Blessing or Burden? The Impact of Refugees on Businesses and the Informal Economy

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Abstract

We study the impact and sudden arrival of more than 3 million Syrian refugees on Turkish businesses. Our empirical design uses the exogenous variation in refugee outflows from Syria and the geographic concentration of Arabic-speaking communities in Turkey prior to the onset of the Syrian conflict. The origin of these communities dates back to the rupture of the Ottoman Empire after World War I, a unique historic episode. Using yearly firm census data from 2006 to 2015, we find that refugee inflows induced a positive impact on the intensive and extensive margins of firm production. The effects are stronger for smaller firms and for firms that operate in the construction and hospitality sectors, they are also largely concentrated in the informal economy.

Keywords: refugees, firms, informality, Turkey, migration.
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I Introduction

Conflict and violence had forcibly displaced 68.5 million people around the globe by the end of 2017, an all time high in the modern history of humanity (UNHCR, 2017). The economic consequences of forced displacement are likely to differ from those caused by voluntary migration. Refugees, for instance, arrive in large numbers and vulnerable conditions, are traumatized by war, and lose the assets that they cannot transfer to the host country. Most often, the lack of clear regulation on their status coupled with the uncertainty in the duration of their stay further complicates their integration to local economies and restricts their human capital investments. Additionally, given that 85% of refugee populations find shelter in developing countries (UNHCR, 2017), their employment opportunities are usually concentrated in the informal sector. Large inflows of refugees, consequently, may propagate profound economic shocks in host economies not only through changes in production and prices, but by inducing changes in the size of the informal economic activity within developing countries.

The present study is the first to examine the implications of refugee movements on firm-level economic behavior (including production, prices, and input demands) and estimate the differential local average treatment effects by firm type, size, and type of industry. We also analyze whether capital and entrepreneurial capacity move from the origin to host country locations with the migrant inflows.

To pursue our analysis, we examine the impacts of the resettlement of more than 3 million Syrian refugees in Turkey and combine multiple data sources including annual censuses of firms, labor force surveys, business registrations and trade statistics, as well as the official population and migration figures between 2006 and 2015. We also supplement the quantitative analysis with observations from face-to-face interviews with business owners and refugees.

Overall, our analysis is informative on the economic consequences of hosting refugees, especially in developing countries that are experiencing or will experience similar inflows and may not have comparable rich data to carry out similar analyses.

Our empirical design relies on an instrumented difference-in-differences approach. It exploits province-year variation in refugee inflows, accounting for the endogeneity between firm outcomes and refugee inflows using a *predicted refugee inflows* measure as an instrumental variable. The instrument is constructed as the interaction of the number of Syrians who left their country each year and the share of Arabic speaking populations in Turkish provinces in 1965. The location of the early settlements of Arabic speakers in Turkey is primarily driven by the collapse of the Ottoman Empire after World War I, a unique historic episode. Once the Ottoman Empire fell, the peace Treaty of Lousanne (signed in 1923) ceded a large area of the old Aleppo *Vilayet* to Turkey, an area mainly populated by Arabic-speaking populations. As we show in the empirical section, the same area was substantially more likely to receive Syrian migration after the onset of the conflict and drives the cross-sectional variation in our instrument.

The case of Syrian refugee inflows in Turkey has appealing features for a *causal* research design. First, Syrian migration to Turkey was negligible before the Syrian Civil War began and the ensuing large-scale migration was unexpected. As such, the timing and the scale of the migration were arguably exogenous to the overall economic conditions in Turkey. Second, the incoming refugee population was more likely to settle in locations with ethnic linkages, namely to regions with a higher share of Arabic-speaking populations, generating substantial geographic variation in exposure to refugee inflows across Turkish provinces.

Our results suggest that the influx of refugees induces a positive shock on the intensive and extensive margins of production for firms. The effect sizes are economically meaningful: a one percentage point increase in the share of refugees to total population boosts firms electricity and oil consumption by 4.3 percent. These effects are entirely driven by small- to medium-sized firms and firms operating in the construction, restaurant, and hotel sectors. We also find that the refugee arrival substantially increased the number of new firms, especially those that involve foreign ownership. The data indicate that a significant part of these newly established firms are co-owned by Syrian partners, who possibly collaborate with Turkish peers to tackle the legal barriers to market entry for foreigners.

The impacts of refugee inflows on firms, however, appear to be limited to the informal economy. Using the official end of year census figures that firms report to the government for tax purposes, we do not observe any increase in firm-reported measures of production, sales, or number of employees. Yet, we document large increases in energy consumption by firms, and firm creation, variables which correct for firm misreporting and account for informal economic activity.

A detailed analysis using the labor force surveys -which include only Turkish workers- provides one potential mechanism to explain the local economic boom in refugee hosting areas. Among native male workers, who constitute 75 percent of the employed labor force in our sample, a one-percentage point increase in refugee to overall population decreases wages by 3.8 percent. Notably, those native workers also see informal employment drop by 0.9 percentage points and their number of hours worked are reduced by 3.1 percent. These results suggest that that refugees are replacing native workers in the informal labor market and reducing labor costs for firms.

Overall, our findings suggest that larger refugee inflows have a positive impact on local businesses and firm creation which are largely concentrated in the informal economy, while reducing employment and wages of native workers in the informal sector. In the large set of outcomes and subgroups that we analyze, most of the estimated effects emerge with the arrival of Syrian refugees and year-to-year changes in effect sizes overlap with the intensity of the population shock. Moreover, outcome trends during the pre-exposure period are remarkably similar across provinces with varying historical settlement of Arabic speakers.

We contribute to two strands of literature. First, we study how unskilled migration shocks impact a developing host country with limited institutional infrastructure and a large informal sector. The existing studies on the impacts of migrants on firm-level outcomes primarily focuses on developed countries and voluntary migrants (see for example Carrizosa and Blasco, 2009 for Spain; Lewis, 2011, Ghosh et al., 2014, and Kerr et al., 2015 for the United States; Accetturo et al., 2012 for Italy; Ottaviano et al., 2018 for the United Kingdom; and Dustmann and Glitz, 2015 for Germany). These studies conclude that unskilled migration improves firm-level productivity

through lower production costs and skill complementarities at the work place,[1] while the estimated impacts on capital investments are mixed.[2]

Second, we contribute to the literature that studies the economic impacts of refugees. This group of studies has mainly focused on studying the labor market effects of refugee shocks,[3] without a consensus on the direction of their impacts.[4] The most related papers to our study are Del Carpio and Wagner (2015) and Ceritoglu et al. (2017), who investigate the impacts of Syrian migration in local labor markets using information from labor force surveys. In line with our estimates, both studies document negative impacts of refugee inflows on the employment and wages of Turkish nationals employed in the informal labor market. More recently, using province-level aggregated data and different empirical approaches, Akgündüz et al. (2018) and Cengiz and Tenguc (2018) show that the refugee inflows increased the number of operating firms in refugee hosting areas.

