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ON HOUSEHOLDS IN EGYPT, 1999-2012**

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**Working Paper No. 1109**

# **THE REGIONAL IMPACT OF TRADE LIBERALIZATION ON HOUSEHOLDS IN EGYPT, 1999-2012**

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## Abstract

This paper assesses the impact of trade liberalization in Egypt by comparing regions more exposed to trade opening compared to regions that were less exposed. As each region in Egypt (that we define as the urban or the rural part of a governorate) specializes in different production sectors, and tariff reduction varies by sector, the impact of trade liberalization on households depends on the region they live in and the sector they source their income from. This approach is relevant in the case of Egypt, as geographical mobility across regions is small. We find that trade liberalization in Egypt at a fast pace between 1999 and 2004 has been detrimental to households, while the subsequent liberalization between 2004 and 2012 had more limited effects. Poverty has declined in Egypt but less so in regions more exposed to tariff reduction. In the latter, household income has also been reduced, especially self-employment income and wages. Unskilled wages were the most affected but less so after 2004, a possible effect of labor reform in 2003. While activity and employment rates increased on average over the period, they did significantly more for skilled individuals in regions that were more protected by trade policy.

**JEL Classification:** F16, I32

**Keywords:** trade liberalization, household income, poverty

## ملخص

تقيم هذه الورقة تأثير تحرير التجارة في مصر عن طريق مقارنة المناطق الأكثر عرضة لافتتاح التجارة مقارنة بالمناطق الأقل تعرضاً. وبما أن كل منطقة في مصر (التي نحددها بوصفها الجزء الحضري أو الريفي للمحافظة) تتخصص في قطاعات إنتاجية مختلفة، وبتفاوت تخفيض التعريفات بحسب القطاع، فإن تأثير تحرير التجارة على الأسر يعتمد على المنطقة والقطاع التي يعيشون فيها فهي مصدر دخلهم. وهذا النهج ذو صلة في مصر، حيث أن التنقل الجغرافي عبر المناطق صغير. ونجد أن تحرير التجارة في مصر يسير بوتيرة سريعة بين عامي 1999 و2004 كان ضاراً بالأسر المعيشية، في حين أن التحرير اللاحق بين عامي 2004 و2012 كان له آثار محدودة. وقد انخفض الفقر في مصر ولكن أقل في المناطق الأكثر تعرضاً لخفض التعريفات الجمركية. وفي هذا الأخير، انخفض أيضاً دخل الأسر المعيشية، لا سيما دخل العمالة الذاتية والأجور. وكانت الأجور غير الماهرة هي الأكثر تضرراً ولكن أقل بعد عام 2004، وهو أثر محتمل لإصلاح العمل في عام 2003. وعلى الرغم من أن معدلات النشاط والعمالة زادت في المتوسط خلال هذه الفترة، إلا أنها كانت أكثر بكثير بالنسبة للأفراد المهرة في المناطق التي كانت أكثر حماية من قبل السياسة التجارية.

## 1. Introduction

This paper studies the case of Egypt, which has implemented a large trade liberalization and economic reform in the past twenty years, yet has not succeeded in keeping the pace of job creation in line with population growth. While poverty rate and inequality have declined in Egypt during 1999 and 2012, employment rate (the share of people with a job in total population) has also decreased. It seems that trade liberalization has not succeeded in creating jobs. Inequality remains high in Egypt, with a strong geographical component. The ranking of regions, between Cairo and the ports and rural areas of upper Egypt, has not changed much: mean income in Suez, the richest governorate in 2012, is 2.4 times the mean income in Sohag (the gap in 1999 between the poorest governorate, Sohag again, and the richest one, Port Saïd, was equal to 3).

Egypt is not an outlier. Actually, within-country inequality has increased in a number of countries in Latin and Central America, China or India (Goldberg and Pavcnik, 2007). Trade has been seen as an obvious culprit, as globalization has risen in parallel. Moreover, the effects of trade liberalization are shown to be heterogeneous according to regions, and within regions, between rural and urban areas, the initial characteristics of the labor force and the initial state of protection (what kind of industries were protected in the first place).

What does the theory tell us? The Stolper Samuelson theorem, in the Heckscher-Ohlin-Samuelson framework, predicts that in developing countries that are endowed with unskilled labor, trade liberalization would increase the wages of unskilled workers relative to skilled; therefore, inequality should decline in those countries. On the other hand, a Ricardian model with specific factors would predict that people will follow the fate of the industries they are working in: with trade liberalization, some sectors will grow, while others will recede; and their fixed factor (capital) as well. Workers, on the other hand, even in the losing industry, might still gain somewhat because of cheaper overall consumption. Recent models emphasize heterogeneity between firms (Melitz 2003). In that framework, trade tends to exacerbate inequality within sectors, between large firms that will benefit most from trade and will attract the most productive workers offering them higher wages, and small firms that will be left with less productive workers at lower wages or will simply leave the market because of foreign competition. Workers previously employed in those least productive firms may have to switch to the informal sector or unemployment (Helpman and et al., 2016).

The literature on trade and income distribution emphasizes the impact on manufacturing industry and wages, because theoretical trade models were devised on industrialized countries, with most of the gain in productivity occurring in manufacturing industry thanks to increasing returns to scale. However, in developing countries, most households are located in the rural and informal sectors. In that context, trade liberalization hits households through direct and indirect effects (Winters, McCulloch and Cirera, 2001). Direct effects go through products (their prices, quantities and number of varieties) and factors markets (wages, employment, and new job opportunities). Indirect effects concern compensating changes in government revenues and social spending, such as oil or food subsidies.

Porto (2006) studies the impact of Mercosur liberalization on Argentina's households in a general equilibrium framework, taking into account the indirect impact on the non-tradable sector. He finds that Mercosur benefitted the poor, because their wages ended up being *more* protected as Mercosur common external tariff on food was actually higher than Argentina's initial tariff. Porto assumes a small open economy, where local prices of traded goods are entirely driven by international prices. Nicita (2009) modifies this assumption, in his study of Mexico between 1989 and 2000. He estimates a pass-through equation that represents the imperfect transmission of international prices and tariffs to local domestic prices. The pass-through depends on the distance of local communities to the border with the USA. He also

takes into account farm activities. He finds that the Mexican trade liberalization and Nafta have benefitted all households, and more the rich. Ural-Marchand (2012) applies Nicita's framework on India; she distinguishes between regions and, within regions, between rural and urban areas. She finds that liberalization was pro-poor and favored the urban sector more than the rural sector.

Another strand of the literature computes an indicator of trade liberalization at the local level. This is the direction opened by Topalova (2007, 2010) on the impact of trade liberalization in India on poverty at the district level. It is also the methodology that we use in this paper. The identification strategy is based on the difference in industrial composition across districts, that result in variation in the change of tariffs at the regional level. Topalova finds that poverty declined overall in India in the 1990s, but declined less in rural areas exposed to larger reduction in tariffs or Non trade barriers. Her findings are not corroborated in Hasan, Mitra and Ural (2007), who perform a similar exercise but on a more aggregate dataset at the Indian state level. Kovak (2013) grounds Topalova's methodology on a Ricardian trade model with specific factors (and a homogeneous labor force) that also account for non-tradable sector. He examines the impact of trade liberalization in Brazil on wages at the micro-regional level. He finds that wages grew slower in micro-regions facing larger tariff decline and that wages in the non-tradable sector move with those of the traded sector. Kovak states that his setting may be used for other labor outcomes.

Dutt, Mitra and Ranjan (2009) explores the impact on unemployment. They stress the difference between a Ricardian model of trade where factors are sector-specific and a Hecksher-Ohlin model where trade comes from differences in endowments. They add to these trade models, a bargaining model on wages. In the Ricardian model, trade liberalization should decrease unemployment, while in a Hecksher-Ohlin model, it should do so only in a labor-abundant country. They test their theory on cross-country data. Felbermayr, Prat and Shmerer (2011) find a similar unemployment-reducing effect of trade liberalization, which is driven by productivity growth, also tested on a cross-country dataset. Hasa, Mitra, Ranjan and Ahsan (2012) model unemployment as arising from search frictions and costly labor mobility in a Ricardian framework. Unemployment does reduce in the sector with the larger tariff reduction, but the impact on economy-wide unemployment depends on the sectoral composition of the economy. They estimate their model on Indian states. They find that unemployment was reduced in states with larger tariff reduction, especially in states with flexible labor regulation and a large share of net export sectors.

In developing countries, a typical household comprises several members who pool their earnings and often do not earn wages under a formal contract. Hence, it is interesting to go beyond wage and unemployment, and examine additional outcomes such as self-employment (on farm or off-farm) or total income. Castilho, Menendez et al. (2009) studies the effects of trade-liberalization in Brazil since 1988 on poverty and inequality in urban and rural areas. They use household level micro-data in order to construct an indicator of trade policy at the state level and within the state, comparing rural and urban areas. They consider households' income and not only wages. The study concludes that trade liberalization results in higher poverty and inequality in urban areas, while it may be associated with reduced inequality in rural areas. Edmonds, Pavcnik and Topalova (2010) examine the impact of trade liberalization on educational outcomes in India.

In this paper, we examine at the regional level the micro linkages that go from trade liberalization to households' income from various sources and poverty. We put the emphasis on regional inequality. We thus follow Topalova (2010) and look at the relative impact of trade liberalization at the governorate level (distinguishing between rural and urban areas of

each of the 27 governorates in Egypt).<sup>1</sup> We estimate a difference in difference model. Our identification strategy relies on the varying degree of regional exposure to trade. Indeed, a region (that we define as the rural or urban area of a governorate) is more or less exposed to trade liberalization depending on its initial production specialization, as each product had a different tariff level and reduction over time. Assuming that the initial tariff level and the size of its subsequent reduction is not correlated with social outcomes in each region, the impact of trade liberalization may be assessed by comparing the fate of regions more exposed to trade opening compared to regions that were less exposed. For our identification strategy to hold, geographical mobility across regions must not be too high, which we verify in the case of Egypt.

Our methodology allows to get spatially detailed micro level results. We focus on the heterogeneity of impact, between rural and urban part of each governorate and between skilled and non skilled individuals. We also look at many outcomes computed at the household level: income and employment disaggregated by types of jobs (wage or self-employed) and poverty. One limit of our method is that we measure the *relative* effect of liberalization on regions that were more or less exposed to trade. We do not consider macro linkages that would go through the overall stabilization of the economy and growth. These are accounted for but as they are likely to impact each region the same way, we do not analyze them. We do not answer the question if Egypt has benefitted from trade liberalization as a whole. Instead, we ask if certain areas or certain groups of people within these areas, have more benefitted or have lost more, compared to others, due to liberalization. We think that our method is suited in the case of Egypt, because of limited spatial mobility.

