# Immigration and firm performance: who gains and who loses

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**Abstract**

Between 2012 and 2021, about 3.64 million Syrian refugees were hosted in Turkey. Two million of them are of working age and were allowed to work. This paper provides evidence on the impact of this massive labor inflow on firm performance. We use a comprehensive firm-level data and city-level immigration density measures. Our results show that there are winners an losers: labor-intensive firms see their sales increase relative to capital intensive firms. This fact has potential consequences on development to the extent that capital intensity is linked to innovation and productivity growth. We develop a general equilibrium model exhibiting heterogenous capital intensity across firms and industries that explains the empirical results.

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# 1 Introduction

From 2011 to 2020 about 3.64 million Syrians found refuge in Turkey representing approximately 4.5% of the Turkish population (See Fig. 1). This flow is by its magnitude probably the most relevant labor market shock in modern history. Furthermore, the fact that migrants were homogeneous in terms of language, culture, and education system makes particularly suitable for economic studies.

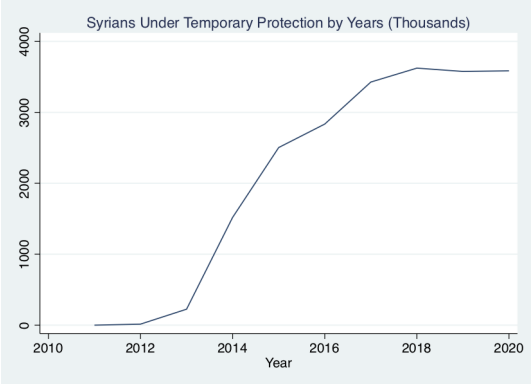


Figure 1: Syrian Immigrants

Migration phenomena have been studied extensively. Traditionally, the literature has examined the link between migration and labor market outcomes. We join instead a more recent trend that studies the effect of migration on firm performance. In this area, we address a new research question: does immigration make winners and losers among firms? Our findings shows that this is indeed the case. We then provide a model that plausibly explains these findings. To our knowledge this is the first paper that investigates the heterogeneity of the effects of immigration on different firms. And yet, this is an important aspect. Understanding the mechanisms and identifying winners and losers is important to design possible corrective policies. Furthermore, firms contribute differently to economic development. Therefore, understanding the heterogeneous impact of immigration on firms performance help understand the overall effect of immigration on development.

Our measure of firm performance is relative sales defined as the sales of a firm relative to the average sales in the same industry and city. Empirically, we find that relative sales of capital-intensive firms in a province are negatively related to the ratio of refugees to the total population in a province. We find the opposite for labor-intensive firms. We rationalize this fact with a formal model that captures the following intuitive link between migration, labor-intensity, and relative sales. Consider a fall in wages induced by immigration. Such wage reduction costs for all firms but more so for labor-intensive firms because these firms use intensively the factor that has became cheaper. As a consequence, sales increase for all firms but more so for labor-intensive firms because they benefit from a larger fall in costs. Thus, the sales of capital-intensive firms tend to fall relative to the average sales, while the sales of labor-intensive firms tend to increase. Our empirical investigation confirms to a large extent this theoretical result. Interestingly, our theoretical explanation is consistent not only with the data in our sample but also with many empirical results found in the literature that we review in the next section.

Our focus on relative sales also sheds an indirect light on the effect of migration on wages. The literature that has tried to capture the direct effect of migration on wages encountered the difficulty of having to deal with unreported employment and unobserved wages. Focusing on relative sales bypasses this problem. The negative effect of migration on relative sales of

capital-intensive firms provides indirect evidence of a fall in average wages.

Our approach has also a collateral advantage. Using relative sales considerably attenuates the endogeneity problem lamented by almost all studies in the literature. Endogeneity between migration and absolute sales (or other labor market outcomes) may arise because migrants might choose locations with better job opportunities thus giving rise to a spurious relationship between firm sales and presence of migrants. But our dependent variable is not absolute sales, it is relative sales, and relative sales does not plausibly relate to any variable (such as job opportunity) that could influence the location decision of migrants.

# 2 Literature review

A vast literature has studied the effect of migration on labor market outcomes; see, e.g., Card (1990), Card (2001), Borjas (2003), Manacorda et al. (2012), Ottaviano and Peri (2012), Dustmann et al. (2013), Dustmann et al. (2016), Prantl and Spitz-Oener (2020), Brücker et al. (2014) to mention but a few. Here we review only the works most relevant for our study. In particular, we review those that use data related to the inflow of Syrian refugees in Turkey and those that focus on firm performance, which is the subject of our paper.

A number of recent studies have focused on the inflow of Syrian refugees in Turkey. Tumen (2016) documents the importance of the phenomenon of informal labor, which is in part responsible for unobserved employment of refugees. He uses difference in difference methodology and distinguishes between treatment and control regions and pre- and post-immigration period. He finds evidence of a negative effects on employment of informal native workers and a positive but small effect on the employment of formal native workers. He finds no effect on wages of native workers. Similar results are found in Del Carpio and Wagner (2018) who use distance from the Syrian border as an instrument. They find that immigration has a positive effect on the propensity of becoming unemployed for informal (uneducated) native workers and a positive effect on the propensity to be formally employed. Ceritoglu et al. (2017) find that the effect on native workers wage is negligible while labor force participation, informal employment, and job finding rates have declined among natives. Aksu et al. (2022), observe that formal employment was already growing at the time when immigrant arrived and that the growth was very heterogeneous across Turkish regions. Abandoning the assumption of common trend embedded in the difference-in-difference methodology they find no overall effect of immigration on employment: the fall in informal employment is compensated by an equally large increase in formal employment. The replacement of formal with informal employment found in the first and third of these works is likely to have implied a reduction in the overall cost of labor which may than have favored labor-intensive firms. This conclusion is compatible with our results.

We now discuss the few papers that effect of migration on firms. Altındağ et al. (2020) is particularly relevant since, like us, it studies the effect of Syrian refugees on Turkish firms. Their focus is on the extensive and intensive margin of production. They find a positive effect on both margins with particular concentration in the informal economy. The effect on the intensive margin is not significant when the dependent variable is firm sales but it is significant and conspicuous when measured by proxies for sales, such as electricity and oil consumption. They also observe a decline in male native wage of approximately 1.9 percent. Akgündüz et al. (2018) investigate the impact of Syrian refugees on firm entry and performance. They document three facts: a large increase in the number of foreign firms in refugee hosting regions, firm-level business indicators such as gross profits and sales are positively affected by the presence of refugees, some weak evidence of an increase in the number of firms in sectors which require

low-skill employment. Across sectors, the declining number of firms are mostly in service sectors that need some skilled labor. Brown et al. (2013) use administrative data from the state of Georgia and find that, on average across all firms, employing undocumented workers reduces a firm's hazard of exit by 19 percent. Using the terminology of heterogeneous firms models (like ours) the results of these two papers means that the entry cut-off shifts to the left; this is indeed one of our theoretical results. The second paper also finds that the advantage from employing undocumented workers decreases with the skill level of the firm's workers and increases with the labor intensity of the firm's production process. This is perfectly consistent with our prediction that immigration favors all firms but more so the labor-intensive firms. Olney (2013) examines whether firms respond to immigration by expanding their production activities within a city in order to utilize the abundant supply of low-skilled workers. Using data on immigration and the universe of establishments in U.S. cities, his results indicate that firms respond to immigration at the extensive margin by increasing the number of establishments. Not surprisingly, immigration has a more positive impact on the number of establishments that are small in size and in relatively low-skill intensive industries. This evidence, like the previous one, may be interpreted as a shift to the left of the entry cut off especially strong for the labor intensive firms, which is once again consistent with our model.

It is interesting to note that our model provides a theoretical rationale for many of the empirical results reviewed above. This paper contributes to the literature with new empirical findings grounded in a fully fledged theoretical model.

# 3 Theoretical background

In this section we focus on the essential theoretical elements while in the appendix we provide a complete description of the model and the derivation of results. The world economy is composed by the migrant-receiving country, denoted $H$ and by the rest of the world, denoted $F$. These economies produce two differentiated goods, $Y$ and $Z$, by using two primary factors $K$ and $L$. While each country is endowed with a fixed quantity of $K$ labor ($L$) migration takes place from $F$ to $H$. $H$ is composed by two locations, $m$ and $n$. Location $m$ is where migrants settle. We use the index $c = m, n, F$ to denote, respectively, the locations in $H$ and the rest of the world, $F$. Labor markets are local. Accordingly, wages $w_j^c$ in addition to be different between countries are also different between the two locations of $H$.

The representative consumer utility function is $u = (Y)^{\gamma_Y}(Z)^{\gamma_Z}$ where $\gamma_i \in (0,1)$, $\gamma_Y + \gamma_Z = 1$ and where $Y$ and $Z$ are CES aggregates whose elasticity of substitution between varieties is $\varsigma > 1$. National income in $H$ is $I^H = w_L^m L^m + w_L^n L^n + w_K^H K^H$. National income in $F$ is: $I^F = w_L^F L_F + w_K^F K^F$.

The variable input technology takes the CES form here represented by the marginal cost which, for a firm in industry $i$ of location $c$, is

$$mc_i^c(t) = \left[(\lambda_i)^\sigma \left(w_L^c\right)^{1-\sigma} \alpha(t)^{\sigma-1} + (1-\lambda_i)^\sigma \left(w_K^c\right)^{1-\sigma} \beta(t)^{\sigma-1}\right]^{\frac{1}{1-\sigma}}. \quad (1)$$

where $\lambda_i \in (0,1)$ is a constant technology parameter of industry $i = Y, Z$ and $\sigma > 0$ measures gross substitutability between factors. The variable $t$ is a random variable whose cumulative distribution $G(t)$ has support in $(t_0, \infty)$, with $t_0 \geq 0$. The continuous and non-decreasing functions $\alpha(t)$ and $\beta(t)$ - where at least one of them is strictly increasing - contribute to determine the relative marginal productivity of factors. The optimal *K-intensity* in production,

$\theta_i^c(t)$, is

$$\theta_i^c(t) = \left(\frac{\Lambda_i}{\omega^c}\right)^{\sigma} (\varphi(t))^{\sigma-1}, \tag{2}$$

where $\omega^c = w_K^c / w_L^c$, where $\Lambda_i = (1-\lambda_i)/\lambda_i$ and where $\varphi(t) = \beta(t)/\alpha(t)$. To fix ideas and without loss of generality we assume that $\Lambda_Y > \Lambda_Z$. This implies that the average *K-intensity* in $Y$ is greater than in $Z$. The rest of the model contains fixed entry costs, fixed production costs, fixed exporting costs, and iceberg trade costs. This gives rise to endogenous entry and export cut off values of $t$, denoted respectively $t_i^{*c}$ and $t_{xi}^{*c}$. An 'over-line' ($\bar{\cdot}$) or a 'tilde' ($\tilde{\cdot}$) above a variable indicates, respectively, the simple and power mean of that variable. The detailed expressions are provided in the appendix. Here, we focus on the results of interest for the empirical investigation.

We begin by defining the firm-level *K-intensity*. Let $\kappa = \theta_i^c / \overline{\theta}_i^c$. A firm is *K-intensive* relative the average in the same industry and location if $\kappa > 1$. A firm is *L-intensive* if $\kappa < 1$. We shall use this definition extensively.