II Background

The Syrian Civil War started with the Bashar Al-Assad's regime disproportionate response to peaceful protests in early 2011. Violence escalated rapidly and spread to many parts of Syria, leading to a severe humanitarian crisis. As of 2017, approximately 12 million individuals, roughly

[1]The group of studies that examines the impacts of high skilled immigration on firm outcomes, on the other hand, largely finds that higher skilled immigration has been associated with higher productivity (Ghosh et al., 2014), employment expansion of skilled natives (Kerr et al., 2015), and large complementarities between high technologies and migrants (Paserman, 2013).

[2]For example, Lewis (2011) finds that plants in areas that received more unskilled immigrants were less likely to adopt automation machinery, which served as a buffer for the effects of immigration on wages. In contrast, Accetturo et al. (2012) and Ottaviano et al. (2018) find that firms in Italy and the United Kingdom increase their capital investments in response to immigration from developing countries, arguably because firms tend to offset the skills downgrading effect with more capital accumulation. The latter also finds that immigration acts as a substitute for offshoring-by lowering the intermediate imports from the immigrants' countries of origin–and tends to increase exports to the immigrants' countries of origin because it helps reduce information barriers and trade costs. Finally, Dustmann and Glitz (2015) find that the responses of firms to an influx of immigrants in Germany depend on their sector of economic activity. While firms in the non-tradable sector respond by lowering wages, their tradable sector counterparts primarily respond by scaling up their employment and changing their skill mix. In addition, the authors also find a positive net entry effect of firms in the tradable sector.

[3]A few notable exceptions are Alix-Garcia and Saah (2009) and Alix-Garcia et al. (2018) who study the impacts of refugees camps in economic activity including night light density and prices.

[4]See Clemens and Hunt (2017) and Borjas and Monras (2017) for the review of this literature.

half of the Syrian pre-war population, had left the conflict areas. Among them, 6 million people sought shelter outside Syria, primarily in neighboring countries (UNHCR, 2017). Turkey has become the primary destination for refugees from the Syrian Civil War, with a community of more than 3.5 million individuals resettled under a temporary protection regime since the beginning of the conflict.

The initial waves of refugees began arriving in Turkey in the second half of 2011, and small numbers of refugees continued to arrive until mid-2012 (İçduygu, 2015). In the following months, there was a substantial and long-lasting increase in the number of Syrian families seeking shelter at the Turkish-Syrian border. According to official data from the United Nations Refugee Agency (UNHCR), the total number of refugees who arrived in Turkey was only around 170,000 in 2012 and increased to over half a million in 2013. The refugee movement intensified with the increasing presence of ISIS in northern Syria, reaching 1.6 million in 2014 and more than 2.5 million in 2015. As of 2017, 3.1 million Syrians were registered in Turkey, accounting for nearly 4 percent of the country's population.

Initially, the Turkish government made an effort to host the displaced population in 25 refugee camps in the southern part of the country near the Turkish-Syrian border. These camps, however, quickly exceeded their capacity when conflict intensified in Syria, and currently only around 8.2 percent of the refugee population lives within the camps (European Commission, 2017). In fact, the majority of the refugee population in Turkey is dispersed across urban areas (Erdoğan, 2017).

The legal regulation concerning the population displaced by the Syrian Civil War in Turkey is based on the 1951 Geneva Convention. Turkey, however, is one of the few countries that signed the convention but does not officially recognize the non-European citizens as asylum seekers, irrespective of their motive (Erdoğan, 2017). Syrian citizens in Turkey are under "temporary protection", which permits their freedom of movement and access to health care and education. According to this regulation, there were no restrictions on refugee movement within Turkey during the study period. Syrian citizens have legal access to free health care and basic education, although in practice,

a lack of clear regulation, available supply, and formal procedures have restricted access to these services (İçduygu and Şimşek, 2016). The temporary protection regime, however, does not offer work authorization; thus, the vast majority of the Syrian labor force works in the informal labor market (Durukan, 2015).[5]

II.1 Characterizing Syrian refugees

Aggregate data from UNHCR suggest that the refugee population in Turkey is balanced by gender, relatively uneducated, and is young, with 45 percent of the population under 18 years of age (see the descriptive statistics in Appendix I).

Although as of today, there are no representative surveys of the Syrian refugee labor force in Turkey, qualitative evidence suggests that Syrian refugees are likely to be employed in informal low-wage jobs in agriculture, construction, manufacturing, and service industries (Erdoğan, 2017; Erdoğan and Unver, 2015). Anecdotal evidence also suggest that Syrian child labor is a significant part of the new work force, especially in the manufacturing industry.[6]

Other insights on the Syrian refugee labor force can be obtained from a survey carried out in Istanbul to 1,003 Syrian refugee workers between 18 and 29 years of age during 2017. The survey suggests that young refugees are typically employed in wholesale and retail sales (22.4%), textile and apparel (17.7%), and accommodation and food services (17.1%).[7] The sectors that create most of the jobs for Turkish workers are similar.[8] The survey also shows that an overwhelming share of young Syrians are employed in small firms.

When comparing the sample of Syrian refugee workers to the population of Turkish workers living in Istanbul who are also between 18 and 29 years of age, we observe that Syrian refugees

[5] As of September 2015, only 6,000 Syrians effectively received legal work permits (Hurriyet, 2015).
[6] See for example the BBC (2016) media report on Syrian child labor.
[7] See IYF (2018) for technical details on the survey.
[8] According to the Turkish labor force surveys of 2017, the five sectors that create more than 60% of the employment for Turkish nationals are manufacturing, wholesale and retail, professional scientific and technical activities, accommodation and food services, and construction.

have lower education levels (only 24% had more than high school relative to 50.6% of Turkish nationals), are disproportionately male (80% vs. 60% of natives), and face higher unemployment rates (48.2% vs. 19.3% of the native population). Additionally, Syrian refugee workers receive on average lower wages and work more hours relative to young Turkish citizens.[9]

III Data

III.1 Refugees inflows

We employ two sources of refugee data in our analysis. Aggregate figures on the total refugee outflows from Syria and inflows from Syria to Turkey come from UNHCR and are available for 2011-2016, covering the entire conflict period. We aggregate these figures annually over the study period (see Figure I). Province figures on the registered refugee population come from the Directorate General of Migration Management (DGMM), the Turkish migration authority. Although our data include the aggregate number of refugees for each year during the study period, the province level registration process in Turkish only started in late 2014 and until recently DGMM did not update these figures on a regular basis. Thus, we only have data from DGMM on the number of refugees at the province level for three time periods: September 2015, April 2016, and December 2016. The Turkish government also released some estimates on province-level refugee populations in August 2014. We collected these data from the newspapers that published the information.[10] Fortuitously, the geographic dispersion of refugees in Turkey was remarkably stable over time, which allows us to estimate the yearly inflows at the province level by using the aggregate figures.