Our results show that trade liberalization in Egypt at a fast pace between 1999 and 2004 has been detrimental to households, while the subsequent liberalization between 2004 and 2012 had more limited effects. Poverty has declined in Egypt but less so in regions more exposed to tariff reduction. In those regions, households' income has declined, especially self-employment income and wages. Unskilled households wages were the most affected but less so after 2004, a possible effect of labor reform in 2003. While activity and employment rates increased on average over the period, they did significantly more for skilled individuals in regions that were more protected by trade policy. A higher level of trade protection also reduced more regional unemployment of unskilled individuals. Moreover, we find that trade liberalization had no significant impact on migration across regions in the short and medium run.

We first present trade liberalization in Egypt and sketch the regional differences in poverty and employment (section 2). We then present the data and the methodology we use (section 3), before turning to the results (section 4).

## **2. Background**

### ***2.1 Trade reform in Egypt***

Egypt has applied a gradual approach to trade liberalization. The first wave of liberalization was initiated in 1986 and was continued by the Economic Reform and Structural Adjustment Program (ERSAP) in 1991. Serious trade liberalization efforts really began with the launch of the WTO in 1995 and the signing of several multi and unilateral trade agreements in the mid-1990s. In 1998, most tariffs were lowered by 5 to 10 percent and the maximum tariff rate (excluding alcoholic beverages) was reduced from 110% at the end of the 1980s to 40% in

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<sup>1</sup> The methodology initiated by Nicita (2009) that we have also used in the case of Indonesia (2015), is to estimate the pass-through of tariffs to local prices. One can then use the results of this first step and infer the impact of the change in local prices due to trade, on household related outcomes. However, such a route was not possible in the case of Egypt, because we could not access data on prices disaggregated enough (by item and by governorate). Hence, we use instead information on households, for many years, in census and surveys.

the end of 1990's (Zaki, 2011). Finally, as part of overall economic reforms (along with financial liberalization, bank privatization, and deregulation), the Egyptian government initiated a second wave of liberalization in 2004: a new tariff structure was applied, cutting the number of tariff brackets from 27 to 6; all customs service fees and charges on imports were removed and the WTO-based customs valuation rules were implemented. Hence, over the last two decades, the country has made significant developments in its tariff structure: the MFN applied rate decreased from 34.6% on average in 1994 to 20% in 2004 and 16.8% in 2012<sup>2</sup>. Most of the decrease occurred before 2004. Besides tariff reduction, trade liberalization also encompasses restructuring customs procedures, the implementation of the WTO's valuation of products and the removal of all fees supported by imports (WTO 2005).

Tariff rates are not homogeneous across sectors. Figure 1 shows the MFN applied rates (i.e. the tariffs that apply to imports from all WTO member countries), disaggregated by sectors. Rates are highest for tobacco and beverages (700% driven by a maximum rate at 3000% for alcoholic drinks). Next come food imports (with a 38% rate in 1999 reduced to 12% in 2010) followed by manufacturing goods (22% in 1999 down to 8.6% in 2010) and agricultural products (16.8% in 1999 and 2% in 2010). Mining products are least taxed but they represent less than 5% of total imports, compared to 2/3 for manufacturing goods, and around 10% each for food and agricultural products (Figure 4).<sup>3</sup>

The Egyptian tariff structure exhibits positive escalation, meaning that tariffs are lower for inputs and higher for final products. Hence, final products are more protected than raw commodities or intermediate goods. The escalation is more pronounced in the food industry, textile and apparel and wood processing industries (WTO 2005).

Imports in Egypt are not subject to licenses or quotas. Hence, this paper will focus on tariffs reduction. Actual tariffs are also subject to concessions and tax exemptions, that are granted under numerous schemes (to ministries or agencies, state-owned enterprises, free zones, assembly industries, limited-liability and joint-stock companies under Law 159/1981..) and discretionary decisions (WTO 2005). As no data is available on these individual schemes, this paper does not consider them.

In this paper, we define trade liberalization as the reduction in the effective tariff rate on imports. We thus include the preferential agreements that Egypt has signed: the EU partnership, which has entered into force in 2004 with a fifteen-year phase-in; the Greater Arab free trade area (GAFTA) with the members of the Arab League, which entered into force in 1998<sup>4</sup>; the Common Market for Eastern and Southern Africa (COMESA)<sup>5</sup> or more precisely, the subset of eight COMESA countries, including Egypt, that have started implementing the preferential access in 2000; and the agreements with the European Free Trade Area<sup>6</sup>. The effective tariff rates that enter the estimations are summarized in Figure 2 by broad product categories. The weighted effective rates are lower than MFN simple averages for two reasons: first, Egypt grants preferential access (below the MFN rate) to partners that are members of a Free trade agreement; second, the tariffs are now weighted by actual import values: hence, a high rate might be mitigated because of low level of imports. Overall, the evolution and rankings across products is the same as for the general MFN tariff;

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<sup>2</sup> Source: TRAINS, simple average (Most Favored Nation applied tariff weighted by the number of tariff lines).

<sup>3</sup> According to WTO definition of agricultural and industrial sectors, the MFN applied rate on agricultural sector has decreased from 77.7% in 1999 to 66.6% in 2012, while the rate on industrial sector dropped from 21.1% to 9.3%. The WTO definition of agriculture includes some manufacturing industries: food and beverages, hence, it's very high protection rate.

<sup>4</sup> Algeria Bahrain Comoros Djibouti Egypt Iraq Jordan Kuwait Lebanon, Libya Mauritania Morocco Oman State of Palestine Qatar Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab emirates, Yemen

<sup>5</sup> Burundi Comores DRC Djibouti Egypt Eritrea Ethiopia Kenya, Libya Madagascar Malawi Mauritius Rwanda Seychelles Sudan Swaziland Uganda Zambia Zimbabwe

<sup>6</sup> Iceland, Liechtenstein, Norway, Switzerland



the only exception is that effective tariff rates on food imports are not higher than the tariff rates on manufacturing goods after 2010. If anything, the choice of considering effective tariff rates in this paper is likely to underestimate the impact of trade liberalization.

Trade liberalization appears as exogenous. The reform has broadly followed a simple rule, advocated by the WTO during the Uruguay round negotiation and which applied to all countries in the same way: tariffs rates should be decreased so as to converge. That means that high initial tariff should be reduced more than low initial tariff. It seems that it is indeed what happened in Egypt (Figure 3). We draw the change in tariff rates as a function of the initial rate, each point representing a sector. The scatter points are placed along a negative line. Hence, the size of tariff reduction seems to be broadly determined by their initial level and not by interventions in recent years that would have pledged for a differential treatment.

Imports have increased in Egypt from 20 billion USD in 2001 to 70 billion in 2012 (Figure 4). The stagnation of imports values in dollars in the early 2000s despite the trade liberalization is due to the depreciation of the Egyptian pound. The global crisis has translated in a 14% drop of imports in 2009. The share of imports over GDP has increased steadily, from 25% in 1998 to 30% in 2004; it has peaked at 39% in 2008 before receding to 26% in 2012 (Figure 5).

## ***2.2 Regional differences in income, employment and poverty<sup>7</sup>***

Income differs by regions. Figure 6 presents total household income (panel a) by regions between 1999 and 2012, as well as income coming from wage earnings (panel b) and self-employed activities.<sup>8</sup> Households in the Cairo area are the richest, followed by households in Port Saïd, Alexandria and Suez; next comes the urban part of Lower and Upper Egypt and last, the rural areas. Incomes seem to converge over time, with a drop in average household income in Cairo and a rising trend in other regions. Self-employed income is higher than wage earnings, especially in Cairo but they have sharply receded between 1999 and 2010.

We can go further and distinguish between individuals within a household. We define as skilled, an individual who has at least a secondary education and as unskilled, an individual who has a primary education at most. The share of active population (the persons either working or seeking a job) is less than 70% in all regions of Egypt (for men and women together). The share has decreased during 1999 and 2012, the more so for unskilled workers in rural areas. However, in the regions of Cairo and Alexandria, the activity rate of unskilled workers has increased (panel a). The employment rate (here, on total population) mirrors the evolution of the activity rate. The figure shows a dual labor market, where skilled individuals have a higher employment rate than unskilled individuals. The gap between the two groups is especially wide in the Upper region (where skilled in the urban area have a 60% chance of being employed, while the rate is only 40% for unskilled) (panel b). Unemployment rate (over the active population) is higher for the skilled than for the unskilled (it is also possible that a skilled individual might afford being unemployed, contrary to an unskilled person). However, the unemployment rate has dropped sharply for skilled between 1999 and 2012, while it has increased for unskilled (panel c).

Poverty rates by regions are a mirror image of the level of income: the regions near Cairo and Alexandria have the lowest headcount while the rural upper region hits an astonishingly high rate of 45% of the population with less than 2 USD a day. Between 1999 and 2012, the poverty rates have decreased in Egypt, the more so in the lower and upper Egypt. The ranking

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<sup>7</sup> The main text is based on the figures; detailed results are available in Appendix (tables A1-A3)

<sup>8</sup> For clarity sake, we present the outcomes by broad regions. In the econometric regressions, the level of observation will be the urban or rural part of each governorate.

between these broad regions have changed somewhat: in 2012, the highest poverty rates are in the Upper region (both urban and rural).

In this paper, we will relate the evolution of households' outcomes to how their region was affected by trade liberalization. The channel we consider go through prices and earnings. All households in a given region will be hit the same way on the consumption side (although some difference might come from variation in the consumption pattern between rich and poor households). Each region has a different production structure and thus a different exposure to trade: households will be affected in a different way, depending on the region they are living and the sector they are working in.

The sectoral distribution of employment differs widely by regions (Table 1)<sup>9</sup>. Agriculture, forestry and hunting account for half of total employment in rural lower Egypt and even 59 percent in upper Egypt, and still about 10 percent or less in the urban regions. Manufacturing accounts for about 20 percent of employment in Cairo, Alexandria, Suez, Port Saïd and Urban lower Egypt, but only 13 percent in Urban upper Egypt and less than 10 percent in rural areas. Wholesale, retail trade and repair services account for about 15 percent of employment in urban regions and less than 5 percent in rural areas. Similarly employment in construction and public administration is higher in urban areas than in rural regions.

The paper, as will be explained below, is based on a strict relationship between the employment structure of each region and the households living in this very region. For this inference to hold, we need to check that there is no much migration between the regions (that could be induced by better employment prospects). Table 2 provides descriptive statistics for rates of cross-governorate migrations. Migrations are based on data from the 1996 and 2006 censuses. Panel (a) reports migration rates by gender and area type, while panel (b) reports those by gender and level of qualification (primary or no education vs. secondary or higher education).<sup>10</sup> Rates of migration across-governorates are low and do not seem to be higher in 2006 than in 1996. Among the urban population, 4.7 percent of men and 4.5 percent of women have migrated across governorates in the past 10 years in 2006 (the corresponding rates were 6.3 and 6.9 in 1996). Among those 3.0 percent of men and 0.2 percent of women migrated for work-related motives (against 3.2 and already 0.2 percent in 1996). As expected, migration rates in the past 5 years are even lower, with 1.7 percent of men having migrated for work over that period. Rates of migration are also lower for the rural population. In 2006, 1.2 percent of men and 1.5 percent of women ever migrated across governorates (against 2.8 and 4.6 percent in 1996) and, among them, 0.6 percent of males and no women did so for work motives. Hence rates of cross-governorate migration seem low in Egypt, in particular during the late 1990s and early 2000s (we do not have data after 2006). Panel (b) reports migration rates disaggregated by levels of qualification. Rates of migrations do not vary much with levels of qualification. Hence, migration does not seem to be prevalent in Egypt. It is thus not likely that trade liberalization has led to a reallocation of labor through spatial mobility; this rules out a possible concern on the choice of our methodology.

