

DISCUSSION PAPER SERIES

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Influx on Firm Performance and Market  
Structure**

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## ABSTRACT

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# Consequences of a Massive Refugee Influx on Firm Performance and Market Structure\*

This study combines an administrative dataset of the full population of Turkish firms and the setting of the sudden mass migration of Syrian refugees to Turkey to identify the effect of migrants on firm performance and market structure. As a result of the migrant shock, existing firms expand and new firms are established. Quantitatively, a 10 percentage-point rise in migrant-to-native ratio increases average firm sales by 4% and the number of registered firms by 5%. While the number of firms rises, new firms are more likely to be small. The resulting market structure shows less concentration and firms reduce the share of workers formally employed. We further document an increased propensity to export and an increase in the variety of exported products. The impact on exports is driven by a rise in competitiveness of firms in regions hosting Syrians as a decline in export prices is observed. We also uncover evidence for an effect of migrants' skills and networks on exports, as the export value and variety of products to the Middle East and North Africa (MENA) region increase more than those to the EU region among exporters while the prices of products exported to the two regions show similar changes.

**JEL Classification:** J15, J61, F16, L11

**Keywords:** refugees, firm performance, market structure, sales, informality, exports, migrant business networks

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# 1 Introduction

While the impact of immigrants on the labor market outcomes of natives have long been of interest to economists, a recent and growing literature focuses on firm adjustments in response to migrant labor supply shocks, using either surveys of firms or administrative datasets that are sometimes censored based on the firm size. These studies, conducted for developed countries, typically use the geographical variation in the settlement patterns of earlier immigrants via shift-share instruments as the source of exogenous variation.<sup>1</sup> In this paper, to study the impact of migrants on firm performance and market structure, we combine an administrative dataset of the full population of firms in Turkey with a very rich set of outcomes and an excellent quasi-experimental source of variation in the geographical distribution of immigrants—the massive exodus of Syrian refugees into Turkey. Turkey was the largest recipient of refugees displaced by the Syrian civil war, which started in 2011. As of the end of 2015, which is the time frame of this study, 2.5 million Syrian refugees has taken up residence in Turkey. Very few work permits were issued to Syrian refugees before 2016,<sup>2</sup> so almost all of them were employed in the informal sector.<sup>3</sup>

The arrival of relatively young and unskilled migrants who work in the informal sector causes firms in the hosting regions to adjust their production in a number of ways. First, migrants' arrival changes the relative wages of formal and informal workers. In fact, Aksu et al. (2019) find a positive impact on the wages of formal employees but a negative effect on the wages of informal employees. This implies that firms would be willing to substitute formal workers with informal ones. Even in the absence of a change in relative wages, this substitution could take place due to a change in production technology, as a result of technological adoption following changes in relative factors (Acemoglu, 1998; Beaudry and Green, 2005). Second, the scale effects resulting from falling labor costs would cause firms to expand. Third, as the Rybczynski theorem (Rybczynski, 1955) asserts, as informal labor becomes more abundant, we would expect firms to produce more of the goods that are intensive in the more

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<sup>1</sup>See, for instance, Dustmann and Glitz (2015), Mitaritonna et al. (2017), Ottaviano et al. (2018).

<sup>2</sup>A total of 7,351 work permits were issued for Syrians before January 2016 (Ministry of Labor and Social Security).

<sup>3</sup>Workers in the informal sector have no social security coverage.

abundant informal labor. This would result in changes in the shares of different sectors.<sup>4</sup>

In addition to these channels, firms can adjust their production in response to the increased local demand in the product market, particularly those firms producing non-tradable goods. Moreover, immigrants not only provide labor but also bring their unique talents and networks to the host country, thus increasing the diversity of entrepreneurial skills for firms (see, e.g., Ortega and Peri 2014). These latter effects – local demand effect and migrant skills and networks – as well as the falling labor costs would also affect new firm openings.

We use a rich administrative dataset of balance sheets, income statements, social security records, and customs data. Our dataset gives a very comprehensive overview of Turkish firms' activities and covers the entire population of firms.<sup>5</sup> Using this data, we generate a comprehensive set of firm outcomes: sales, profits, labor costs, exports, export product variety and export prices. In addition, combining all firms that report their sales, we construct market structure variables at the sector-region level such as concentration and the total number of firms. Finally, for exports, the customs data allow us to construct price measures at the firm-product-destination level, which are comparable over time.

For identification of the migrant impact on firm outcomes, we use the variation in the migrant supply shock across the 81 provinces of Turkey in a difference-in-differences framework. In several provinces, migrants constitute more than 10 percent of the population. A well-known threat to identification in this context is the potential endogeneity of the provincial distribution of migrants, as they might take the economic conditions of provinces into consideration in choosing their location. We use a variant of the distance instrument in the literature; our particular instrument takes the potential endogeneity in the size and timing of the refugee flow – which is not common in studies using migrant shocks resulting from political events in the origin country. The massive size of the migrant shock in our context is highly important for identification because it essentially dwarfs any other event occurring after the arrival of refugees that may be correlated with our distance instrument. In addition, our estimation strategy pays due attention to the potential regional and sectoral differences

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<sup>4</sup>In fact, Dustmann and Glitz (2015) examine these three channels using German data and find the substitution effect to be the most important despite the lack of a significant change in relative wages there.

<sup>5</sup>The balance sheet data allow us to observe not only firms that report complete balance sheets but also smaller enterprises that only report simple balance sheets for tax purposes and often have no formal employment.

in economic trends.

We have three sets of main results: overall sales and profits, market structure and sales to other countries. Our analysis of firm sales reveals that a percentage point increase in the refugee-native ratio raises firm sales by 0.4%. These effects are concentrated in the construction and manufacturing sectors. The increase in sales is found to correspond to a less robust increase in profit margins (the ratio of profits to sales). Second, we document that the number of active firms increases and market concentration decreases. We further find a decline in the labor cost share among existing large firms in the service and construction sectors, suggesting a switch to the cheaper informal refugee labor either directly or through outsourcing. Finally, we find positive effects on the export probability of firms in the hosting regions. While the export probability to Syria rises, existing exporters appear to increase their export volume to the Middle East and Africa (MENA) region countries while decreasing it to the EU countries. We further find that exporters increase their product variety and decrease the average price of their exports, which suggests a switch to lower cost goods. We also find direct evidence of the labor cost advantage provided by refugees, as there is a general decline in the prices of exports defined at the good-destination (transaction) level.

We make several contributions to the literature. First, this is the first study that combines an administrative dataset of the full population of firms with a major natural experiment to examine migrants' impact on firm performance.<sup>6</sup> The few studies that investigate this issue include Dustmann and Glitz (2015), who examine the adjustment of wages and the establishment of new firms after a change in the supply of skill mix due to migrants, and Mitaritonna et al. (2017), who examine the impact of migrants on a number of firm outcomes including productivity, sales, market share, physical capital and exports. While the former uses an administrative dataset of German firms, the latter draws on survey data for French manufacturing firms with at least 20 employees. Both of these studies utilize the geographic variation in past settlement patterns of immigrants via a shift-share instrument for identification – not a sudden and massive exodus of migrants.<sup>7</sup> Moreover, our study also differs from that of Mi-

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<sup>6</sup>Some studies combine full population of firms with minor natural experiments only to examine trade outcomes (see, e.g., Cohen et al. (2017)).

<sup>7</sup>Jaeger et al. (2018) show that when the settlement patterns of immigrants are persistent over time, shift-share instruments conflate the short-run partial equilibrium effects with longer-run general equilibrium effects, which tend to offset each other, resulting in biased

taritonna et al. (2017) in that the immigrants in France are relatively highly skilled whereas the migrants in our context are low skilled refugees.<sup>8</sup>

More similar to our study is the analysis by Altındağ et al. (2020), who use a survey of manufacturing and service firms conducted by the Turkish Statistical Institute (TurkStat) to study the impact of the Syrian refugee influx on firms' input demand and sales.<sup>9</sup> While Altındağ et al. (2020) focus on the impact of the refugee influx on input demand and sales,<sup>10</sup> our study also includes a detailed analysis of the impact on market structure and export outcomes (based on rich administrative customs data). A key advantage of our firm performance analysis over Altındağ et al. (2020), whose data cover only firms with more than 20 employees, is the use of administrative data on the full population of firms. Capturing the population of small firms with less than 20 employees is particularly important for understanding the effect of the refugee shock on market structure because most of the new firms fall into this category. In terms of identification, since the empirical specification of Altındağ et al. (2020) does not include firm fixed effects, they cannot disentangle the effect of the refugee shock on existing firms' performance from the effect on the composition of firms, which we show to be highly important in this setting.<sup>11</sup>

Our second contribution is the analysis of market structure outcomes like firm entry and market concentration, which is difficult to study without data on the full population of firms. Economic dynamism and productivity growth are strongly linked to market structure and competitiveness (Aghion et al., 2015; Akcigit and Ates, 2019a). Estimating the impact of immigration on market structure is crucial to understanding the potential long-term structural transformations of local economies in the host regions. Our results show that the arrival of

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short-run estimates.

<sup>8</sup>See also studies on the impact of highly skilled immigrants on innovation by Kerr and Lincoln (2010) and Hunt and Gauthier-Loiselle (2010).

<sup>9</sup>Akgündüz et al. (2018) also analyze the impact of Syrian refugee inflows on foreign-owned firm entry, sales, and profits and find generally positive effects. However, they are limited to province-level aggregate data and cannot observe market structure, export performance, and firm heterogeneity effects.

<sup>10</sup>They find an increase in inputs like electricity but no corresponding increase in sales (unlike our findings) which they attribute to a lack of reporting by the firms in the survey.

<sup>11</sup>In addition, while Altındağ et al. (2020) take the timing and size of the refugee flow entering Turkey as exogenous, like most studies that use migrant shocks resulting from political events do, our instrumental variable accounts for the potential endogeneity in the size and timing of the refugee influx. Their language-based instrument also makes the potentially strong assumption that language does not directly affect employment and firm-level outcomes. Moreover, since Arabic is spoken in just a few provinces in Turkey, their LATE puts substantial weight only on these few provinces, which could be problematic in the case of significant regional heterogeneity in the migrant impact. In fact, Araci et al. (2020) find evidence for substantial regional heterogeneity in the impact of refugees on labor market outcomes of natives. Finally, we use a more flexible empirical specification including region-year and sector-year fixed effects.

a large number of refugees significantly alters the market structure in Turkey. The rise in the number of small firms employing the newly abundant informal labor not only decreases market concentration but also fosters the informalization of the economy, which has important implications for productivity in Turkey.<sup>12</sup>

Our third contribution is to uncover a novel beneficial effect of migrants on the exports of the host country. Earlier studies focus on the benefits accrued from migrants in increasing trade with their origin countries and point out migrant business networks as the underlying mechanism (Cohen et al., 2017; Parsons and Vézina, 2018; Steingress, 2018). In these studies, the migrant shock is quite small to make an impact on the cost of production. In our context, however, we also uncover a cost mechanism. Extending our analysis to export prices at the transaction level, we find evidence of a drop in export prices with the migrant shock. In other words, Syrian refugees improve the international competitiveness of firms in the hosting regions by lowering their costs of production.

Our final contribution is related to the importance of migrant networks in exports. We find that exports to the MENA region increase more than those to the EU. Similarly, some earlier studies provide evidence that migrant networks make it easier to penetrate the import markets of certain countries than those of other countries (see, e.g., Ottaviano et al. (2018)). These studies highlight the network effect accruing from the refugees' business networks and better knowledge of particular markets. However, migrants also potentially lower the cost of production. Moreover, the cost advantage accrued from the arrival of migrants would matter more in the products exported to their origin countries if migrants were more likely to be employed in industries with a higher propensity to export to their origin countries. In this study, we disentangle these two channels. Our results on the prices of exported goods at the transaction level allow us to rule out the cost-of-production channel – as the export prices to the MENA and to the EU change similarly – and we can conclusively point out the network effects of Syrian refugees in the greater increase of exports to the MENA region than to the EU. Finally, our finding that firms increase the variety of products they export to the MENA

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<sup>12</sup>Brunello et al. (2020) report a similar effect of low-skilled immigration to Italy, where a rise in the informalization of the Italian economy results from the enlargement of small firms. We, however, find that both small and large firms grow with the Syrian refugee influx. In the Turkish case, we find that market concentration changes with the entry of more small firms, as well as the decrease in the size of an average entering firm.

region further highlights the importance of the information advantage that Syrian refugee networks provide in exports.

The remainder of the paper is structured as follows. Section 2 provides background information on the Syrian refugee influx into Turkey and on firm behavior and market structure in Turkey. Section 3 presents the conceptual framework we use to interpret our empirical findings. The data are introduced in Section 4 and the empirical methodology in Section 5. Section 6 presents our results. Section 7 gives a general discussion of our results within the wider literature and concludes the paper.

## **2 Background Information**

### **2.1 Syrians in Turkey**

The Syrian civil war, which started in 2011, displaced 13.1 million Syrians (half of the country's population) of whom 5.6 million had taken refuge in other countries by February 2018 (UNHCR, 2018). Turkey has been the largest recipient of Syrians and 3.6 million Syrian refugees resided in Turkey as of January 2020. In fact, Turkey has hosted the highest number of refugees in the world since 2015. As of the end of 2015, which is the time frame of this study, 2.5 million Syrians had taken up residence in Turkey.

The first refugees from Syria arrived in Turkey in April 2011; however, their number at the end of 2011 was very small, around 8,000. Turkey had an open door policy to the Syrian refugees and gave them "temporary protection" status in October 2011. As the war intensified, the number of Syrians in Turkey had increased to 170,912 by the end of 2012 and to 560,129 by the end of 2013. Meanwhile, the Turkish Disaster and Emergency Management Authority (TDEMA) set up camps for the refugees. By December 2013, 21 camps had been set up in 10 provinces, housing over 210,000 refugees.

The flow of refugees into Turkey accelerated after 2013 and the number of total refugees rose to 1,622,839 by the end of 2014 and reached 2,503,549 by the end of 2015. Given that the population of Turkey is around 80 million, the refugee to native ratio reached more than 3% at the end of 2015. Since the TDEMA could not cope with the increasing number of

refugees, the Turkish government established the Turkish Directorate General for Migration Management (TDGMM) in April 2013, which was made responsible for the registration and overall coordination of refugees. Over time, most refugees settled in urban areas, and only about 10% of the Syrians in Turkey lived in refugee camps at the end of 2015 according to the figures released by TDGMM.