Figure II compares the province-level DGMM numbers after normalizing the overall refugee population to 100 for each period. It strongly suggests that the refugees consistently moved to

[9] for instance, the average wage of a young Syrian in Istanbul is 1,492TL as opposed to 1,882 TL received by a young Turkish citizen.

[10] See Habeturk (2014) for examples of news outlets that published these data.

the same provinces despite a substantial increase in the overall refugee population, with all the provinces tightly clustered around the 45 degree diagonal. While Istanbul stands out as an outlier in August 2014, as discussed in the empirical section, excluding it from our estimates has no impact on our results. Given the persistent distribution of refugees, we use the September 2015 shares to construct an exposure intensity measure as

$$\text{Refugee Population}_{pt} = \text{Refugee Share}_{p,\text{Sept. 2015}} \times \text{Refugee Population}_{t} \tag{1}$$

where $\text{Refugee Population}_{pt}$ stands for our constructed measure of refugee population in province p and year t, $\text{Refugee Share}_{p,\text{Sept. 2015}}$ is the proportion of refugees received in province p as of September 2015, and $\text{Refugee Population}_{t}$ is the total number of refugees who arrived to Turkey at the end of year t. Appendix III shows the constructed measure and the observed data for September of 2015, showing that our constructed measure of refugee inflows is consistent approximation of the exact values of refugee inflows for that period. It is important to note that the official numbers released by DGMM reflect the number of registered refugees in each province. Refugees might have left the provinces after registration, moving either to another location or out of the country. Thus, the measurement error in the local inflow intensity variable is an important drawback, which we attempt to offset through using a more precisely measured instrument.

Using the constructed measure of refugees population illustrated in equation (1), we estimate the province-year share of refugees as a percentage of total population as

$$\text{PctRef}_{pt} = \frac{\text{Refugee Population}_{p,t}}{[\text{Refugee Population}_{p,t} + \text{Turkish Population}_{p,t}]} \times 100 \tag{2}$$

where PctRef_{pt} is the variable we use in our main estimates.

III.2 Firm data

Our main estimates use the Annual Industry and Service Statistics (AISS) survey produced by the Turkish Statistical Institute (TurkStat), which is available between 2003-2015. The AISS survey is a census of firms with at least 20 employees and a representative sample of firms with less than 20 employees. We use only the census part of the AISS which covers only firms with at least 20 employees.[11] Since the AISS data between 2003 and 2005 is generally regarded as less reliable, we focus on the period 2006-2015.[12] The unit of analysis in the AISS is the firm and not the plant.

The AISS includes information on all economic sectors except agriculture, finance, public administration, community services, and extra territorial organizations. It includes data on nominal sales, gross production (defined as sales plus change in inventories), value added, investment, costs, energy consumption, employment (divided in paid and unpaid workers),[13] industry classification,[14] labor expenses, and headquarters location by province. Although we do not observe the firm's capital demand directly, we impute it to each firm based on their reported depreciation levels.[15]

Given that we only observe the location of the headquarters of each firm, in our main analysis, we use the province of the headquarter as the operating region, assuming that all the subsidiary plants are located within the same province. In the robustness analysis, we restrict the sample to firms with a single plant to test for the sensitivity of our results to this assumption. We present the aggregate time trends for our outcomes in Appendix II.

[11] The AISS also includes a representative sample of firms with less than 20 employees collected using stratified sampling based on economic activity, size groups, and regions. However, we only employ the census data in our analysis.

[12] Between 1980 and 2001, TurkStat collected the Annual Manufacturing Industry Statistics survey, which sampled private manufacturing plants with at least 10 employees and all state owned plants. Because of incompatibilities of methodology and definitions with the European Union (EU), TurkStat abandoned this survey in 2002 and began collecting the AISS survey. The objective was to facilitate international comparisons and ensure compatibility with EU structural business statistics regulations. Unfortunately, implementation and coordination issues between different administrative bodies involved in the data collection and management exercise made the initial years less reliable.

[13] Unpaid workers are firm owners, partners, unpaid family workers, and apprentices.

[14] In 2009 the sector classification of the AISS data changed from NACE Rev.1 to NACE Rev.2. Although there is no one-to-one correspondence between these two systems, TurkStat publishes the NACE Rev.2 code for the census part of the AISS for years before 2009.

[15] Unfortunately, for approximately 40 percent of the firms reported depreciation is zero or missing. To solve this issue, we predict capital depreciation using sector and year dummies, value added, number of employees, electricity consumption, and oil expenditures as predictors.

III.3 Other data sources

We use five additional sources of information. Data on Turkish citizen's labor outcomes come from the annual Household Labor Force Surveys (HFLS). The surveys are available between 2004 and 2016 and are collected by TurkStat. We focus on the period between 2005 and 2016 due to quality concerns related to the 2004 wave.[16]

These repeated cross-section surveys are representative of the working age Turkish population at the regional level and include a rich set of demographic variables in addition to detailed information on labor supply status. Population figures of Turkish citizens also come from TurkStat for each year and province during our period of analysis.

Our third source of information is the Turkish Population Census of 1965, which we employ to construct our instrument. The census includes information on the mother language of each individual at the province level. To our knowledge, this is the latest publicly available census with these information.[17]

Our fourth source of data is yearly-province level statistics on exports and imports, available from TurkStat between 2002 and 2017. The foreign trade figures include all international registered trade transactions by firms of any size.

Finally, our fifth source of information is the Company Establishment and Liquidation Statistics published by the Union of Chambers and Commodity Exchanges of Turkey (TOBB) between 2010 and 2017. It includes information on all formal firms created in Turkey. Specifically we use information on the number of new and exiting firms, their ownership structure, and the annual amount of foreign capital for newly created firms.

[16] A major sampling methodology change took place in January 2005, which rends the waves of HLFS surveys before and after 2005 incomparable.

[17] In 1965, there were 67 provinces in Turkey. Fourteen districts became provinces later on, the latest one in 1999. For the provinces established after 1965, we use the percentage of the Arabic population within the 1965 administrative boundaries. For example, Yalova was a district of Istanbul in 1965 and became a province in 1995. We assigned the same percentage of Arabic speaking populations to Istanbul and Yalova in our analysis.

IV Empirical Strategy

Our empirical strategy relies on comparing firm outcomes in locations that are exposed to larger refugee inflows with those that are not, before and after Syrian Civil War began. Refugee resettlement, however, is a potentially endogenous decision and time-varying components that we cannot account for might be affecting both the resettlement pattern and firm behavior. Refugees, for instance, might choose to move to areas where local businesses are more prosperous, which would lead us to overestimate the effects of refugees on firm outcomes. It is also possible, for instance, that measurement error in the refugee figures at the province level could bias our coefficients in the reverse direction. To solve these issues we estimate the following specification:

$$ln(y_{ipt}) = \tau \widehat{\text{PctRef}}_{pt} + \gamma_{1p} + \gamma_{1t} + \epsilon_{1ipt} \tag{3}$$

$$\widehat{\text{PctRef}}_{pt} = \pi \text{Predicted Inflows}_{pt} + \gamma_{2p} + \gamma_{2t} + \epsilon_{2pt} \tag{4}$$

where p stands for the province and t for year; y represents the outcome for firm i including gross production, sales, oil and energy consumption, labor and capital demand, and average wages; PctRef_{pt} is the population share of refugees in province p in year t, constructed using equation 2. In both equations, γ_p and γ_t account for province and year fixed-effects. The standard errors are clustered at the province level to account for the time serial correlation in outcomes across provinces.

