Coefficient	-235.41	900.36	404.79	674.03
	t-statistic	(-0.53)	(1.51)	(0.93)	(0.56)
	N	38	35	35	37
Services	Coefficient	-287.51***	-119.41	21.71	111.96
	t-statistic	(-2.66)	(-1.10)	(0.09)	(0.33)
	N	248	250	248	246
Males	Coefficient	-373.86***	-244.49***	107.09	47.95
	t-statistic	(-3.67)	(-3.32)	(0.89)	(0.17)
	N	249	250	248	246
Females	Coefficient	-64.65	-67.59	-24.94	-19.54
	t-statistic	(-0.51)	(-0.41)	(-0.08)	(-0.11)
	N	202	201	204	205
Low Skill	Coefficient	-275.70***	-286.06***	204.50	-60.47
	t-statistic	(-3.86)	(-2.61)	(1.40)	(-0.17)
	N	245	247	245	242
High Skill	Coefficient	-353.34*	-149.22	-394.40	-246.79
	t-statistic	(-1.95)	(-0.64)	(-0.59)	(-0.91)
	N	233	236	232	231
Young	Coefficient	-295.35***	-203.63***	287.28*	-420.47
	t-statistic	(-2.66)	(-2.81)	(1.87)	(-1.10)
	N	247	246	245	244
Old	Coefficient	-349.56***	-242.24**	-241.97	378.40
	t-statistic	(-3.25)	(-2.11)	(-0.57)	(1.08)
	N	248	250	248	246
Rural	Coefficient	-204.77***	-133.67**	110.75	-54.67
	t-statistic	(-2.70)	(-2.19)	(1.09)	(-0.45)
	N	148	149	147	146
Urban	Coefficient	-374.26**	-380.90*	135.40	153.70
	t-statistic	(-2.29)	(-1.72)	(0.72)	(0.25)
	N	156	156	160	149

t statistics in parentheses ="* p<0.1, ** p<0.05*** and p<0.01"

Table 6. Change in the informality rate after a US$100 increase in exports per worker (Percentage)

Type of worker		2009-2010	2009-2012	2009-2015	2009-2017
		(1)	(2)	(3)	(4)
All	Coefficient	0.00310	-0.00026	0.00694	-0.01514
	t-statistic	(1.44)	(-0.09)	(0.57)	(-1.09)
	N	249	250	248	246
Manufacturing	Coefficient	0.00001	-0.00827	0.02003	-0.01831
	t-statistic	(0.00)	(-0.73)	(1.49)	(-1.23)
	N	151	150	155	139
Textiles and Apparel	Coefficient	-0.01209	-0.02855	0.04017	-0.02836
	t-statistic	(-0.82)	(-1.09)	(0.91)	(-0.66)
	N	45	45	43	46
Services	Coefficient	-0.00121	-0.00081	-0.00136	-0.00065
	t-statistic	(-1.13)	(-1.50)	(-1.01)	(-0.88)
	N	249	250	248	246
Males	Coefficient	0.00281	-0.00194	0.00934	-0.01775
	t-statistic	(1.42)	(-0.62)	(0.75)	(-1.19)
	N	249	250	248	246
Females	Coefficient	-0.00017	-0.00067	-0.00184	0.00216
	t-statistic	(-0.10)	(-0.65)	(-0.65)	(0.97)
	N	230	226	226	224
Low Skill	Coefficient	0.00303*	-0.00127	0.00920	-0.02031
	t-statistic	(1.90)	(-0.45)	(0.80)	(-0.88)
	N	245	247	245	242
High Skill	Coefficient	-0.00160	-0.00012	-0.00208	-0.00116
	t-statistic	(-1.00)	(-0.06)	(-0.22)	(-0.31)
	N	239	241	239	238
Young	Coefficient	0.00168	0.00028	0.00994	-0.01981
	t-statistic	(0.73)	(0.08)	(0.85)	(-1.12)
	N	249	250	248	246
Old	Coefficient	0.00259	-0.00125	0.00455	-0.01342
	t-statistic	(1.12)	(-0.44)	(0.38)	(-1.11)
	N	249	250	248	246
Rural	Coefficient	0.00225	-0.00017	-0.00621	-0.00319
	t-statistic	(1.23)	(-0.12)	(-1.60)	(-1.13)
	N	148	149	147	146
Urban	Coefficient	0.00024	-0.00086	0.01621	-0.02437
	t-statistic	(0.10)	(-0.14)	(0.85)	(-0.91)
	N	156	156	160	149

t statistics in parentheses ="* p<0.1, ** p<0.05*** and p<0.01"

Table 7. Change in the female labor force participation rate after a US$100 increase in exports per worker (Percentage)

Type of worker		2009-2010	2009-2012	2009-2015	2009-2017
		(1)	(2)	(3)	(4)
All	Coefficient	-0.00236**	-0.00117	0.00466*	0.00107
	t-statistic	(-1.98)	(-0.74)	(1.66)	(0.39)
	N	249	250	248	246
Low skill	Coefficient	-0.00152	-0.00160	0.00562	-0.00389
	t-statistic	(-1.63)	(-1.44)	(1.62)	(-1.10)
	N	247	248	247	244
High skill	Coefficient	-0.00722***	0.00078	0.01194	-0.00507
	t-statistic	(-3.02)	(0.27)	(0.60)	(-1.09)
	N	244	245	243	242
Young	Coefficient	-0.00365**	-0.00189	0.00787	0.00082
	t-statistic	(-2.38)	(-0.79)	(1.53)	(0.24)
	N	249	250	248	246
Old	Coefficient	-0.00087	-0.00001	0.00249	0.00019
	t-statistic	(-0.67)	(-0.01)	(1.05)	(0.06)
	N	247	248	247	245
Rural	Coefficient	-0.00158	-0.00051	0.00321	-0.00079
	t-statistic	(-1.14)	(-0.25)	(1.03)	(-0.25)
	N	148	149	147	146
Urban	Coefficient	-0.00265	-0.00072	0.01007	0.00026
	t-statistic	(-1.39)	(-0.35)	(1.30)	(0.06)
	N	156	156	160	149

t statistics in parentheses ="* p<0.1, ** p<0.05*** and p<0.01"