Let $s_{id}^c$, and $s_{ix}^c$ denote, respectively, the demand emanating from domestic residents and from foreign residents for the output of a firm in industry $i$ and location $c$. Then we can define relative sales, $RS_{ij}^c$, as follows.

$$RS_{ij}^c = \frac{s_{ij}^c}{\overline{s}_{ij}^c}, \qquad j = d, x. \tag{3}$$

In this class of models, relative sales are proportional to relative marginal costs. Thus, for any firm whose realization of $t$ is such that $\theta_i^c = \kappa \overline{\theta}_i^c$, we can use (1), (2) and the fact that $\theta_i^c / \overline{\theta}_i^c = \varphi_i^c / \widetilde{\varphi}_i^c$ to write (3) as follows:

$$RS_{id}^c = \left[\frac{1 + \Lambda_i^{\sigma}\left(\frac{\widetilde{\varphi}(t_i^c)}{\omega^c}\right)^{\sigma-1}\kappa}{1 + \Lambda_i^{\sigma}\left(\frac{\widetilde{\varphi}(t_i^c)}{\omega^c}\right)^{\sigma-1}}\right]^{\frac{1-\varsigma}{1-\sigma}}. \tag{4}$$

Expression (4) represents the key theoretical relationship in the model. It tells us the effect of relative factor price on relative domestic sales. An analogous formula applies to $RS_{ix}^c$ where $\widetilde{\varphi}(t_{xi}^c)$ replaces $\widetilde{\varphi}(t_i^c)$. Immigration causes an increase in the supply of labor relative to capital, it then brings about an increase in $\omega^c$. We see from expression (4) that the effect of an increase of $\omega^c$ on $RS_{id}^c$ is positive or negative depending on whether $\kappa$ is smaller or larger than one. That is:

$$\frac{\partial RS_{ij}^c}{\partial \omega^c} \gtreqless 0 \quad \Leftrightarrow \quad \kappa \lesseqgtr 1. \tag{5}$$

To understand this result consider a decline in $w_L^c$ and two firms, one of which is *K-intensive* ($\kappa > 1$) while the other is *L-intensive* ($\kappa < 1$). The decline in $w_L^c$ reduces the marginal cost of both firms but the marginal cost of the *L-intensive* firm falls more strongly because this firm uses intensively the factor whose relative price has declined. As a consequence, sales increase for both firms but sales of the *L-intensive* firm increase more strongly and therefore they increase more than the average. The same result applies if we consider an increase in $w_K$. Then the marginal cost increases for both firms but increases less strongly for the *L-intensive* firms; its relative sale therefore increase. Eq. (4) also shows the $RS_{ij}^c$ is log-super-modular in $(\omega^c, \Lambda_i)$ for $\kappa > 1$ while it is log-sub-modular $(\omega^c, \Lambda_i)$ for $\kappa < 1$. Indeed, taking the derivatives with respect

to $\omega^c$ and recalling that $\Lambda_Y > \Lambda_Z$ we obtain

$$\frac{\partial RS^c_{Zj}}{\partial \omega^c} > \frac{\partial RS^c_{Yj}}{\partial \omega^c} > 0 \quad \Leftrightarrow \quad \kappa < 1 \tag{6}$$

$$\frac{\partial RS^c_{Zj}}{\partial \omega^c} < \frac{\partial RS^c_{Yj}}{\partial \omega^c} < 0 \quad \Leftrightarrow \quad \kappa > 1 \tag{7}$$

Inequalities (6) and (7) have a graphical counterpart in Fig. 2, which plots the distribution of relative sales for the two industries and for location $m$.

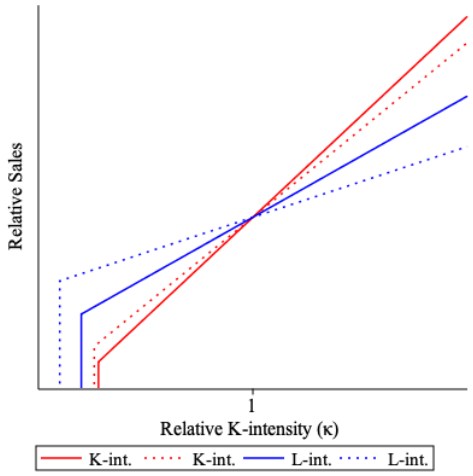


Figure 2: Relative Domestic Sales $RS^m_{id}$

Industry $Y$ is *K-intensive* while $Z$ is *L-intensive* industry. Firms to the left of $\kappa = 1$ are labor intensive relative to the industry average, firms to the right of $\kappa = 1$ are capital intensive relative to the industry average. The solid lines represent the distributions of sales before immigration while the dotted lines represent them after immigration. Relative sales decrease for the *K-intensive* firms and increase for the *L-intensive* firms, which corresponds to expression (5). We also see that the change is stronger for the *L-intensive* industry. This corresponds to the log super- and log sub-modular properties expressed in (6) and (7). Analogous result applying to foreign sales.

We can now substitute the relationship between factor price and factor abundance to obtain the expression subjected to empirical investigation. The relative price of labor is inversely related to its relative abundance through general equilibrium (see appendix sect. 8.1). In our notation this means that we can write $\omega^c$ as function of relative endowments, $\omega^c(L^c/K^c)$; and $d\omega^c(L^c/K^c)/dL^c > 0$ for any given $K^c$. Substituting $\omega^c(L^c/K^c)$ into expression (4) and taking the derivatives we obtain

$$\frac{\partial RS^c_{Zj}}{\partial L^c} > \frac{\partial RS^c_{Yj}}{\partial L^c} > 0 \quad \Leftrightarrow \quad \kappa < 1 \tag{8}$$

$$\frac{\partial RS^c_{Zj}}{\partial L^c} < \frac{\partial RS^c_{Yj}}{\partial L^c} < 0 \quad \Leftrightarrow \quad \kappa > 1 \tag{9}$$

for any given $K^c$. These are the effects of migration on relative sales that we are going to submit to empirical investigation.

# 4 Data

**Firm Performance:** In our empirical analysis we exploit different micro datasets obtained from the Turkish Statistical Institute. These are Business Register (BR), Annual Survey of Industry and Service Statistics (AISS), and local unit files of AISS. All these micro data files except local unit files of AISS, are at enterprise level which can be formed of several establishments, multi-unit, or just one establishment, single unit. After aggregating the local unit files of AISS at enterprise level, we merge these three data files using firm level identification numbers.

Firm level employment, domestic sales, total sales, investment, amortization value, and total wage bill data come from AISS. Location data comes from two sources BR and local unit files of AISS. Data on the number of establishment of an enterprise comes from local unit files of AISS. We use these data to identify single unit firms. In our panel spanning from 2006-2015 out of 266,180 observations 188,686 are single unit. The rest of the observations belong to enterprises having more than one local unit.

**Industry Classification:** Industry classification is based on NACE Rev.2 codes. Although infrequent, industry classification of some firms change during the time span of our study because some enterprises have more than one economic activity and the main activity of the enterprise may change. This is problematic as we rely on relative sales information, calculated as firm level sales divided by the industry sales in a given city. For a given firm, sector switches can result in deflated or inflated numbers of relative values of performance indicators (relative domestic sales and relative total sales) for the years in which sectoral categorization shifts. Therefore, we assign a unique NACE code to each firm. Unique NACE code of a given firm is equal to the industry code of the sector through which that firm receives highest sales throughout the time span of our study. Based on this definition 6.6% of the unique NACE code do not match with the original code reported in the data and most of the occurrences are in NACE codes 25 and 28.

**Firm Location:** When testing our predictions, the location information is a key variable as we control for city-level immigration ratio in our empirical analysis. The main source of location information is BR which collects this information at the enterprise level for the entire period of our study. However, if the enterprise is multi-unit, the city of the enterprise reported in the data may not be necessarily the location of the production facility which is potentially affected by the immigrants. For example, if the head office is in Istanbul and the textile factory is in Bursa, BR may record the location of the factory as Istanbul.

As it has been stressed, location information comes from two sources. These are BR and local unit files of AISS. BR provides information on the province (NUTS3) of a given enterprise. Local unit files also provide location information at province level (NUTS3) although only for the years 2014 and 2015. In order to have an idea about the magnitude of this measurement error we conduct a simple exercise by comparing the location information coming from BR and local unit files of AISS using the years 2014 and 2015. Firstly, we aggregate local unit files to enterprise level. While doing the aggregation we assume that the NUTS3 code of the enterprise is the NUTS3 code of the establishment with highest employment in a given year. When we compare the province level location information coming from BR and local unit files for the years 2014 and 2015 out of 64,159 observations, the city codes do not match for only 4.9% of the observations. This implies that for about 95% of the observations BR correctly reports the location information of the establishment with highest employment level. In addition we

conduct a robustness check based only on the sample of single-unit firm observations. This will be discussed in the methodology and results section.

**Immigration Data:** Syrian migration to Turkey has started in April 2011. Turkey has adopted an open door policy and gave a temporary protection status to Syrian refugees in October 2011. Under temporary protection, immigrants were able to get access to free health and education, as well as social assistance, psychological support and access to the labor market. As a first policy response Turkish Disaster and Emergency Management Authority (TDEMA) established 21 camps across 10 provinces for the Syrian refugees. In the beginning, these provinces with the camps located in the southeastern region, were the main areas that Syrians were located. However, after the initial immigration shock, most of the refugees moved to other Turkish provinces (See Fig. 3). As the number of migrants increased, TDEMA became inadequate for the coordination of the migration process and was replaced by a new governmental entity, the Turkish Directorate General for Migration Management (TDGMM), which is responsible for the management of migration process.

The refugee labor force is made primarily by unskilled and young persons. According to the survey conducted by TDEMA in June 2013, 37% of Syrian refugees in camps and 33% of refugees outside camps only have a primary school degree. The graduates of secondary school account for 25% and 19% of those in camps and out of camps, respectively. In terms of age distribution, Syrian refugees are considerably younger than natives, their median age is 21, compared to 31 for natives (Aksu et al. (2022)). While the educational attainment of Syrian refugees and native population located in the southeastern region are similar, educational attainment of Syrian refugees is far below the educational attainment reported at country level. Based on 2015 data, 10.9% of Turks have less than primary school degree, while this number amounts to 29.2% for Syrian population (Aksu et al. (2022). Across all educational attainment categories (primary, secondary, high school, university) Syrian refugees perform lower. In any case, immigration of Syrian refugees represents an increase in labor relative to capital.

The city level immigrant information comes from different sources. For the year 2013, TDEMA provides information only on the number of Syrians in provinces with camps. Reportedly, there are approximately 80,000 refugees residing in provinces without camps.Therefore, for these provinces without camps, the province-level immigrant numbers have been distributed based on the migrant shares in these provinces in the following year. Following Aksu et al. (2022), the number of refugees across provinces for the year 2014 is taken from Erdoğan (2014) and the numbers for the year 2015 are taken by the TDGMM. [1]

# 5 Variable Definitions

**Construction of Capital Stock:** We construct capital stock using perpetual inventory method:

$$K_{i,t+1} = (1 - \delta)K_{i,t} + I_{i,t} \tag{10}$$

where $K$ is capital stock, $\delta$ is depreciation and $I$ is investment. By employing this method, it becomes possible to calculate the capital stock by utilizing investment and depreciation values, provided that data on the initial capital stock is available. In order to construct the initial level of capital stock we first assume a depreciation rate of 10% and we generate the initial capital stock as equal to the first year the firm reports non-zero amortization: $K_0 = D_0/\delta$, where $D_0$

[1]We thank to Prof. M. Kırdar for generously providing the data on province-level migrant numbers.

is the first amortization value.[2] Then we apply the perpetual inventory method described in Eq. (10). At the observation level, capital stock information was generated for almost 80% of the firm-level observations in our sample. Observations with a reported depreciation value of "0" were considered as empty observations during the creation of capital stock data. For these firms, we have imputed capital stock by using capital stock/employment (K/L) ratio of the firms in the same 2-digit industry and size category. We have only imputed capital stock series of the firms which have zero values for all their observations. After this imputation, 92% of the firm-year observations have a capital stock data available in our sample.

**Capital Intensity of Firms and Industries:** We use two different measures of capital intensity at firm level. These definitions measure capital intensity as capital stock divided by employment (method 1) and total wage bill (method 2), respectively. The employment is the summation of paid and unpaid employment. [3]

In accordance with the construction of our empirical model, a firm is considered capital-intensive if its capital intensity is above the mean value of capital intensity across all sectors in a given year and city. Accordingly, it may happen that a firm is classified as capital-intensive in one year and labor-intensive in another year. Approximately 71% of the firms, however, are consistently classified in the same capital intensity category in all years.[4] Since we use two different measures of capital intensity, the capital intensity status of firms may change across these definitions as well. When comparing the capital intensity status of a given firm across these two definitions, we find that in 85% of the observations, the firm-level capital intensity status remains the same across the two definitions. We show the kernel densities of capital intensities across the 2 digit NACE Rev.2 sectors in Figures 4 and 5. To control for outliers we drop the upper and lower 2.5 percent of the distribution of the capital intensity variables. The figures show that capital intensity varies considerably across firms in a given industry.

We apply the same approach to identify capital intensive industries. Our reference value to define industry level capital intensity is set based on yearly averages of capital intensities of the firms belonging to all sectors (manufacturing and non-manufacturing) in a given city. For a given capital intensity measure, sectors can switch their capital intensity status across cities and years. Across the two definitions, sectoral capital intensity status are consistent.

Table 1 presents the average values of the main variables that we use in our empirical investigation across NACE Rev.2 sectors.

# 6 Methodology and Estimation Results

We adopt two different empirical methodology to assess the impact of immigration on firm-level domestic sales and total sales. The first method employs a Difference-in-Differences (DID) model, focusing on the treatment area located in the southeastern portion of Anatolia, where Syrian immigration is intense, and a control area adjacent to the immigration region. Secondly, we employ a continuous treatment model that encompasses all firms in our sample,

[2]Ozler and Yilmaz (2009) adopted a similar depreciation rate for machinery for the construction of initial level of capital stock.

[3]Unpaid employment includes persons who live with the owner of unit or regularly work for the unit but who have not a contract and not receive wages and salaries in kind.