### **3. Empirical Strategy**

#### **3.1 Data**

We use several sources of data for the analysis. The Household Income, Expenditure and Consumption Survey (HIECS) provide information on the outcomes of interest, households income and individual employment. We use the five most recent rounds of these budget

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<sup>9</sup> Table 1 provides the structure of employment by industry and region – for exposition purposes, the table presents aggregated data at the ISIC 2-digit level for six large regions while we actually use the more disaggregated ISIC 3-digit level and 50 regions in the econometric analysis.

<sup>10</sup> The 1996 population census dataset we obtained from IPUMS does not contain a harmonized variable for educational attainment.

surveys, namely 1999/2000, 2004/5, 2008/9, 2010/11 and 2012/13.<sup>11</sup> We use the ERF harmonized version of these datasets, which consist in full samples of about 24,000 households for the three first rounds and 50% samples of about 8,000 households for the two latest ones. With these repeated cross-sectional surveys, we construct a panel of 50 regions defined by the governorate (Egypt has 27 governorates) and type of area (urban or rural – the four governorates of Cairo, Alexandria, Port Saïd and Suez are entirely urban). The surveys are representative for each of those regions.

We take the total annual value of labor incomes at the household level and distinguish between wage incomes and self-employment incomes, deflated to January 2005.<sup>12</sup> We construct measures of poverty based on international poverty lines of 1.25, 2 and 2.5 PPP US dollars a day using the 2005 PPP exchange rate and consumption price inflation obtained from the IMF Middle East and Central Asia Department (MCD) regional economic outlook database.<sup>13 14</sup> Employment and unemployment status are measured at the individual level.<sup>15</sup>

The HIECS surveys also provide information on the governorate and type of area (urban or rural) of residence, and several household and individual characteristics – among those, we use the level of education and define unskilled as individuals with no more than primary education and skilled as individuals with at least secondary education. In turn, a household will be defined as skilled (resp. unskilled) if the head is so. All outcomes are averaged at the level of governorate and type of area (rural or urban). The analysis of heterogeneity will also consider the skill composition of the labor force.

The Egyptian population census of 1996 provides the allocation of employment across production sectors before the trade liberalization of the 2000s, at the level of 3 digits ISIC-revision 3 industries (representing 162 activities), for each region (rural or urban area of governorates).

The data on tariffs are obtained from the TRAINS database. TRAINS provide an aggregation at the ISIC-revision 3, 3-digit level of the original classification of tariff lines at the Harmonized System (HS) 6-digit level (which accounts for approximately 5 000 tariff lines). As a result, the effective tariff rates are available for 70 (traded) product categories for each year preceding the household budget surveys, i.e. 1999, 2004, 2008, 2010 and 2012.

The 1996 census, together with the one of 2006, also provides information on migrations. We compute the shares of individuals aged 20 to 59 who live in a different governorate than the one where they were born, who have migrated across governorates in the past 10 and 5 years, and who have migrated across governorates for job-related reasons.

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<sup>11</sup> Each of these surveys was fielded during the second semester of the first year indicated in their (e.g. end of year 2004 for the 2004/2005 wave) and the first semester of the second year (e.g. beginning of year 2005 for the 2004/2005 wave).

<sup>12</sup> In a previous version of the paper, we have also considered consumption, defined as the total annual value of consumption at the household level, deflated based on January 2005 as well as food and non-food consumption, including home-produced goods and private transfers. Results are similar and available on request.

<sup>13</sup> National poverty lines were constructed in World Bank (2007), but those depend on local prices (so as to measure the local cost of calories based on the local structure of consumption). As we have access to local prices and local poverty lines only for 1999 and 2004, we hence prefer to rely on international poverty lines. In January 2004, the national poverty line was close to 2 dollars a day.

<sup>14</sup> According to Ferreira et al. (2015, World Bank PRWP 7432), the latest 2011 revision of PPP (the price data collected by the International Comparison Program) seems inconsistent with the former 2005 revision for Egypt, which should be used preferably.

<sup>15</sup> We use the definitions from the ERF HIECS harmonized database. A broad employment variable covers all individuals who, during the reference period (the week preceding the survey), carried out any employment (any type or any extent) – even just an occasional hour of paid work or irregular unpaid family work (ILO definition). We then exclude working students and housewives. The unemployed are individuals who state that, during the reference period, unemployment is his/her primary activity (e.g. unemployed and actively searching for a job) or who are registered as unemployed and do not indicate significant participation in any other activity.

### 3.2 Measurement of regional exposure to trade liberalization

Our empirical strategy follows Topalova (2010). We construct a measure of regional exposure to trade liberalization. This is the mean import tariff that is applied to the goods produced by the industries of a region (the urban or rural area of a governorate). This mean tariff is computed as the effective tariff at time  $t$  weighted by employment structure in 1996.

Regional import tariffs  $Tariff_{r,t}$  are then constructed as:

$$Tariff_{r,t} = \frac{\sum_i Empl_{r,i,1996} \cdot tariff_{i,t}}{Empl_{r,1996}} \quad (1)$$

where  $Empl_{r,i,1996}$  is the employment in industry  $i$  in region  $r$  in 1996,  $Empl_{r,1996}$  is total employment in the region in 1996 including non-traded activities, and  $tariff_{i,t}$  is the effective tariff applied to industry  $i$  in year  $t$ .

The regional tariff is *scaled* in the sense that non-traded industries, which are assigned a zero tariff by definition, are taken into account: a higher share of employment in non-traded industries will lower the regional tariff. Hence, the scaled tariff is sensitive to the share of people working in non-traded activities. The latter might possibly be related to initial poverty, as poor people are more likely to work as construction workers or household servants. Thus the link between the scaled tariff and initial regional poverty could confound the impact of trade liberalization. Hence, following Topalova (2010), we will also consider *non-scaled* tariffs on imports that are defined on traded industries only,  $TrTariff_{r,t}$  :

$$TrTariff_{r,t} = \frac{\sum_i Empl_{r,i,1996} \cdot tariff_{i,t}}{\sum_i Empl_{r,i,1996}} \quad (2)$$

Here, the summation (and averaging) is computed over traded industries only, so that workers in non-traded industries are ignored.

Table 3 gives the means of scaled and non-scaled tariffs on imports by broader region (these are simple averages over the different governorates within a region). Several points should be denoted. First, tariffs are lower in upper than in lower Egypt throughout the analysis period, but the gap declines. Second, while they were similar prior to the reforms, regional tariffs have proportionally declined more in rural regions than in urban ones due to the stronger tariff reduction on agricultural and food products than on manufactured goods. For instance, regional tariffs have almost been divided by three in Rural Lower or Upper Egypt, while they have been divided by about two in urban regions. Third, scaled tariffs (on traded goods only) are 3 to 4 times smaller than non-scaled ones in urban areas and about half of the latter in rural areas: this is due to the larger relative size of the non-traded industries in cities.

### 3.3 Regional exposure to trade liberalization and regional outcomes

We are interested in estimating the effects of the trade liberalization documented above on the welfare of households. The trade liberalization was particularly significant between 1999 and 2004, with important reductions in tariffs in 2004 in particular, and between 2004 and 2008, with significant reductions in tariffs in 2007 and 2008; the decrease continued at a slower pace between 2008 and 2012. To the extent that these large reductions of tariffs were exogenous to the decisions of industries because they were driven by multilateral considerations (the Single undertaking of the Uruguay Round), this setting provides a natural experiment that allows investigating the causal effects of trade liberalization on households' welfare.

As in the Indian context examined by Topalova (2010), because the structure of the local economy varied in the late 1990s, regions were exposed with different intensities to trade liberalization. In particular, given that tariffs were reduced more for agricultural than industrial imports, regions where agriculture and food industries accounted for a higher share of initial employment were more exposed to trade liberalization than ones initially more specialized in manufactures. We can then examine the effects of liberalization by comparing the variations in households' outcomes before and after the reform between regions in which production sectors were confronted to higher reductions in import tariffs and regions in which production sectors were less exposed to international trade competition.

Our methodology does not enable to measure the level effect of liberalization on poverty or employment in Egypt as a whole. Rather, it measures the relative effect of liberalization on regions more or less exposed to trade.

Figure 9 and 10 illustrate the variation underlying our estimation strategy. Each figure draws by governorates, distinguishing between their urban or rural parts (a "region"), the reduction in the regional (scaled) tariff between 1999 and 2012 on the X-axis, against the change in households' outcome on the Y-axis. The figure shows that the regional tariff decreased most in the rural part of the Damietta governorate, and least in the urban part of El Wadi-El Gadid governorate, Cairo being in the middle. The estimation strategy relates these regional tariff reductions to changes in regional households' outcomes. For instance, households' income has increased in the cities of Luxor governorate but decreased in Sinai (Figure 9). Poverty rates (here defined with a threshold at 2.5 USD), have decreased everywhere in Egypt, and most in rural Assiut (Figure 10). The figures are a mere illustration of the variation in the data that will be used in the estimations. Without controlling for regional fixed effects and the remaining endogeneity of the tariffs, it is difficult to infer any result from the simple inspection of the correlation between regional outcomes and regional tariffs.

### 3.4 Estimation strategy

In order to investigate the differential local responses to varying exposures to trade liberalization, we first consider, in a regression framework, the following baseline econometric model:

$$y_{r,t} = \alpha + \beta \text{Tariff}_{r,t} + \text{year}_t + \delta_r + \varepsilon_{r,t} \quad (3)$$

where  $y_{r,t}$  is the region level welfare outcome of interest at date  $t$ , and  $\text{Tariff}_{r,t}$  is the scaled import tariff on goods produced in region  $r$  at date  $t$ . The coefficient of interest is  $\beta$ , which captures the average effect of trade protection on regional welfare outcomes. Period fixed effects,  $\text{year}_t$ , control for macroeconomic shocks or trends, common to all regions. Region fixed effects,  $\delta_r$  control for time-invariant heterogeneity in welfare outcomes across regions. Note that this strategy then identifies the differential effects of trade liberalization across regions, but does not identify the aggregate mean effect for the country.