Following Altindag and Kaushal (2017), we define $\text{Predicted Inflows}_{pt}$ as

$$\text{Predicted Inflows}_{pt} = \left[\frac{\text{Arabic Speaking Pop}_{p,1965}}{\text{Total Pop}_{p,1965}} \times \text{Syrian Aggregate Displacement}_{t} \right] \tag{5}$$

where $\text{Predicted Inflows}_{pt}$ is constructed as the interaction of the share of Turkish citizens with an Arabic mother language in 1965 and the total number of individuals displaced outside Syria in year

t.

In this framework, year fixed effects account for aggregate time variation, whereas province fixed effects purge out the time-invariant differences across areas. Our instrument, thus, exploits province-year variation and follows the original idea by Card (2001), which suggests that past migration patterns are strong predictors of subsequent migration waves within the same ethnic groups. Note that the instrument in this study, however, is different in that we use the Syrian conflict intensity as a proxy for the within-time variation of the refugee inflows. Further, we use the geographic distribution of Turkish citizens who speak Arabic to predict the geographic resettlement patterns of refugees across Turkish provinces. The latter was not a result of an early migration of Syrian citizens to Turkey, but the outcome of the abrupt ending of the Ottoman Empire, which had a multi-ethnic population that dispersed under many newly founded states after World War I. Moreover, the migration flows from Syria to Turkey were negligible before 2010 compared to the conflict period.

The identifying assumption is that our instrument should be correlated with the supply-side drivers of labor mobility, such as common language with the host population, but should not be directly correlated with firm performance.[18] Our instrument supports both claims. First, as illustrated in Figure III, the year-to-year geographic distribution of Syrian refugees in Turkey strongly overlaps with the Arabic-speaking regions in Turkey.[19] Second, the interaction of the 1965 Arabic-speaking population share and the worldwide Syrian refugee inflows should not be correlated with the Turkish local business dynamics in any other way than through the Syrian refugee movement after fully adjusting for the differences across firms in different provinces and the aggregate time trends.

Although there is no fully robust test to validate the latter assumption, we regress the outcomes on our instrument using each year of data in the pre-conflict period and estimate a dynamic difference-in-differences model. In particular, for all outcomes, we estimate the following reduced

[18] See Imbens and Angrist (1994), Abadie (2003) and Angrist et al. (1996) for a general discussion of the exclusion restriction assumption.

[19] We provide formal evidence on the strength of the correlation between these variables in Table I.

form regression:

$$ln(y_{ipt}) = \sum_{j=2006}^{2009} \theta_j(year_j \times A_{p,1965}) + \sum_{j=2011}^{2015} \theta_j(year_j \times A_{p,1965}) + \gamma_{3p} + \gamma_{3t} + \epsilon_{3ipt} \quad (6)$$

where p stands for province, t for year, and $A_{p,1965}$ is the cross-section component of our instrument: the percentage of Arabic speakers in province p in 1965. $year_j$ represents year dummy for year j while γ_{3p} and γ_{3t} account for province and year fixed-effects. We exclude the year 2010 as it marks the beginning of the Syrian Civil War, hence, it is convenient to have it as the baseline comparison year. If the instrument is valid, we expect the interaction terms to fluctuate around zero in the pre-conflict period, suggesting that the instrument is orthogonal to the pre-existing residual trends in firm outcomes.

Estimating equation 6 serves two purposes. First, it allows us to observe, on a yearly basis, if the intensity of Arabic speakers population shares in 1965 is correlated with the firm outcomes before the refugee inflows began to ensure that differential trends in outcomes are not artificially producing the reported results.[20] Second, the reduced-form coefficients in the post-exposure period describe year-to-year changes in outcomes. Thus, if the reduced form identification strategy is correct, we expect any observed impact to emerge around 2013 and increase afterwards following the overall intensity of refugee inflows. We address other potential concerns related to the validity of our empirical strategy in the robustness test section at the end of the paper.

IV.1 Historical background of Arabic speakers in 1965

A large share of the Arabic speakers identified in the Turkish 1965 population Census are descendants of populations that survived the collapse of the Ottoman Empire after World War I. The Ottoman Empire was a multi- ethnic, religious, and linguistic state and was governed under the *vilayet* system from 1299 until its collapse in 1922 (see Figure IV). The *vilayets* were provinces

[20] In addition to visual inspection, we formally test if the interaction coefficients are jointly equal to zero in the pre-exposure period; that is, we test if the provinces with varying levels of Arabic-speaking populations in 1965 have similar trends in outcomes before the refugee inflows began.

ruled by governors directly appointed by the sultan (Shaw and Shaw, 1976). Centered around the city of Aleppo, the *Vilayet* of Aleppo is split in today's northern Syria and southern Turkey (see Figure V). According to the 1914 Ottoman population Census, the region was mainly populated by Muslims with a large Arabic speaking populations (Shaw, 1978). Following the collapse of the Ottoman Empire, the peace Treaty of Lausanne signed in 1923, ceded a significant part of the Aleppo *Vilayet* to the newly founded Turkey while the southern territories eventually became the independent Syria.

Figure V shows the current Turkish region which was part of the Aleppo *Vilayet* (with circles illustrating the six province centers within this region). As of 1965, the most recent census data that includes information on mother language of Turkish citizens, around 43% of the population whose mother language was Arabic still lived in the six provinces that were part of the Ottoman Empire.

Although migration from Syria to Turkey was negligible before 2011,[21] the beginning of the conflict initiated a large inflow of immigrants to Turkey whose primary destination was substantially more likely to be the geographic areas in which similar ethnic communities lived. The official figures between 2012 and 2016 indicate that the six provinces within the old Aleppo *Vilayet* received around half of the Syrian refugee population during the war whereas they merely represent 10% of Turkey's population in 2016. The cross-sectional variation in our instrument is consequently driven by the location of Arabic speakers in these six provinces and identifies an area in Turkey defined by pre-existing language and cultural links that did not receive a significant Syrian migration before 2012.