[4]For the first definition of capital intensity, out of 66,974 firms with available capital intensity measures, 47,662 firms do not switch categories. For the second definition, where capital intensity is defined as capital stock divided by wages, 44,913 firms do not switch any category.

Table 1: Summary Statistics

| Industries | % of K-intensive industries | % of K-intensive firms | % of Single-plant firms | Relative Domestic sales | Relative Total sales |
|---|---|---|---|---|---|
| 10 Food pr. | 0,45 | 0,38 | 0,54 | 2,82 | 2,81 |
| 11 Beverage | 0,80 | 0,40 | 0,57 | 25,50 | 25,51 |
| 12 Tobacco prod. | 0,87 | 0,23 | 0,72 | 20,67 | 20,51 |
| 13 Textile | 0,53 | 0,38 | 0,72 | 1,80 | 1,80 |
| 14 Wearing app. | 0,03 | 0,33 | 0,72 | 1,40 | 1,39 |
| 15 Leather | 0,10 | 0,36 | 0,67 | 5,19 | 5,19 |
| 16 Wood | 0,23 | 0,40 | 0,69 | 11,67 | 11,67 |
| 17 Paper & PP | 0,50 | 0,37 | 0,78 | 6,41 | 6,40 |
| 18 Printing | 0,38 | 0,38 | 0,81 | 9,08 | 9,08 |
| 19 Coke & Petr. | 0,78 | 0,44 | 0,75 | 29,41 | 29,41 |
| 20 Chemicals | 0,57 | 0,40 | 0,64 | 7,07 | 7,07 |
| 21 Pharmaceutical | 0,36 | 0,34 | 0,62 | 13,37 | 13,39 |
| 22 Rubber & Pl. | 0,49 | 0,38 | 0,70 | 4,09 | 4,09 |
| 23 Other non met. | 0,85 | 0,41 | 0,65 | 3,70 | 3,70 |
| 24 Basic metal | 0,52 | 0,41 | 0,74 | 5,01 | 5,01 |
| 25 Fabric. met. | 0,20 | 0,41 | 0,77 | 2,36 | 2,36 |
| 26 Computer-electronics | 0,19 | 0,40 | 0,78 | 7,47 | 7,46 |
| 27 Electrical Equipment | 0,18 | 0,39 | 0,74 | 4,54 | 4,53 |
| 28 Machinery | 0,20 | 0,41 | 0,78 | 2,76 | 2,75 |
| 29 Motor vehicles | 0,24 | 0,39 | 0,82 | 4,77 | 4,76 |
| 30 Other transport equip. | 0,30 | 0,38 | 0,85 | 9,45 | 9,46 |
| 31 Furniture | 0,06 | 0,37 | 0,67 | 4,77 | 4,77 |
| 32 Other Manuf. | 0,14 | 0,38 | 0,64 | 6,02 | 5,98 |
| 33 Repair and Inst. | 0,05 | 0,40 | 0,87 | 6,36 | 6,35 |

*Notes*: A firm observation has three dimensions: industry, city, time. The table reports mean values. More detailed summary statistics are in the appendix (Tables 6 and 7). A firm is capital intensive if the firms capital stock is above the average capital stock in the industry-city-year to which the firm belongs. Percentages are in terms of total observation (in the specified industry-city-time). Relative values in the last two columns are in terms of totals in the same industry-city-time. Capital stock has been calculated based on perpetual inventory method and capital intensity measure is based on definition 2.

rather than restricting our analysis to specific treatment and control regions. These methods and corresponding results will be discussed in the relevant sections below.

## 6.1 Difference in Difference Estimation

As previously mentioned, our initial methodology is based on the Difference-in-Differences (DID) estimation strategy. This framework takes advantage of the forced nature of immigration and of the exogenous distribution of migrants in Turkish regions during the initial years of immigration. In the first two years (2012-2013) immigrants were allocated to Turkish regions simply by logistic and administrative criteria and migrants, hosted in camps, did not have the right to move. As we have previously discussed, immigration studies often face endogeneity concerns due to self-selection bias, where immigrants tend to choose cities with more favorable labor market conditions. By focusing solely on the initial years of the migration episode, we create a quasi-natural experiment that is less susceptible to the endogeneity problem arising from self-selection.

In the DID analysis treatment area consist of cities for which the refugee/population ratio is above 2 percent. The control region is a close region to the treatment area which exhibit significant similarities with treatment region in terms of cultural background and economic development level, as well as the previous patterns of the primary labor market results such as informal employment, unemployment, and labor force participation rates. The control area is composed of four NUTS2-level regions where the ratios of refugees to the population are low, in fact close to zero. [5]

We create a binary variable $S$ that takes the value of 1 in the treatment area and 0 in the control area. Additionally, another binary variable $T$ is constructed, taking the value of 1 in the post-immigration period and 0 in the pre-immigration period. The pre-immigration period includes the years 2010 and 2011, while the post-immigration period corresponds to 2012 and 2013. Consequently, the DID equation can be represented in the following manner:

$$Y_{ijt} = \alpha_1 + \alpha_2(S_i \times T_i) + \kappa Z_{jt} + f_j + f_t + f_i + \epsilon_{ijt} \tag{11}$$

where $Y_{ijt}$ is the relative performance measure for firm $i$, in province $j$, at time $t$. $Z_{jt}$ is a region- and time-specific proxy for economic activity, proxied by the growth of real gross domestic product, at province level, and $\epsilon_{ijt}$ is an error term. In order to address potential bias arising from unobserved differences between firms, we also incorporate firm fixed effects (denoted as $f_i$ ) into our estimation. As stated in Ceritoglu et al. (2017) this approach aligns entirely with the fundamental principles of standard Difference-in-Differences (DID) analysis and is applicable in regression models that encompass multiple years and regions.[6]

**Results:** The empirical estimation results are shown in Table 2 and 3. Our analysis incorporates six distinct samples. The first and second samples consist of capital-intensive and labor-intensive firms, respectively. The third and fourth samples include capital (KK) and labour (LK) intensive firms within capital intensive industries. Similarly, the fifth and sixth sample consist of capital (KL) and labour (LL) intensive firms in labour intensive industries. This grouping reflects the theoretical prediction summarized in Fig. 2. The KK group is constituted by firms whose relative sales are represented by the section of the red line to the right of the crossing point. The KL firms are those represented by the section of the blue line to the right of the crossing point, and so on.

The results of our analysis align with the predictions of our theoretical model. In the case of labor-intensive firms, the Ordinary Least Squares (OLS) results shown in Table 2 (Panels 1 and 2) indicate that the coefficient $\alpha_2$ is positive and statistically significant. Furthermore, for labor-intensive firms operating in both capital and labor-intensive industries, the coefficient $\alpha_2$ remains positive and significant. These results suggest that the influx of refugees positively affects domestic sales and total sales at the firm level. Conversely, for capital-intensive firms, the coefficient $\alpha_2$ exhibits a negative and significant relationship. Additionally, when examining capital-intensive firms operating in labor-intensive industries, the coefficient $\alpha_2$ remains negative and significant. These results indicate that the refugee inflow has a negative impact on firm-level domestic and total sales within these particular sub-samples. When controlling for firm fixed effects (individual-specific characteristics that do not vary over time), the estimation results presented in Table 2 (Panels 3 and 4) confirm that the refugee flow has a positive

[5]The cities in the treatment area are Kilis, Osmaniye,Gaziantep, Kahramanmaras, Sanliurfa, Batman, Diyarbakir, Adiyaman, Sirnak, Siirt,Adana, Mardin, Hatay, and Mersin. The cities within the control area are Erzurum, Erzincan, Elazig, Malatya, Mus, Van, Kars, Ardahan, Agri, Igdir, Hakkari, Bingol, Tunceli, Bayburt, and Bitlis. The analysis covers the time period from 2010 to 2013

[6]Notably, previous studies such as Carpenter (2004), Wooldridge (2010).

impact on firm outcomes for the sample of labor-intensive firms and labor-intensive firms in capital-intensive industries. However, when examining the other sub-samples, the coefficient $\alpha_2$ becomes insignificant.

Results based on the second definition of capital intensity are presented in Table 3. Specifically, when focusing on labor-intensive firms, the OLS analysis in Panels 1 and 2 consistently shows a positive and statistically significant coefficient for $\alpha_2$, in line with the findings derived from the alternative capital intensity definition in Table 2 (Panels 1 and 2). This positive impact is also observed in labor-intensive firms operating within capital-intensive industries. When we incorporate firm fixed effects into the analysis, the coefficient of $\alpha_2$ remains positive for labor-intensive firms, providing further evidence that immigration have a positive impact on sales measures within this specific subgroup. However, for the remaining subgroups involving different combinations of firms and industries, the coefficients associated with $\alpha_2$ do not exhibit statistical significance.

Overall, these diff-in-diff analysis points at a positive effect of immigration on labor-intensive firms. Among these firms the effect is stronger for those in labor intensive industries. The effect on capital intensive firms is negative but less robust. In no case the empirical result is on contrast with our theoretical rationale.

## 6.2 Continuous treatment

In the second methodology, we investigate the impact of migration on firm-level performance indicators using the following specification. This method involves firms from all cities, and the study spans the time period from 2006 to 2015. We estimate the following equation:

$$Y_{ijt} = \alpha_1 + \alpha_2 R_{jt} + f_j + f_t + f_i + \epsilon_{ijt} \tag{12}$$

where $Y_{ijt}$ is the relative performance measure for firm $i$, in province $j$, at time $t$. Relative performance measure is the relative domestic sales and relative total sales of a given firm in a given city with respect to the industry that the firm belongs to. $R_{jt}$ stands for the immigration ratio, defined as total immigration stock divided by population, in province $j$ which has positive values for the years after 2012. For the years before 2013, immigration ratio is equal to zero.

We introduce dummy variables for time, $f_t$, for the province $f_j$, as well as firm fixed effect, $f_i$ to control time specific,province specific, and firm-specific effects that might cause the change in the relative performance measures. Year fixed effects controls time variation, while province fixed effects account for time-invariant differences across cities. We estimate Eq. (12) at firm-level. In this set up, immigration stock is measured at city level, while relative performance is measured at firm-level. In the baseline specification, we are trying to measure within firm variation across time in the relative domestic sales and relative total sales. The coefficient of interest is $\alpha_2$, the coefficient of immigration ratio ($R_{jt}$). Positive (negative) and significant values of the coefficient $\alpha_2$ imply that immigration has a positive (negative) impact on the firm level performance measures.

**Results:** Table 4 and Table 5 present the effect of the refugee inflow on the firm level sales measures using the two definitions of capital intensity, respectively. The baseline regression results can be found in column (1) of the corresponding tables. The subsequent columns (2-5) present additional specifications where we incorporate various control variables. In column (2), we include regional time trends, while in column (3), we consider time trends specific to the 12 NUTS-1 regions. Column (4) includes interactions of 5 regions and year-fixed effects. Column (5) includes interactions of sector and year-fixed effects. Just like the difference in difference

model, to further examine our theoretical predictions, we estimate Eq.(12) using six distinct samples.

When focusing solely on capital-intensive manufacturing firms, we observe that the immigration ratio has a negative and statistically significant impact on domestic and total sales in specifications 1 and 5. This implies that as the ratio of Syrian migrant stock to the overall population increases, there is a corresponding decrease in relative sales of capital-intensive firms. However, for the labor-intensive firms, the effect of immigration stock on relative domestic sales or total sales is not statistically significant.

In the analysis focused on capital-intensive firms within capital-intensive industries, we also observe negative and significant coefficients for the immigration ratio consistent with our empirical predictions (columns 3 and 5). Moreover, when we compare the magnitude of the coefficients of immigration ratio in the sample of capital intensive firms in capital intensive industries and in the sample of all capital intensive firms, the former appears smaller and this finding is also in line with the predictions of our empirical model discussed in equations (8) and (9). In addition, when analyzing the sample of labor-intensive firms in labor-intensive industries, we find that the regression results in specifications 2, 3, and 4 in Table 5 exhibit positive coefficients for the immigration ratio, which align with the predictions of our empirical model. This suggests that as the refugee flow increases, there is a corresponding rise in firm-level domestic and total sales of labor intensive firms operating in labor-intensive industries.

We further conduct robustness checks using only single unit firms in the sample. The observation numbers drop approximately by 30 percent when we limit our sample to single unit firms. The results are presented in Tables 8 and 9. Overall, for the sample consisting only single unit firms, the findings are in line with the results obtained using whole sample.

Overall, the empirical evidence shows that immigration affects firms differently depending. Very often we find a detrimental effect for capital intensive firms and a positive effect for labor intensive firms. Often this effect is quantitatively different depending on the capital intensity of the industry. In a number of cases our estimations tells us the immigration has no impact on relative sales.