Tariff reduction was larger during 1999-2004, while the decrease was more moderate after 2008. More importantly, a labor reform was adopted in 2003 and implemented in the following years. Such reform is likely to modify the effects of trade liberalization on local labor markets as it could ease private sector expansion and labor reallocation from sectors hit by trade competition towards sectors benefitting from market access. Hence, for the empirical analysis, we add a dummy for the period 2004-2012.

One limitation of the baseline econometric model above, as emphasized by Topalova (2010), is that the share of employment in non-traded industries should be related to initial poverty and could drive the relationship between these tariffs and welfare outcomes. To deal with this, we follow the methodology she suggested and instrument scaled tariffs by non-scaled

tariffs that are computed on traded industries only. Variations in non-scaled tariffs are independent of the size of the non-traded sector and depend only on the composition of the traded sector and tariffs applied to it. Hence, non-scaled tariffs provide a good instrument to scaled tariffs, since they are correlated with them but uncorrelated with regional initial poverty:

$$\text{Tariff}_{r,t} = \alpha + \beta \text{TrTariff}_{r,t} + \text{year}_t + \delta_r + \varepsilon_{r,t} \quad (4)$$

with region and year fixed-effects, for 1999-2004 and 2004-2012 respectively.

We also use a second set of instruments derived from the rule that was adopted on tariff reduction at the Uruguay round. The tariff reduction was meant to decrease the dispersion of tariffs as well as their overall level. Hence, the larger tariff cuts occur for industries that were initially more protected. As Topalova, we hence instrument tariffs after trade liberalization by pre-reform tariffs and their interaction with post-reform period; we use non-scaled tariffs to account for the potential endogeneity in the size of the traded-goods sector:

$$\text{Tariff}_{r,t} = \alpha + \beta \text{TrTariff}_{r,t} + \theta \text{year}_t \text{TrTariff}_{r,1999} + \text{year}_t + \delta_r + \varepsilon_{r,t} \quad (5)$$

Results of the first-stage estimation show a good correlation between scaled tariffs and the instruments and are reported in table A4 in the Appendix.

#### 4. Results

Using the models above, we estimate the effects of trade liberalization on poverty and household income. To document the mechanisms at play, we then investigate the effects on employment and migration outcomes of individuals. We report the estimates for the entire period 1999-2012 and allow for a differentiated response following the 2003 labor reform. In addition to the results for the entire sample, we report the ones for the two sub-groups of skilled and non-skilled households and individuals within households taken separately.

##### 4.1 Trade liberalization and poverty

Table 4 reports the estimates of the effects on regional poverty rates. In a context of overall decrease of poverty, the estimates suggest that, compared to other regions, poverty rates (at any poverty line) diminished in regions relatively more protected by trade policy (and thus increased in regions more exposed to trade liberalization). The estimated magnitudes suggest that an increase of regional import tariff by 10 percent reduces 2 dollars a day poverty rate by 2.6 percent and 2.5 dollars a day poverty rate by 3 percent. After 2004, the negative impact of trade liberalization is mitigated: an increase of regional import tariff by 10 percent reduces the 2 dollars a day poverty rate by 1.8 percent instead of 2.5 percent previously.

These results hence suggest that the rapid trade liberalization of the 1999-2004 period has been detrimental on poverty while the subsequent continued liberalization of the 2004-2012 period had more limited effects.

##### 4.2 Trade liberalization and household income

Table 5 reports the estimates of the effects of trade liberalization on regional mean incomes, considering total annual household income and then distinguishing between wage income and self-employment income. The estimates indicate that higher levels of regional protection from imports by trade policy increased wage earnings and income from self-employment (in the first instrumentation IV-1). A 10 percent higher regional tariff increases regional wages by 6.2 percent and self-employment income by 0.8 percent. This points again to a negative effect of trade liberalization.

Unskilled households are affected more through their wage earnings: a 10 percent higher regional tariff increases unskilled wage by 11 percent. Skilled households are affected

through the income coming from self-employment: a 10 percent higher regional tariff increases skilled self-employed income by more than 9.6 percent.

The labor reform succeeds in mitigating the negative effect of trade liberalization: after 2004, a higher regional tariff by 10 percent increases wage by 4 percent instead of 6.2 previously. The mitigating effect is mostly felt by unskilled households.

The estimates confirm the negative effects of trade liberalization on households' income, with significant declines of self-employment income and wages in regions more exposed to liberalization. Unskilled households wage are the most affected but less so after 2004.

#### ***4.3 Trade liberalization and employment***

We now turn to the mechanisms behind these negative effects of trade liberalization on household income. A first channel through which trade policy affects individuals is by creating or destroying jobs. Table 6 reports the estimates of the effects of trade liberalization on employment and unemployment. The estimates suggest that, while activity and employment rates increased on average over the period, they did significantly more for skilled individuals in regions that were more protected by trade policy. Where regional tariffs are 10 percent higher, the employment rate of skilled is 1.4 percent higher.<sup>16</sup> Estimates also suggest that a higher level of trade protection reduces more unskilled unemployment. There is no differential evolution after 2004. .

These results hence suggest that trade liberalization did affect the supply of jobs, in the sense that the progress observed during that period was more moderate in regions more exposed to trade opening. The liberalization that occurred after 2004 doesn't seem to have affected employment outcomes.

#### ***4.4 Trade liberalization and migration***

Section 2 has shown that there are few cross-regions migrations during the period. Yet, we can examine the relationship between regional exposure to trade liberalization and migration rates of the population in each region (defined as inward migration). Table 7 presents estimates based on the cross-sectional data from the 2006 census, using a simple OLS specification and an IV specification with scaled tariffs instrumented by non-scaled tariffs. The estimates show no evidence of any statistically significant effects of relative regional exposure to trade liberalization on local migration rates. Neither regions whose production sectors were more protected, nor those that were more exposed to trade liberalization receive any more migrants than other regions. This finding justifies the choice of our methodology on estimating the regional impact of trade liberalization.

### **5. Conclusion**

We investigate the effects of trade liberalization in Egypt between 1999 and 2012 by comparing the variations in households' income and employment before and after the trade reforms between regions (defined as rural versus urban area of each governorate). We compare regions where the production sector faced a larger reduction in import tariffs and regions where the production sectors remained protected. Our results suggest that the fast trade liberalization between 1999 and 2004 has been detrimental to households' income, while the subsequent liberalization at a slower pace between 2004 and 2012 had more limited effects. We also find that self-employed skilled households and unskilled wage earners were more affected in the early 2000s. The labor reform in 2003 and the lower pace of subsequent trade liberalization has alleviated the impact on unskilled wage earners. We have then examined the mechanisms at play by documenting the effects on employment and migration outcomes of individuals in regions more exposed to trade liberalization. The trade

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<sup>16</sup> Activity rate include working students and housewives, while employment excludes these two groups.

liberalization seems to have negatively affected the supply of jobs, in the sense that the progress in employment rates was more moderate in regions more exposed to trade opening. On the other hand, cross-governorate migration rates have remained low: no spatial reallocation of labor did seem to have occurred in response to trade liberalization.

Understanding the social impact of trade reform matters for policies; first, as trade liberalization creates losers and gainers and adds uncertainty of one's fate, the support for reform could dwindle. Moreover, a careful assessment of the heterogeneous impact of trade is needed as groups that are more vocal in demanding redistribution are not always those that are the most affected by the trade shock. The differences are not only between rich and poor, or skilled and unskilled, but also between localities in Egypt.

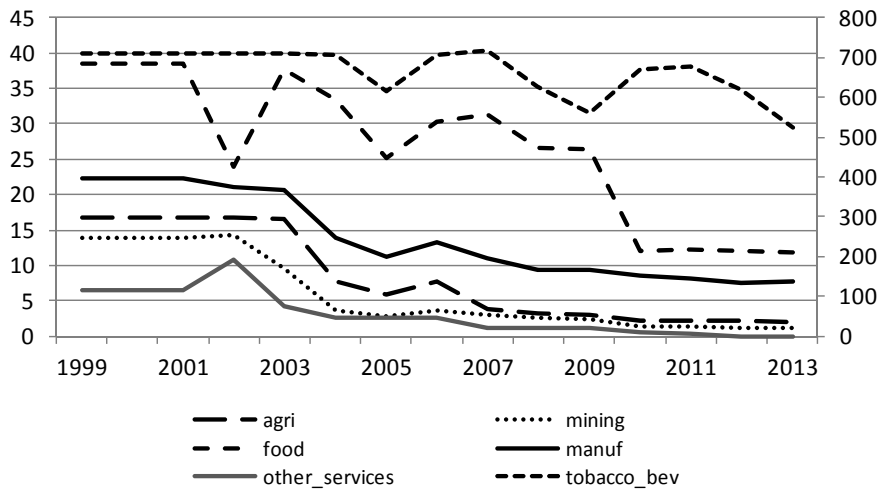


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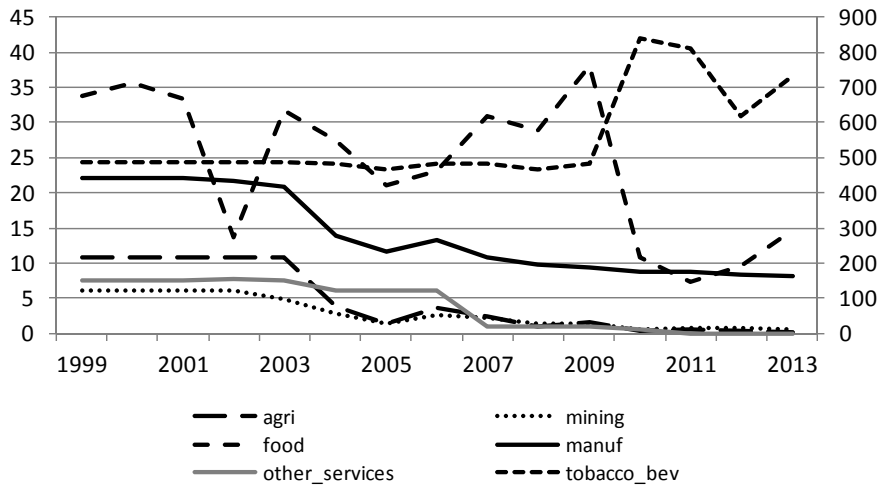
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**Figure 1: Egyptian MFN Import Tariffs, 1999-2013 - Simple Average**