[21] İçduygu and Yükseker (2012) and Içduygu (2013) use historic data from the Bureau for Foreigners, Borders, and Asylum within the Directorate of General Security of the Ministry of the Interior and the General Command of the Gendarmerie and the Coast Guard Command to characterize migration inflows to Turkey. The authors conclude that Turkey was a country of emigration to Western European countries (especially Germany) since the early 1960s, but that starting in the 1980s it became progressively a country of immigration. İçduygu and Yükseker (2012) document that until the Syrian refugee influx began in 2012, the primary form of migration to Turkey can be labeled as more of transit, irregular or circular migration. The authors define irregular migration as an umbrella concept containing (i) transit migration, (ii) circular migration, and (iii) asylum-seeker and refugee movements. The authors report that almost all these irregular migrants that were apprehended before the beginning of the Syrian Civil War were from Iraq, Pakistan, Afghanistan, Iran, Bangladesh, Mauritania and Somalia. Further they document that the share of Syrian irregular migrants to Turkey before 2011 was negligible.

Recently, Jaeger et al. (2018) proposed a critique to shift-share instruments that exploit geographic variation in the concentration of immigrants to identify their impact on a variety of outcomes. According to the authors, if the composition of early migration settlement patterns is correlated over time, with the same areas repeatedly receiving large inflows, short- and long-term responses to immigration will have contradictory responses that will confound their true effects. Our identification strategy is not subject to this critique since the early settlements of Arabic speakers were mainly originated from the Ottoman Empire rupture, a one time historic event. Additionally, migration from Syria to Turkey was negligible after the Ottoman Empire.

V Results

V.1 Firm production and prices

V.1.1 Internal margin of production

We first analyze the effects of refugee arrivals on nominal sales and gross production because through these estimates we may be able to decompose the effects of refugee migration on output prices. Particularly, we decompose the overall impact on sales into two components: (i) change in gross production (estimated as sales plus change in inventories) and (ii) output prices. Since the sales are the product of gross production and the prices, the following elasticity decomposition holds

$$\varepsilon_{sales} = \varepsilon_{price} + \varepsilon_{production} \tag{7}$$

where ε shows the elasticities of sales, prices, and production with respect to the inflow of refugees. Since our main estimated equation is in a log-linear form (see equation 5), it follows that (i) $\varepsilon_{sales} = \tau_{sales} \times \text{PctRef}_{pt}$, and (ii) $\varepsilon_{production} = \tau_{production} \times \text{PctRef}_{pt}$. Therefore, we can indirectly recover

the impact of refugees on output prices by using the following equation:

$$\underbrace{\tau_{sales}}_{\text{observable}} = \tau_{Price} + \underbrace{\tau_{Ouput}}_{\text{observable}} \tag{8}$$

We present the estimates of equations 3 and 4 in Table I and illustrate the estimates of equation 6 in Figure VI.[22] We find no evidence of a significant effect of refugee arrival on nominal sales and gross production and as a consequence on output prices. These results, however, do not account for under-reporting in nominal sales and gross production, which is a common practice in the Turkish economy due to high informal production (see Davutyan, 2008).

To circumvent the possible misreporting, we also estimate the effects of refugee arrival in energy consumption as measured by electricity and oil expenditures. Energy consumption is an indirect measure of production which corrects for under-reporting since the energy data available at the AISS surveys come from the energy consumption bills paid by the firm. Systematic under-reporting of these figures is unlikely considering that the energy bills are based on a meter reading system. Using informality corrected measures, we are able to identify positive effects of refugee inflows on production through our instrumental variable and reduced-form estimates. In particular, we find that a one percentage point increase in the share of refugee population increases electricity and oil consumption by approximately 4.3 percent (see Table I, columns 3 and 4). As shown in Figure VI, gross production and sales of firms follows parallel trends across different provinces both the in pre- and post- refugee movement periods. The same trends also show a clear pattern change in energy demand by firms in the aftermath of major refugee movements.

V.1.2 External margin of production

We next explore the effects of refugee arrival on firm creation. Figure I illustrates descriptive evidence of the dramatic increase of Syrian capital in Turkey, after 2012. Panel B shows that between 2011 and 2016, the share of foreign firms with Syrian partnership increased by 35 percentage

[22] Bars around the point estimates indicate 95 percent confidence intervals

points, from 2 percent to 37 percent. The figure also shows that the total number of firms with foreign partnership also saw a drastic increase between 2013 and 2014 entirely driven by an increment in the number of firms with Syrian partnership. The timing of this shock coincides with the year in which Turkey began receiving large inflows of refugees from Syria.

The ratio of Syrian to total foreign capital in Turkey shows a similar trend, increasing from 2 to 27 percent between 2011 and 2016, as observed in the panel B. Finally, panel D also shows a sharp increase in the share of the capital of firms with Syrian partnership after the beginning of the Syrian conflict. Together, these figures pose strong descriptive evidence of a sharp arrival of Syrian entrepreneurship to Turkey as a consequence of the intensification of the Syrian Civil War.

To formally test for the effects of refugee inflows in firm entry, we use the firm censuses and create province-year cells adding up the total number of firms with more than 20 employees. We then use our main specifications to estimate the effects of refugee inflows on the number of firms. Table I and Figure VI indicate a robust growth in the number of firms in refugee hosting areas.

To test for the validity of these results we also employ data on firm registration and liquidation, available between 2010 and 2016. They include data on the number of all newly established firms of any size, newly established firms with foreign capital, and those firms that exit the market on a yearly basis. These data covers all registered firms independent of their size. The results of our main specifications using these data are shown in the first three columns of Table II, and the reduced form event study coefficients are shown in the left panel of Figure VII. Our results in column 1 indicate that a one percentage point increase in the share of refugees as a percentage of population leads to 1.5 percentage points increase in the number of firms and a 6.3 percentage points increment in the number of firms with foreign partnership. We do not find any evidence of significant effects of the refugee inflows on firm exit. The event study graphs confirm that the observed effects coincide with the period with a substantial increase in refugees inflows to Turkey.

In an effort to test whether the increment in the foreign number of firms in Turkey was reflected in more trade, we also estimate our main regressions using the total Turkish exports and imports

as outcomes. For this purpose we employ foreign trade statistics from TurkStat available between 2002 and 2017. The results are shown in Table II and Figure VII. We are not able to identify a significant effect of refugee inflows on any of these outcomes.

Overall, these results suggest a positive effect of refugee inflows on firms intensive and extensive margins of production, which is largely concentrated in the informal economy. Notably, we were also able to document that the number of firms is increasing disproportionately in areas that host refugee population and part of these effects are driven by Syrian capital flows into refugee hosting areas during the conflict period.

V.2 Impact of refugees on input demands

We next examine the effects of refugee inflows on labor and capital demands in Table III and Figure VIII. We only find a negative and significant effect of refugees migration on capital demand. These figures only include formal employment and as such, exclude any informally hired workers, who very likely account for a significant share of the Turkish labor force and an overwhelming majority of refugee workers (as refugees do not have working permits in Turkey). Coefficients for the differential year-to-year trends for formal hiring and wages in both pre- and post-exposure period fluctuate around zero, supporting the validity of our empirical strategy.