When interpreting our results, we must consider the measurement problem stemming from informal employment. The presence of informal employment can impact the classification of firms based on their capital intensity, potentially leading to an incorrect classification of labor-intensive firms as capital-intensive. This misclassification occurs because reported employment or wages may be lower than their actual values. Consequently, it is important to note that our predictions may exhibit a bias toward more conservative outcomes.

# 7 Conclusion

In this paper we present firm-level evidence on Turkish manufacturing firms performances in response to Syrian immigrant flows. Using different specifications and different samples, we document statistically significant and negative impact of immigration on relative sales of capital intensive firms and a positive impact on labor-intensive firms. This is in line with the prediction of our theoretical model. In a number of specifications we do not obtain significant coefficients. In only a handful of estimations out of 408 we find week evidence in contrast to our theoretical prediction.

From a policy perspective, significant and negative impact of immigration on capital intensive firms has several implications. Currently, informal employment in Turkey is approximately 30%, corresponding to 9.7 million of workers being almost equally divided in agriculture and

non-agricultural sectors. Rising immigration is a factor that intensifies the labour demand in favour of unskilled and non registered labour, a potential drag on the fight against informal economy. Another potential effect could be on productivity dynamics. Turkish productivity has been on a declining trend since the global recession as many other developing countries. The abundance of cheap labour is an incentive for switching across factor inputs as well as industries. Empirically, we partly see this trend as 20-23% of the firm in our sample switch between capital and labour intensive status. As a result of the availability of unskilled (and cheap labour) there might be tendency to shift lower productivity activities which may deter the productivity statistics further.

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# 8 Appendix

In this appendix we detail the model and provide estimation tables for the case of single unit firms.

## 8.1 Model

In the text we have presented the setting of the model, the variable input technology, and consumer preferences. This appendix completes the description of the model and derives the results.

**Averages.** The average values of $\alpha(t)$, $\beta(t)$, and $\varphi(t)$ are:

$$\widetilde{\alpha}_i^c = \left(\frac{1}{1-G\left(t_i^{*c}\right)}\int_{t_i^{*c}}^{\infty}\alpha(t)^{\sigma-1}dG\right)^{\frac{1}{\sigma-1}},$$

$$\widetilde{\beta}_i^c = \left(\frac{1}{1-G\left(t_i^{*c}\right)}\int_{t_i^{*c}}^{\infty}\beta(t)^{\sigma-1}dG\right)^{\frac{1}{\sigma-1}},$$

$$\widetilde{\varphi}_i^c = \left(\frac{1}{1-G\left(t_i^{*c}\right)}\int_{t_i^{*c}}^{\infty}\varphi^{1-\sigma}dG\right)^{\frac{1}{1-\sigma}}.$$

The average marginal cost and the average *K-intensity* in industry $i$ of location $c$ are defined respectively as $\widetilde{mc}_i^c = \left\{\frac{1}{1-G\left(t_i^{*c}\right)}\int_{t_i^{*c}}^{\infty}\left(mc_i^c\right)^{1-\sigma}dG\right\}^{\frac{1}{1-\sigma}}$ and $\overline{\theta}_i^c = \frac{1}{1-G\left(t_i^{*c}\right)}\int_{t_i^{*c}}^{\infty}\theta_i^c(t)\,dG$. Then, we have

$$\widetilde{mc}_i^c = \left[(\lambda_i)^{\sigma}\left(w_L^c\right)^{1-\sigma}\left(\widetilde{\alpha}_i^c\right)^{\sigma-1} + (1-\lambda_i)^{\sigma}\left(w_K^c\right)^{1-\sigma}\left(\widetilde{\beta}_i^c\right)^{\sigma-1}\right]^{\frac{1}{1-\sigma}} \tag{13}$$

$$\overline{\theta}_i^c = \left(\frac{\Lambda_i}{\omega^c}\right)^{\sigma}\left(\widetilde{\varphi}_i^c\right)^{\sigma-1} \tag{14}$$

For further reference note that $\widetilde{mc}_i^c = mc_i^c\left(\widetilde{\alpha}_i^c, \widetilde{\beta}_i^c\right)$ and that $\overline{\theta}_i^c = \theta\left(\widetilde{\varphi}_i^c\right)$. Analogous formulas where $\widetilde{\varphi}(t_{xi}^{*c})$ replaces $\widetilde{\varphi}(t_i^{*c})$ apply to $\widetilde{\alpha}_{ix}^c$, $\widetilde{\beta}_{ix}^c$, $\widetilde{\varphi}_{ix}^c$, $\widetilde{mc}_{ix}^c$, and $\overline{\theta}_{ix}^c$.

**Fixed costs.** Assuming that the fixed input technology is homogeneous or that it is heterogeneous gives qualitatively the same results. We assume homogeneous fixed costs since this assumption allows focusing on heterogeneity in the production process (which is the heart of the matter). This is the assumption most commonly retained in the literature (Melitz, 2003; Bernard, Redding and Schott, 2007; and many others). Specifically we assume that the fixed input technology is represented by the cost function $\widetilde{mc}_i^c$ described in Eq. (13). Thus, the fixed production cost is $F_i\widetilde{mc}_i^c$ where $F_i$ is a positive constant. This assumption represents the fixed input as a homogenous, non-traded, composite good produced in a perfectly competitive market by assembling in a CES all varieties of the domestic industry output (similarly to Ethier, 1980). But it may also be interpreted as in Yeaple (2005) who assumes that the fixed cost is represented by output that must be produced by the firm and that ultimately cannot be sold; with the difference that in our model this output requires a unit cost function $\widetilde{mc}_i^c$. Analogously to fixed production cost, the fixed entry cost is $F_{ie}\widetilde{mc}_i^c$ and the fixed exporting cost is $F_i\widetilde{mc}_{ix}^c$, where $F_{ie}$ and $F_{ix}$ are positive constants. These assumptions have the convenient property that the average factor intensity in production of output is the same as in the production of the fixed input. Then the average factor intensity in the industry is independent of the scale of the industry. This assures no (average) factor intensity reversal and makes the ranking of industry factor intensity entirely determined by the ranking of $\Lambda_i$.

**Demand.** Given consumer preferences described in the text the demand emanating from domestic residents, $s_{id}^m$, and from foreign residents, $s_{ix}^m$ for the output of a firm in industry $i$ of location $m$ is:

$$s_{id}^m(t) = \left(\frac{p_{id}^m(t)}{P_i^H}\right)^{1-\varsigma} \gamma_i I^H, \qquad s_{ix}^m(t) = \left(\frac{p_{ix}^m(t)}{P_i^F}\right)^{1-\varsigma} \gamma_i I^F, \tag{15}$$

where $p_{id}^m(t)$ and $p_{ix}^m(t)$ are prices and $P_i^H$ is the price index. The absence of internal trade costs makes that consumers in the same country face the same prices and the same price index regardless of the location. Analogous functions obtain for the other locations. Total firm sales are represented by $s_i^c(t) = s_{id}^c(t) + s_{ix}^c(t)$.

**Profit maximization and zero profit.** With monopolistic competition and under the large-group assumption, the profit-maximising prices for the domestic and the foreign market are:

$$p_{id}^c(t) = \frac{\varsigma}{\varsigma - 1} mc_i^c(t), \quad p_{ix}^c(t) = \frac{p_{id}^c}{\tau} \tag{16}$$

The notation $mc_i^c(t)$ reminds us that firms with different $t$ have different marginal costs; they therefore apply different prices and will obtain different sales. Indeed, for any two firms with draws $t'$ and $t''$ the relative sales are

$$\frac{s_{ij}^c(t')}{s_{ij}^c(t'')} = \left[\frac{mc_i^c(t')}{mc_i^c(t'')}\right]^{1-\varsigma}, \qquad j = d, x. \tag{17}$$

By paying the fixed entry cost, a firm draws randomly the value of $t$. At any point in time has a probability of death that, without loss of generality, we set equal to 1. This is equivalent to say that firms live for one instant. After drawing $t$ the firm stays in the market if the expected realization of profits is non negative and exits otherwise.[7] Firm's profit in each market may be written as $\pi_{id}^c(t) = s_{id}^c(t)/\varsigma - F_i \widetilde{mc}_i^c$ and $\pi_{ix}^c(t) = s_{ix}^c(t)/\varsigma - F_{ix} \widetilde{mc}_i^c$, from which we obtain the zero profit conditions

$$s_{id}^c\left(t_i^{*c}\right) = \varsigma F \widetilde{mc}(t_i^{*c}), \tag{18}$$

$$s_{ix}^c\left(t_{ix}^{*c}\right) = \varsigma F \widetilde{mc}(t_{ix}^{*c}). \tag{19}$$

**Aggregation.** Applying equations (17) and (18) to $s_{id}^c(t)/s_{id}^c\left(t_i^{*c}\right)$ gives domestic sales of any firm as function of the cut off value $t_i^{*c}$; that is: $s_{id}^c(t) = \left[\frac{mc_i^c(t)}{mc(t_i^{*c})}\right]^{1-\varsigma} \varsigma F \widetilde{mc}_i^c$. From this expression we obtain the average domestic sales defined as
$\overline{s}_{id}^c = \frac{1}{1-G(t_i^{*c})} \int_{t_i^{*c}}^{\infty} s_i^c(t) dG$.
Applying the same procedure to foreign sales we finally obtain

$$\overline{s}_{id}^c = \left[\frac{\widetilde{mc}_i^c(t_i^{*c})}{mc(t_i^{*c})}\right]^{1-\varsigma} \varsigma F \widetilde{mc}_i^c(t_i^{*c}), \tag{20}$$

$$\overline{s}_{ix}^c = \left[\frac{\widetilde{mc}_i^c(t_{ix}^{*c})}{mc(t_{ix}^{*c})}\right]^{1-\varsigma} \varsigma F_x \widetilde{mc}_i^c(t_i^{*c}). \tag{21}$$

[7] Given that $G(t)$ and that the probability of death are constant over time, it is irrelevant for the equilibrium value of the endogenous variables whether the firm decides to stay on the basis of expected profit or the basis of actual (instant) profit.

Computing the average domestic and foreign profit in industry $i$ of country $c$ we obtain

$$\overline{\pi}_{id}^{c} = \left[\frac{\overline{s}_{id}^{c}}{\varsigma} - F\widetilde{mc}_{i}^{c}(t_{i}^{*c})\right], \tag{22}$$

$$\overline{\pi}_{ix}^{c} = \left[\frac{\overline{s}_{ix}^{c}}{\varsigma} - F_{x}\widetilde{mc}_{i}^{c}(t_{i}^{*c})\right]. \tag{23}$$

Average total profit is $\overline{\pi}_{i}^{c} = \overline{\pi}_{id}^{c} + \chi_{i}^{c}\pi_{ix}^{c}$. Using profit-maximizing prices we compute the average domestic price, the average export price and the price indices:

$$\widetilde{p}_{id}^{c} = \frac{\varsigma}{\varsigma - 1}\widetilde{mc}_{i}^{c}, \qquad \widetilde{p}_{ix}^{c} = \frac{\varsigma}{\varsigma - 1}\widetilde{mc}_{ix}^{c}, \tag{24}$$

$$P_{i}^{H} = \left[M_{i}^{m}\left(\widetilde{p}_{id}^{m}\right)^{1-\varsigma} + M_{i}^{n}\left(\widetilde{p}_{id}^{n}\right)^{1-\varsigma} + \chi_{i}^{c}M_{i}^{F}\left(\widetilde{p}_{ix}^{H}\right)^{1-\varsigma}\right]^{\frac{1}{1-\varsigma}}, \tag{25}$$

$$P_{i}^{F} = \left[\chi_{i}^{m}M_{i}^{m}\left(\widetilde{p}_{ix}^{m}\right)^{1-\varsigma} + \chi_{i}^{n}M_{i}^{n}\left(\widetilde{p}_{ix}^{n}\right)^{1-\varsigma} + M_{i}^{F}\left(\widetilde{p}_{id}^{F}\right)^{1-\varsigma}\right]^{\frac{1}{1-\varsigma}}, \tag{26}$$

where $M_{i}^{c}$ is the mass of firms in industry $i$ of location $c$.

**General Equilibrium.** In addition to profit-maximising prices and to the zero profit conditions discussed above, there are five additional sets of equilibrium conditions. First, stationarity of the equilibrium requires the mass of potential entrants, $M_{ei}^{c}$, to be such that at any instant the mass of successful entrants, $\left[1 - G\left(t_{i}^{*c}\right)\right] M_{i}^{c}$ equals the mass of incumbent firms who die, $M_{i}^{c}$:

$$\left[1 - G\left(t_{i}^{*c}\right)\right] M_{ei}^{c} = M_{i}^{c}. \tag{27}$$

Second, free entry ensures that the expected benefit from entry equals the entry cost:

$$\left[1 - G\left(t_{i}^{*c}\right)\right] \overline{\pi}_{i}^{c} = F_{e}\widetilde{mc}_{i}^{c}\ . \tag{28}$$

The left-hand-side is the present value - prior to entry - of the expected profit and the right-hand-side is the entry cost.