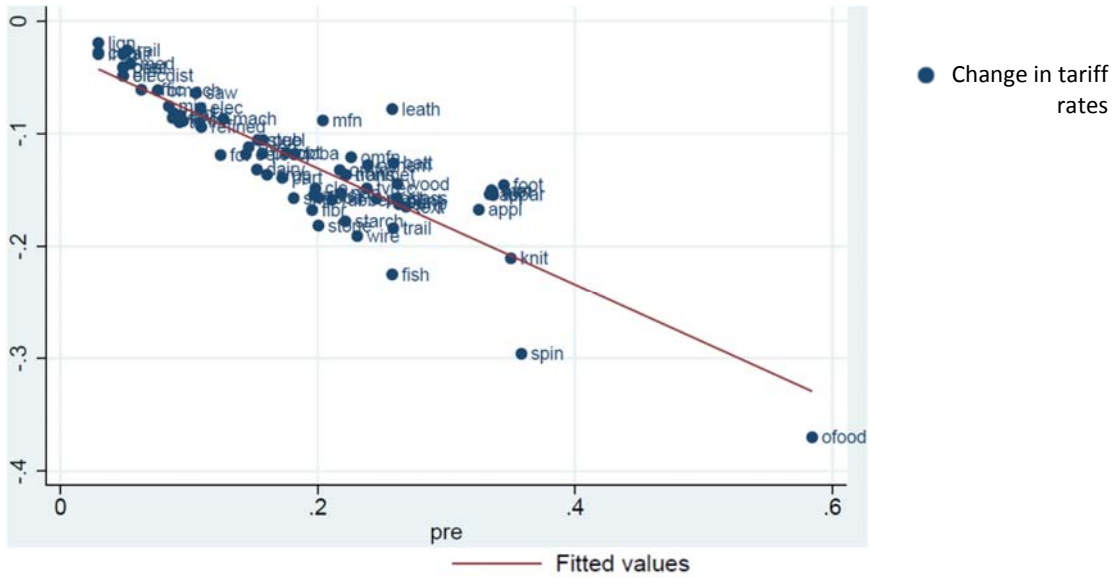
Source: TRAINS. Applied MFN tariffs at the ISIC-rev3 3 digit level, weighted by the number of tariff lines (simple average). Tariffs on Tobacco and beverages are read on the right axis; tariffs on agriculture, mining, food and manufactured goods are read on the left axis.

**Figure 2: Effective Import Tariffs, 1999-2012 (including preferential regimes), Weighted by Import Values**



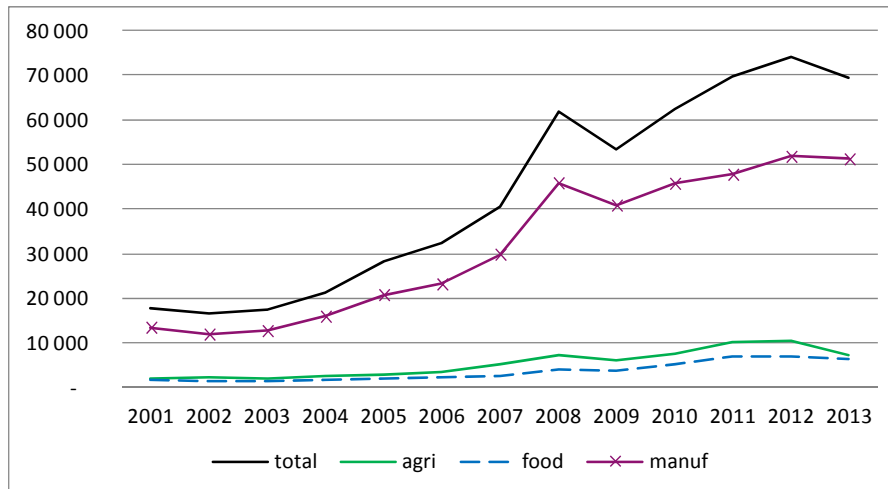
Source: TRAINS. Effective tariffs at the ISIC-rev3 3 digit level, weighted by bilateral imports values in USD (weighted average). Effective tariffs are the applied MFN tariff or the preferential rate whenever applicable. The preferential agreements considered are: EU Partnership, GAFTA, EFTA and COMESA. The weights are those given by TRAINS dataset: 1998 imports for 1999; 2001 imports for 2000-2008; current year imports for 2009-2013. Tariffs on Tobacco and beverages are read on the right axis; tariffs on agriculture, mining, food and manufactured goods are read on the left axis.

**Figure 3: Tariffs Change and Initial Tariff Level**



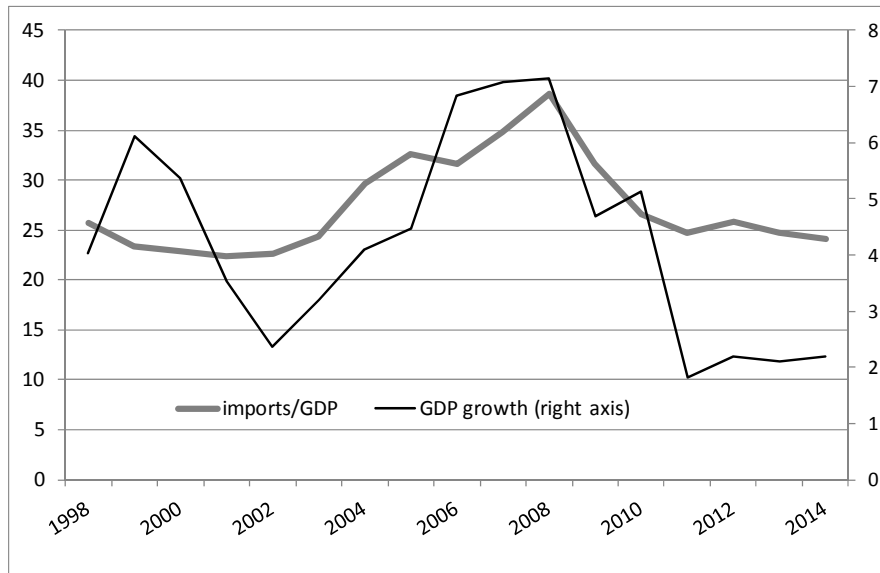
Note: proportional change in  $\log(1 + \text{effective tariff rate})$  between 1999 and 2012 (Y-axis), drawn with respect to  $\log(1 + \text{initial rate in 1999})$  (X-axis), by ISIC3 sectors. The figure excludes alcoholic beverage whose tariff rate is prohibitive.

**Figure 4: Egyptian Imports, Total and By Sectors, 2001-2013 (million USD)**



Source: BACI. BACI is a dataset available at CEPII, France, which harmonizes the UN-COMTRADE dataset between reporter and partner countries.

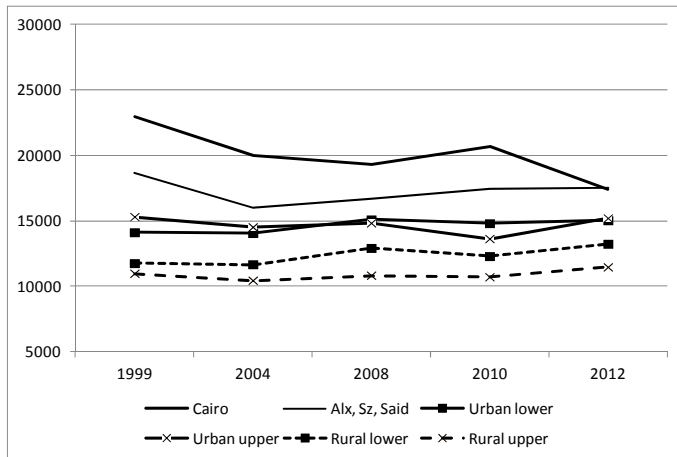
**Figure 5: Share of Imports of Goods and Services in Total GDP and GDP Growth, 1998-2014**



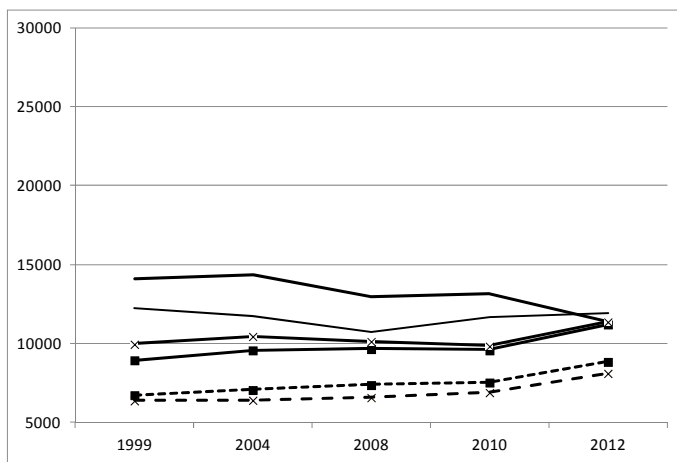
Source: World Development Indicators. Imports of goods and services over GDP (left axis) and current GDP growth (right axis)