The negative estimates on firm capital in Table III (column 4) suggest that the refugee labor supply is a substitute of capital and that firms are modifying their production technology. These results, however, are weakly supported by the event-study analysis presented in Figure VIII. Although the figure shows a differential positive trend in capital in favor of provinces with a higher share of Arabic-speaking populations, we still observe a drastic change in trends after the conflict onset in 2012.

V.3 Heterogeneous effects by firm type

Table IV and Table V show the estimated 2SLS results by firm size and sector.[23] Specifically, we split our sample by (i) firm size, between small and medium size firms (SMEs) with 250 or fewer employees and their larger peers and (ii) industry, between the firms that operate in the manufacturing, construction, retail, restaurants and hotels, and other sectors that do not fit into any of these categories, as defined by TurkStat.

The results are similar to the effects observed for the whole sample estimates across all samples. We find no evidence of significant effects of refugee inflows on sales, formal employment, and wages, but we are able to identify significant positive effects on electricity and oil consumption. We also observe that the positive effects of refugee inflows on energy consumption are entirely driven by SMEs, consistent with previous evidence suggesting that small firms are more sensitive to economic shocks (Narjoko and Hill, 2007; Vannoorenberghe, 2012; Kurz and Senses, 2016) and with the idea that the effects or refugee inflows are concentrated in the informal sector where small firms operate.

The sector based estimates show similar results for sales and formal employment in addition to positive and statistically significant effects for formal wages paid by firms. The positive effects observed on energy consumption are driven by firms who operate in construction, restaurants and hotels, and "other" sectors. Informal work is traditionally more common and easier in construction and hospitality sectors which may be facilitating higher production. Additionally, we speculate that these sectors might also be enjoying a larger aggregate demand shock due to refugee migration as housing and food are basic necessities.

[23] The other specifications and variables are available upon request. We did not report them due to space concerns.

VI Refugee Inflows and the Informal Economy

VI.1 Labor supply of native workers

The reported effects of refugee inflows on labor markets exclude the informal economy, which we attempt to incorporate into our study using the annual Turkish labor force surveys (HLFS) from 2005 to 2016. These surveys include individual information from Turkish citizens aged 15-64.

Using these data, we estimate equations 4 and 5, after aggregating the endogenous variable and the instrument at 26 NUTS-2 regions.[24] We examine, particularly, the impacts of refugees on formal and informal employment,[25] hours worked, and wages.[26] All regressions include controls for age and fixed-effects for education level and marital status. The standard errors are clustered at at region-year level (338 clusters).

Table VI and Figure IX, present the results for men, who constitute 75% of the Turkish labor force population in our sample. The 2SLS results suggest that an increment of 1 percentage points in the inflow of refugees to total population results in a large decline in informal employment (0.9 percentage points), while we find no detectable impact on the likelihood of being formally employed. Overall, total employment rate drops by 0.7 percentage points among native male workers. Total hours worked and wages fall as well, indicating that a one percentage point increase in the share of refugee to total population reduces total hours worked by 3.1 percent and wages by 3.8 percent. Del Carpio and Wagner (2015) and Ceritoglu et al. (2017) show similar displacement patterns in the informal sector using different identification strategies,.

Figure IX illustrates that the outcomes of interest show strikingly similar trends across provinces

[24] NUTS-2 is the smallest geographic level for which the data are representative.

[25] We define informality as production or employment by a firm without paying corporate tax and social security tax.

[26] We define employment as being a regular paid employee or self-employed and exclude being an employer or a unpaid family worker. We define informal employment as being employed but not contributing to the social security. This definition is the most commonly used by Turkstat to define the size of the informal economy in Turkey. Hours worked and wage outcomes are based on reported usual number of hours. Number of hours worked and average wages were transformed using the inverse hyperbolic sine transformation (see Burbidge et al., 1988 and MacKinnon and Magee, 1990 for details). The coefficients can be interpreted as a log transformation on the dependent variable.

from 2005 to 2011, supporting the validity of our empirical strategy.[27] The estimates confirm a negative impact of refugee inflows on total male employment mainly driven by a decline in informal employment. We also observe reductions in total hours worked and average wages. Estimated year-to-year reduced form estimates again peak with the intensity of the refugee shock.

The results for native women also show a reduction on employment, hours worked, and average wages (see Table VII and Figure X). In contrast to men, the negative effects of refugee inflows observed on employed native women are mainly driven by a reduction of formal jobs.

Overall, our results strongly support the idea that refugees are largely displacing male native workers from the informal labor market, which in turn is reflected in a reduction of overall employment. When considering a simple model of labor supply and demand, the reduction observed in wages suggest that the arrival of refugees has been reflected in a larger expansion of the labor supply relative to the demand in the informal sector.

VI.2 Supporting qualitative evidence

In this section, we briefly document qualitative evidence from in-depth interviews and focus groups with 22 employers in the textile, apparel, and service sectors, 2 business associations, and 1,003 Syrian refugee workers aged between 18 and 29 and located in Turkey during 2017. The surveys aimed at enhancing knowledge on the employment needs, challenges, and opportunities of young Syrian refugees in Turkey (IYF, 2018). In this subsection, we focus our analysis on understanding the motives that business owners have to hire young refugees informally.

The most striking finding was that only 4 percent of all the Syrian refugee respondents had applied for a work permit to be hired formally at the time of the interview, and yet, almost 90 percent of the interviewees were already working informally in Turkey. Additionally, the interviews

[27] Formally, at any conventional significance level, we can not reject the null hypothesis that the pre-exposure interaction coefficients in equation 6 are jointly equal to zero. The p-value of the joint F-test in the pre-exposure period on year and Arabic Population in 1965 interaction coefficients are 0.25, 0.27, 0.39, 1.50, and 1.02 for employment, formal employment, informal employment, hours worked, and hourly wage, respectively.

suggest that one of the primary motivates for business owners to informally hire Syrian refugees is the low cost of labor and their stronger attachment to low-paid jobs relative to their Turkish peers. In particular, the interviews indicate that young Syrians work for lower wages and longer hours.[28] Business owners also report that government restrictions play an important role in creating incentives to hire refugees informally. The bureaucratic process for legally hiring Syrian refugees is reported to be time consuming, costly, and complicated.[29] The surveys also suggest that Syrian employment is also limited by the difficulty around official recognition of skills, education backgrounds, and occupational qualifications. Particularly, language is cited as a critical barrier to high paid jobs. Finally, the survey suggested that some refugees are not interested in being formalized either. Business owners report that while Turkish workers demand to be insured, Syrian refugees just want to be paid the insurance premium in cash as they face uncertainty on whether they will stay in Turkey as permanent residents and receive a pension.