Surveys of Syrians report that they are younger, less educated, and disproportionately male. Erdogan (2020) reports that while the average age of Syrian refugees is 22.5, it is 31.7 for natives. Aksu et al. (2019), comparing the educational distribution of refugees based on a survey by TDEMA and the World Health Organization conducted in December 2015 and the educational distribution of natives of the same age group based on the Turkish Household Labor Force Surveys, show that the refugees were significantly less educated.

Crucial for our analysis is the fact that very few Syrian migrants in Turkey had work permits during the time frame of our analysis. Therefore, almost all of them worked in the informal sector, where they had no social security coverage and could be paid below the minimum wage. Before the enactment of the Council of Ministers Decree number 8375 in January 2016, which allowed Syrians under temporary protection to have work permits under certain conditions, only 7,351 work permits were issued to Syrians – mostly to those who started a business (Ministry of Labor and Social Security). Many studies report that refugees mostly work in construction, agriculture, and textiles and clothing manufacturing (Erdogan, 2014; Kirişci et al., 2016; Erdogan, 2020). No official statistics exist for the labor market outcomes of Syrian refugees. However, reviewing a number of surveys, Aksu et al. (2019) conclude that of the working-age refugee population, about half participate in the labor force and their employment rate stands at about 30-40%.

Syrian refugees also established new businesses or became shareholders. Using data from the Union of Chambers and Commodity Exchanges of Turkey, TEPAV (2018) reports that the number of companies established in Turkey with Syrian shareholders increased from just 30 in 2010 to 1,599 in 2015. Firms with Syrian shareholders made up around 1% of all new firms in 2015. Moreover, while Syrian capital in new firm openings amounted to 2.2% of all foreign capital in 2011, this figure rose to 15.9% in 2014 and to 22.9% in 2015.

Kirişci et al. (2016) argue that Syrian refugees also contributed to trade, particularly with Syria. They report that exports to Syria from the Turkish provinces bordering Syria increased by more than 200% between 2011 and 2014, while the overall increase in Turkey's exports to Syria was only 11%. They claim that the emergence of firms set up by Syrians with connections to their home country was behind this boom in exports.

## **2.2 Market Structure, Firm Behavior and Informality in Turkey**

The Turkish economy is dominated by the service sector. As of 2018, the share of services in the GDP was 64.7%. The corresponding shares were 19% for manufacturing, 5.8% for agriculture, and 7.2% for construction. The remainder is made up of taxes and subsidies provided by the government. The bulk of employment is also provided by the service sector. While the share of employment in services is 54.9%, it is 19.7% for manufacturing, 18.4% for agriculture, and 6.9% for construction. Although the share of manufacturing is not very high in the GDP or employment, manufactured goods make up 93% of exports.

The size distribution of Turkish firms is right-skewed and the average firm size is small. Around 75% of firms have fewer than 10 employees. Turkey has the largest number of employees in firms with 1 to 9 employees among the OECD countries, edging out Italy at the top (OECD, 2020). Firm size is strongly correlated with the usual indicators of productivity. At the firm level, Table 1 shows the correlation matrix for certain primary firm characteristics. Firm size, as measured in sales, is positively correlated with exports and the probability of reporting formal employment, which is observed from the number of employees registered to the Social Security Institute. On the other hand, firm size and exports are negatively correlated with the ratio of labor costs to total costs, suggesting that large firms are less likely to be labor intensive.

Akcigit et al. (2020) analyze firm dynamics and activity in Turkey between 2006 and 2016 and find that economic dynamism rose until 2013, but slowed down or even declined afterwards. Economic dynamism, a term referring to the level of competitiveness and creative destruction in the economy, is measured in line with the US literature through indicators such as the degree of market concentration, profit margins, employee churn, firm entry, and

the share of young firms in the economy. Following the 2009 financial crisis, GDP growth exceeded 10% in 2010 and 2011, but slowed down and unemployment rose after 2013. Market concentration, measured as the percentage of employees in the four largest firms (CR4), has also been rising since 2013 both for the manufacturing sector and for the full economy. On the other hand, the firm entry rate declined from 18% in 2012 to 12% by 2016. As expected, new firms are small at the start and their average size, in terms of sales, is equal to a third of the market average.

Taymaz et al. (2009) reports that while most businesses in Turkey are registered, many only partially report employment, excluding informal workers. Therefore, informal firms are very rare but informal employment is very common in Turkey. In 2011, more than 40% of Turkish employment was informal and informality varies considerably by region, sector and firm size. According to the 2011 Turkish Household Labor Force Survey (before the Syrian refugees started arriving in Turkey), the share of informal workers was 82.6% in agriculture, whereas it was lower than 25% in both manufacturing and services. The incidence of informality decreases with firm size. In 2011, the share of informal workers was 51.9% in firms employing fewer than 10 people, 23.4% in firms employing 10-24 people, 12.6% in firms employing 25-49 people, 6.5% in firms employing 50-249 people, and 2.6% in firms employing more than 250 people.

### **3 Conceptual framework**

Here, we first outline a conceptual framework that motivates our empirical analysis and discuss the mechanisms through which Syrian refugees might affect local firm performance. Then, we discuss the effects of the migrant shock within this framework in terms of the three main sets of outcomes we analyze in this paper sequentially: 1) firm sales and profit margins, 2) market structure, and 3) exports.

Since refugees are less-skilled workers who mostly work in the informal sector, their arrival changes the relative abundance of production factors, tilting the balance in favor of unskilled workers. Firms adjust to this change by altering their output and methods of pro-

duction in a number of ways. First, the arrival of refugees lowers the wages paid to informal workers relative to the wages paid to formal workers, as shown in Aksu et al. (2019). Therefore, for a given output level, firms choose a more informal intensive method of production, replacing formal workers with informal workers. Even in the absence of a change in relative factor prices, as noted by Dustmann and Glitz (2015), this substitution could take place due to the adoption of new technology after the change in relative factor levels, via the methods shown by Acemoglu (1998) and Beaudry and Green (2005). Second, since refugees are willing to work for lower wages due to their low bargaining position, they decrease the cost of production and, hence, boost production (scale effect). Third, because of the change in the relative abundance of factors of production, firms change the product mix in the economy. For example in a two goods and two inputs economy as in Rybczynski (1955), an increase in the amount of unskilled labor will lead to an increase in the share of the goods that use unskilled labor intensively.

In addition to the above factors, which highlight the cost advantage of firms that employ refugees, the arrival of refugees affects firms' behavior through a number of other channels. First, there are demand-side effects of refugees on firms. As the consumption base expands with refugees, demand increases, fueling both prices and production in the standard supply and demand framework.<sup>13</sup> This shift in the demand curve would be especially pronounced for firms producing non-tradable products. Second, refugees not only bring their labor but also their human capital in terms of entrepreneurial skills, language ability and business networks. This might further contribute to the expansion of existing firms (for instance, via improving the export networks with Arabic-speaking countries) and new firms to be established. Third, firms that cannot or do not employ informal workers can also benefit through their supply linkages. Recent literature has highlighted the downstream and upstream propagation of shocks in supply networks (Acemoglu et al., 2016). For instance, in the textiles and clothing-manufacturing sector, many large downstream exporting firms would benefit from the drop in costs for small upstream firms.

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<sup>13</sup>Hong and McLaren (2015) find that immigrants in the US increase consumer demand for local services, leading to both local employment creation and a rise in non-tradable service wages. Similar increases in product prices with the arrival of migrants have been reported for less developed countries as well. See, for instance, Alix-Garcia and Saah (2010) and Maystadt and Verwimp (2014) for Tanzania, Alix-Garcia et al. (2018) for Kenya, Depetris-Chauvin and Santos (2018) for Colombia, Taylor et al. (2016) for Congolese refugees in Rwanda.

### 3.1 Firms' Sales and Profit Margins

According to the above framework, both the supply effect (due to the falling costs of informal labor and the resulting scale effect) and demand effects (due to the expansion of the consumption base) point to an increase in the quantity sold in any given product market. Hence, as long as the product price does not fall more than the rise in quantity sold (a highly unlikely scenario in this setting),<sup>14</sup> we expect an increase in firms' sales. In mostly non-tradable sectors such as services and construction, this rise in quantity sold would mainly stem from the increase in demand. In sectors like agriculture, construction and manufacturing – where refugees can be easily employed – the rise in quantity sold would stem more from the reduction in production costs. Hence, in the construction sector, which is both non-tradable and requires manual labor that refugee workers can supply, the sales effect would be especially strong.

As illustrated in Section 2.2, smaller firms in Turkey are much more likely to employ informal workers. Therefore, the rise in production, resulting from lower costs of production, would be stronger for them. However, countervailing effects exist. First, via the downward linkages, larger firms would also benefit from the reduction in costs for small firms. Second, there may be a switch among larger firms towards more informal employment as well. Third, larger firms, which are more likely to export, may well be in a better position to use the human capital and business networks of Syrian merchant-refugees in Turkey.

The impact of the migrant shock on the profit margin is more complicated. It depends on whether sales or the cost of sales increases more. In addition to the change in quantity sold, it depends on the change in output and input prices, as well as technology parameters.<sup>15</sup> While the expected increase in amount sold and the lower cost of informal labor suggest a rise in the profit margin,<sup>16</sup> a potential decrease in product prices,<sup>17</sup> a rise in the costs of formal labor,<sup>18</sup>

<sup>14</sup>This could happen only when the demand curve is highly inelastic and the supply curve shifts outward with not much of an outward shift in the demand curve.

<sup>15</sup>Technology parameters such as the elasticity of the substitution between different factors of production would also affect the size of the effect on sales, but not its direction.

<sup>16</sup>Aksu et al. (2019) find weak evidence of a fall in the wages of informal native workers with the arrival of refugees. The refugees themselves, however, may well be earning at a lower rate than native informal workers.

<sup>17</sup>While Balkan and Tumen (2016) find a negative effect of the migrant shock on product prices, Aksu et al. (2019) find a positive effect of the migrant shock on the regional consumer price index. The second approach accounts for the share of different items in households' budget and, hence, puts more weight on non-tradable products like housing expenditures.

<sup>18</sup>In fact, Aksu et al. (2019) estimate a positive effect of the migrant shock on natives' wages in the formal sector.

and decreasing returns to scale would potentially lower it. Therefore, overall, the direction of the impact on profit margins is a primarily empirical question. At the same time, due to the stronger positive price effect expected for non-tradable products and the stronger negative cost effect expected in sectors that use more informal-labor intensive methods of production, the profit margin is more likely to increase for firms in these sectors.

*Testable Hypotheses I:* (i) While the migrant shock increases firms' sales, its effect on the profit margin is ambiguous. (ii) The effects on sales and profit margins are more positive for firms using informal-labor intensive methods of production and that produce non-tradable products. (iii) The variation in the magnitude of the effects in sales by firm size is ambiguous.

### **3.2 Market Structure and Informality**

The refugee shock is also likely to change the pace of the establishment of new firms. Several of the adjustment mechanisms of firms to the labor supply shock, outlined in the beginning of this section (falling labor costs, the rise in local demand, and the arrival of Syrian entrepreneurship) all imply an increase in new firm establishments. In addition, the rise in the establishment of new firms would have important implications for market structure. New firms in Turkey are more likely to be smaller; in fact, the sales of new firms are equal to a third of the market average. In addition, smaller firms, which are more likely to use informal labor in Turkey, would have an advantage in market entry relative to larger firms after the arrival of refugees. Therefore, as the pace of new firm entry increases, we expect a fall in market concentration – especially in sectors where new firm openings are more common.

The arrival of refugees would also change the methods of production of existing firms with respect to the use of informal workers. The substitution effect and the Rybczynski effect discussed in the main framework tilt the method of production toward using more informal labor at the expense of formal labor and capital. Hence, we would expect existing firms to use a more informal-labor intensive method of production. New firms are also more likely to be established in sectors that can take advantage of the fall in the costs of informal labor. Furthermore, conditional on the product, new firms probably will employ more informal-labor intensive methods of production because it is easier for new firms to choose a new method

of production than for existing firms to change their method of production. Therefore, we expect the average size of the new firms to fall as firms that are more informal-labor intensive are smaller.

*Testable Hypothesis II:* (i) The establishment of new firms would take place at a faster pace in the migrant-hosting provinces. (ii) Market concentration falls. (iii) The incidence of informal employment among new and existing firms increases, and average start-up size is smaller.

### 3.3 Exports

Exports of firms in the hosting regions are likely to be affected through both a cost effect resulting from the employment of low-cost refugee labor and a network effect accruing from the refugees' business networks and better knowledge of particular markets. For products exported to other countries, the local demand effect resulting from the arrival of refugees would be limited. Therefore, we would expect the cost effect to dominate the demand effect and the resulting decline in product prices to give a competitive advantage to the exporting firms in the refugee-hosting regions. Consequently, the incidence and level of exports of firms in the refugee-hosting regions would increase.

Migrants' knowledge of home-country markets, language, and preferences as well as their business networks can lead to advantages in exporting for firms in the host country (Gould, 1994). In addition, Rauch and Trindade (2002) emphasize the role of migrant networks in matching and referral among trade partners and in community enforcement of sanctions that ensures the quality of shipments and the payment for shipments. In a trade model with heterogeneous fixed costs for exporting like that in Jørgensen and Schröder (2008), refugees can be expected to reduce fixed costs for firms in the hosting regions. Among empirical studies, Peri and Requena-Silvente (2010) attribute the link between province level trade and immigration to reduced fixed costs of exporting. As the fixed cost of exporting falls, firms are expected to increase their exports, particularly to the regions with which the immigrants have a connection. In the case of Syrian refugees, the export destination that would benefit from such an effect is the MENA region, where their language skills and networks can provide a

competitive advantage.<sup>19</sup>

Here, it is important to note that exports to the MENA region compared to those to other regions, say for instance the EU, could increase more for another reason. If the cost advantage accrued from the arrival of refugees matters more in the products exported to the MENA region because these products are more intensive in informal labor, exports to the MENA region would also increase more than those to the other regions. Hence, it is critical to account for the change in export prices in disentangling the effect of migrant skills and networks on exports.

Syrian ethnic networks could also affect the variety of exported products. Rauch and Trindade (2002) argue that homogenous products have reference prices (Rauch, 1999),<sup>20</sup> and a comparison of the reference prices of alternative sellers provides sufficient information for potential buyers. However, for differentiated products, prices cannot convey all information necessary for international trade. Here, ethnic networks can play an important role in matching buyers and sellers.<sup>21</sup> Therefore, we expect that the Syrian refugee shock increases the product variety among exports.

*Testable Hypothesis III:* (i) The incidence and the level of exports by firms in the refugee hosting regions increase due to a decline in costs and prices. (ii) Exports to the MENA region increase more than exports to the EU countries due to the language skills, information advantages, and business networks of the refugees, holding the change in export prices resulting from the arrival of refugees constant across destination regions. (iii) Product variety in exports increases.