**Figure 6: Income by Sources and Regions 1999-2012**

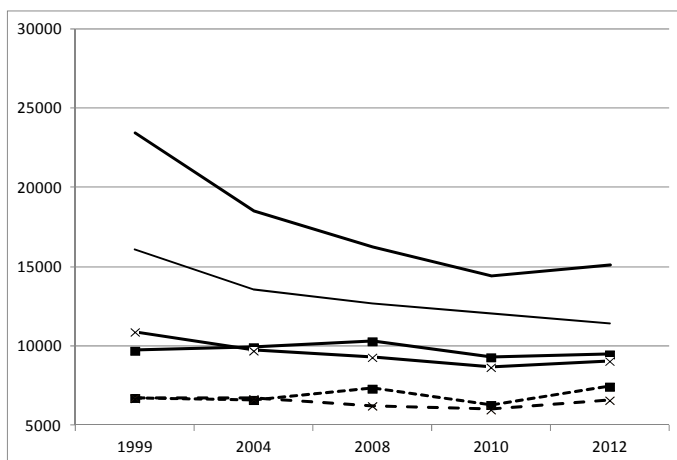
**(a) total income**



**(b) wage earnings**

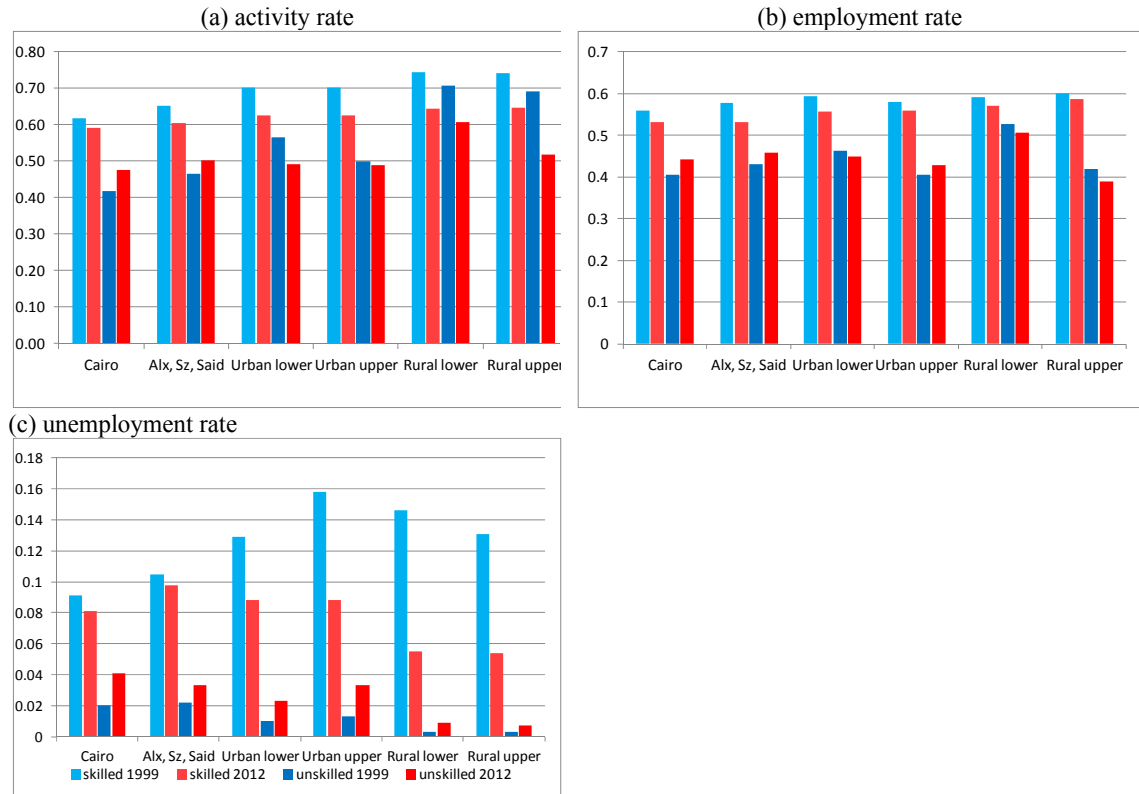


**(c) self-employment income**



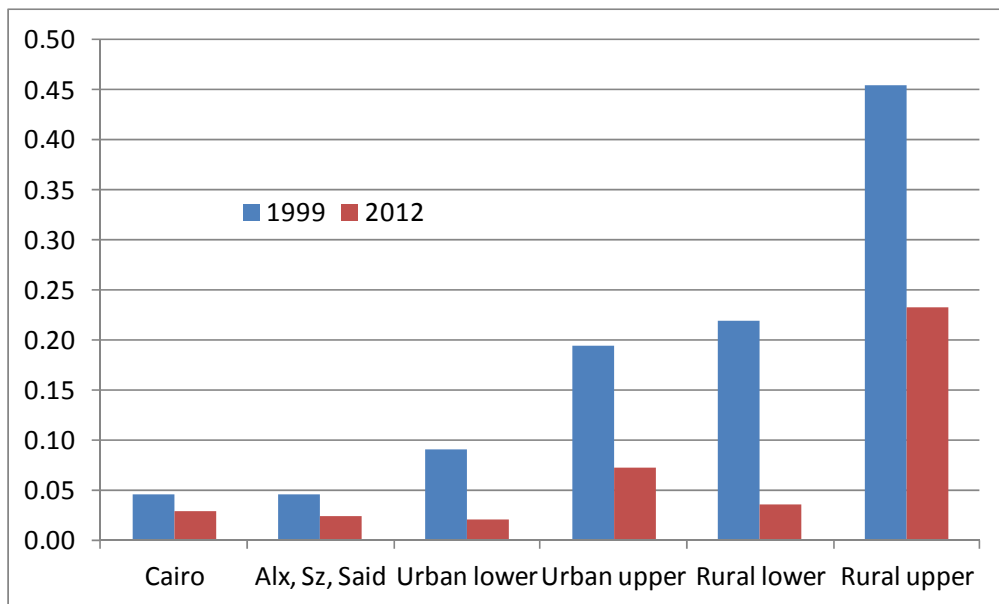
Note: Households total income (panel a), wage earnings (panel b) and self-employment income (panel c), by regions, 1999-2014. Incomes are deflated with a national CPI and are in 2005 Egyptian pounds. Source: HIECS and authors' calculations.

**Figure 7: Activity, Employment and Unemployment Rates by Regions, 1999 and 2012**



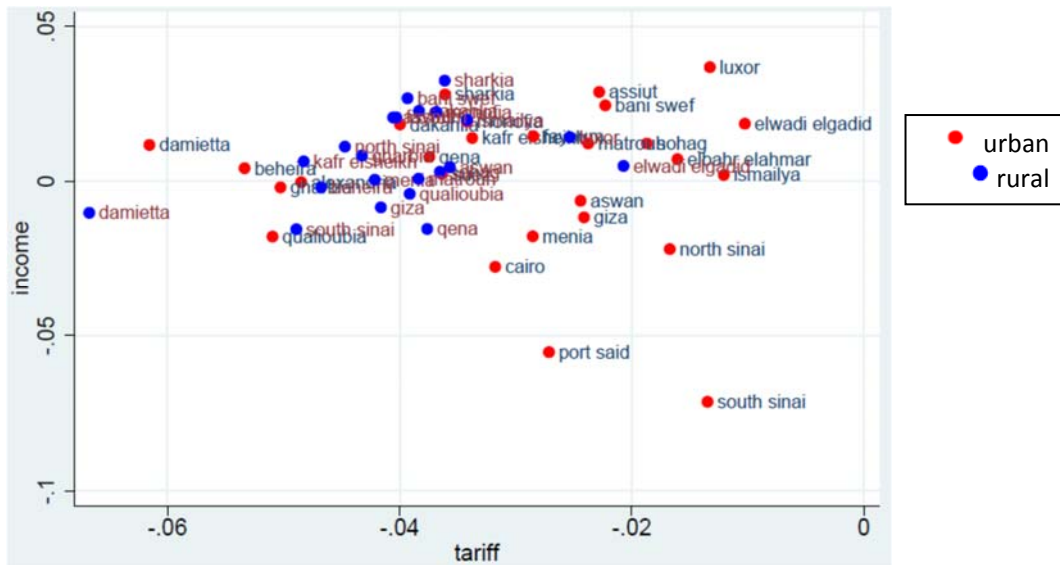
Note: activity and employment as share of total population; unemployment as share of active population, by region. Skilled are individuals with secondary education or more; unskilled have less than secondary education.

**Figure 8: Evolution of Regional Poverty Rate**



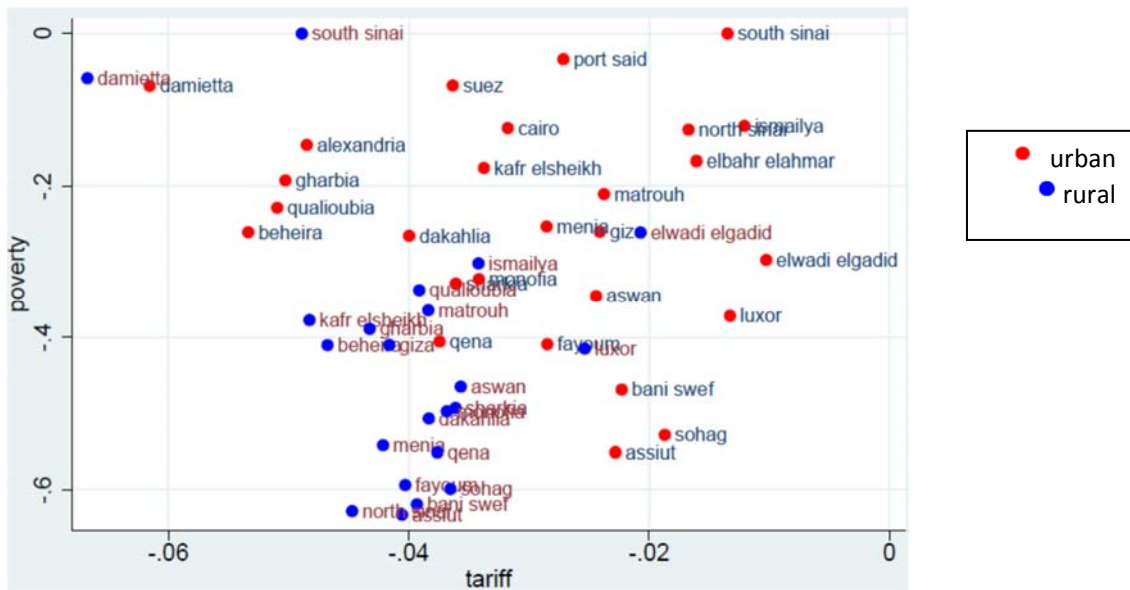
Note: Share of population with real income below 2 USD at PPP exchange rate. Source: HIECS and authors' calculations.

**Figure 9: Change in Income and Tariff Reduction by Urban and Rural Parts of Governorates, 1999-2012**



Note : change in household income in 2005 Egyptian pounds, versus the change in (1+tariff rate) between 1999 and 2012, by urban and rural parts of each governorate. Source : HIECS

**Figure 10: Change in Poverty and Tariff Reduction by Rural and Urban Parts of Governorates, 1999-2012**



Note: change in poverty rate between 1999 and 2012 (defined at the 2.5 USD a day threshold) versus change in (1+tariff rate) by urban and rural parts of each governorate. Source : HIECS



**Table 1: Employment Structure by Region and Industry (ISIC-2 digit) in 1996**

Industry (ISIC 2)	Cairo	Alex, Suez, P.Saïd	Urban lower	Urban upper	Rural lower	Rural upper
Agriculture, forestry, hunting	0.012	0.088	0.111	0.103	0.498	0.590
Fishing	0.000	0.015	0.018	0.004	0.011	0.007
Mining, quarrying	0.005	0.006	0.003	0.007	0.002	0.003
Manufacturing	0.222	0.212	0.189	0.128	0.097	0.060
Electricity, water and gas	0.012	0.017	0.013	0.013	0.008	0.006
Construction	0.126	0.109	0.084	0.102	0.053	0.075
Wholesale, retail trade, repair services	0.163	0.141	0.134	0.130	0.051	0.049
Restaurants and hotels	0.025	0.018	0.016	0.025	0.006	0.005
Transport, storage, communications	0.089	0.105	0.064	0.072	0.045	0.034
Financial intermediation	0.026	0.015	0.014	0.021	0.006	0.004
Real estate, renting, business services	0.042	0.025	0.023	0.032	0.011	0.008
Public administration, defense, social security	0.109	0.101	0.135	0.152	0.088	0.066
Education	0.092	0.094	0.140	0.143	0.092	0.064
Health and social work	0.034	0.029	0.035	0.036	0.018	0.012
Other community, social, personal services	0.029	0.018	0.019	0.026	0.015	0.015
Private households with employed persons	0.012	0.006	0.002	0.005	0.000	0.000
Extra-territorial organizations and bodies	0.002	0.001	0.000	0.001	0.000	0.000

Note: distribution of employment by ISIC2 industries and regions. Source: 1996 population census.