Third, we need to ensure goods market equilibrium. Computing the average demand from (15) we see that average demand is equivalent to replacing the average price into the demand function. This allows writing the goods market equilibrium equations as follows:

$$\overline{s}_{ij}^{c} = s_{ij}^{c}\left(\widetilde{p}_{ij}^{c}\right) \qquad c = m, n, F; \qquad j = d, x. \tag{29}$$

Fourth, equilibrium in factor market requires that total factor demand, denoted $L_{i}^{c}$ and $K_{i}^{c}$, be equal to factor supply

$$L_{Y}^{c} + L_{Z}^{c} = L^{c}, \qquad c = m, n, F \tag{30}$$

$$K_{Y}^{c} + K_{Z}^{c} = K^{c} \qquad c = H, F. \tag{31}$$

After replacing equations (20)-(26) into (28)-(31) we can count equations and unknowns as a preliminary check. We count 17 independent equilibrium conditions and 18 endogenous variables. The equations are the six free-entry conditions (28), any five out of the six goods market equilibrium conditions (29), and the six factor market equilibrium (30)-(31). The endogenous are three $\left\{t_{i}^{*c}\right\}$, three $\left\{t_{ix}^{*c}\right\}$, six $\left\{w_{L}^{c}, w_{H}^{c}\right\}$ and six $\left\{M_{i}^{c}\right\}$. The equilibrium value of all other endogenous variables can be computed from these. The choice of a numéraire makes the model determined.

**Factor abundance and factor price.** In our model, the standard negative relationship between relative factor abundance and relative factor price holds. Thus, immigration of $L$ for any given $K$ reduces the relative price of $L$:

$$\frac{d\omega^c}{dL^c} > 0 \tag{32}$$

Numerical simulations show this unequivocally. After all, this result is intuitive since our model structure has the property of no (average) factor intensity reversal.

## 8.2 Tables and Figures

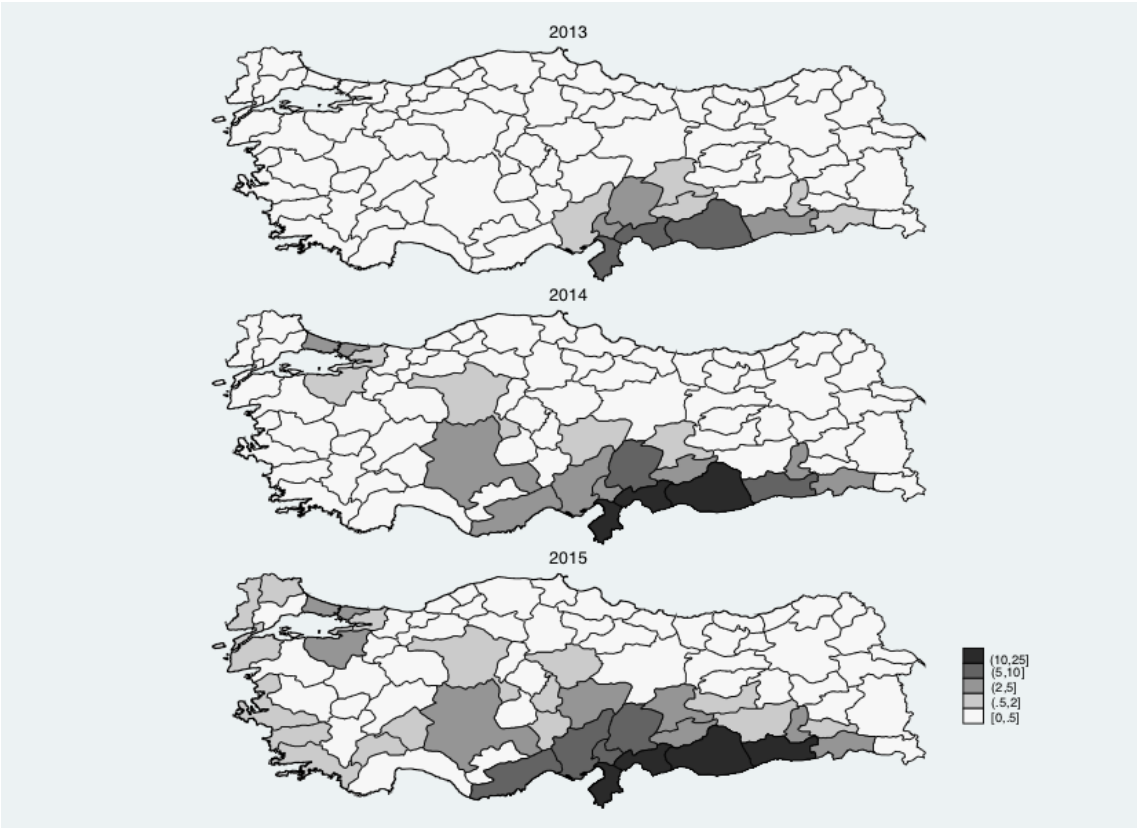


Figure 3: Syrian Immigrants Across Provinces (2013-2015)