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<sup>19</sup>Prior to the beginning of the civil war in 2010, Syria's share of exports to the Middle East and North Africa was 42.8%. This share was nearly double that of Turkey, where the share of exports to the Middle East and North Africa was around 21.9% in 2018. On the other hand, the total value of Turkish exports (113.8 billion USD) in 2010 was ten times as large as the total value of Syrian exports (11.4 billion USD) in 2010.

<sup>20</sup>Reference prices of homogenous products are quoted on organized exchanges such as the London Metal Exchange.

<sup>21</sup>Rauch and Trindade (2002) find that Chinese networks increase trade more for differentiated than for homogenous products.

## 4 Data

### 4.1 Micro-data: The Entrepreneurship Information System of Turkey

Our micro-level data were acquired from the Entrepreneurship Information System (EIS), which is made available to researchers working on-site by the Turkish Ministry of Science and Industry. The EIS covers the entirety of firm population in Turkey with the exception of public and finance sectors. Since it is an administrative dataset, we have no information on any firms that are not registered at all. While informal employment is common, firm informality in Turkey is negligible.<sup>22</sup>

The EIS dataset brings together several administrative datasets and makes it possible to link them through common firm identifiers. In particular, we use four main datasets: 1) annual firm registry indicating the sector and location of all registered firms in Turkey, 2) balance sheet and income statement information reported by firms annually to the Revenue Administration, 3) transaction level customs data provided by the Ministry of Customs and Trade, and 4) quarterly employment data provided by the Social Security Institute. We use data for the years 2010-2011 and 2014-2015 in our main analysis. We define 2010-2011 as the pre-treatment and 2014-2015 as the post-treatment period. Data for the 2012-13 period are not used due to the unavailability of official data on the number of Syrian refugees across provinces. We do not use the post-2015 data because a major policy was implemented at the beginning of 2016; the national minimum wage was increased by 30%, which could drastically affect firm behavior.<sup>23</sup>

#### 4.1.1 Sales and Balance Sheets

We obtain sales information from income statements reported annually to the Revenue Administration. Income statements are actually comprised of two datasets. The first dataset is made-up of balance sheets and detailed income statements reported by firms for which the

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<sup>22</sup>Most firms employ both formal and informal workers; however, this incidence decreases with firm size as discussed in Section 2.

<sup>23</sup>This hike was substantially higher than previous increases in the minimum wage level, which were at the level of inflation. In addition, the variation in the bite of the minimum-wage policy across provinces could be correlated with the distribution of refugees because wages are on average higher in western Turkey.

value of sales exceeds a certain threshold.<sup>24</sup> Such firms make up around 45% of our sample and this proportion varies little across sectors. However, this threshold does not apply to incorporated firms, which report their detailed income statements regardless of the value of their sales. Firms whose sales fall below the threshold can still voluntarily report detailed income statements. Firms that report detailed income statements give information on numerous elements under the three main headings of assets, liabilities and owner's equity. The second dataset contains simple balance sheets for firms whose sales do not exceed the threshold. Firms in this group include self-entrepreneurships. In this dataset, the reported elements include only basic items like total sales and profits. Since our concern for this paper is the sales and profits of firms and the information on these variables is available regardless of the financial reporting status, our sample covers all firms that report positive sales in Turkey during the relevant years.<sup>25</sup> We define the profit margin of all firms as the ratio of profits to sales. In both datasets, we define the cost of sales as sales net of profits.

Since income statement items like profits and sales have to be reported by all firms, no observations are missing from the data. We exclude from our sample all firms that report sales for a single year during the analysis period because our baseline specifications for firm level outcomes like sales and profit margins always include firm fixed effects. This reduces the total number of firm-year observations from 8.6 to 7.5 million; however, these 1.1 million observations that are excluded account for only 3% of total sales.<sup>26</sup>

The summary statistics for firms' sales, profit margins, labor cost shares are presented in Table 2. We observe 2,651,587 unique firms in the complete sample. On average, around 2 million firms report their sales, leading to a sample size of around 7.5 million firm observations across the years. Of these observations, the majority (almost 6 million observations) are for firms in the services sector, whereas about 1.1 million observations are for manufacturing firms. The number of observations are fewer for construction firms (about 460 thousand) and firms in agriculture (about 41 thousand). The sales variable in the analysis is defined as the log of reported sales in Turkish Liras and adjusted for inflation using the annual CPI. Since

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<sup>24</sup>The value of the threshold depends on the year and is adjusted according to inflation. This threshold was 220,000 TL in 2015.

<sup>25</sup>To avoid capturing sales effects from moving to a new province, we excluded firms that changed their headquarters during the sample period, but this corresponds to only 2% of the sample.

<sup>26</sup>These firms are, however, included in market- and province-level outcomes as well as in the analysis on firm entry.

extreme values are observed in both, we limit the sample for the profit margin analysis to firms that report a margin between minus one and one.

#### 4.1.2 Market structure

We use sales information from the income statements to construct several indicators for market concentration at the sector-province-year level. We define each sector at the 4-digit NACE level, which provides us information about the market shares of firms with similar products in each province. We define market concentration using three variables: the average market share, the market share of the largest 4 firms in each cell and the Herfindahl-Hirschman (HH) index. All three are calculated for 30,945 sector-province combinations over time. These measures can only be calculated for sector-province-year cells where at least a single firm exists. The top-4 share is further restricted to sector-province-year cells with at least 4 firms. In fact, 14% of the 4-digit sector-province level cells have zero firms while 45% have fewer than 4 firms. Therefore, we also calculate all three measures at the more aggregate 2-digit sector level. The summary statistics for market structure variables are presented in Table 3.

We use alternative definitions for the total number of firms according to the depth of information provided in our administrative data. First, the number of firms registered in the firm registry gives the highest total number of firms (sample I). There is no indication about whether all firms in the registry are active. Second, the number of firms that report their sales through any type of balance sheet to the Revenue Administration makes up the next highest total number of firms (sample II). This corresponds to the sample used in the analyses of sales and profits using income statements, described in the previous section. Third, we limit the sample further to firms that have at least one employee registered in the social security system (sample III). Fourth, we limit the sample to firms that report detailed income statements (sample IV). While sample (IV) is a subset of sample (II), it is not a subset of sample (III). We calculate the total number of firms in each sample (II) to (IV) for each sector-province cell to understand the impact of Syrian refugees on the firm entry by the type of activity. For the number of firms variables, we take the log (plus 1) of the number of firms when estimating our regressions.

Finally, for firms that report employment to the Social Security Institute (SSI), we define the labor share of costs as annual reported wages divided by the cost of sales. The labor share variable can exceed 1 and even be negative when profits for a year exceed sales. We limit the sample to firms with a labor share between 0 and 1. When estimating the effects on labor share, this corresponds to a drop of about 16% of firm observations that report employment to the SSI.

Since the SSI data only covers formally employed workers in each firm and very few Syrians are employed formally, effects on the labor share of costs can be informative about firms' use of informal labor. Since we do not observe informally employed workers, any attempt to estimate the effects on productivity measures like value added per labor or TFP of firms would be biased upward by the informal employment of Syrian refugees.

#### **4.1.3 Exports**

For exports, we match firms' balance sheets with data from the Ministry of Trade. Customs data are independent of balance sheets and include all exports made by any firm, including firms that report only simple balance sheets (sample II). As in most other countries, the customs data are highly detailed. We construct variables for firms which show whether the firm is exporting, its export value, the value of exports to specific destinations, the number of export varieties defined at the 4-digit product level, the average price of exports, and the price of each export. Since we know the type of goods exported at the 8-digit product level and the data include information on the USD value and the amount of each export, we can further construct price measures for each transaction that are comparable over time.

We disaggregate total exports by region: Europe (EU countries), Middle East and North Africa (MENA), and Syria. The EU is the primary destination for Turkish exports while exports to MENA and Syria may be affected by the social and business networks that Syrians bring with them. Table 4 presents summary statistics for all the export related variables that we use in the regression analysis. A general increase is observed in the probability of Turkish firms to export from 2.6% in the pre-shock period to 2.8% in the post-shock period. The incidence of exporting to the EU among all exporters is quite high at about 64% ( $1.65/2.6$ ). The

rise in the export probability between 2011 and 2015 appears to be driven by the exports to the MENA region, where the probability of a Turkish firm to export increases from 1.1% to 1.3%.

## 4.2 Data on Refugees

The data on the distribution of Syrian refugees across provinces in Turkey come from Erdogan (2014), who draws on information from the Turkish Ministry of Interior, for the year of 2014 and from the Directorate General of Migration Management for the year of 2015. We also use information on the monthly total number of Syrians in Turkey obtained from the UNHCR, which is illustrated in Figure 1.

The cross-provincial numbers on the number of Syrians are end of year for 2014 and 2015. However, as can be seen from Figure 1, the monthly numbers of Syrians display substantial variation over the year, particularly in 2014. Therefore, we make an adjustment on the cross-provincial numbers so that they represent the yearly average rather than the end of year in terms of the total number of Syrians in Turkey.<sup>27</sup> The resulting provincial migrant-to-native ratios are illustrated in Figure 2.<sup>28</sup>

As can be seen in Figure 2, the refugee-native ratio is much higher for provinces close to Syria. A number of reasons exist for this. First, the refugee camps were mostly established in provinces close to the border. Second, refugees are expected to use education and health facilities in the province where they are registered. Although this was not strictly enforced until 2019, it generated some inertia against moving. Third, many refugees have family members back in Syria, whom they visit from time to time. Hence, living closer to the border provides a practical advantage. At the same time, Figure 2 illustrates that a disproportionately high number of refugees (after controlling for distance) live in the major industrial cities of western Turkey, including Istanbul, Izmir, Bursa, and Kocaeli. This suggests that some refugees also move in search of job opportunities. In fact, in a regression analysis, Aksu et al. (2019)

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<sup>27</sup>First, we calculate the average value of the monthly numbers of Syrian migrants for 2014 and 2015 (call this  $x[t]$ , where  $t$  denotes the year) using the UNHCR data. Then we calculate the total number of Syrian refugees in Turkey according to the provincial data for each year (call this  $y[t]$ ). We adjust the cross-provincial numbers by multiplying it by  $x[t]/y[t]$  to align the sum of provincial numbers in each year with the average monthly value for that year.

<sup>28</sup>Aksu et al. (2019) find no evidence of an effect from refugee influx on internal migration, suggesting that the native population at the province level is unaffected by the arrival of refugees.

find that while distance is the most important determinant of Syrians' settlement patterns, employment opportunities are also a pull factor. The fact that distance is an important determinant of settlement patterns is also critical for the definition of our instrumental variable.

## 5 Identification Method and Estimation

To identify the effects of Syrian refugees on firm performance, we exploit the rapidness of their arrival and their geographical distribution after arrival in an instrumental-variables difference-in-differences framework. The years 2010 and 2011, when the refugees had not yet arrived in Turkey, are the control years and the years 2014 and 2015, after the arrival of refugees, are the treatment years. The effects are then identified through the variation in the refugee intensity across the 81-provinces. The data for 2012 and 2013 are excluded due to a lack of information on the distribution of refugees and due to their concentration in refugee camps, which would limit their impact on local economies.

Using our firm-level data, we estimate the following equation,

$$y_{fjt} = \alpha + \beta R_{jt} + \gamma_f + \rho_j + \theta_t + \lambda_{st} + \pi_{f't} + \mu_{rt} + s_{ft} + e_{fjt}, \quad (1)$$

where  $y_{fjt}$  denotes the outcome for firm  $f$  in province  $j$  at time  $t$  and  $R_{jt}$  is the ratio of migrants to natives in province  $j$  at time  $t$ . The key parameter of interest is  $\beta$ , which shows the effect of increasing the migrant-to-native ratio from 0 to 1 on the firm outcome. In equation (1),  $\gamma_f$  stands for firm fixed effects,  $\rho_j$  for province fixed effects,<sup>29</sup> and  $\theta_t$  for time fixed effects. Since the hosting provinces have different sectoral compositions and sector-specific technological effects might be observed, we include a vector of sector-year fixed effects,  $\lambda_{st}$ , where sector is at the two-digit level. To account for potential changes in firms' reporting type of income statements ( $f'$ ) over time, we further add fixed effects for the interactions of income statement types of firms with year dummies,  $\pi_{f't}$ .<sup>30</sup> Given the variation in the development

<sup>29</sup>Province fixed effects are actually absorbed by firm fixed effects as no variation exists in the province of firms. Firms that change provinces in our time frame are excluded from the sample. There are 58,297 such firms, which form about 2 percent of the total firm population. Our sample includes 2,593,290 firms.

<sup>30</sup>This also serves as a control for year specific effects to different firm size groups because full balance sheets tend to be reported by larger and more formal (incorporated) firms while simple income statements are reported by micro firms.

levels of Turkey's regions, firms from different regions could have different trends in firm performance. Hence, in equation (1), we also include region-year fixed effects ( $\mu_{rt}$ ) for 5 regions of Turkey: West (NUTS-1 regions 1–4), Central (NUTS-1 regions 5 and 7), South (NUTS-1 region 6), North (NUTS-1 regions 8–9), and East (NUTS-1 regions 10–12). In robustness checks, we further show that including more detailed NUTS-1 level (12 regions) region-year fixed effects lead to similar results as with 5 region-year fixed effects. Finally, to further control for shocks specific to larger firms, we include a year specific fixed effect for firms with more than 50 employees,  $s_{ft}$  for outcomes where we estimate alternative specifications with large firm and Syrian-native ratio interactions.

We also run regressions with data defined at the sector-province-year level, where sector is defined at the NACE-2 or NACE-4 level, when we examine the impact of the migrant shock on market structure outcomes and the number of firms. In this case, we adjust equation (1) as follows,

$$y_{sjt} = \alpha + \beta R_{jt} + \delta_s + \rho_j + \theta_t + \lambda_{st} + \kappa_{sj} + \mu_{rt} + e_{sjt}, \quad (2)$$

where  $y_{sjt}$  denotes the outcome for sector  $s$  in province  $j$  at time  $t$ . Firm fixed effects in equation (1) are replaced by sector fixed effects,  $\delta_s$ . In addition, we include sector-province fixed effects  $\kappa_{sj}$ .<sup>31</sup> The inclusion of  $\kappa_{sj}$  implies that sector-province cells that have constant market shares or a constant number of firms over time drop from the analysis sample. The other control variables are the same as those in equation (1).