**Table 2: Migration between Governorates****Panel a: by gender and year**

	Males		Females	
	1996	2006	1996	2006
<i>Rural areas</i>				
Lives in a different governorate than one where was born	0.039	0.042	0.048	0.045
Ever migrated across governorates	0.068	0.044	0.123	0.050
Migrated across governorates in past 5 years	0.016	0.007	0.025	0.008
Migrated across governorates in past 10 years	0.028	0.012	0.048	0.015
Migrated across governorates for work in past 5 years	0.006	0.003	0.000	0.000
Migrated across governorates for work in past 10 years	0.010	0.006	0.000	0.000
<i>Urban areas</i>				
Lives in a different governorate than one where was born	0.189	0.160	0.205	0.161
Ever migrated across governorates	0.245	0.165	0.268	0.175
Migrated across governorates in past 5 years	0.035	0.028	0.035	0.024
Migrated across governorates in past 10 years	0.063	0.047	0.069	0.045
Migrated across governorates for work in past 5 years	0.018	0.017	0.001	0.001
Migrated across governorates for work in past 10 years	0.032	0.030	0.002	0.002

**Panel b: by gender and level of education**

	Males		Females	
	unskilled	skilled	unskilled	skilled
<i>Rural areas</i>				
Lives in a different governorate than one where was born	0.043	0.040	0.044	0.046
Ever migrated across governorates	0.047	0.039	0.049	0.051
Migrated across governorates in past 5 years	0.006	0.007	0.006	0.012
Migrated across governorates in past 10 years	0.012	0.013	0.011	0.022
Migrated across governorates for work in past 5 years	0.004	0.003	0.000	0.000
Migrated across governorates for work in past 10 years	0.007	0.005	0.000	0.000
<i>Urban areas</i>				
Lives in a different governorate than one where was born	0.159	0.159	0.179	0.146
Ever migrated across governorates	0.170	0.162	0.197	0.159
Migrated across governorates in past 5 years	0.023	0.030	0.021	0.026
Migrated across governorates in past 10 years	0.042	0.050	0.041	0.048
Migrated across governorates for work in past 5 years	0.018	0.017	0.001	0.001
Migrated across governorates for work in past 10 years	0.031	0.029	0.002	0.002

Source: Egypt 1996 and 2006 population census (10% sample obtained from IPUMS). Education measured in 2006 (the educational attainment was not available in IPUMS 1996 census data)

**Table 3: Regional Measures of Tariffs on Imports by Governorate and Area Type**

Region	1999	2004	2008	2010	2012
Cairo	8.27	6.52	5.54	5.68	4.89
	33.53	26.44	22.44	23.04	19.92
Alx, Sz, Said	7.54	5.66	4.48	5.26	4.18
	27.88	21.22	17.28	20.81	16.50
Urban lower	7.92	5.50	4.09	3.91	3.40
	24.43	17.05	12.68	12.10	10.51
Urban upper	4.68	3.64	3.06	3.03	2.47
	20.62	15.65	13.02	12.80	10.49
Rural lower	7.16	4.84	2.76	2.97	2.57
	12.40	8.46	4.98	5.39	4.64
Rural upper	5.34	3.40	1.77	1.87	1.55
	10.69	6.82	3.88	4.57	3.73

Note: mean scaled and non-scaled region tariffs by broad regions – the regional tariffs are defined for each governorate by type of area in the data, but are averaged in this table for exposition purposes (without any weighting) at the level of broader regions.

**Table 4: Impact of Trade Liberalization on Regional Poverty Rates**

Poverty rate	Model	Tariff (scaled)		Tariff (scaled) x Post 2004		Adj_R-square	Control mean	P-val. non zero effect post 2004
1.25\$	OLS	-0.0015	(0.002)	0.0016	(0.001)	0.590	0.038	0.978
2.0\$		-0.0048	(0.008)	0.0015	(0.004)	0.751	0.252	0.648
2.5\$		-0.0023	(0.010)	-0.0003	(0.005)	0.801	0.416	0.799
1.25\$	IV-1	-0.0092***	(0.003)	0.0038**	(0.002)	0.564		0.030
2.0\$		-0.0260**	(0.011)	0.0078*	(0.004)	0.738		0.020
2.5\$		-0.0299**	(0.013)	0.0085	(0.005)	0.789		0.042
1.25\$	IV-2	-0.0091***	(0.003)	0.0037**	(0.001)	0.565		0.026
2.0\$		-0.0252**	(0.010)	0.0077*	(0.004)	0.739		0.020
2.5\$		-0.0293**	(0.013)	0.0083	(0.005)	0.789		0.044

Notes: Estimates of effects of trade liberalization on poverty rates computed with different thresholds. Rows (1)-(3) report OLS estimates, rows (4)-(6) IV estimates based on first-stage equation (4), and rows (7)-(9) IV estimates based on first-stage equation (5). Sample: governorate x area type x year. All estimates are with year and Governorate x area type fixed effects. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. 248 obs.

**Table 5: Effects of Trade Liberalization on Household Income**

dep. var								
<b>All households</b>			Tariff (scaled)	Tariff (scaled) x Post 2004	Adj_R-sq	Control mean	P-val.	
OLS	total income	0.0040	(0.013)	-0.0014	(0.006)	0.675	14581	0.827
	wage	0.0061	(0.026)	-0.0013	(0.008)	0.700	6436	0.844
	self-employment	0.0319	(0.034)	-0.0059	(0.014)	0.245	4742	0.363
IV-1	total income	0.0242	(0.017)	-0.0088	(0.006)	0.669		0.277
	wage	0.0620***	(0.024)	-0.0202**	(0.009)	0.683		0.032
	self-employment	0.0775*	(0.046)	-0.0204	(0.015)	0.236		0.117
IV-2	total income	0.023	(0.017)	-0.0085	(0.006)	0.669		0.299
	wage	0.0617***	(0.023)	-0.0201**	(0.009)	0.683		0.028
	self-employment	0.0716	(0.046)	-0.0193	(0.015)	0.238		0.144
<b>Skilled households</b>			Tariff (scaled)	Tariff (scaled) x Post 2004	Adj_R-sq	Control mean	P-val.	
OLS	total income	0.0073	(0.019)	-0.0005	(0.007)	0.562	16741	0.700
	wage	0.0031	(0.019)	-0.0026	(0.008)	0.700	8776	0.975
	self-employment	0.0159	(0.042)	-0.0145	(0.018)	0.155	4153	0.968
IV-1	total income	0.0011	(0.020)	-0.0007	(0.008)	0.562		0.980
	wage	0.0149	(0.022)	-0.0075	(0.008)	0.698		0.668
	self-employment	0.0989*	(0.057)	-0.0374*	(0.020)	0.133		0.162
IV-2	total income	0.0004	(0.019)	-0.0006	(0.008)	0.562		0.988
	wage	0.0151	(0.021)	-0.0076	(0.008)	0.698		0.657
	self-employment	0.0967*	(0.056)	-0.0373*	(0.020)	0.134		0.167
<b>Unskilled households</b>			Tariff (scaled)	Tariff (scaled) x Post 2004	Adj_R-sq	Control mean	P-val.	
OLS	total income	0.0039	(0.013)	0.0002	(0.006)	0.619	13068	0.722
	wage	-0.0007	(0.031)	0.0027	(0.012)	0.452	5043	0.942
	self-employment	0.0597	(0.037)	-0.0158	(0.017)	0.284	4780	0.133
IV-1	total income	0.0424**	(0.020)	-0.0120*	(0.007)	0.596		0.062
	wage	0.1104***	(0.041)	-0.0294**	(0.015)	0.397		0.011
	self-employment	0.0629	(0.038)	-0.0211	(0.016)	0.283		0.153
IV-2	total income	0.0419**	(0.020)	-0.0119*	(0.007)	0.596		0.060
	wage	0.1140***	(0.041)	-0.0299**	(0.015)	0.393		0.008
	self-employment	0.0534	(0.038)	-0.0192	(0.016)	0.283		0.238

Notes : outcomes in log. Rows (1)-(3) report OLS estimates, rows (4)-(6) IV estimates based on first-stage equation (4), and rows (7)-(9) IV estimates based on first-stage equation (5). Sample: governorate x area type x year. All estimates are with year and Governorate x area type fixed effects. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. The p-value (last column) tests for a non zero effect post 2004. 248 obs.

**Table 6: Effects of Trade Liberalization on Labor Outcomes**

<b>all population (18-59)</b>		Tariff (scaled)		Tariff (scaled) x Post 2004		Adj_R-sq	Control mean	p_value
OLS	Activity	0.0057	(0.004)	-0.0025	(0.002)	0.586	0.653	0.408
	Employment	0.0023	(0.004)	-0.0007	(0.002)	0.570	0.519	0.557
	Unemployment	-0.0039	(0.003)	0.0027*	(0.002)	0.403	0.083	0.634
IV-1	Activity	0.0013	(0.006)	-0.0006	(0.002)	0.583	0.653	0.889
	Employment	0.0087	(0.005)	-0.0021	(0.001)	0.560	0.519	0.140
	Unemployment	-0.0049	(0.004)	0.0028*	(0.002)	0.403	0.083	0.548
IV-2	Activity	0.0004	(0.006)	-0.0004	(0.002)	0.582	0.653	0.994
	Employment	0.0082	(0.005)	-0.0020	(0.001)	0.562	0.519	0.160
	Unemployment	-0.0048	(0.004)	0.0028*	(0.001)	0.403	0.083	0.573
<b>skilled</b>								
OLS	Activity	0.0039	(0.006)	-0.0022	(0.002)	0.383	0.730	0.725
	Employment	0.0045	(0.005)	-0.0036*	(0.002)	0.432	0.602	0.845
	Unemployment	0.0000	(0.004)	0.0029	(0.002)	0.450	0.147	0.369
IV-1	Activity	0.0080	(0.006)	-0.0025	(0.002)	0.381	0.730	0.236
	Employment	0.0140**	(0.006)	-0.0055**	(0.002)	0.419	0.602	0.105
	Unemployment	-0.0087	(0.006)	0.0051**	(0.002)	0.436	0.147	0.446
IV-2	Activity	0.0072	(0.006)	-0.0023	(0.002)	0.381	0.730	0.271
	Employment	0.0132**	(0.006)	-0.0053**	(0.002)	0.421	0.602	0.124
	Unemployment	-0.0082	(0.006)	0.0050**	(0.002)	0.438	0.147	0.497
<b>unskilled</b>								
OLS	Activity	0.0052	(0.007)	-0.0015	(0.004)	0.645	0.569	0.543
	Employment	-0.0077	(0.005)	0.0059**	(0.003)	0.540	0.445	0.623
	Unemployment	-0.0043	(0.003)	0.0020	(0.001)	-0.020	0.012	0.392
IV-1	Activity	-0.0031	(0.010)	0.0014	(0.004)	0.642	0.569	0.830
	Employment	-0.0016	(0.007)	0.0051**	(0.002)	0.536	0.445	0.526
	Unemployment	-0.0126**	(0.006)	0.0042***	(0.002)	-0.056	0.012	0.127
IV-2	Activity	-0.0043	(0.010)	0.0016	(0.004)	0.641	0.569	0.735
	Employment	-0.0022	(0.007)	0.0052**	(0.002)	0.537	0.445	0.582
	Unemployment	-0.0124*	(0.006)	0.0042***	(0.002)	-0.055	0.012	0.133