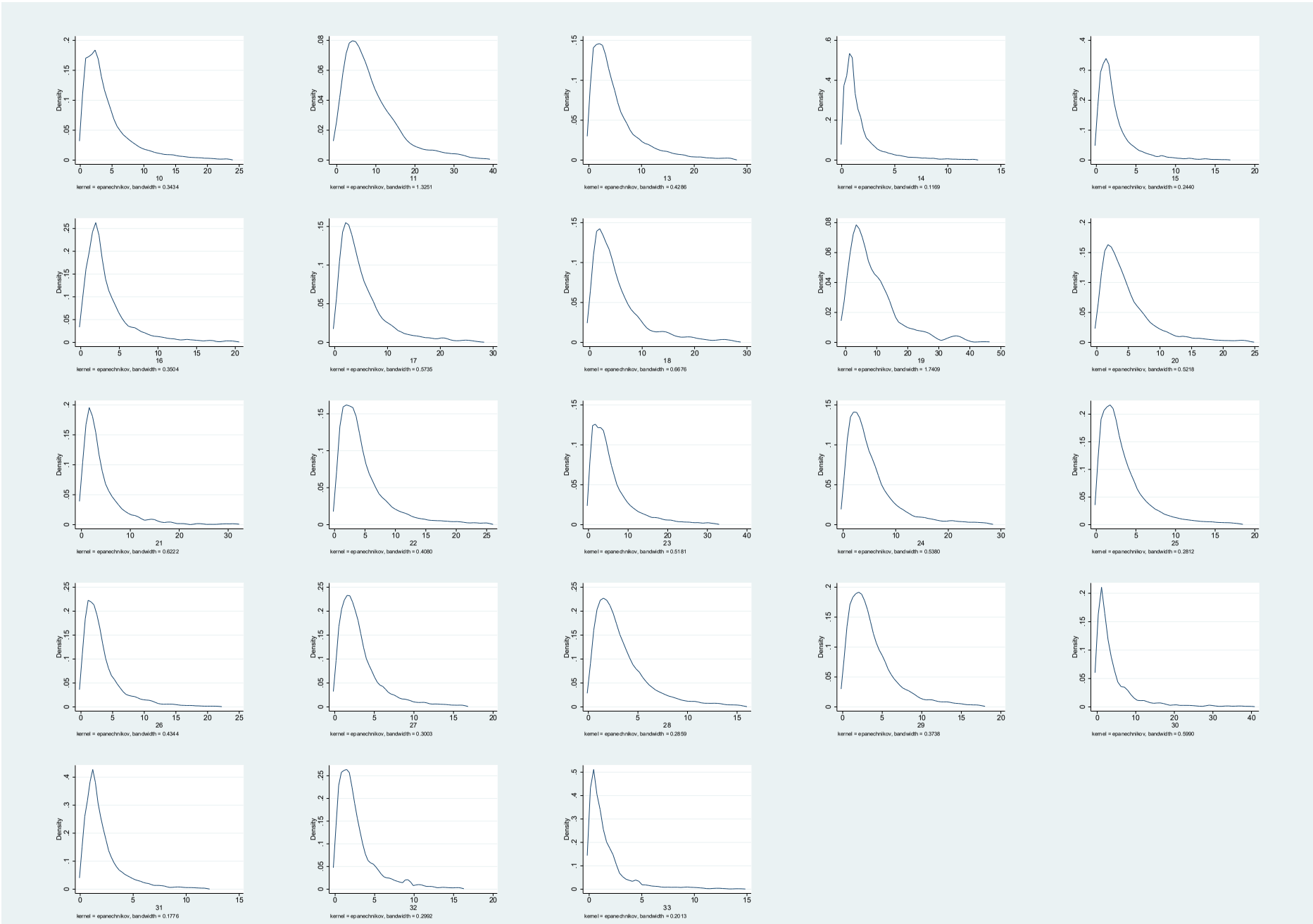


Figure 4: Kernel Density Plot of Capital Intensities across Sectors

[8] **Notes: Capital Stock based on the first definition.**

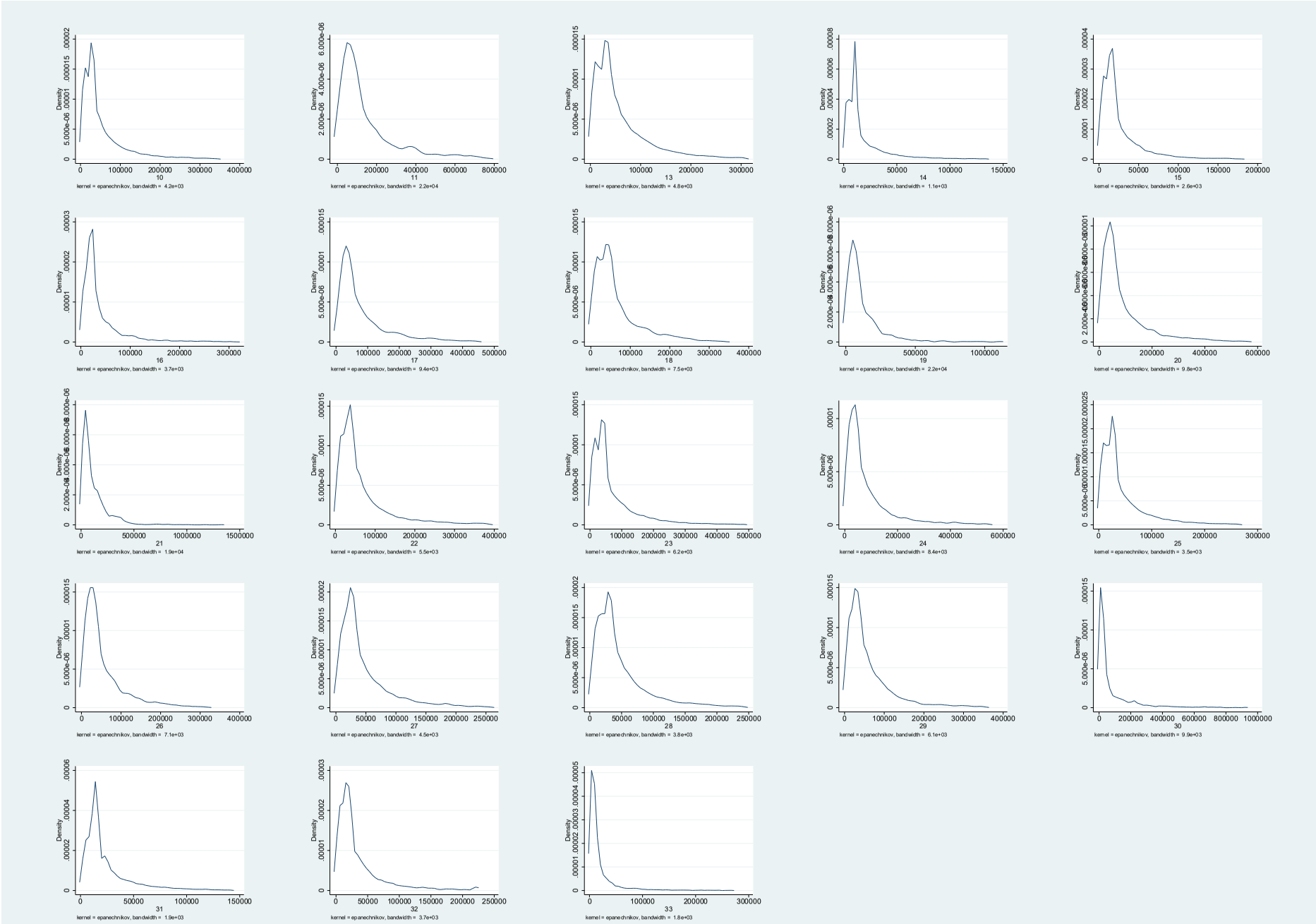


Figure 5: Kernel Density Plot of Capital Intensities across Sectors

[9] **Notes: Capital Stock based on the first definition.**

Table 2: Difference in differences estimations
Method 1

| | Firms | | Firms / Industries | | | |
|---|---|---|---|---|---|---|
| Samples | K-intensive | L-intensive | KK | LK | KL | LL |
| Observations | 4,301 | 6,514 | 1,815 | 2,739 | 2,486 | 3,775 |
| **Panel 1**. Dependent Variable: Relative Domestic Sales. Year and region FE | | | | | | |
| POSTTREAT | -3.200** | 5.808*** | 0.949 | 4.945** | -6.188*** | 4.404** |
| | (1.430) | (1.392) | (2.336) | (1.952) | (1.851) | (1.872) |
| $GDPGrowth_{jt}$ | -0.0502 | 0.158** | -0.0375 | 0.100 | -0.0840 | 0.141 |
| | (0.0698) | (0.0717) | (0.103) | (0.0915) | (0.0966) | (0.101) |
| R-squared | 0.144 | 0.216 | 0.215 | 0.231 | 0.138 | 0.300 |
| **Panel 2**. Dependent Variable: Relative Total Sales. Year and region FE | | | | | | |
| POSTTREAT | -3.469** | 5.858*** | 0.823 | 5.016** | -6.566*** | 4.456** |
| | (1.436) | (1.390) | (2.369) | (1.953) | (1.849) | (1.867) |
| $GDPGrowth_{jt}$ | -0.0477 | 0.157** | -0.0401 | 0.101 | -0.0817 | 0.139 |
| | (0.0701) | (0.0716) | (0.105) | (0.0915) | (0.0965) | (0.100) |
| R-squared | 0.143 | 0.217 | 0.210 | 0.231 | 0.138 | 0.302 |
| **Panel 3**. Dependent Variable: Relative Domestic Sales. Year, region and firm FE. | | | | | | |
| POSTTREAT | 0.450 | 1.904** | 1.107 | 3.526* | -0.803 | 0.439 |
| | (0.942) | (0.947) | (1.911) | (1.863) | (1.181) | (1.137) |
| $GDPGrowth_{jt}$ | 0.0304 | 0.0690** | 0.0555 | 0.0463 | 0.0107 | 0.0550 |
| | (0.0304) | (0.0348) | (0.0405) | (0.0463) | (0.0536) | (0.0564) |
| R-squared | 0.029 | 0.031 | 0.020 | 0.036 | 0.054 | 0.035 |
| Number of ids | 2,167 | 3,075 | 983 | 1,460 | 1,515 | 2,155 |
| **Panel 4**. Dependent Variable: Relative Total Sales. Year, region and firm FE. | | | | | | |
| POSTTREAT | 0.328 | 2.003** | 1.198 | 3.569* | -1.069 | 0.636 |
| | (0.957) | (0.944) | (1.922) | (1.866) | (1.205) | (1.125) |
| $GDPGrowth_{jt}$ | 0.0372 | 0.0677** | 0.0536 | 0.0525 | 0.0248 | 0.0484 |
| | (0.0272) | (0.0343) | (0.0394) | (0.0468) | (0.0454) | (0.0551) |
| R-squared | 0.029 | 0.031 | 0.022 | 0.035 | 0.053 | 0.033 |
| Number of ids | 2,167 | 3,075 | 983 | 1,460 | 1,515 | 2,155 |

*Notes*: Capital stock has been calculated based on perpetual inventory method, and capital intensity measure is based on definition 1.

Table 3: Difference in differences estimations
Method 2

| | Firms | | Firms / Industries | | | |
|---|---|---|---|---|---|---|
| Samples | K-intensive | L-intensive | KK | LK | KL | LL |
| Observations | 4,478 | 6,261 | 2,165 | 2,992 | 2,313 | 3,269 |
| **Panel 1**. Dependent Variable: Relative Domestic Sales. Year and region FE | | | | | | |
| POSTTREAT | -1.476 | 5.492*** | 1.127 | 7.931*** | -2.393 | 1.208 |
| | (1.351) | (1.471) | (1.982) | (1.883) | (1.863) | (2.136) |
| $GDPGrowth_{jt}$ | -0.0553 | 0.192** | 0.0940 | 0.0736 | -0.213** | 0.370*** |
| | (0.0676) | (0.0750) | (0.0948) | (0.0937) | (0.0971) | (0.112) |
| R-squared | 0.132 | 0.220 | 0.177 | 0.210 | 0.129 | 0.303 |
| **Panel 2**. Dependent Variable: Relative Total Sales. Year and region FE | | | | | | |
| POSTTREAT | -1.796 | 5.602*** | 1.139 | 7.930*** | -2.947 | 1.399 |
| | (1.355) | (1.470) | (2.003) | (1.884) | (1.857) | (2.132) |
| $GDPGrowth_{jt}$ | -0.0518 | 0.189** | 0.0887 | 0.0773 | -0.202** | 0.363*** |
| | (0.0678) | (0.0749) | (0.0958) | (0.0938) | (0.0967) | (0.111) |
| R-squared | 0.131 | 0.221 | 0.173 | 0.210 | 0.130 | 0.304 |
| **Panel 3**. Dependent Variable: Relative Domestic Sales. Year, region, and firm FE | | | | | | |
| POSTTREAT | 0.594 | 1.850* | 0.764 | 2.382 | -0.524 | -0.716 |
| | (0.991) | (0.973) | (1.691) | (1.457) | (1.221) | (1.103) |
| $GDPGrowth_{jt}$ | 0.0130 | 0.0681* | 0.0264 | 0.0457 | -0.0108 | 0.0499 |
| | (0.0309) | (0.0396) | (0.0362) | (0.0562) | (0.0533) | (0.0543) |
| R-squared | 0.031 | 0.031 | 0.022 | 0.026 | 0.055 | 0.033 |
| Number of ids | 2,422 | 3,004 | 1,217 | 1,590 | 1,470 | 1,846 |
| **Panel 4**. Dependent Variable: Relative Total Sales. Year, region, and firm FE | | | | | | |
| POSTTREAT | 0.462 | 1.976** | 0.786 | 2.357 | -0.852 | -0.433 |
| | (0.998) | (0.976) | (1.682) | (1.461) | (1.216) | (1.105) |
| $GDPGrowth_{jt}$ | 0.0233 | 0.0665* | 0.0282 | 0.0495 | 0.00796 | 0.0426 |
| | (0.0276) | (0.0392) | (0.0368) | (0.0564) | (0.0432) | (0.0525) |
| R-squared | 0.032 | 0.030 | 0.022 | 0.026 | 0.058 | 0.030 |
| Number of ids | 2,422 | 3,004 | 1,217 | 1,590 | 1,470 | 1,846 |

*Notes*: Capital stock has been calculated based on perpetual inventory method, and capital intensity measure is based on definition 2.

Table 4: Continuous Treatment (All Firms)
Method 2

| | A: Relative domestic sales | | | | | B: Relative total sales | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specification | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Sample: Capital intensive Firms. Observations: 96,965. Number of id: 30,771. | | | | | | | | | | |
| Method 1 | -0.0792*** | 0.0287 | -0.0270 | 0.00105 | -0.0995*** | -0.0812** | 0.0287 | -0.0249 | -0.00230 | -0.101*** |
| | (0.0301) | (0.0411) | (0.0422) | (0.0486) | (0.0305) | (0.0328) | (0.0450) | (0.0467) | (0.0532) | (0.0332) |
| R-squared | 0.011 | 0.019 | 0.023 | 0.021 | 0.022 | 0.011 | 0.019 | 0.024 | 0.022 | 0.024 |
| Sample: Labour Intensive Firms. Observations: 156,634. Number of id: 51,987. | | | | | | | | | | |
| Method 1 | -0.0758 | 0.000238 | -0.0459 | -0.0438 | -0.0860 | -0.0732 | 0.000998 | -0.0450 | -0.0391 | -0.0831 |
| | (0.0538) | (0.0653) | (0.0688) | (0.0741) | (0.0544) | (0.0531) | (0.0642) | (0.0678) | (0.0732) | (0.0536) |
| R-squared | 0.007 | 0.014 | 0.019 | 0.017 | 0.017 | 0.007 | 0.013 | 0.019 | 0.017 | 0.018 |
| Sample: Capital Intensive Firms in Capital Intensive Industries. Observations: 12,141. Number of id: 5,010 | | | | | | | | | | |
| Method 1 | 0.0212 | 0.0450 | -0.0690* | 0.0380 | -0.0832* | 0.0211 | 0.0453 | -0.0634* | 0.0401 | -0.0857* |
| | (0.0311) | (0.0476) | (0.0376) | (0.0657) | (0.0488) | (0.0307) | (0.0471) | (0.0363) | (0.0654) | (0.0486) |
| R-squared | 0.020 | 0.023 | 0.035 | 0.028 | 0.085 | 0.021 | 0.024 | 0.036 | 0.030 | 0.090 |
| Sample: Capital Intensive Firms in Labour Intensive Industries. Observations: 84,824. Number of id: 28,363 | | | | | | | | | | |
| Method 1 | -0.144*** | -0.0143 | -0.0447 | -0.0439 | -0.147*** | -0.136*** | -0.000576 | -0.0278 | -0.0333 | -0.140*** |
| | (0.0433) | (0.0458) | (0.0476) | (0.0533) | (0.0436) | (0.0426) | (0.0451) | (0.0467) | (0.0522) | (0.0428) |
| R-squared | 0.010 | 0.023 | 0.028 | 0.027 | 0.027 | 0.011 | 0.025 | 0.030 | 0.028 | 0.029 |
| Sample: Labour Intensive Firms in Capital Intensive Industries. Observations: 18,114. Number of id: 7,668 | | | | | | | | | | |
| Method 1 | -0.136 | -0.124 | -0.211 | -0.225 | -0.254* | -0.131 | -0.123 | -0.212 | -0.222 | -0.234 |
| | (0.124) | (0.156) | (0.154) | (0.184) | (0.151) | (0.122) | (0.154) | (0.151) | (0.181) | (0.151) |
| R-squared | 0.015 | 0.017 | 0.028 | 0.023 | 0.086 | 0.015 | 0.017 | 0.028 | 0.023 | 0.087 |
| Sample:Labour Intensive Firms in Labour Intensive Industries.Observations: 138,520. Number of id: 48,192 | | | | | | | | | | |
| Method 1 | -0.0189 | 0.0681 | 0.0513 | 0.0459 | -0.0180 | -0.0213 | 0.0618 | 0.0456 | 0.0439 | -0.0202 |
| | (0.0513) | (0.0545) | (0.0597) | (0.0615) | (0.0524) | (0.0518) | (0.0551) | (0.0601) | (0.0624) | (0.0529) |
| R-squared | 0.005 | 0.014 | 0.021 | 0.019 | 0.019 | 0.005 | 0.014 | 0.020 | 0.018 | 0.019 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 Region Lin. Time Trends | No | Yes | No | No | No | No | Yes | No | No | No |
| NUTS1 Lin. Time Trends | No | No | Yes | No | No | No | No | Yes | No | No |
| 5 Region-Year FE | No | No | No | Yes | No | No | No | No | Yes | No |
| Nace-Year FE | No | No | No | No | Yes | No | No | No | No | Yes |

*Notes*: Each cell shows the coefficient of the immigration ratio ($\alpha_2$) resulting from the Eq. 12. In specification 1, we regress firm level relative domestic sales and total sales on city-level immigration ratio, year fixed effects, city fixed effects, and firm-specific effects. Specification 2 and 3 include regional and NUTS1 level time trends, respectively. Specification 4 includes region-year fixed effects and specification 5 includes sector-year fixed effects. Method 1 defines capital intensity as capital stock divided by employment. * (p<0.10), ** (p<0.05 ), *** (p<0.01).