We use a different specification in analyzing the effect of Syrian refugees on export prices because the available customs data for prices are considerably richer. Price can be calculated at the product level and each transaction includes information on the export destination. Hence, our data here are at the product-firm-province-destination–time level. In this estimation, we use the following equation,

$$p_{ifjkt} = \alpha + \beta R_{jt} + \eta_i + \gamma_f + \rho_j + \varphi_k + \theta_t + \lambda_{st} + \pi_{f't} + \mu_{rt} + \omega_{ikt} + e_{ifjkt}, \quad (3)$$

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<sup>31</sup>In equation (1),  $\kappa_{sj}$  fixed effects are captured by firm fixed effects because sector–province combinations do not change for firms.

where  $p_{ifjkt}$  stands for the price of product  $i$  of firm  $f$  in region  $j$  sold to destination country  $k$  at time  $t$ . Fixed effects are denoted by  $\eta_i$  for products, by  $\gamma_f$  for firms, by  $\rho_j$  for provinces, by  $\varphi_k$  for destinations, and by  $\theta_t$  for years.<sup>32</sup> Equation (3) includes NACE-4 level sector-year fixed effects ( $\lambda_{st}$ ), income statement type-year fixed effects ( $\pi_{f't}$ ), and 5 region-year fixed effects ( $\mu_{rt}$ ) as in equation (1). Equation (3) also includes product-destination-year fixed effects ( $\omega_{ikt}$ ). Further allowing each product-destination fixed effect to be year-specific absorbs all time-varying demand related shocks for that product-destination group. In turn, this allows us to estimate the effect of Syrian refugees on comparable products sold to comparable destinations.

Another challenge in estimating the effects of any immigration shock through regional variation is the potential endogeneity of immigrant distribution. If Syrian refugees move to regions where firms are performing well due to better employment conditions, the OLS estimates will be biased. We use the instrument in Aksu et al. (2019), which is an extension of the instrument used by Del Carpio and Wagner (2015), whose instrument allocates the Syrian refugees in Turkey in each year across Turkish provinces according to the distance of each Turkish province from each Syrian province and the pre-war population shares of Syrian provinces. This instrument assumes that the timing and size of the refugee inflow to Turkey are exogenous, which is standard in studies using migrant supply shocks because these shocks are driven by the political conditions of the country of origin. However, Aksu et al. (2019) argue that since Syrian refugees also arrived in neighboring countries other than Turkey (Lebanon, Jordan, and Iraq) the relative economic conditions and the relative treatment of refugees in these countries, as well as the change in these over time, would influence the timing and size of the refugee inflow to Turkey.<sup>33</sup> Therefore, their instrument accounts for not only the distance of Syrian provinces to Turkish provinces but also their distance to the other three bordering countries in the following way,

$$I_{p,t} = \sum_{s=1}^{13} \frac{\left(\frac{1}{d_{s,T}}\right)\pi_s}{\left(\frac{1}{d_{s,T}} + \frac{1}{d_{s,L}} + \frac{1}{d_{s,J}} + \frac{1}{d_{s,I}}\right)d_{ps}} \frac{T_t}{d_{p,s}}, \quad (4)$$

<sup>32</sup>Fixed effects for sectors are absorbed by firm fixed effects.

<sup>33</sup>In fact, the data show that the arrival of refugees in Turkey vis-à-vis the other three countries gained momentum over time.

where  $I_{p,t}$  stands for the expected number of refugees in Turkish province  $p$  at time  $t$ ,  $d_{s,X}$  for  $X = T, L, J, I$  stands for the minimum distance of Syrian province  $s$  to any entry point in the border of Turkey, Lebanon, Jordan, and Iraq, respectively.<sup>34</sup> In equation (2),  $\pi_s$  stands for the pre-war population share of Syrian province  $s$  and  $T_t$  stands for the total number of Syrian refugees in the four neighboring countries, which is roughly equal to the total number of refugees exiting Syria given the low numbers in other countries in 2014 and 2015. Finally,  $d_{p,s}$  is the distance of Turkish province  $p$  to Syrian province  $s$ .

The key difference of this instrument from that in Del Carpio and Wagner (2015) is that it essentially reweights the prewar population shares of Syrian provinces according to their distances from the four neighboring countries. For instance, while the prewar population share of the Aleppo province in Syria was 21.6%, this formulation would raise its share to 42.3% because Aleppo is much closer to Turkey than to the other three neighboring countries. In fact, surveys of Syrian refugees in Turkey indicate that almost 60% of Syrian refugees originate from this province.<sup>35</sup> In addition, the instrument in equation (4) is different from the del Carpio and Wagner instrument in that  $T_t$  stands for the total number of refugees rather than the refugees in Turkey. Therefore, this instrument accounts for the potential endogeneity of the size and timing of the refugee inflow to Turkey.

First stage F-tests confirm the relevance of the instrument. For the regressions in our primary sample with all firms that report sales, the first stage F-test is greater than 35.<sup>36</sup> In unreported robustness tests, we use the instrument of Del Carpio and Wagner (2015) and found similar second stage results but the precision in the first stage seems to improve when we use the share of refugees in Turkey from each Syrian province. This seems an intuitive result. Not all regions of Syria had the same degree of refugee exodus or chose Turkey and taking the choice between destinations into account improves the precision of the distance effect we capture.

We estimate 2SLS regressions using equation (1) with the instrument in (4) where the de-

<sup>34</sup>There are six entry points on the Turkish border, three at the Iraqi border, two at the Jordanian border, and four at the Lebanese border.

<sup>35</sup>There are also ethno-religious reasons for the higher share of refugees from this region, which houses mostly Sunni Arabs rather than Alawite Arabs or Sunni Kurds. "Incentives" to exit Syria were stronger for the former group.

<sup>36</sup>The first stage F-test becomes larger (45) if region-year fixed effects are excluded and smaller (31) when 12 region NUTS-1 year fixed effects are included.

pendent variable is sales or profits in Section 6.1 and using equation (2) with the instrument in (4) where the dependent variable is the number of firms or market structure variables like concentration in Section 6.2. Finally, using equation (3) with the same instrument, we estimate regressions on export prices in Section 6.3. In all regressions, the standard errors are clustered at the province level, as our key variable of interest varies at this level.<sup>37</sup> Moreover, since our resulting sample is biased towards micro and small firms, we estimate how the effect of the migrant shock on certain dependent variables varies by firm size. For this purpose, we use a dummy variable for large firms – those having more than 50 employees.<sup>38</sup> A similar approach is taken in Mitaritonna et al. (2017) to examine the heterogeneity in migrant impact by firm size.

## 5.1 Identification Assumptions

The assumption for the validity of our instrument is that the trends in outcomes in regions with high and low values of the instrument would have been the same, conditional on region and time fixed effects and a set of covariates, in the absence of the refugee shock. This could fail, for instance, if firm dynamics exhibited more positive or negative time trends in the pre-shock period for provinces bordering Syria (for which our distance-based instrument takes higher values) than for other provinces. In fact, since we use region-year fixed effects, we impose a weaker conditional independence assumption. We assume that within the 5-regions of the country, our instrument is not correlated with the unobserved pre-existing time trends in our firm and market structure outcomes.

We test the validity of this assumption by assuming that the arrival of Syrian refugees in 2014 and 2015 occurred in 2010 and 2011. In this case, we use the calendar years 2008 and 2009 as the pre-shock period. If our instrument were correlated with the pre-shock trends, the result of this regression would yield statistically significant estimates for the instrument even though the placebo obviously cannot have an actual effect. The placebo estimates are presented in Appendix Tables A1 and A2. Table A1 shows placebo estimates for firm level

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<sup>37</sup>Clustering at the province-year level generally gives slightly smaller standard errors but makes little qualitative difference. Since there are 81 provinces, clustering at the province level seems to be the most conservative option.

<sup>38</sup>Here, the employment number of a firm is defined as the average employment size during the observation period. The large firm dummy is, therefore, time invariant at firm level.

outcomes: sales, profit margins, export probability and export value. Table A2 shows placebo estimates for market structure outcomes: the number of firms and market concentration. There is limited evidence of unobserved pre-existing trends in firm outcomes being correlated with the instrument. Among the 2SLS estimates, only the impact on the profit margin is statistically significant at the 10% level. Neither of the export outcomes and none of the market structure outcomes appear to have significant unobserved pre-shock trends that are correlated with the instrument. While there are statistically significant OLS estimates for market structure outcomes, none of the IV estimates indicate unobserved pre-shock trends in market structure outcomes.

## 6 Results

### 6.1 Firms' Sales and Profits

First, we examine the effect of the migrant shock on firms' sales and how this effect varies according to firm size. The results are presented in Table 5 for all firms, as well as by sector of employment for the four main sectors: agriculture, manufacturing, construction, and services. Panel A gives the OLS results, whereas panel C presents the 2SLS results with our distance-based instrument. The dependent variable is the logarithm of sales value. Strong evidence exists that the migrant shock increases firms' sales according to both the OLS and 2SLS estimates. Quantitatively, according to the 2SLS estimates, a 10-percentage-point increase in the migrant-to-native ratio (the magnitude of the shock is in fact greater in four provinces) increases firms' sales by 4.2 percent. This finding confirms hypothesis I-(i) in Section 3 that the migrant shock increases firms' sales.

While the overall sales effect is positive, this is likely to hide considerable heterogeneity across sectors. As discussed in Section 3, demand and supply effects of refugees may be more pronounced in some sectors. Table 5 also shows the OLS and IV estimates for sales effects by sector. We find that a 10-percentage-point increase in the migrant-to-native ratio raises the sales of construction firms by 8.0%, manufacturing firms by 7.5% and firms in the service sector by 3.5%. No statistically significant effects are observed for agricultural

firms.<sup>39</sup> We find that the effect is largest in construction, where both increased demand and cost advantages due to the arrival of refugees play a role.<sup>40</sup> Since manufacturing output is tradeable, there is no reason to expect a large increase in demand that is specific to the regions hosting refugees. The effect on manufacturing is therefore likely to be driven by cost advantages.<sup>41</sup> Just the opposite holds for the services sector, where fewer migrants can work due to language barriers but products are generally non-tradeable. The much larger positive effect in the manufacturing sector than that in the services sector suggests that cost-advantages provided by refugees play a stronger role than the increased demand with their arrival.

Next, we investigate the heterogeneity in the migrant impact on firms' sales by firm size, which is given in panels B and D of Table 5. These panels include an interaction term between our ratio variable and an indicator variable for firms that have more than 50 formal employees, as well as fixed effects for large-firm and year interactions. Overall, we do not find evidence of a difference between the effects for small and large firms despite the fact that Syrians are largely employed informally and informal employment is more pronounced among small firms. As discussed in the conceptual framework, this could be explained by countervailing factors including cost advantages accruing to large firms via their upward linkages to small firms and large firms benefiting more from the business networks of Syrian refugees due to their higher probability of exporting. A more direct way for large firms to benefit from Syrian refugees would be to increase their informal employment. It seems likely that government authorities ignored the informal employment of Syrian refugees in the host provinces in 2014 and 2015 because they did not issue work permits to Syrian refugees until the beginning of 2016, except in rare specific cases.

The 2SLS estimates in Table 5 for all firms, as well as firms in manufacturing, services, and construction, are always higher than the OLS estimates. This suggests that firms in the border regions of Turkey, where most migrants chose to settle, would have worse time trends

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<sup>39</sup> Among the four main sectors, firms in the agricultural sector are the least representative of total production in that sector because agricultural production in Turkey is mostly family-owned small-farm production.

<sup>40</sup> In fact, Aksu et al. (2019) find substantial employment displacement of natives by refugees in the construction sector, suggesting important cost advantages for this sector.

<sup>41</sup> The rise in manufacturing sales is consistent with the significant increase in natives' formal employment in this sector with the arrival of refugees, as reported in Aksu et al. (2019).

in sales in the absence of the refugee shock than firms in other regions of the country, as the 2SLS estimates put less weight in these provinces near the border.

Table 6 shows the effects of the refugee shock on profit margins. We find evidence of an increase in profit margins with the 2SLS estimates. The OLS estimates are also positive but not statistically significant. The fact that the 2SLS estimates are higher than the OLS estimates when profit margin is the dependent variable is similar to the above patterns when sales are the dependent variable. In terms of sectoral heterogeneity, the positive effect of the migrant shock on profit margins exists for manufacturing and services sectors, as in the case of sales, but not for construction. A potential explanation is that there is greater measurement error for profits in the construction sector, as misreporting is more likely to occur in this sector, where informal employment is also much more prevalent. Unlike sales, there is a clear tax motive to underreport sales, and the ease of underreporting may vary by sector.

Finally, in terms of the heterogeneity of these effects by firm size, we find that the migrant shock has a larger effect on the profits of firms with more than 50 employees. Moreover, this finding holds for the manufacturing and services sectors, as well as the entire sample of firms.<sup>42</sup> Nonetheless, we should be cautious in interpreting this finding because it might partly stem from better profit reporting by larger firms.

## 6.2 Market Structure and Informality

The previous section showed that the arrival of refugees caused existing firms to enlarge in terms of sales and profits. This section examines the results on market structure variables: firm creation, characteristics of new firms, market concentration and labor costs.

First, to examine the effect of refugees on net firm creation, we estimate the effect of the migrant shock on the number of firms using alternative definitions for the number of firms as defined in Section 4.1.2. The dependent variables are all in natural logarithms. As can be seen in Table 7, based on the 2SLS estimates in panel B, a 10 percentage-point rise in the migrant-to-native ratio increases the total number of firms that report sales by about 5.9% and the number of firms that report sales through extended balance sheets by about 8.5%, and the

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<sup>42</sup>While Table 5 provides no evidence of a varying effect on sales by firm size, the interaction terms for large firm size are marginally insignificant for the manufacturing and services sectors.

number of firms with at least one formal employee by 10.3%. Using the mean values of the number of firms for the pre-shock period shown in Table 3, we can conclude that 4.4 new firms report sales, while 1.6 new firms report balance sheets and 2.7 new firms report formal employment in each sector-province cell. Regardless of how we define firm activity or entry, we find strong evidence for a positive effect of refugees on net firm creation. This confirms our hypothesis II-(i) that new firms are established at a higher pace due to the arrival of refugees as a result of the cost advantages, increased product demand and business networks that Syrian refugees provide.

As the pace of new firm entry increases, as discussed in the conceptual framework, we expect a fall in market concentration (hypothesis II-(ii)). We test this hypothesis at the NACE-4 sector-province-year level by testing the impact of Syrian refugees on the average market share, the market share of top four largest firms and the HH index.<sup>43</sup> As can also be seen from the 2SLS estimates in panel B of Table 7, evidence of a negative effect exists on the average market share, market concentration and the market share of the top four largest firms. Quantitatively, a 10 percentage-point increase in the refugee-native ratio causes about a 10 percentage-point drop in all three market structure variables. In panels C and D of Table 7, we replicate the analysis at the NACE-2 sector-province-year level. The NACE-2 level sector definition increases the number of firms in each sector-province-year cell and confirms that the effects are not driven by small-sized cells. The results remain qualitatively and quantitatively similar. These findings are in line with our Hypothesis II-(ii) that market concentration falls. Although we find evidence for the expansion of firms, the establishment of new firms overwhelm this effect and market concentration falls. Our rich data (including information on very small firms) are particularly helpful in this sense.