VII Robustness Tests

To test the robustness of our empirical analysis we carry out several exercises. We first impose three sample restrictions. First, we exclude Istanbul from the main estimates because a large share of economic activity takes place in this province and because refugees have also settled in large numbers there. Second, we restrict our sample to single plant firms. As explained in the data section, the AISS surveys only have the location of the headquarters for each firm, and hence, we imputed that location for all the plants of the firm, which might not be the case for many of them. Thus, we re-estimate all our regressions restricting the sample to include only single plant firms for which we have no measurement error. The results are robust to both of these individual sample

[28]The average wage of a young Syrian in Istanbul is 1,492 Turkish Liras (TL) in contrast to 1,883 TL for young native workers. In addition, approximately 90 percent of young Syrian workers report working more than 48 hours a week. Similar qualitative evidence has been documented by several media outlets (see for example Reuters (2015); Al Monitor (2016); ABC News (2014); Financial Times (2017)).

[29]For example, the Ministry of Labor and Social Security in Turkey dictates that the number of Syrian refugees legally employed in a firm cannot exceed 10 percent of the total number of Turkish employees. Moreover, the work permit costs 600 TL per year per Syrian worker and must be renewed annually.

restrictions and also their combined restrictions.[30]

Third, we re-estimate our regressions excluding the border provinces. The idea behind this exercise is that since the variation in our instrument is driven by the provinces near by the Turkish-Syrian border, these provinces might also be negatively affected by the Syrian conflict independent of the refugee inflows. Assuming the impact of the civil war in Syria on nearby provinces is negative, the Wald estimator in the instrumental variable specification would be biased negatively, suggesting that our reported outcomes represent a lower bound estimates for the true effects of refugee inflows. To account for this potential issue, we re-estimate our regressions excluding the border provinces. Although the residual variation is not sufficiently strong to be a reliable instrument we do still observe quantitatively similar results for the reduced form difference-in-differences estimates, suggesting that the main estimates are robust to even muting a substantial part of the variation in our instrument.[31]

In a separate exercise, to further test the validity of our empirical strategy, we modify our instrument to directly represent the concentration of Arabic speakers in 1965 according to the following formula:

$$\text{Predicted Inflows}_{pt}^{robust} = \left[\frac{\text{Arabic Speaking Pop}_{p,1965}}{\text{Total Arabic Speaking Population}_{p,1965}} \times \text{Syrian Aggregate Displacement}_{t}\right]$$

where $\text{Predicted Inflows}_{pt}^{robust}$ is constructed as the interaction of the concentration of Turkish citizens with an Arabic mother language in 1965 and the total number of individuals displaced outside Syria in year t. The modified instrument places more weight in provinces around the Turkish-Syrian border. When we re-estimate our main specifications using the modified instrument, we obtain extremely similar results.[32]

[30] The result are available upon request but where not included in the main manuscript due to space concerns.
[31] The results are omitted due to space constraints and available upon request.
[32] The results are omitted due to space constraints and available upon request.

VIII Discussion

We examine the impact of a large refugee shock on the economic performance of firms in a developing country with a large informal sector. Although we are not able to identify significant effects on firms formal production figures (measured by reported sales and gross output for accounting purposes), we find strong evidence of a positive effect of refugees inflows on production proxies that account for firms under-reporting such as oil and electricity consumption. Similarly, we find that refugee migration boosts firm creation, especially the share of those with a foreign partnership. We conclude that local businesses are booming in the refugee-hosting areas in Turkey. However, most of these growth seems to be taking place in the informal economy with a net displacement of native workers.

We explain these findings through several potential mechanisms. The likelihood of permanently leaving their original location might have induced the civil war refugees to bring most of their accumulated wealth to the host country and invest it. Our analysis support the idea that Syrian entrepreneurship and capital has increase dramatically in hosting areas.

Additionally, fixed costs associated with initial resettlement, such as housing and setting up a new business, might be contributing to positive shock, especially in the construction sector. Anecdotal evidence suggests that the construction sector is expanding[33] and refugees are more likely to work in this industry through subcontracting (Erdoğan and Unver, 2015).

The inflow of aid provided to refugee settlement locations by the Turkish government, international governments, and other non-governmental organizations are mainly supplied by local firms, which might also contribute to the observed changes in firm outputs (Erdoğan and Unver, 2015).

Overall, our findings support all of these hypotheses given that the empirical analysis suggests that the small SMEs and the construction and hospitality sectors are the main drivers of the positive effects of refugee inflows in hosting economies.

[33] see Al Monitor, 2016; Hurriyet Daily News, 2016 for examples of media reports.

Reduced labor costs through informal hiring of refugees seem to also contribute to the local production boom in the refugee hosting areas. Both firm and labor supply data show no change in formal hiring while we do observe a significant replacement of refugee workers with their Turkish peers in the informal economy. Similar decreases in extensive and intensive margins of labor supply by native workers are shown in Del Carpio and Wagner (2015) and Ceritoglu et al. (2017). In contrast to these studies, we do not observe robust changes in formal labor supply. This results are consistent with the hypothesis that formal firms may be hiring Syrian refugees but not reporting it.

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IX Tables and Figures

Table I: Effects of Refugee Inflows on the Extensive and Intensive Margin of Production

Dependent Variable (in logs)	Sales (1)	Gross Production (2)	Electricity (3)	Oil (4)	Number of Firms (5)
Panel A. OLS					
PctRef: Share of Refugees (% Pop)	0.004	0.003	0.014	0.011	0.012
	(0.010)	(0.009)	(0.005)	(0.006)	(0.004)
Adj. R-squared	0.03	0.03	0.03	0.01	0.98
Panel B. Reduced Form					
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	0.004	0.006	0.053	0.054	0.054
	(0.009)	(0.009)	(0.019)	(0.020)	(0.028)
Adj. R-squared	0.03	0.03	0.03	0.01	0.98
Panel C. 2SLS					
PctRef: Share of Refugees (% Pop)	0.003	0.005	0.043	0.043	0.057
	(0.008)	(0.008)	(0.016)	(0.016)	(0.037)
Panel D. First Stage					
Dependent Variable	**PctRef: Share of Refugees (% Pop)**				
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	1.246	1.246	1.236	1.257	0.945
	(0.174)	(0.173)	(0.134)	(0.120)	(0.238)
First Stage F-statistic	51.52	51.60	84.97	109.98	15.81
Observations (for all panels)	782,453	781,330	653,027	585,507	810

Notes: All panels include controls for province and year fixed effects. Standard errors clustered at the province level are shown in parentheses. There are 81 clusters in each regression. *Data Source:* AISS.