Table 5: Continuous Treatment (All Firms)
Method 2

| | A: Relative domestic sales | | | | | B: Relative total sales | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specification | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Sample: Capital intensive Firms. Observations: 101,576. Number of id: 35,975. | | | | | | | | | | |
| Method 2 | -0.0721*** | 0.0224 | -0.0314 | 0.00519 | -0.0883*** | -0.0696*** | 0.0272 | -0.0225 | 0.0132 | -0.0860*** |
| | (0.0255) | (0.0294) | (0.0314) | (0.0359) | (0.0262) | (0.0264) | (0.0301) | (0.0325) | (0.0375) | (0.0272) |
| R-squared | 0.008 | 0.012 | 0.018 | 0.015 | 0.020 | 0.009 | 0.016 | 0.019 | 0.018 | 0.019 |
| Sample: Labour Intensive Firms. Observations: 151,929. Number of id: 49,158. | | | | | | | | | | |
| Method 2 | -0.0698 | 0.0371 | -0.0163 | -0.00568 | -0.0831 | -0.0660 | 0.0392 | -0.0135 | -0.00323 | -0.0789 |
| | (0.0538) | (0.0673) | (0.0710) | (0.0763) | (0.0543) | (0.0530) | (0.0662) | (0.0699) | (0.0751) | (0.0535) |
| R-squared | 0.008 | 0.018 | 0.022 | 0.021 | 0.020 | 0.009 | 0.020 | 0.027 | 0.023 | 0.020 |
| Sample: Capital Intensive Firms in Capital Intensive Industries. Observations: 22,454. Number of id: 9,535. | | | | | | | | | | |
| Method 2 | -0.0337 | 0.0523 | -0.0223 | 0.00680 | -0.0776* | -0.0305 | 0.0526 | -0.0193 | 0.0127 | -0.0742* |
| | (0.0336) | (0.0434) | (0.0445) | (0.0556) | (0.0399) | (0.0342) | (0.0442) | (0.0464) | (0.0574) | (0.0405) |
| R-squared | 0.013 | 0.020 | 0.026 | 0.025 | 0.074 | 0.013 | 0.021 | 0.026 | 0.026 | 0.068 |
| Sample: Capital Intensive Firms in Labour Intensive Industries. Observations: 79,122. Number of id: 30,866. | | | | | | | | | | |
| Method 2 | -0.0829* | -0.00162 | -0.0333 | -0.0288 | -0.0887** | -0.0844* | 0.00739 | -0.0186 | -0.0153 | -0.0895* |
| | (0.0427) | (0.0445) | (0.0479) | (0.0543) | (0.0434) | (0.0454) | (0.0466) | (0.0502) | (0.0577) | (0.0462) |
| R-squared | 0.007 | 0.018 | 0.022 | 0.022 | 0.020 | 0.007 | 0.018 | 0.023 | 0.022 | 0.020 |
| Sample: Labour Intensive Firms in Capital Intensive Industries. Observations: 31,442. Number of id: 12,462. | | | | | | | | | | |
| Method 2 | -0.158 | -0.128 | -0.218 | -0.250 | -0.230* | -0.157 | -0.131 | -0.225 | -0.255* | -0.226* |
| | (0.111) | (0.138) | (0.146) | (0.155) | (0.121) | (0.109) | (0.136) | (0.143) | (0.151) | (0.119) |
| R-squared | 0.017 | 0.023 | 0.031 | 0.031 | 0.078 | 0.017 | 0.022 | 0.031 | 0.031 | 0.077 |
| Sample:Labour Intensive Firms in Labour Intensive Industries.Observations: 120,487. Number of id: 42,790. | | | | | | | | | | |
| Method 2 | -0.00298 | 0.133** | 0.115* | 0.109 | -0.0107 | 0.00550 | 0.139** | 0.124** | 0.117* | -0.00258 |
| | (0.0493) | (0.0602) | (0.0636) | (0.0666) | (0.0504) | (0.0470) | (0.0575) | (0.0608) | (0.0637) | (0.0480) |
| R-squared | 0.007 | 0.022 | 0.029 | 0.028 | 0.026 | 0.007 | 0.022 | 0.030 | 0.028 | 0.026 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 Reg. Lin. Trends | No | Yes | No | No | No | No | Yes | No | No | No |
| NUTS1 Lin. Trends | No | No | Yes | No | No | No | No | Yes | No | No |
| 5 Region-Year FE | No | No | No | Yes | No | No | No | No | Yes | No |
| NACE-Year FE | No | No | No | No | Yes | No | No | No | No | Yes |

*Notes*: Each cell shows the coefficient of the immigration ratio ($\alpha_2$) resulting from the Eq. 12. In specification 1, we regress firm level relative domestic sales and total sales on city-level immigration ratio, year fixed effects, city fixed effects, and firm-specific effects. Specification 2 and 3 include regional and NUTS1 level time trends, respectively. Specification 4 includes region-year fixed effects and specification 5 includes sector-year fixed effects. Method 2 defines capital intensity as capital stock divided by wages. * (p<0.10), ** (p<0.05 ), *** (p<0.01).

## Table 6: Descriptive Statistics - Part 1

| | 10 - Food products (n=27,036) | | | | | 11 - Beverages (n=1,399) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 36.285 | 100 | 0 | 7.017 | 35.309 | 36.526 | 85.714 | 0 | 19.465 | 38.636 |
| Ratio (k-intensive2) | 38.471 | 100 | 0 | 6.744 | 37.368 | 39.957 | 100 | 0 | 20.116 | 42.424 |
| Ratio (single) | 53.813 | 100 | 0 | 13.615 | 51.974 | 57.041 | 100 | 0 | 28.153 | 50.000 |
| Relative DS | 2.818 | 100 | 0.152 | 5.535 | 1.310 | 25.497 | 100 | 1.695 | 32.247 | 9.806 |
| Relative TS | 2.813 | 100 | 0.151 | 5.537 | 1.295 | 25.505 | 100 | 1.695 | 32.242 | 9.715 |
| | 12 - Tobacco products (n=256) | | | | | 13 - Textiles (n=27,923) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 33.203 | 83.333 | 0 | 20.362 | 35.714 | 37.962 | 100 | 0 | 5.792 | 37.768 |
| Ratio (k-intensive2) | 22.656 | 50.000 | 0 | 14.303 | 25.000 | 38.180 | 100 | 0 | 5.185 | 37.843 |
| Ratio (single) | 71.875 | 100 | 0 | 24.901 | 75.000 | 71.880 | 100 | 0 | 10.444 | 71.134 |
| Relative DS | 20.671 | 100 | 7.044 | 24.687 | 8.333 | 1.805 | 100 | 0.079 | 7.787 | 0.204 |
| Relative TS | 20.511 | 100 | 6.779 | 24.722 | 8.121 | 1.799 | 100 | 0.078 | 7.782 | 0.204 |
| | 14 - Wearing apparel (n=43,761) | | | | | 15 - Leather (n=6,235) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 32.648 | 100 | 0 | 6.572 | 31.373 | 34.451 | 100 | 0 | 8.625 | 34.279 |
| Ratio (k-intensive2) | 32.970 | 100 | 0 | 5.474 | 31.722 | 35.509 | 100 | 0 | 8.701 | 34.043 |
| Ratio (single) | 72.236 | 100 | 0 | 8.529 | 70.833 | 67.121 | 100 | 0 | 12.924 | 66.667 |
| Relative DS | 1.399 | 100 | 0 | 6.107 | 0.039 | 5.186 | 100 | 0.216 | 14.355 | 0.350 |
| Relative TS | 1.392 | 100 | 0.025 | 6.075 | 0.039 | 5.188 | 100 | 0.214 | 14.356 | 0.351 |
| | 16 - Wood (n=4,449) | | | | | 17 - Paper paper products (n=5,186) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 38.391 | 87.500 | 0 | 13.736 | 37.500 | 35.499 | 100 | 0 | 9.781 | 35.395 |
| Ratio (k-intensive2) | 39.852 | 80.000 | 0 | 12.892 | 38.462 | 37.466 | 100 | 0 | 8.739 | 37.805 |
| Ratio (single) | 69.049 | 100 | 0 | 18.587 | 68.421 | 78.481 | 100 | 0 | 11.002 | 77.737 |
| Relative DS | 11.671 | 100 | 0.827 | 17.626 | 5.263 | 6.411 | 100 | 0.285 | 15.803 | 0.364 |
| Relative TS | 11.666 | 100 | 0.817 | 17.626 | 5.263 | 6.404 | 100 | 0.285 | 15.799 | 0.364 |
| | 18 - Printing (n=3,984) | | | | | 19 - Coke and Petroleum (n=600) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 36.119 | 100 | 0 | 11.560 | 36.328 | 43.333 | 100 | 0 | 24.340 | 50.000 |
| Ratio (k-intensive2) | 38.379 | 100 | 0 | 11.866 | 38.075 | 44.000 | 100 | 0 | 25.744 | 50.000 |
| Ratio (single) | 81.175 | 100 | 0 | 13.904 | 83.264 | 74.500 | 100 | 0 | 24.184 | 80.000 |
| Relative DS | 9.081 | 100 | 0.391 | 21.877 | 0.472 | 29.407 | 100 | 1.871 | 32.707 | 12.500 |
| Relative TS | 9.081 | 100 | 0.391 | 21.878 | 0.472 | 29.409 | 100 | 1.871 | 32.709 | 12.500 |
| | 20 - Chemicals (n=6360) | | | | | 21 - Pharmaceutical products (n=1250) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 37.186 | 75 | 0 | 9.869 | 38.719 | 34.080 | 100 | 0 | 14.612 | 34.444 |
| Ratio (k-intensive2) | 39.544 | 83 | 0 | 9.785 | 39.548 | 33.680 | 100 | 0 | 13.592 | 36.047 |
| Ratio (single) | 63.805 | 100 | 0 | 14.474 | 58.824 | 61.600 | 100 | 0 | 18.229 | 55.789 |
| Relative DS | 7.069 | 100 | 0.239 | 17.396 | 1.424 | 13.372 | 100 | 0.917 | 26.551 | 1.364 |
| Relative TS | 7.072 | 100 | 0.243 | 17.391 | 1.425 | 13.390 | 100 | 0.908 | 26.558 | 1.364 |

*Notes*: A firm observation has three dimensions: industry, city, time. The table reports mean values. A firm is capital intensive if the firms capital stock is above the average capital stock in the industry-city-year to which the firm belongs. Percentages are in terms of total observation (in the specified industry-city-time). Relative values in the last two columns are in terms of totals in the same industry-city-time. Ratio (k-intensive1) represents ratio of capital intensive firms based on the first definition of capital intensity, while ratio (k-intensive2) represents ratio of capital intensive firms based on the second definition of capital intensity. DS represents domestic sales. TS represents total sales.

Table 7: Descriptive Statistics - Part 2

| | 22 - Rubber-plastic (n=15,790) | | | | | 23 - Other non-metallic (n=20,326) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 36.187 | 100 | 0 | 8.041 | 35.565 | 38.680 | 100 | 0 | 8.951 | 37.755 |
| Ratio (k-intensive2) | 38.353 | 100 | 0 | 7.792 | 37.859 | 40.844 | 100 | 0 | 7.943 | 40.000 |
| Ratio (single) | 70.038 | 100 | 0 | 12.625 | 67.442 | 65.143 | 100 | 0 | 14.801 | 61.818 |
| Relative DS | 4.092 | 100 | 0.123 | 11.646 | 0.633 | 3.700 | 100 | 0.219 | 7.190 | 1.886 |
| Relative TS | 4.091 | 100 | 0.122 | 11.646 | 0.633 | 3.698 | 100 | 0.217 | 7.186 | 1.885 |
| | 24 - Basic metals (n=8,432) | | | | | 25 - Fabricated metal (n=25,536) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 37.298 | 100 | 0 | 9.317 | 37.000 | 38.338 | 100 | 0 | 7.652 | 37.968 |
| Ratio (k-intensive2) | 40.655 | 100 | 0 | 8.930 | 39.601 | 41.259 | 100 | 0 | 7.361 | 39.369 |
| Ratio (single) | 73.968 | 100 | 0 | 13.700 | 72.449 | 77.287 | 100 | 0 | 10.625 | 76.062 |
| Relative DS | 5.008 | 100 | 0.242 | 13.110 | 1.097 | 2.365 | 100 | 0.087 | 7.785 | 0.409 |
| Relative TS | 5.006 | 100 | 0.243 | 13.111 | 1.042 | 2.364 | 100 | 0.088 | 7.781 | 0.409 |
| | 26 - Computer-electronic (n=2,608) | | | | | 27 - Electrical equipment (n=9,156) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 36.771 | 100 | 0 | 11.240 | 37.269 | 37.232 | 100 | 0 | 7.980 | 36.545 |
| Ratio (k-intensive2) | 39.571 | 100 | 0 | 11.190 | 40.909 | 38.576 | 100 | 0 | 7.983 | 38.333 |
| Ratio (single) | 78.183 | 100 | 0 | 12.723 | 79.227 | 74.061 | 100 | 0 | 10.701 | 71.071 |
| Relative DS | 7.467 | 100 | 0.483 | 18.699 | 0.862 | 4.537 | 100 | 0.175 | 13.014 | 0.279 |
| Relative TS | 7.457 | 100 | 0.483 | 18.699 | 0.862 | 4.531 | 100 | 0.175 | 13.009 | 0.279 |
| | 28 - Machinery-equipment (n=19,427) | | | | | 29 - Motor vehicles (n=8,535) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 38.730 | 100 | 0 | 6.646 | 39.286 | 36.508 | 90 | 0 | 9.737 | 35.526 |
| Ratio (k-intensive2) | 40.727 | 100 | 0 | 6.138 | 40.164 | 39.426 | 100 | 0 | 8.274 | 38.889 |
| Ratio (single) | 77.840 | 100 | 0 | 8.476 | 76.836 | 81.816 | 100 | 0 | 10.809 | 83.333 |
| Relative DS | 2.756 | 100 | 0.103 | 9.508 | 0.437 | 4.772 | 100 | 0.215 | 13.640 | 1.111 |
| Relative TS | 2.752 | 100 | 0.101 | 9.507 | 0.436 | 4.755 | 100 | 0.155 | 13.641 | 1.088 |
| | 30 - Other transport equipment (n=3,119) | | | | | 31 - Furniture (n=12,464) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 36.839 | 88 | 0 | 14.608 | 35.294 | 35.815 | 100 | 0 | 8.944 | 34.975 |
| Ratio (k-intensive2) | 38.314 | 100 | 0 | 14.235 | 35.185 | 37.123 | 100 | 0 | 8.904 | 35.729 |
| Ratio (single) | 84.675 | 100 | 0 | 11.228 | 82.716 | 67.282 | 100 | 0 | 13.510 | 68.500 |
| Relative DS | 9.449 | 100 | 0 | 19.079 | 3.226 | 4.769 | 100 | 0.211 | 12.461 | 0.639 |
| Relative TS | 9.462 | 100 | 0.578 | 19.181 | 3.226 | 4.766 | 100 | 0.211 | 12.461 | 0.639 |
| | 32 - Other manufacturing (n=5,884) | | | | | 23 - Repair and installation (n=6,464) | | | | |
| | mean | max | min | sd | median | mean | max | min | sd | median |
| Ratio (k-intensive1) | 35.826 | 100 | 0 | 8.771 | 35.714 | 34.731 | 100 | 0 | 11.599 | 34.732 |
| Ratio (k-intensive2) | 37.763 | 100 | 0 | 9.376 | 36.533 | 40.269 | 88 | 0 | 10.096 | 40.000 |
| Ratio (single) | 63.885 | 100 | 0 | 14.799 | 60.839 | 87.454 | 100 | 0 | 10.878 | 90.000 |
| Relative DS | 6.018 | 100 | 0.183 | 16.519 | 0.348 | 6.359 | 100 | 0.218 | 16.252 | 0.320 |
| Relative TS | 5.980 | 100 | 0.175 | 16.481 | 0.337 | 6.354 | 100 | 0.218 | 16.252 | 0.309 |