A related question is the type of firms entering the market. We define new firms in a given year as all firms that did not report sales in the previous year. Panels A and B of Table 8 show the estimated effects on the average size of new firms. The IV estimates suggest that new firms become on average 6% smaller in response to a 10 percentage-point increase in the

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<sup>43</sup>The number of observations is slightly lower for market concentration variables because these cannot be calculated for sector-province-year cells with zero firms. The number of observations is lowest for the top 4 share estimation, where each cell needs to include at least four firms.

refugee-native ratio. This effect appears to be driven by the service and construction sectors. We repeat the exercise for exiting firms, which are defined as firms that do not report any sales in the following year in panels C and D of Table 8. We find no corresponding effects and can conclude that new entrants are becoming smaller but are not necessarily displacing small firms. A decline in firm size is in line with the stylized fact that smaller firms are more likely to employ their workers informally. Firms may have an increased incentive to start small to employ Syrian workers informally.

We conclude this section by testing whether an increase in the use of informal labor by existing firms (Hypothesis II-(iii)) can be observed. Since our dataset is administrative, there is no direct way to observe informal workers. However, we can check whether there is a decline in the ratio of (formal) labor costs to cost of sales of firms. A decline is expected if firms choose more informal-labor intensive methods of production to take advantage of the lower cost of employing refugees. We show the results of firm level estimations, as in equation (1), where the dependent variable is the ratio of labor costs to total costs of firms in Table 9. While the effects are relatively imprecisely estimated, we do find generally negative coefficient estimates that are consistent with an increase in the use of informal labor. The estimates are particularly robust and statistically significant for large construction and service firms. This result suggests that large firms either begin to use more informal labor or out-source their labor intensive activities to other firms. Since a larger fraction of workers are employed formally in large firms, replacing formal workers with informal ones is more plausible for large firms. The substitution of informal refugee labor for formal employees also helps explain why we find no heterogeneous effects on sales by firm size in Table 5. While small firms were already employing informal workers, large firms could raise their share of informal employment in response to the arrival of Syrian refugees.

### **6.3 Exports and Export Prices**

Our final outcome of interest is export performance, the results for which are presented in Tables 10 to 12. Table 10 presents the effects on the probability of exporting and the value of exports by destination. Table 11 shows the effects on the exporters' product variety and aver-

age price. Table 12 shows the estimates at the transaction level on prices where destination-product-year fixed effects are included to capture the effect on the price of individual products.

Table 10 gives strong evidence of an increase in the likelihood of exporting for all firms. Again, the 2SLS coefficients are higher than the OLS estimates. According to the former, a 10 percentage-point increase in the refugee-native ratio causes a 3 percentage-point increase in the probability of exporting. This amounts to a substantial increase in exporting as only 2.6 percent of all firms export during the pre-shock period and this confirms hypothesis III-(i). By the region of destination, the results indicate that export probability increases due to exports to Syria. This is confirmed by the final column, where we find no statistically significant effect on the probability of exporting to countries other than Syria.

In the interpretation of export performance by destination, it is important to note that the increase in export probability to Syria could in part result from the direct effects of the war, unlike the effects in exports to the EU and the MENA region. The Syrian war caused substantial destruction to the production infrastructure in Syria, and northwestern Syria on the Turkish border (in particular, around Aleppo) is a heavily-populated area. Kirişci et al. (2016) report a substantial rise in exports from Turkish provinces on the Syrian border to Syria. Hence, we need to focus on the exports to the EU and the MENA region to understand the impact of refugees in Turkey on firms' export behavior.

Panels C and D of Table 10 show the impact of the refugee shock on the value of exports for a given firm. The 2SLS estimates indicate that although the magnitude of the effect is large (a 10 percentage-point increase in the refugee-native ratio brings about a 12-percent increase in the value of exports), this is marginally statistically insignificant at the 10-percent level. The results showing the effect on export value by destination region are more mixed. While the effect for the EU as the destination is in fact negative, that for the MENA region is positive.<sup>44</sup> This supports hypothesis III-(ii), which states that refugees would improve trade with certain countries – those with which they have closer business networks and information advantages

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<sup>44</sup>Using the coefficient estimates and their mean export values shown in Table 4 for 2010-2011, we can calculate the firm level estimated value of the increase in MENA exports to be 19,600 USD and the value of the decline in exports to EU to be 15,800 USD per 10 percentage-point increase in the refugee-native ratio.

– than other countries.

Combining the effects on the intensive and extensive margins, we observe that for the EU as the destination, the effect on the extensive margin is positive but statistically insignificant and the effect on the intensive margin is negative. On the other hand, for the MENA region as the destination, the effect on the intensive margin is statistically significant, positive and large. According to the 2SLS estimate, a 10 percentage-point increase in the refugee-native ratio increases the value of exports of a given firm to the MENA region by more than 20 percent. For Syria as the destination, in contrast, evidence of an effect exists in both the intensive margin and the extensive margin.

Next, we examine the effect of the refugee shock on the variety and average price of exported products. Panels A and B in Table 11 show the effects on the number of 4-digit products exported to each destination. The overall effect is positive, indicating a 9.5% increase in export variety in response to a 10 percentage-point increase in the refugee-native ratio and confirming hypothesis III-(iii). In line with the results on the export value, we find no evidence of an expansion in the export variety to the EU countries. On the other hand, export variety to both Syria and the MENA countries rises by 10 and 12% respectively per 10 percentage-point increase in the refugee-native ratio.

Panels C and D give an idea about the change in the type of exported products by showing the effects on the average price of exports at firm level. The overall effect seems positive, but this positive effect is entirely driven by exports to Syria, suggesting that the complexity and quality of products sold to Syria increased after the war. Once exporters to Syria are excluded, the effect becomes negative and statistically significant, as can be seen in column 5. While the estimated coefficient is marginally insignificant for exports to the MENA region, the size of the coefficient is still large, indicating a 6% decline in the average price of exports in response to a 10 percentage-point increase in the refugee-native ratio.

In essence, many new firms start exporting to Syria and the variety of exports to Syria increases. However, as stated above, this is less interesting because it could be the direct effect of the war. The evidence on the increase in the volume of exports to the MENA region by existing exporters is certainly more interesting. As discussed in the conceptual framework

section, this could result either from the cost advantages accruing from the arrival of cheaper refugee labor or from the ethnic and language networks of refugees. In our context, it is possible to identify the effects of these two mechanisms separately because the latter mechanism would apply to the MENA region (with a common language and culture to Syrians) but not to the EU, whereas the former channel would apply to both destinations. In order to distinguish between these two channels, the evidence concerning the effect of the refugee shock on export prices (to be examined next) will be critical.

Table 12 presents the results related to the effect of the refugee shock on the price of a given product exported to a given destination. Two different specifications are used: one that uses firm fixed effects eliminating the effects of compositional changes in the firm pool due to entry and exit to exporting and another that does not use firm fixed effects. Both specifications indicate a decline in the prices of exported goods. This decrease is larger when compositional effects due to entry and exit are included (implying that the price effect is mostly driven by firms that are new to exporting). According to the 2SLS estimates, export prices decline by 0.58% per one percentage-point increase in the refugee-native ratio. Including firm fixed effects reduces the size of the effect by nearly half, to 0.38%.

Since our transaction level specifications include product-destination-year fixed effects, they are free of changes in the composition of exports and yearly demand shocks at the product-destination level. We can, therefore, interpret the decline in prices in Table 12 as the cost-of-production effect of Syrian refugee inflows. Isolating the cost effect allows us to disentangle the mechanisms behind the impact on the firm-level weighted price of exports, where we find a decline of 0.87% per one percentage-point increase in the refugee-native ratio (excluding exporters to Syria). Since the cost effect (0.38%) is less than half of the effect on the weighted price of exports, we conclude that firms in the hosting regions both have a cost advantage and alter their composition of exports towards lower quality exports. Hence, the increase in product variety that we document can be interpreted as a switch towards lower quality exports.

Since similar price effects are reported in panel B of Table 12 for exports to the EU and to the MENA region, we can safely conclude that the decrease in costs accruing from em-

ploying Syrian refugees is universal among exporters. Therefore, we can conclude that the larger increase in the intensive margin of exports to the MENA region, compared to the EU, must result from the skills provided by Syrian ethnic networks. Essentially, firms that had been exporting prior to the inflow of Syrian refugees benefit more from networks of Syrian refugees to the MENA region. In addition, the impact on the export value to the EU suggests that the increased competition from new exporters and the increased availability of exporting opportunities to the MENA region cause exporters to reduce their export share to the EU region.

#### **6.4 Robustness Checks**

In this subsection, we check the robustness of our findings using alternative specifications. Tables A3 and A4 in the Appendix show the results from five alternative specifications using OLS and IV estimation, respectively, for firm level outcomes. The first column presents results where we estimate equation (1) without sector-year and region-year fixed effects. The second column adds sector-year fixed effects at the 2-digit NACE sector level. The third column includes sector-year fixed effects at the 4-digit NACE sector level. The fourth column controls for potential regional differences in time effects by including region-year fixed effects for 5 regions of Turkey, as well as sector-year fixed effects at the 2-digit sector level, and is equivalent to our baseline specification. Finally, the fifth column includes a finer control for regional differences in time trends by including region-year fixed effects for the 12 NUTS-1 regions of Turkey, as well as sector-year fixed effects at the 2-digit sector level.

Panels (A) of Tables A3 and A4 show the effects on sales with different specifications. The inclusion of sector-year fixed effects in columns 2 and 3 make little difference to the point estimate, indicating that the refugee density is not correlated with sectoral trends. On the other hand, including region-year fixed effects in columns 4 and 5 lead to smaller estimates, showing that pre-shock regional trends exist that are correlated with refugee densities. While the estimated effect of a percentage-point increase in the refugee-native ratio is 0.7% in column 3, the point estimate declines to 0.4% in columns 4 and 5. The difference in estimates between columns 4 and 5 is limited, indicating that the 5 region-year fixed effects are sufficient to con-

control for regional trends. A similar pattern is observed for panel B which shows the effects on profit margins. In panels C and D, we show the results from different specifications for the export outcomes, where the inclusion of sector or region-year fixed effects makes a limited difference to the estimated impact.

Tables A5 and A6 show the OLS and 2SLS results of varying specifications for the market structure variables at the province-NACE-2 level using fixed effects for NACE-2 sectors, provinces and years. In column 2, time varying fixed effects for NACE-2 sectors are introduced. In columns 3 and 4, we include the 5-region- and NUTS-1 level region-year fixed effects, respectively. Columns 4 and 5 replace the NACE-2 and province fixed effects with their interaction in order to check for province-level sector heterogeneity. Column 6 is our preferred specification, where we further include a 5-region year fixed effect while adding sector-province fixed effects. Overall, the results change comparatively little throughout the specifications for our market structure outcomes. The addition of region-year fixed effects in columns 3 and 4 reduces the precision of the estimates for market concentration outcomes (i.e. the top 4 share), but these estimates are again significant at conventional levels once sector-province fixed effects are included.

## **7 Conclusion**

In this study, we combine an administrative dataset of the full population of firms in Turkey covering a very rich set of outcomes with the massive exodus of Syrian refugees into Turkey to study migrants' effect on firm performance and market structure.

Turkish firms substantially benefit in terms of both sales and the profit margin as a result of the refugee influx. A 10 percentage-point increase in the ratio of refugees to natives brings about a 4.2 percent increase in sales, but the magnitude of the effect on the profit margin is much smaller. Moreover, the rise in sales is more pronounced in manufacturing and construction, where many Syrian refugees work informally, but smaller in the services sector, where it is harder for the refugees to secure jobs due to the language barrier. In addition, both large and small firms benefit from the arrival of refugees in terms of sales. Although

small firms have more direct cost advantages due to their higher propensity of employing informal workers, large firms also benefit via the upstream linkages to small firms, the switch to informal employment, and the export benefits of Syrian networks – as they are more likely to export than smaller firms.

The arrival of the refugees also leads to an increase in the establishment of new firms. This finding is consistent with the declining costs of production resulting from the employment of refugees in the informal sector, the inflow of Syrian refugees with entrepreneurial skills and the rise in the consumption base due to the arrival of refugees. One further finding – that the size of new firms declines – implies that new firms adopt technologies that are intensive in informal-labor, which becomes more abundant with the arrival of refugees.

Our dataset covering the full population of Turkish firms allows us to study market concentration. We find that new firms are smaller on average and this leads to a drop in market concentration. The fact that new firms are smaller is in line with the more informal-labor intensive production methods of smaller firms and the reduction in the relative costs of informal labor. At the same time, the share of formal labor in the production process of existing firms decreases. These findings suggest an informalization of the production process in Turkey.

Using the detailed price measures for each exported product, destination, and firm in our dataset, we find that the prices of exported products fall. This also points out the cost advantages of employing Syrian refugees informally, as no demand-side effect of Syrian refugees exists for exported products. In other words, the arrival of Syrian refugees increases the competitiveness of Turkish firms in international product markets. As a result of the arrival of Syrian refugees, exports to the MENA region increase substantially, somewhat at the expense of exports to the EU. In addition, the product variety of exports to the MENA region also increases.

The increase in the volume of exports to the MENA region can take place due to either the cost advantages that are accrued from refugees or the network effects of Syrian refugees in trading. The fact that the prices of exported products to the EU and the MENA region change similarly as a result of the refugee shock allows us to disentangle the effects of these

two channels. Since the export volume and the product variety to the MENA region increases much more, we can conclude that business and social networks of Syrian refugees and their knowledge about the MENA region play an important role by reducing informational barriers, providing matching and referral services and increasing contract enforcement in trade. In other words, while refugee workers make the exported products less expensive both to the EU and to the MENA regions, refugee networks increase the volume and variety of exports to the MENA region disproportionately.

To get a better overview of the economic impact of Syrian refugees, our results need to be considered together with the previous findings on the labor market effects of Syrian refugees. Ceritoglu et al. (2017) find relatively small negative effects on native employment and Aksu et al. (2019) find no negative effect on native men's employment but a negative effect on the employment of native women with weak attachment to the labor market. The increase in output and firm performance explains the limited negative effects Syrians have had on native employment. Essentially, firms use more of the production factor, which becomes more abundant after the arrival of refugees. The sectors that can benefit most from this – such as construction and manufacturing – see the highest rise in sales. This is consistent with the findings in Aksu et al. (2019), which report a substantial replacement of informally-employed native workers with refugees in both of these sectors as well as a significant rise in formally-employed native workers in manufacturing.