Notes: Sample of 18-59 years old. Rows (1)-(3) report OLS estimates, rows (4)-(6) IV estimates based on first-stage equation (4), and rows (7)-(9) IV estimates based on first-stage equation (5). Sample: governorate x area type x year. Year and governorate x area fixed effects. Employment is defined over total population and unemployment over active population. The p-value tests for a non zero effect post 2004.. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 7: Effects of Trade Liberalization on Migrations**

dependent variable : share of migrants in total regional	OLS		IV-1	
	migrants in past 5 years	economic migrants in past 5 years	migrants in past 10 years	economic migrants in past 10 years
	(1)	(2)	(3)	(4)
Tariff	-0.0024 (0.004)	-0.0030 (0.002)	-0.0046 (0.006)	-0.0052 (0.004)
Broad region x area FE	Yes	Yes	Yes	Yes
Nb_obs	50	50	50	50
R-squared	0.171	0.192	0.174	0.208
Adj R-squared	0.033	0.057	0.037	0.076
Outcome mean	0.023	0.011	0.042	0.019

Note: Estimates of effects of trade liberalization on migrations. Columns (1)-(2) report OLS estimates, columns (3)-(4) IV estimates with scaled tariffs instrumented by non-scaled tariffs. Sample: governorate x area type, for 2006. Source: 2006 population census, and 2004 tariff data.

## Appendix

### Table A1: Descriptive Statistics of Regional Household Income

Mean incomes by broad regions and year						Standard deviations					
		1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Cairo	total income	22918	19958	19274	20689	17431	22120	23207	18847	19814	15716
	wage income	14086	14346	12945	13164	11362	10520	12464	11189	11912	7511
	Self-employment income	23427	18538	16250	14400	15097	25966	28803	19896	14471	18134
	total income skilled head	29432	25934	25465	26160	22514	26976	29814	24179	24527	19578
	total income unskilled head	15054	13530	13143	14109	12190	9405	9058	7246	7875	7234
Alx, Sz, Said	(same variables)	18679	15974	16669	17419	17541	14762	20168	17485	13144	11737
		12238	11749	10705	11652	11932	10667	17032	7735	9382	9130
		16078	13557	12666	12022	11449	14845	15188	23574	11219	9455
		24084	21060	20072	22272	22286	18837	28892	14531	16772	14427
		14792	12086	13904	13320	13579	9130	6692	19117	6663	6670
Urban lower	(same variables)	14112	14045	15094	14802	15028	11175	10130	20120	13081	9770
		8963	9595	9672	9596	11233	5161	5825	6654	5913	7417
		9725	9949	10322	9314	9498	13371	10120	14786	7817	7325
		16345	16398	17960	17246	18025	13575	12186	27862	16778	11579
		12125	11914	12443	12372	11788	7978	7177	6830	7039	5785
Urban upper	(same variables)	15308	14520	14826	13631	15202	15896	12108	14572	9934	10707
		9978	10473	10155	9855	11389	7753	8569	9870	7239	9701
		10910	9722	9312	8683	9073	15289	11968	13027	11132	6923
		19604	17979	18030	16229	18407	21256	14633	17215	11713	13006
		11733	11540	11581	11296	11761	7668	8320	10311	7249	5768
Rural lower	(same variables)	11749	11665	12912	12293	13230	6301	6194	11336	6571	6592
		6755	7086	7396	7559	8864	3833	3979	4477	4710	5129
		6756	6626	7339	6308	7463	5758	6153	7142	5401	5864
		12795	12501	13752	13429	14668	7313	6808	9414	7610	6960
		11410	11286	12478	11560	12278	5897	5856	12189	5682	6155
Rural upper	(same variables)	10977	10445	10830	10713	11466	22169	10834	6213	6399	9149
		6404	6432	6603	6923	8134	3888	4381	3891	4168	4657
		6719	6703	6251	6011	6610	15466	11722	5729	6173	4963
		14037	12414	11811	11355	13423	47985	19804	7136	5551	13618
		10210	9840	10485	10423	10537	5842	5599	5814	6728	5720

Notes: Mean and standard deviation of total household income, by broad regions, for all households and depending on the level of education of the head (skilled : higher than secondary education, or lower than secondary education : unskilled).

**Table A2: Descriptive Statistics for Regional Economic Activity, Employment and Unemployment Rates**

		skilled individuals					unskilled individuals				
		1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Cairo	activity rate	0.617	0.592	0.601	0.573	0.591	0.418	0.460	0.455	0.494	0.475
	employment rate	0.559	0.538	0.539	0.520	0.532	0.405	0.444	0.439	0.473	0.443
	unemployment rate	0.091	0.081	0.089	0.079	0.081	0.020	0.017	0.019	0.030	0.041
Aix, Sz, Said	(same variables)	0.653	0.617	0.605	0.651	0.605	0.465	0.464	0.483	0.494	0.503
		0.579	0.546	0.535	0.565	0.531	0.431	0.441	0.454	0.447	0.458
		0.105	0.103	0.098	0.106	0.098	0.022	0.028	0.031	0.034	0.033
Urban lower	(same variables)	0.702	0.665	0.632	0.619	0.625	0.564	0.582	0.564	0.550	0.491
		0.595	0.563	0.545	0.544	0.557	0.463	0.477	0.485	0.442	0.448
		0.129	0.123	0.093	0.076	0.088	0.010	0.011	0.006	0.009	0.023
Urban upper	(same variables)	0.701	0.662	0.639	0.640	0.627	0.500	0.529	0.509	0.477	0.489
		0.581	0.566	0.564	0.564	0.560	0.405	0.444	0.422	0.404	0.428
		0.158	0.126	0.092	0.086	0.088	0.013	0.012	0.009	0.039	0.033
Rural lower	(same variables)	0.744	0.736	0.695	0.684	0.643	0.707	0.774	0.718	0.707	0.607
		0.592	0.565	0.562	0.559	0.571	0.528	0.520	0.506	0.495	0.506
		0.146	0.114	0.083	0.042	0.055	0.003	0.002	0.002	0.007	0.009
Rural upper	(same variables)	0.742	0.745	0.717	0.735	0.648	0.692	0.703	0.651	0.646	0.519
		0.602	0.619	0.601	0.618	0.588	0.420	0.432	0.405	0.385	0.389
		0.131	0.099	0.079	0.066	0.054	0.003	0.002	0.004	0.004	0.007

Notes: activity (row 1), employment as share of total population (row 2), and unemployment (row 3) rates by broad region, year and level of qualification (skilled: individuals with secondary education or more / unskilled : individuals with lower attainments). "Activity" includes working housewives and students, while "Employment" excludes them. Sample of individuals 18 to 59 years old.

Source: HIECS surveys.



**Table A3: Descriptive Statistics of Regional Poverty Rates**

		1999	2004	2008	2010	2012
Cairo	Poverty rate - 1.25\$ line	0.005	0.002	0.004	0.001	0.004
	Poverty rate - 2.00\$ line	0.045	0.032	0.049	0.029	0.029
	Poverty rate - 2.50\$ line	0.097	0.090	0.122	0.066	0.095
Alx, Sz, Said	(same variables)	0.002	0.001	0.005	0.003	0.001
		0.045	0.045	0.055	0.026	0.023
		0.110	0.136	0.127	0.073	0.073
Urban lower	(same variables)	0.005	0.004	0.001	0.000	0.000
		0.090	0.076	0.056	0.039	0.021
		0.223	0.205	0.175	0.111	0.089
Urban upper	(same variables)	0.026	0.021	0.025	0.018	0.007
		0.194	0.141	0.168	0.125	0.072
		0.347	0.251	0.316	0.254	0.205
Rural lower	(same variables)	0.011	0.004	0.003	0.003	0.000
		0.219	0.130	0.107	0.065	0.035
		0.452	0.334	0.298	0.198	0.138
Rural upper	(same variables)	0.079	0.049	0.062	0.032	0.030
		0.454	0.342	0.374	0.290	0.232
		0.661	0.554	0.602	0.500	0.451

Notes: poverty rates for lines of 1.25\$ (row 1), 2.0\$ (row 2) and 2.5\$ (row 3), by great region and year.  
Source: HIECS surveys.

## First-stage Results

Table A4 (columns 1 and 2) report the estimates of the first-stage relationship between scaled and non-scaled tariffs based on equation (4) with region and year fixed-effects. There is a strong correlation between non-scaled and scaled tariffs. Columns 2 and 4 of Table A4 report the estimates with the second set of instruments (pre-reform tariffs and their interaction with post-reform period, using non scaled tariff) (equation 5). Scaled tariffs are correlated with non-scaled tariffs on traded sectors, as well as the interaction

**Table A4: First Stage: Relationship between Scaled and Non-scaled Tariffs**

	Tariff (scaled)	Post2004 x Tariff (scaled)	Tariff (scaled)	Post2004 x Tariff
Non-scaled tariff on traded industries only (TrTariff r,t)	0.2148*** (0.025)	0.0145 (0.021)	0.2290*** (0.074)	0.0158 (0.069)
Non-scaled tariff on traded industries only (TrTariff r,t)	0.0303*** (0.007)	0.2561*** (0.012)	0.0173 (0.052)	0.2564*** (0.064)
yr==2004	-0.7167*** (0.171)	0.0697 (0.167)	-0.8668*** (0.301)	0.0378 (0.244)
yr==2008	-1.6080*** (0.263)	0.6835*** (0.200)	-1.6361*** (0.302)	0.6852*** (0.220)
yr==2010	-1.5939*** (0.272)	0.7303*** (0.236)	-1.7227*** (0.359)	0.7411*** (0.271)
yr==2012	-1.6949*** (0.290)	0.6621*** (0.220)	-1.7735*** (0.326)	0.6351*** (0.234)
yr2004 x TrTariff r,1999			0.0129 (0.013)	0.0023 (0.024)
yr2008 x TrTariff r,1999			0.0152 (0.056)	0.0003 (0.068)
yr2010 x TrTariff r,1999			0.0212 (0.052)	-0.0001 (0.067)
yr2012 x TrTariff r,1999			0.0183 (0.056)	0.0022 (0.068)
Governorate x area FE	Yes	Yes	Yes	Yes
Nb obs	248	248	248	248
R-squared	0.968	0.960	0.968	0.960
Adj_R-squared	0.959	0.948	0.958	0.947
Mean initial (1999) non-scaled tariffs	5.912			
Mean initial (1999) scaled_tariffs	16.938			

Note: Estimates of the relationship between non-scaled and scaled tariff (1st stage equations). Sample: governorate x area type x year. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01