*Notes*: A firm observation has three dimensions: industry, city, time. The table reports mean values. A firm is capital intensive if the firms capital stock is above the average capital stock in the industry-city-year to which the firm belongs. Percentages are in terms of total observation (in the specified industry-city-time). Relative values in the last two columns are in terms of totals in the same industry-city-time. Ratio (k-intensive1) represents ratio of capital intensive firms based on the first definition of capital intensity, while ratio (k-intensive2) represents ratio of capital intensive firms based on the second definition of capital intensity. DS represents domestic sales. TS represents total sales.

Table 8: Continuous Treatment (Single Unit Firms)
Method 1

| | A: Relative domestic sales | | | | | B: Relative total sales | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specification | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Sample: Capital intensive Firms. Observations: 65,044. Number of id: 25,546. | | | | | | | | | | |
| Method 1 | -0.0531 | 0.0448 | -0.0167 | 0.0243 | -0.0737** | -0.0513 | 0.0491 | -0.00732 | 0.0266 | -0.0723* |
| | (0.0533) | (0.0533) | (0.0507) | (0.0648) | (0.0366) | (0.0424) | (0.0614) | (0.0603) | (0.0745) | (0.0429) |
| R-squared | 0.017 | 0.015 | 0.023 | 0.017 | 0.028 | 0.011 | 0.016 | 0.024 | 0.018 | 0.028 |
| Sample: Labour Intensive Firms. Observations: 114,468. Number of id: 44,457. | | | | | | | | | | |
| Method 1 | -0.0997 | -0.0211 | -0.0499 | -0.0562 | -0.109 | -0.0931 | -0.0159 | -0.0435 | -0.0473 | -0.102 |
| | (0.0845) | (0.0845) | (0.0882) | (0.0980) | (0.0693) | (0.0678) | (0.0836) | (0.0874) | (0.0973) | (0.0687) |
| R-squared | 0.015 | 0.012 | 0.015 | 0.015 | 0.019 | 0.006 | 0.012 | 0.014 | 0.015 | 0.019 |
| Sample: Capital Intensive Firms in Capital Intensive Industries. Observations: 8,228. Number of id: 3,981. | | | | | | | | | | |
| Method 1 | 0.0300 | 0.0399 | -0.0545 | 0.0107 | -0.0645 | 0.0307 | 0.0418 | -0.0493 | 0.0258 | -0.0529 |
| | (0.0375) | (0.0499) | (0.0435) | (0.0803) | (0.0594) | (0.0372) | (0.0495) | (0.0422) | (0.0814) | (0.0575) |
| R-squared | 0.020 | 0.022 | 0.035 | 0.034 | 0.108 | 0.021 | 0.022 | 0.037 | 0.036 | 0.113 |
| Sample: Capital Intensive Firms in Labour Intensive Industries. Observations: 56,816. Number of id: 23,290. | | | | | | | | | | |
| Method 1 | -0.0899** | 0.0204 | -0.0124 | 0.0116 | -0.0899** | -0.0725* | 0.0444 | 0.0215 | 0.0323 | -0.0733* |
| | (0.0417) | (0.0496) | (0.0481) | (0.0559) | (0.0420) | (0.0417) | (0.0497) | (0.0486) | (0.0546) | (0.0419) |
| R-squared | 0.008 | 0.016 | 0.023 | 0.018 | 0.032 | 0.009 | 0.018 | 0.025 | 0.020 | 0.034 |
| Sample: Labour Intensive Firms in Capital Intensive Industries. Observations: 12,805. Number of id: 6,184. | | | | | | | | | | |
| Method 1 | -0.194 | -0.198 | -0.267 | -0.334 | -0.297 | -0.187 | -0.193 | -0.264 | -0.328 | -0.286 |
| | (0.149) | (0.191) | (0.185) | (0.220) | (0.183) | (0.148) | (0.189) | (0.183) | (0.217) | (0.182) |
| R-squared | 0.018 | 0.019 | 0.034 | 0.033 | 0.101 | 0.018 | 0.020 | 0.035 | 0.033 | 0.098 |
| Sample:Labour Intensive Firms in Labour Intensive Industries.Observations: 101,663. Number of id: 40,981. | | | | | | | | | | |
| Method 1 | -0.0212 | 0.0794 | 0.0743 | 0.0779 | -0.0174 | -0.0174 | 0.0801 | 0.0775 | 0.0823 | -0.0125 |
| | (0.0692) | (0.0726) | (0.0778) | (0.0811) | (0.0709) | (0.0699) | (0.0735) | (0.0785) | (0.0827) | (0.0714) |
| R-squared | 0.004 | 0.014 | 0.019 | 0.019 | 0.019 | 0.004 | 0.014 | 0.019 | 0.018 | 0.019 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 Reg. Lin. Trends | No | Yes | No | No | No | No | Yes | No | No | No |
| NUTS1 Lin. Trends | No | No | Yes | No | No | No | No | Yes | No | No |
| 5 Region-Year FE | No | No | No | Yes | No | No | No | No | Yes | No |
| NACE-Year FE | No | No | No | No | Yes | No | No | No | No | Yes |

*Notes*: Each cell shows the coefficient of the immigration ratio ($\alpha_2$) resulting from the Eq. 12. In specification 1, we regress firm level relative domestic sales and total sales on city-level immigration ratio, year fixed effects, city fixed effects, and firm-specific effects. Specification 2 and 3 include regional and NUTS1 level time trends, respectively. Specification 4 includes region-year fixed effects and specification 5 includes sector-year fixed effects. Method 1 defines capital intensity as capital stock divided by employment. * (p<0.10), ** (p<0.05 ), *** (p<0.01).

Table 9: Continuous Treatment (Single Unit Firms)
Method 2

| | A: Relative domestic sales | | | | | B: Relative total sales | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specification | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Sample: Capital intensive Firms. Observations: 70,232. Number of id: 30,272. | | | | | | | | | | |
| Method 2 | -0.0557* | 0.0393 | -0.0169 | 0.0360 | -0.0708** | -0.0473 | 0.0525 | 0.00285 | 0.0590 | -0.0623* |
| | (0.0309) | (0.0364) | (0.0368) | (0.0459) | (0.0323) | (0.0315) | (0.0370) | (0.0378) | (0.0475) | (0.0329) |
| R-squared | 0.008 | 0.012 | 0.018 | 0.015 | 0.020 | 0.008 | 0.013 | 0.018 | 0.015 | 0.020 |
| Sample: Labour Intensive Firms. Observations: 108,905. Number of id: 41,492. | | | | | | | | | | |
| Method 2 | -0.0852 | 0.0252 | -0.0186 | -0.00678 | -0.0976 | -0.0782 | 0.0307 | -0.0110 | -0.00335 | -0.0904 |
| | (0.0709) | (0.0899) | (0.0928) | (0.104) | (0.0718) | (0.0702) | (0.0888) | (0.0918) | (0.103) | (0.0710) |
| R-squared | 0.008 | 0.018 | 0.022 | 0.021 | 0.020 | 0.008 | 0.018 | 0.022 | 0.022 | 0.021 |
| Sample: Capital Intensive Firms in Capital Intensive Industries. Observations: 15,634. Number of id: 7,820. | | | | | | | | | | |
| Method 2 | -0.0446 | 0.0712 | -0.0105 | -0.00566 | -0.0949* | -0.0423 | 0.0732 | -0.00622 | 0.0101 | -0.0897* |
| | (0.0431) | (0.0585) | (0.0595) | (0.0803) | (0.0493) | (0.0447) | (0.0602) | (0.0633) | (0.0843) | (0.0496) |
| R-squared | 0.015 | 0.024 | 0.033 | 0.036 | 0.104 | 0.015 | 0.025 | 0.033 | 0.033 | 0.088 |
| Sample: Capital Intensive Firms in Labour Intensive Industries. Observations: 54,598. Number of id: 25,471. | | | | | | | | | | |
| Method 2 | -0.0406 | 0.0227 | -0.00939 | 0.0306 | -0.0424 | -0.0345 | 0.0460 | 0.0233 | 0.0668 | -0.0356 |
| | (0.0471) | (0.0505) | (0.0528) | (0.0610) | (0.0478) | (0.0485) | (0.0515) | (0.0533) | (0.0628) | (0.0492) |
| R-squared | 0.006 | 0.011 | 0.016 | 0.015 | 0.027 | 0.006 | 0.013 | 0.018 | 0.017 | 0.024 |
| Sample: Labour Intensive Firms in Capital Intensive Industries. Observations: 22,110. Number of id: 10,050. | | | | | | | | | | |
| Method 2 | -0.220 | -0.215 | -0.304* | -0.351* | -0.288* | -0.219 | -0.217 | -0.308* | -0.361* | -0.287* |
| | (0.140) | (0.176) | (0.175) | (0.196) | (0.151) | (0.138) | (0.173) | (0.171) | (0.190) | (0.148) |
| R-squared | 0.021 | 0.025 | 0.036 | 0.037 | 0.106 | 0.022 | 0.026 | 0.038 | 0.039 | 0.108 |
| Sample:Labour Intensive Firms in Labour Intensive Industries.Observations: 86,795. Number of id: 35,668. | | | | | | | | | | |
| Method 2 | 0.0187 | 0.172** | 0.168** | 0.162* | 0.0123 | 0.0324 | 0.183** | 0.184** | 0.171** | 0.0258 |
| | (0.0641) | (0.0784) | (0.0815) | (0.0881) | (0.0658) | (0.0612) | (0.0749) | (0.0782) | (0.0846) | (0.0627) |
| R-squared | 0.006 | 0.025 | 0.028 | 0.031 | 0.031 | 0.006 | 0.025 | 0.029 | 0.031 | 0.032 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 Reg. Lin. Trends | No | Yes | No | No | No | No | Yes | No | No | No |
| NUTS1 Lin. Trends | No | No | Yes | No | No | No | No | Yes | No | No |
| 5 Region-Year FE | No | No | No | Yes | No | No | No | No | Yes | No |
| NACE-Year FE | No | No | No | No | Yes | No | No | No | No | Yes |

*Notes*: Each cell shows the coefficient of the immigration ratio ($\alpha_2$) resulting from the Eq. 12. In specification 1, we regress firm level relative domestic sales and total sales on city-level immigration ratio, year fixed effects, city fixed effects, and firm-specific effects. Specification 2 and 3 include regional and NUTS1 level time trends, respectively. Specification 4 includes region-year fixed effects and specification 5 includes sector-year fixed effects. Method 2 defines capital intensity as capital stock divided by wages. * (p<0.10), ** (p<0.05 ), *** (p<0.01).