The productivity growth of Turkish firms in the 2006-2016 period has been shown to be stagnant (Akcigit et al., 2020). Since large firms tend to be more productive and less informal, growing incentives to remain small and informal by employing Syrian refugees can have adverse consequences on the long-term productivity of the hosting regions. This is particularly problematic for the Turkish economy, which is already dominated by relatively unproductive small firms. Akgündüz and Torun (2020) show that the capital intensity of firms has also declined due to the arrival of Syrian refugees. Together with our finding that the sales increase is accompanied by an increase in informality and a decline in concentration, the decrease in capital intensity is worrying for the long-term productivity of hosting regions.

While recent studies suggest that lower market concentration could increase competition

and spur growth, the underlying assumption in these models is that firms with higher productivity will be allowed to grow in a competitive environment (Akcigit and Ates, 2019b; Autor et al., 2020). Introducing an incentive to remain small and informal will similarly result in lower market concentration, but not due to increased competition or the creative destruction of firms. Even if aggregate economic activity is positively affected by the availability of low-cost labor and increased demand, this increase may be at the cost of declining firm productivity. These long-term concerns further emphasize the need for policy-making to encourage the unequivocally positive aspects of refugee inflows, by supporting the entrepreneurship of refugees and the export activity of firms with countries where refugees' business networks matter.

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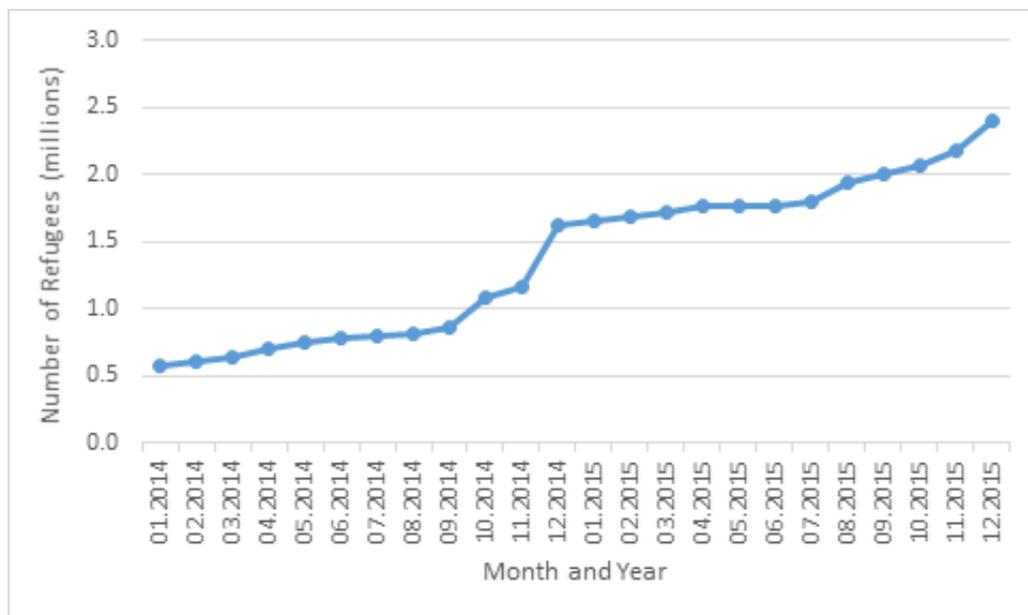
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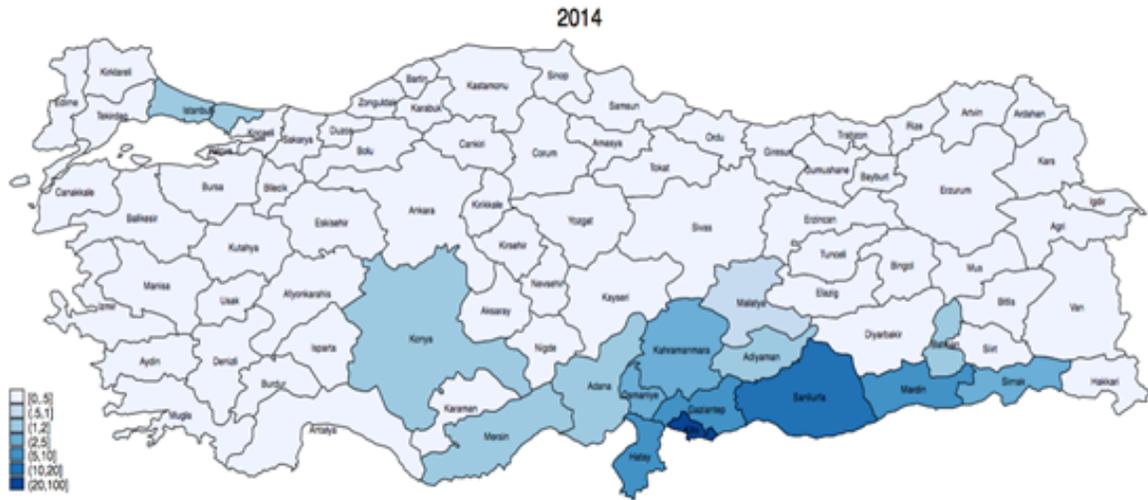
## Figures and Tables

Figure 1: Total Number of Registered Syrian Migrants in Turkey (in millions) 2014–2015

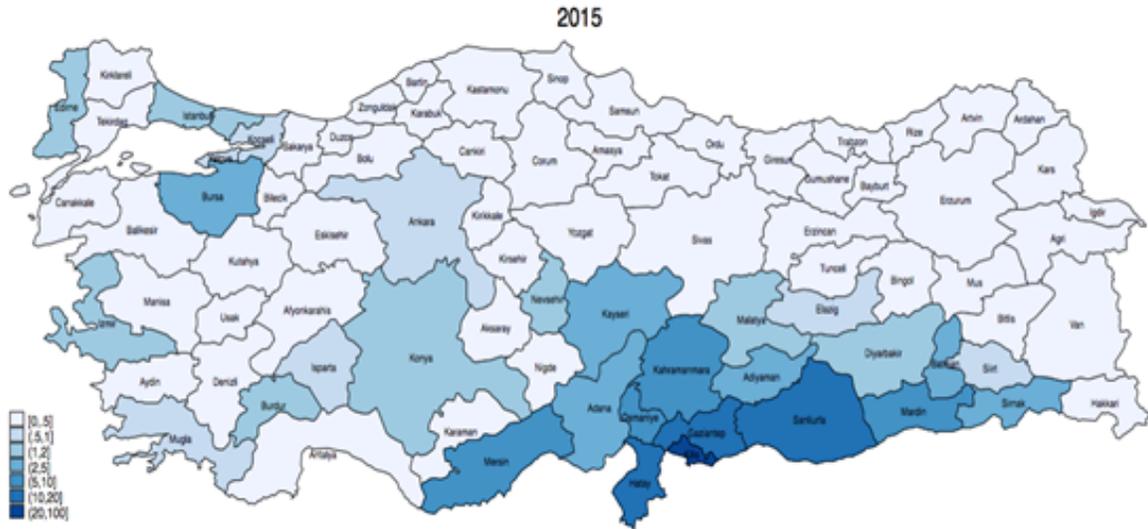


Notes: UN Refugee Agency, <http://data.unhcr.org/syrianrefugees/country.php?id=224>

Figure 2: Ratio of Migrants to Natives across Provinces (multiplied by 100), 2014–2015



Source: Turkish Statistical Institute and Endogan(2014)



Source: Turkish Statistical Institute and Turkish Directorate of General Migration Management

Table 1: Inter-correlation of firm characteristics in Turkey

|                         | Sales | Exporter | Labor share | Average employment | Reported employment |
|-------------------------|-------|----------|-------------|--------------------|---------------------|
| Sales                   | 1     |          |             |                    |                     |
| Exporter                | 0.44  | 1        |             |                    |                     |
| Labor cost share        | -0.48 | -0.19    | 1           |                    |                     |
| Employment              | 0.24  | 0.2      | -0.03       | 1                  |                     |
| Formal employment (0/1) | 0.52  | 0.21     | 0.01        | 0.1                | 1                   |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in public and finance sectors. We use the years 2010-2011 and 2014-2015 to construct the table, which corresponds with the years of our baseline analysis. The unit of sales obtained from firm balance sheets is Turkish Liras deflated using the annual CPI. We define exporters using customs data information. Labor cost share is defined as the ratio of labor costs to cost of sales reported in the balance sheets of firms. Employment is the average number of employees reported to the Social Security Institute (SSI) over 4 quarters in a given year. Formal employment (0/1) indicates whether a firm has an employee reported to the SSI.

Table 2: Summary statistics – balance sheets

|                       | Mean   | Median | SD    | p10    | p90    | N         |
|-----------------------|--------|--------|-------|--------|--------|-----------|
| 2010-2011             |        |        |       |        |        |           |
| <i>Sales:</i>         |        |        |       |        |        |           |
| All                   | 10.218 | 10.173 | 2.319 | 7.384  | 13.16  | 3,535,153 |
| Agriculture           | 10.489 | 10.47  | 2.426 | 7.605  | 13.574 | 18,848    |
| Manufacturing         | 10.576 | 10.522 | 2.441 | 7.537  | 13.707 | 510,330   |
| Construction          | 10.944 | 11.174 | 2.339 | 7.894  | 13.649 | 204,547   |
| Services              | 10.098 | 10.038 | 2.276 | 7.335  | 12.996 | 2,801,428 |
| <i>Profit margin:</i> |        |        |       |        |        |           |
| All                   | 0.0562 | 0.198  | 0.29  | -0.195 | 0.426  | 3,265,916 |
| Agriculture           | -0.002 | 0.004  | 0.277 | -0.271 | 0.26   | 17,347    |
| Manufacturing         | 0.042  | 0.02   | 0.276 | -0.199 | 0.348  | 471,597   |
| Construction          | 0.046  | 0.032  | 0.262 | -0.181 | 0.3    | 187,075   |
| Services              | 0.06   | 0.019  | 0.294 | -0.195 | 0.446  | 2,589,897 |
| 2014-2015             |        |        |       |        |        |           |
| <i>Sales:</i>         |        |        |       |        |        |           |
| All                   | 10.335 | 10.3   | 2.354 | 7.454  | 13.299 | 4,034,044 |
| Agriculture           | 10.791 | 10.93  | 2.486 | 7.74   | 13.852 | 22,087    |
| Manufacturing         | 11.186 | 11.44  | 2.35  | 8.128  | 13.867 | 254,991   |
| Construction          | 10.731 | 10.686 | 2.474 | 7.633  | 13.895 | 576,240   |
| Services              | 10.192 | 10.135 | 2.308 | 7.398  | 13.099 | 3,180,726 |
| <i>Profit margin:</i> |        |        |       |        |        |           |
| All                   | 0.076  | 0.025  | 0.298 | -0.171 | 0.464  | 3,712,478 |
| Agriculture           | 0.025  | 0.014  | 0.283 | -0.229 | 0.289  | 20,361    |
| Manufacturing         | 0.063  | 0.026  | 0.28  | -0.166 | 0.386  | 531,263   |
| Construction          | 0.05   | 0.032  | 0.257 | -0.159 | 0.287  | 232,467   |
| Services              | 0.08   | 0.024  | 0.304 | -0.172 | 0.487  | 2,928,387 |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in the public and finance sectors. The sample is restricted to firms with positive sales for years 2010-11 and 2014-15. All sales variables are in log form. The unit of sales is Turkish Liras deflated using the annual CPI. The profit margin (defined as profits divided by sales) variable is only constructed for firms that report a profit margin between -1 and 1.

Table 3: Summary statistics for market structure at (NACE-4)-province-year level

|                              | Mean   | Median | SD    | p10   | p90   | N         |
|------------------------------|--------|--------|-------|-------|-------|-----------|
| 2010-2011                    |        |        |       |       |       |           |
| <i>Number of firms that:</i> |        |        |       |       |       |           |
| Reported sales               | 66.157 | 5      | 4.144 | 0     | 106   | 61890     |
| Reported balance sheets      | 24.468 | 2      | 1.665 | 0     | 35    | 61890     |
| Reported SSI                 | 28.576 | 2      | 2.002 | 0     | 42    | 61890     |
| <i>Market concentration:</i> |        |        |       |       |       |           |
| Average share                | 0.311  | 0.143  | 0.359 | 0.008 | 1     | 54275     |
| HH index                     | 0.493  | 0.424  | 0.353 | 0.064 | 1     | 54275     |
| Top 4 share                  | 0.697  | 0.754  | 0.254 | 0.31  | 0.986 | 31932     |
| <i>Labor cost share:</i>     | 0.186  | 0.113  | 0.198 | 0.021 | 0.468 | 1,468,288 |
| 2014-2015                    |        |        |       |       |       |           |
| <i>Number of firms that:</i> |        |        |       |       |       |           |
| Reported sales               | 76.084 | 6      | 4.764 | 1     | 121   | 61890     |
| Reported balance sheets      | 30.561 | 3      | 2.134 | 0     | 44    | 61890     |
| Reported SSI                 | 36.525 | 3      | 2.617 | 0     | 54    | 61890     |
| <i>Market concentration:</i> |        |        |       |       |       |           |
| Average share                | 0.292  | 0.125  | 0.35  | 0.007 | 1     | 55184     |
| HH index                     | 0.47   | 0.386  | 0.35  | 0.057 | 1     | 55184     |
| Top 4 share                  | 0.684  | 0.736  | 0.258 | 0.293 | 0.985 | 33714     |
| <i>Labor cost share:</i>     | 0.204  | 0.128  | 0.208 | 0.023 | 0.511 | 1,815,892 |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in public and finance sectors. The sample is defined at the level of NACE-4 level sector–province combinations for years 2010-11 and 2014-15. The number of firms variables in regression specifications are in log (plus 1) form.

Table 4: Summary statistics – exports

|                        | Mean   | Median | SD    | p10    | p90    | N         |
|------------------------|--------|--------|-------|--------|--------|-----------|
| 2010-2011              |        |        |       |        |        |           |
| Exporter               | 0.026  | 0      | 0.159 | 0      | 0      | 3,535,153 |
| Exporter EU            | 0.017  | 0      | 0.128 | 0      | 0      | 3,535,153 |
| Exporter Syria         | 0.002  | 0      | 0.042 | 0      | 0      | 3,535,153 |
| Exporter MENA          | 0.011  | 0      | 0.104 | 0      | 0      | 3,535,153 |
| Exporter w/o Syria     | 0.026  | 0      | 0.159 | 0      | 0      | 3,535,153 |
| Export value           | 11.711 | 11.678 | 2.4   | 8.765  | 14.801 | 91,988    |
| Export value EU        | 11.341 | 11.29  | 2.528 | 8.256  | 14.612 | 58,412    |
| Export value Syria     | 10.792 | 10.748 | 1.932 | 8.476  | 13.267 | 6,314     |
| Export value MENA      | 11.456 | 11.435 | 2.219 | 8.742  | 14.261 | 38,816    |
| Export value w/o Syria | 11.701 | 11.664 | 2.401 | 8.756  | 14.796 | 91,286    |
| Product variety        | 1.329  | 1.099  | 1.195 | 0      | 2.996  | 91,988    |
| Average price          | 1.452  | 0.971  | 3.753 | -2.849 | 6.758  | 91,988    |
| 2014-2015              |        |        |       |        |        |           |
| Exporter               | 0.028  | 0      | 0.165 | 0      | 0      | 4,034,043 |
| Exporter EU            | 0.017  | 0      | 0.129 | 0      | 0      | 4,034,043 |
| Exporter Syria         | 0.001  | 0      | 0.035 | 0      | 0      | 4,034,043 |
| Exporter MENA          | 0.013  | 0      | 0.113 | 0      | 0      | 4,034,043 |
| Exporter w/o Syria     | 0.028  | 0      | 0.165 | 0      | 0      | 4,034,043 |
| Export value           | 11.704 | 11.68  | 2.393 | 8.741  | 14.786 | 113,506   |
| Export value EU        | 11.255 | 11.191 | 2.52  | 8.182  | 14.533 | 68,001    |
| Export value Syria     | 11.272 | 11.118 | 1.885 | 9.038  | 13.794 | 4,861     |
| Export value MENA      | 11.513 | 11.489 | 2.195 | 8.814  | 14.32  | 51,954    |
| Export value w/o Syria | 11.694 | 11.67  | 2.396 | 8.728  | 14.781 | 112,383   |
| Product variety        | 1.337  | 1.099  | 1.197 | 0      | 3.045  | 113,506   |
| Average price          | 1.811  | 1.318  | 3.787 | -2.562 | 7.175  | 113,507   |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in public and finance sectors. The sample covers only manufacturing firms with positive sales for years 2010-11 and 2014-15. Export values and average price are reported in US dollars and transformed into logs. Product variety is measured at the 4-digit level and log transformed.

Table 5: Sales

|                     | All                   | Agriculture         | Manufacturing         | Construction          | Services             |
|---------------------|-----------------------|---------------------|-----------------------|-----------------------|----------------------|
| A - OLS             |                       |                     |                       |                       |                      |
| Ratio               | 0.3253**<br>(0.1404)  | 0.4338<br>(0.6495)  | 0.4338***<br>(0.1541) | 0.7335***<br>(0.2446) | 0.2879**<br>(0.1410) |
| B - OLS interaction |                       |                     |                       |                       |                      |
| Ratio               | 0.3232**<br>(0.1384)  | 0.4612<br>(0.6608)  | 0.4305***<br>(0.1519) | 0.7591***<br>(0.2456) | 0.2850**<br>(0.1393) |
| Ratio x large firm  | 0.4361<br>(0.6482)    | -4.3917<br>(4.5568) | 0.5400<br>(0.9489)    | -0.4510<br>(1.0658)   | 0.6725<br>(0.6729)   |
| C - IV              |                       |                     |                       |                       |                      |
| Ratio               | 0.4196***<br>(0.1445) | -0.2918<br>(0.8753) | 0.7481***<br>(0.2037) | 0.7973***<br>(0.2706) | 0.3597**<br>(0.1463) |
| D - IV interaction  |                       |                     |                       |                       |                      |
| Ratio               | 0.4159***<br>(0.1444) | -0.2274<br>(0.9028) | 0.7294***<br>(0.1921) | 0.8970***<br>(0.3130) | 0.3518**<br>(0.1465) |
| Ratio x large firm  | 0.5703<br>(0.7820)    | -6.4082<br>(5.9175) | 1.6426<br>(1.2408)    | -2.2603<br>(1.8418)   | 1.0664<br>(0.7827)   |
| N                   | 7,569,196             | 40,935              | 1,086,570             | 459,538               | 5,982,153            |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales (who report balance sheets). All models include firm, year, large firm x year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Ratio is the ratio of Syrian refugees to native population. In panels C and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. In panel D, the product of the weighted distance and large firm dummy is added as an instrument. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 6: Profit margins

|                     | All                   | Agriculture         | Manufacturing         | Construction        | Services             |
|---------------------|-----------------------|---------------------|-----------------------|---------------------|----------------------|
| A - OLS             |                       |                     |                       |                     |                      |
| Ratio               | 0.005<br>(0.0135)     | 0.0418<br>(0.0549)  | 0.0069<br>(0.0149)    | 0.0065<br>(0.0251)  | 0.0039<br>(0.0146)   |
| B - OLS interaction |                       |                     |                       |                     |                      |
| Ratio               | 0.0045<br>(0.0137)    | 0.0401<br>(0.0547)  | 0.0048<br>(0.0156)    | 0.0070<br>(0.0261)  | 0.0036<br>(0.0148)   |
| Ratio x large firm  | 0.0682*<br>(0.0390)   | 0.2345<br>(0.2321)  | 0.1405**<br>(0.0665)  | -0.0111<br>(0.0649) | 0.0491<br>(0.0512)   |
| C - IV              |                       |                     |                       |                     |                      |
| Ratio               | 0.0414**<br>(0.0195)  | -0.0106<br>(0.0742) | 0.0511***<br>(0.0194) | -0.0174<br>(0.0445) | 0.0424**<br>(0.0211) |
| D - IV interaction  |                       |                     |                       |                     |                      |
| Ratio               | 0.0398**<br>(0.0193)  | -0.0085<br>(0.0745) | 0.0443**<br>(0.0189)  | -0.0099<br>(0.0470) | 0.0413*<br>(0.0210)  |
| Ratio x large firm  | 0.1542***<br>(0.0574) | -0.1825<br>(0.5512) | 0.2701***<br>(0.0694) | -0.1835<br>(0.1865) | 0.1891**<br>(0.0870) |
| N                   | 6,790,753             | 36,736              | 980,258               | 412,578             | 5,361,181            |

Notes: The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales (who report balance sheets) and excludes firms that report a profit margin that is greater than 1 or less than -1. All models include firm, year, large firm x year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Ratio is the ratio of Syrian refugees to native population. In panels C and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. In panel D, the product of the weighted distance and large firm dummy is added as an instrument. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 7: Market structure

| Number of firms that: |                       |                         |                       |                        |                        |                        |
|-----------------------|-----------------------|-------------------------|-----------------------|------------------------|------------------------|------------------------|
|                       | Reported sales        | Reported balance sheets | Reported SSI          | Market share           | HH index               | Top 4 share            |
| A- OLS NACE-4 level   |                       |                         |                       |                        |                        |                        |
| Ratio                 | 0.3094***<br>(0.1111) | 0.2914*<br>(0.1612)     | 0.3680**<br>(0.1670)  | -0.0935***<br>(0.0210) | -0.0758***<br>(0.0166) | -0.0501***<br>(0.0153) |
| B- IV NACE-4 level    |                       |                         |                       |                        |                        |                        |
| Ratio                 | 0.5928**<br>(0.2474)  | 0.8526**<br>(0.4031)    | 1.0272**<br>(0.4524)  | -0.1115**<br>(0.0525)  | -0.0987**<br>(0.0450)  | -0.1004***<br>(0.0342) |
| N                     | 123,780               | 123,780                 | 123,780               | 109,459                | 109,459                | 64,485                 |
| C- OLS NACE-2 level   |                       |                         |                       |                        |                        |                        |
| Ratio                 | 0.3986***<br>(0.0619) | 0.2392**<br>(0.1066)    | 0.3850***<br>(0.1073) | -0.1428***<br>(0.0290) | -0.1157***<br>(0.0168) | -0.0727***<br>(0.0169) |
| D- IV NACE-2 level    |                       |                         |                       |                        |                        |                        |
| Ratio                 | 0.4427***<br>(0.1331) | 0.3890**<br>(0.1926)    | 0.6002***<br>(0.2186) | -0.1029*<br>(0.0552)   | -0.0920**<br>(0.0361)  | -0.0937**<br>(0.0384)  |
| N                     | 23,456                | 23,456                  | 22,204                | 22,204                 | 22,204                 | 17,515                 |

Notes: The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in public and finance sectors. Each observation is at the province-sector-year (NACE-4 or NACE-2) level. All models include province-sector, year, NACE-2 x year and 5-region x year fixed effects. In panels B and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. All variables are in log form. Reported SSI stands for firms that have a registered employee at the social security institute. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 8: Entrant and exiter firm characteristics

| <i>Firm size:</i> | All                   | Agriculture          | Manufacturing       | Construction           | Services              |
|-------------------|-----------------------|----------------------|---------------------|------------------------|-----------------------|
| Entrant:          |                       |                      |                     |                        |                       |
| A – OLS           |                       |                      |                     |                        |                       |
| Ratio             | -0.4433**<br>(0.2201) | -2.1021<br>(2.1511)  | -0.1143<br>(0.2861) | -1.2899***<br>(0.3525) | -0.4101*<br>(0.2345)  |
| B – IV            |                       |                      |                     |                        |                       |
| Ratio             | -0.6353**<br>(0.2995) | -4.2688*<br>(2.1915) | 0.1312<br>(0.4745)  | -0.7190*<br>(0.4020)   | -0.7009**<br>(0.3441) |
| N                 | 1,596,513             | 10,893               | 195,982             | 120,169                | 1,269,469             |
| Exiter:           |                       |                      |                     |                        |                       |
| C- OLS            |                       |                      |                     |                        |                       |
| Ratio             | -0.2382<br>(0.3556)   | -0.4875<br>(0.4296)  | -0.1691<br>(2.1330) | 0.1354<br>(2.1934)     | -0.2084<br>(0.4964)   |
| D – IV            |                       |                      |                     |                        |                       |
| Ratio             | -0.4875<br>(0.4296)   | -0.1691<br>(2.1330)  | 0.1354<br>(2.1934)  | -0.2084<br>(0.4964)    | -0.3613<br>(0.3381)   |
| N                 | 1,492,065             | 9,189                | 179,774             | 97,837                 | 1,205,265             |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey, except for those in public and finance sectors. The dependent variable in all models is the natural logarithm of the CPI adjusted sales. All models include year, province, income statement type x year, NACE-2 x year and 5-region x year fixed effects. In panels B and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. All variables are in log form. Entrants are firms that did not report sales in the previous year. Exiters are firms that do not report sales in the following year. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 9: Labor cost to cost of sales ratios

|                     | All                  | Agriculture         | Manufacturing       | Construction          | Services              |
|---------------------|----------------------|---------------------|---------------------|-----------------------|-----------------------|
| A - OLS             |                      |                     |                     |                       |                       |
| Ratio               | -0.0205<br>(0.0182)  | 0.0838<br>(0.0971)  | -0.0260<br>(0.0354) | -0.0312<br>(0.0294)   | -0.0189<br>(0.0193)   |
| B - OLS interaction |                      |                     |                     |                       |                       |
| Ratio               | -0.0182<br>(0.0172)  | 0.0884<br>(0.1010)  | -0.0257<br>(0.0355) | -0.0158<br>(0.0292)   | -0.0168<br>(0.0182)   |
| Ratio x large firm  | -0.0890*<br>(0.0486) | -0.9425<br>(0.6411) | -0.0052<br>(0.0529) | -0.1772*<br>(0.0952)  | -0.1193**<br>(0.0558) |
| C - IV              |                      |                     |                     |                       |                       |
| Ratio               | -0.0361<br>(0.0280)  | 0.1053<br>(0.0914)  | -0.0232<br>(0.0610) | -0.0718*<br>(0.0411)  | -0.0364<br>(0.0237)   |
| D - IV interaction  |                      |                     |                     |                       |                       |
| Ratio               | -0.0325<br>(0.0262)  | 0.1038<br>(0.0922)  | -0.0234<br>(0.0606) | -0.0545<br>(0.0390)   | -0.0337<br>(0.0225)   |
| Ratio x large firm  | -0.1337<br>(0.0828)  | -0.5954<br>(0.6413) | 0.0216<br>(0.0415)  | -0.2434**<br>(0.1174) | -0.2198**<br>(0.0965) |
| N                   | 3,010,937            | 17,784              | 576,651             | 258,360               | 2,158,142             |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales that have reported their employment costs to the Social Security Institute and have a labor cost share between -1 and 1. All models include firm, year, large firm x year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Ratio is the ratio of Syrian refugees to native population. In panels C and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. In panel D, the product of the weighted distance and large firm dummy is added as an instrument. The LHS variable is defined as the ratio of total (formally employed) labor cost to cost of sales (defined as sales net of profits). Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 10: Export probability and value by destination

|                            | All                   | EU                     | Syria                  | MENA                 | All w/o Syria      |
|----------------------------|-----------------------|------------------------|------------------------|----------------------|--------------------|
| A – Export probability OLS |                       |                        |                        |                      |                    |
| Ratio                      | 0.0193***<br>(0.0061) | 0.0048<br>(0.0033)     | 0.0160**<br>(0.0064)   | 0.0073<br>(0.0055)   | 0.0085<br>(0.0064) |
| B - Export probability IV  |                       |                        |                        |                      |                    |
| Ratio                      | 0.0324***<br>(0.0114) | 0.0061<br>(0.0067)     | 0.0381***<br>(0.0094)  | 0.0092<br>(0.0122)   | 0.0115<br>(0.0151) |
| N                          | 7,569,196             | 7,569,196              | 7,569,196              | 7,569,196            | 7,569,196          |
| C – Export value OLS       |                       |                        |                        |                      |                    |
| Ratio                      | 0.4096<br>(0.5962)    | -0.3212<br>(0.6495)    | -1.9617***<br>(0.4448) | 1.5578**<br>(0.6365) | 0.8599<br>(0.5822) |
| D - Export value IV        |                       |                        |                        |                      |                    |
| Ratio                      | 1.1844<br>(0.7149)    | -1.8815***<br>(0.6780) | 0.3656<br>(1.7954)     | 2.0834**<br>(0.9031) | 0.9235<br>(0.7321) |
| N                          | 174,647               | 104,676                | 7,069                  | 72,486               | 172,880            |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. All models include firm, year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Ratio is the ratio of Syrian refugees to native population. In panels B and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 11: Product variety and weighted price by destination

|                        | All                   | EU                  | Syria                 | MENA                  | All w/o Syria          |
|------------------------|-----------------------|---------------------|-----------------------|-----------------------|------------------------|
| A- Product variety OLS |                       |                     |                       |                       |                        |
| Ratio                  | 0.8049***<br>(0.2489) | -0.075<br>(0.2882)  | 1.0661***<br>(0.3383) | 0.8666***<br>(0.2867) | 0.4638*<br>(0.2474)    |
| B- Product variety IV  |                       |                     |                       |                       |                        |
| Ratio                  | 0.9476***<br>(0.2788) | -0.3767<br>(0.2772) | 1.0488<br>(1.1917)    | 1.2645***<br>(0.3615) | 0.6255**<br>(0.2957)   |
| C- Weighted price OLS  |                       |                     |                       |                       |                        |
| Ratio                  | 0.9895**<br>(0.4406)  | -0.1838<br>(0.2353) | 3.1157***<br>(0.6022) | -0.4934<br>(0.3193)   | -0.5968**<br>(0.2470)  |
| D- Weighted price IV   |                       |                     |                       |                       |                        |
| Ratio                  | 0.6227<br>(0.6933)    | -0.1863<br>(0.3341) | 0.8072<br>(3.5230)    | -0.598<br>(0.3594)    | -0.8763***<br>(0.2911) |
| N                      | 174,647               | 104,677             | 7,069                 | 72,486                | 173,070                |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to manufacturing firms with positive sales (who report balance sheets). All models include firm, year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Standard errors are clustered at the 81 province level in all regressions. Ratio is the ratio of Syrian refugees to native population. In In panels B and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table 12: Transaction level impact on export prices

| A- No firm FE OLS   |                        |                        |                     |                        |
|---------------------|------------------------|------------------------|---------------------|------------------------|
|                     | All                    | EU                     | Syria               | MENA                   |
| Ratio               | 0.0220<br>(0.1094)     | 0.0680<br>(0.1703)     | -0.2370<br>(0.2971) | -0.6833***<br>(0.2189) |
| B- No firm FE IV    |                        |                        |                     |                        |
| Ratio               | -0.5753***<br>(0.1440) | -1.2750***<br>(0.2339) | 0.0498<br>(0.6375)  | -1.1978***<br>(0.2617) |
| N                   | 5,025,393              | 1,989,539              | 58,410              | 1,204,471              |
| C- With firm FE OLS |                        |                        |                     |                        |
| Ratio               | -0.1750<br>(0.1119)    | -0.1374<br>(0.1778)    | -0.1802<br>(0.3440) | -0.6035***<br>(0.2198) |
| D- With firm FE IV  |                        |                        |                     |                        |
| Ratio               | -0.3825**<br>(0.1588)  | -0.2893<br>(0.2484)    | -0.7416<br>(0.6556) | -0.4860<br>(0.2990)    |
| N                   | 4,945,848              | 1,977,220              | 55,730              | 1,194,217              |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. All models include year, 4-digit product x country x year and 5-region x year fixed effects. Ratio is the ratio of Syrian refugees to native population. In In panels B and D, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. Standard errors are clustered at the destination country-4-digit product level in all regressions. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

## Appendix

Table A1: Placebo tests for sales and profits

|         | Sales                | Profit margin       | Export probability  | Export value       |
|---------|----------------------|---------------------|---------------------|--------------------|
| A - OLS |                      |                     |                     |                    |
| Ratio   | -0.1089*<br>(0.0643) | 0.0139<br>(0.0101)  | 0.0044<br>(0.0065)  | 0.1912<br>(0.2583) |
| B - IV  |                      |                     |                     |                    |
| Ratio   | -0.1083<br>(0.0920)  | 0.0303*<br>(0.0170) | -0.0100<br>(0.0080) | 0.4783<br>(0.3939) |
| N       | 5,524,865            | 5,158,762           | 5,524,865           | 136,530            |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales (who report balance sheets). All models include firm, year, large firm x year, income statement type x year, NACE-2 x year and 5-region x year fixed effects. Standard errors are clustered at the 81 province level in all regressions. Ratio is the ratio of Syrian refugees to native population. In panel B, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. The placebo estimates assume that the Syrian refugee distribution in 2014-2015 had occurred in 2011-2012. 2009-2010 are used as control years. The profit sample is restricted to firms that report a profit to sales ratio between -1 and 1. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table A2: Placebo tests for NACE-2 level market structure outcomes

| Number of firms that reported: |                     |                    |                    |                       |                     |                      |
|--------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------------|----------------------|
|                                | Sales               | Balance sheets     | SSI                | Market share          | HH index            | Top 4 share          |
| A- OLS                         |                     |                    |                    |                       |                     |                      |
| Ratio                          | 0.1110*<br>(0.0622) | 0.0316<br>(0.1414) | 0.0837<br>(0.1390) | -0.0420**<br>(0.0199) | -0.0096<br>(0.0172) | 0.0333**<br>(0.0164) |
| B- IV                          |                     |                    |                    |                       |                     |                      |
| Ratio                          | 0.1588<br>(0.1093)  | 0.2029<br>(0.2505) | 0.2896<br>(0.2750) | -0.0214<br>(0.0377)   | 0.0029<br>(0.0350)  | 0.0176<br>(0.0322)   |
| N                              | 23,249              | 23,249             | 23,249             | 22,056                | 22,056              | 17,168               |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. Ratio is the ratio of Syrian refugees to native population. In Panel B, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. The placebo estimates assume that the Syrian refugee distribution in 2014-2015 had occurred in 2011-2012. 2009-2010 are used as control years. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table A3: Specification tests – OLS estimates

|                              | (1)                  | (2)                  | (3)                   | (4)                   | (5)                   |
|------------------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|
| <b>A- Sales</b>              |                      |                      |                       |                       |                       |
| Ratio                        | 0.4591**<br>(0.1859) | 0.4609**<br>(0.1845) | 0.4253**<br>(0.1765)  | 0.3264**<br>(0.1419)  | 0.2370*<br>(0.1289)   |
| <b>B- Profit margin</b>      |                      |                      |                       |                       |                       |
| Ratio                        | 0.0390**<br>(0.0179) | 0.0383**<br>(0.0182) | 0.0346**<br>(0.0165)  | -0.0013<br>(0.0192)   | -0.0136<br>(0.0282)   |
| <b>C- Export probability</b> |                      |                      |                       |                       |                       |
| Ratio                        | 0.0196**<br>(0.0083) | 0.0174**<br>(0.0067) | 0.0183***<br>(0.0058) | 0.0194***<br>(0.0061) | 0.0162***<br>(0.0043) |
| <b>C- Export value</b>       |                      |                      |                       |                       |                       |
| Ratio                        | -0.3366<br>(0.4711)  | -0.1778<br>(0.3930)  | 0.0075<br>(0.4232)    | 0.4096<br>(0.5962)    | 0.1985<br>(0.6326)    |
| NACE2 x year FE              |                      | +                    |                       | +                     | +                     |
| NACE4 x year FE              |                      |                      | +                     |                       |                       |
| 5-region x year FE           |                      |                      |                       | +                     |                       |
| NUTS1 x year FE              |                      |                      |                       |                       | +                     |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales (who report balance sheets). Ratio is the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table A4: Specification tests – 2SLS estimates

|                              | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   |
|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>B- Sales</b>              |                       |                       |                       |                       |                       |
| Ratio                        | 0.7417***<br>(0.2810) | 0.7070***<br>(0.2608) | 0.6496**<br>(0.2526)  | 0.4213***<br>(0.1463) | 0.3937**<br>(0.1660)  |
| <b>B- Profit margin</b>      |                       |                       |                       |                       |                       |
| Ratio                        | 0.1069**<br>(0.0521)  | 0.1033**<br>(0.0499)  | 0.0941**<br>(0.0441)  | 0.0341<br>(0.0245)    | 0.0030<br>(0.0392)    |
| <b>C- Export probability</b> |                       |                       |                       |                       |                       |
| Ratio                        | 0.0232*<br>(0.0132)   | 0.0222**<br>(0.0107)  | 0.0253***<br>(0.0082) | 0.0325***<br>(0.0114) | 0.0354***<br>(0.0131) |
| <b>D- Export value</b>       |                       |                       |                       |                       |                       |
| Ratio                        | -0.3831<br>(0.6989)   | -0.3708<br>(0.6725)   | 0.0109<br>(0.6110)    | 1.1844<br>(0.7149)    | 1.5157<br>(0.9305)    |
| NACE2 x year FE              |                       | +                     |                       | +                     | +                     |
| NACE4 x year FE              |                       |                       | +                     |                       |                       |
| 5-region x year FE           |                       |                       |                       | +                     |                       |
| NUTS1 x year FE              |                       |                       |                       |                       | +                     |

*Notes:* The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. The sample is restricted to firms with positive sales (who report balance sheets). Ratio is the ratio of Syrian refugees to native population. In all estimates, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table A5: OLS estimates for NACE-2 level market structure outcomes

|   | (1)                    | (2)                    | (3)                    | (4)                    | (5)                    | (6)                    |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| A- Number of firms that reported sales          |                        |                        |                        |                        |                        |                        |
| Ratio   | 0.4496***<br>(0.0841)  | 0.4342***<br>(0.0871)  | 0.3636***<br>(0.0761)  | 0.3240***<br>(0.1024)  | 0.4077***<br>(0.0626)  | 0.3986***<br>(0.0619)  |
| B- Number of firms that reported balance sheets |                        |                        |                        |                        |                        |                        |
| Ratio   | 0.4798***<br>(0.0815)  | 0.4498***<br>(0.0895)  | 0.4234***<br>(0.0755)  | 0.3953***<br>(0.0992)  | 0.2641***<br>(0.0971)  | 0.2392**<br>(0.1066)   |
| C- Number of firms that reported to SSI         |                        |                        |                        |                        |                        |                        |
| Ratio   | 0.6187***<br>(0.0889)  | 0.5915***<br>(0.0949)  | 0.5842***<br>(0.0873)  | 0.5581***<br>(0.0874)  | 0.4054***<br>(0.0999)  | 0.3850***<br>(0.1073)  |
| D- Market share                                 |                        |                        |                        |                        |                        |                        |
| Ratio   | -0.1045***<br>(0.0212) | -0.1067***<br>(0.0197) | -0.1049***<br>(0.0183) | -0.0984***<br>(0.0233) | -0.1397***<br>(0.0313) | -0.1428***<br>(0.0290) |
| E- HH index                                     |                        |                        |                        |                        |                        |                        |
| Ratio   | -0.1149***<br>(0.0108) | -0.1161***<br>(0.0113) | -0.0958***<br>(0.0125) | -0.0877***<br>(0.0239) | -0.1119***<br>(0.0191) | -0.1157***<br>(0.0168) |
| F- Top 4 share                                  |                        |                        |                        |                        |                        |                        |
| Ratio   | -0.0656***<br>(0.0247) | -0.0683**<br>(0.0283)  | -0.0548**<br>(0.0218)  | -0.0473*<br>(0.0260)   | -0.0653***<br>(0.0155) | -0.0727***<br>(0.0169) |
| NACE2 x year FE                                 |                        | +                      | +                      | +                      | +                      | +                      |
| 5-region x year FE                              |                        |                        | +                      |                        |                        | +                      |
| NUTS1 x year FE                                 |                        |                        |                        | +                      |                        |                        |
| NUTS3 x NACE-2 FE                               |                        |                        |                        |                        | +                      | +                      |

Notes: The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. Ratio is the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.

Table A6: 2SLS estimates for NACE-2 level market structure outcomes

|   | (1)                    | (2)                    | (3)                    | (4)                   | (5)                   | (6)                   |
|---|------------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|
| A- Number of firms that reported sales          |                        |                        |                        |                       |                       |                       |
| Ratio   | 0.5159*<br>(0.2678)    | 0.3478<br>(0.2858)     | 0.2082<br>(0.3114)     | 0.1120<br>(0.3978)    | 0.6514***<br>(0.2130) | 0.4427***<br>(0.1331) |
| B- Number of firms that reported balance sheets |                        |                        |                        |                       |                       |                       |
| Ratio   | 0.8083***<br>(0.2790)  | 0.6198***<br>(0.2192)  | 0.5674**<br>(0.2195)   | 0.5491**<br>(0.2455)  | 0.6272**<br>(0.3033)  | 0.3890**<br>(0.1926)  |
| C- Number of firms that reported to SSI         |                        |                        |                        |                       |                       |                       |
| Ratio   | 1.0695***<br>(0.3595)  | 0.8511***<br>(0.2787)  | 0.8683***<br>(0.2997)  | 0.8740***<br>(0.3235) | 0.8763**<br>(0.3665)  | 0.6002***<br>(0.2186) |
| D- Market share                                 |                        |                        |                        |                       |                       |                       |
| Ratio   | -0.0777*<br>(0.0409)   | -0.0818**<br>(0.0387)  | -0.0881**<br>(0.0344)  | -0.0750<br>(0.0454)   | -0.0991*<br>(0.0579)  | -0.1029*<br>(0.0552)  |
| E- HH index                                     |                        |                        |                        |                       |                       |                       |
| Ratio   | -0.1091***<br>(0.0287) | -0.1131***<br>(0.0281) | -0.0906***<br>(0.0254) | -0.0770*<br>(0.0456)  | -0.0863**<br>(0.0412) | -0.0920**<br>(0.0361) |
| F- Top 4 share                                  |                        |                        |                        |                       |                       |                       |
| Ratio   | -0.0948*<br>(0.0530)   | -0.0970*<br>(0.0548)   | -0.0819*<br>(0.0463)   | -0.0791<br>(0.0561)   | -0.0853**<br>(0.0396) | -0.0937**<br>(0.0384) |
| NACE2 x year FE                                 |                        | +                      | +                      | +                     | +                     | +                     |
| 5-region x year FE                              |                        |                        | +                      |                       |                       | +                     |
| NUTS1 x year FE                                 |                        |                        |                        | +                     |                       |                       |
| NUTS3 x NACE-2 FE                               |                        |                        |                        |                       | +                     | +                     |

Notes: The data come from the Entrepreneurship Information System of Turkey, which covers the entire firm population of Turkey except for those in public and finance sectors. Ratio is the ratio of Syrian refugees to native population. In all estimates, the weighted distance of a province to Syrian regions is used as an instrument for the ratio of Syrian refugees to native population. Standard errors are clustered at the 81 province level. Statistical significance \*\*\* at the 1 percent level, \*\* at the 5 percent level, \* at the 10 percent level.