Table II: Effects of Refugees Inflows on Firm Entry, Exit, and International Trade

Dependent Variable (in logs)	Firm Entry (1)	Firm Exit (2)	Firms with Foreign Partnership (3)	Exports (4)	Imports (5)
Panel A. OLS					
PctRef: Share of Refugees (% Pop)	0.012	-0.009	0.065	0.028	-0.004
	(0.002)	(0.006)	(0.018)	(0.007)	(0.006)
Adj. R-squared	0.99	0.89	0.92	0.93	0.94
Panel B. Reduced Form					
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	0.016	-0.004	0.065	0.037	0.007
	(0.008)	(0.023)	(0.040)	(0.034)	(0.017)
Adj. R-squared	0.99	0.89	0.91	0.93	0.94
Panel C. 2SLS					
PctRef: Share of Refugees (% Pop)	0.015	-0.004	0.063	0.037	0.007
	(0.009)	(0.022)	(0.026)	(0.039)	(0.018)
Panel D. First Stage					
Dependent Variable	**PctRef: Share of Refugees (% Pop)**				
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	1.034	1.034	1.034	0.995	0.995
	(0.253)	(0.253)	(0.253)	(0.246)	(0.246)
First Stage F-statistic	16.71	16.71	16.71	16.37	16.37
Observations (for all panels)	567	567	567	1,215	1,215

Notes: Exports and imports are in nominal thousands of dollars. All panels include controls for province and year fixed effects. Standard errors clustered at the province level are shown in parentheses. There are 81 clusters in each regression. *Data Sources:* TOBB data was used for the first 3 columns; and province-level foreign trade data from TurkStat was employed in columns 4 and 5.

Table III: Effects of Refugees Inflows on Input Demands

Dependent Variable (in logs)	Paid Employment (1)	Total Employment (2)	Wages (3)	Capital (4)
Panel A. OLS				
PctRef: Share of Refugees (% Pop)	-0.003	-0.003	-0.0002	-0.008
	(0.001)	(0.002)	(0.001)	(0.003)
Adj. R-squared	0.01	0.01	0.19	0.03
Panel B. Reduced Form				
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	-0.001	0.001	0.002	-0.012
	(0.003)	(0.004)	(0.002)	(0.005)
R-squared	0.01	0.01	0.19	0.03
Panel C. 2SLS				
PctRef: Share of Refugees (% Pop)	-0.001	0.001	0.001	-0.010
	(0.002)	(0.004)	(0.001)	(0.004)
Panel D. First Stage				
Dependent Variable	**PctRef: Share of Refugees (% Pop)**			
Predicted Inflows: Syrian Displ. $\times$ Share Arabic$_{1965}$	1.248	1.246	1.248	1.208
	(0.169)	(0.174)	(0.169)	(0.110)
First Stage F-statistic	54.74	51.52	54.74	120.27
Observations (for all panels)	761,750	782,526	761,774	505,786

Notes: All panels include controls for province and year fixed effects. Standard errors clustered at the province level are shown in parentheses. There are 81 clusters in each regression. *Data source:* AISS.

Table IV: Effects of Refugees Inflows by Firm Size

Dependent Variable (in logs)	Sales		Employment		Wages	
Sample	Large	SMEs	Large	SMEs	Large	SMEs
	(1)	(2)	(3)	(4)	(5)	(6)
PctRef: Share of Refugees (% Pop)	-0.018	0.003	-0.002	-0.001	0.001	0.001
	(0.015)	(0.008)	(0.004)	(0.002)	(0.006)	(0.002)
First Stage F-statistic	33.38	52.18	33.38	55.62	33.38	55.62
Observations	36,825	745,628	36,825	724,922	36,825	724,946

Dependent Variable (in logs)	Electricity		Oil	
Sample	Large	SMEs	Large	SMEs
	(7)	(8)	(9)	(10)
PctRef: Share of Refugees (% Pop)	0.002	0.041	-0.019	0.045
	(0.030)	(0.017)	(0.024)	(0.017)
First Stage F-statistic	51.28	86.46	59.28	113.17
Observations	34,469	618,555	33,018	552,488

Notes: A firm is defined as Small or Medium size Enterprise (SME) if it has less than 250 employees. All panels include controls for province and year fixed effects. Standard errors clustered at the province level are shown in parentheses. There are 81 clusters in each regression. *Data Source:* AISS.

Table V: Effects of Refugees Inflows by Sector

Sample	Manufacturing (1)	Construction (2)	Retail (3)	Restaurants/Hotels (4)	Others (5)
Dependent Variable (in logs)			Sales		
PctRef: Share of Refugees (% Pop)	-0.002	0.004	0.008	0.020	0.026
	(0.009)	(0.020)	(0.009)	(0.016)	(0.015)
First Stage F-statistic	83.38	36.86	72.55	63.1	40.06
Observations	275,046	122,483	146,020	45,436	180,756
Dependent Variable (in logs)			Employment		
PctRef: Share of Refugees (% Pop)	0.002	0.001	-0.002	-0.001	0.000
	(0.005)	(0.002)	(0.002)	(0.005)	(0.005)
First Stage F-statistic	89.6	38.54	78.3	66.58	42.25
Observations	269,916	119,837	141,386	44,725	173,847
Dependent Variable (in logs)			Wages		
PctRef: Share of Refugees (% Pop)	-0.001	0.003	0.005	0.002	0.005
	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
First Stage F-statistic	89.63	38.54	78.3	66.58	42.25
Observations	269,925	119,838	141,386	44,725	173,857
Dependent Variable (in logs)			Electricity		
PctRef: Share of Refugees (% Pop)	0.019	0.041	0.027	0.053	0.056
	(0.013)	(0.016)	(0.023)	(0.016)	(0.019)
First Stage F-statistic	109.04	60.91	102.64	89.17	62.21
Observations	251,093	85,438	128,051	40,838	137,263
Dependent Variable (in logs)			Oil		
PctRef: Share of Refugees (% Pop)	0.025	0.046	0.033	0.037	0.084
	(0.005)	(0.020)	(0.021)	(0.017)	(0.020)
First Stage F-statistic	147.14	116.64	126.15	107.98	62.61
Observations	224,188	83,247	116,751	37,271	113,984

Notes: All panels include controls for province and year fixed effects. Standard errors clustered at the province level are shown in parentheses. There are 81 clusters in each regression.*Data Source:* AISS

Table VI: Effects of Refugees Inflows on Formal and Informal Employment. Sample: Men, 15-64

Dependent Variable	P(employment)			y^*	y^*
Sample	All	Formal	Informal	Hours worked	Hourly Wage
Panel A. OLS estimates	(1)	(2)	(3)	(4)	(5)
PctRef: Share of Refugees (% Pop)	-0.001	0.005	-0.006	-0.005	-0.010
	(0.001)	(0.000)	(0.000)	(0.004)	(0.005)
Adj. R-squared	0.052	0.223	0.196	0.043	0.263
Panel B. 2SLS Estimates					
PctRef: Share of Refugees (% Population)	-0.007	0.001	-0.009	-0.031	-0.038
	(0.003)	(0.001)	(0.002)	(0.011)	(0.012)
Outcome mean	0.89	0.59	0.29	4.08	3.08
Panel C. First Stage Estimates					
Dependent Variable	**PctRef: Share of Refugees (% Population)**				
Predicted Inflows: Syrian Displ. × Share Arabic 1965		1.243		1.242	1.200
		(0.175)		(0.177)	(0.175)
First Stage F-statistic		50.17		50.17	47.71
Observations (for all panels)		1,269,623		1,269,331	918,358

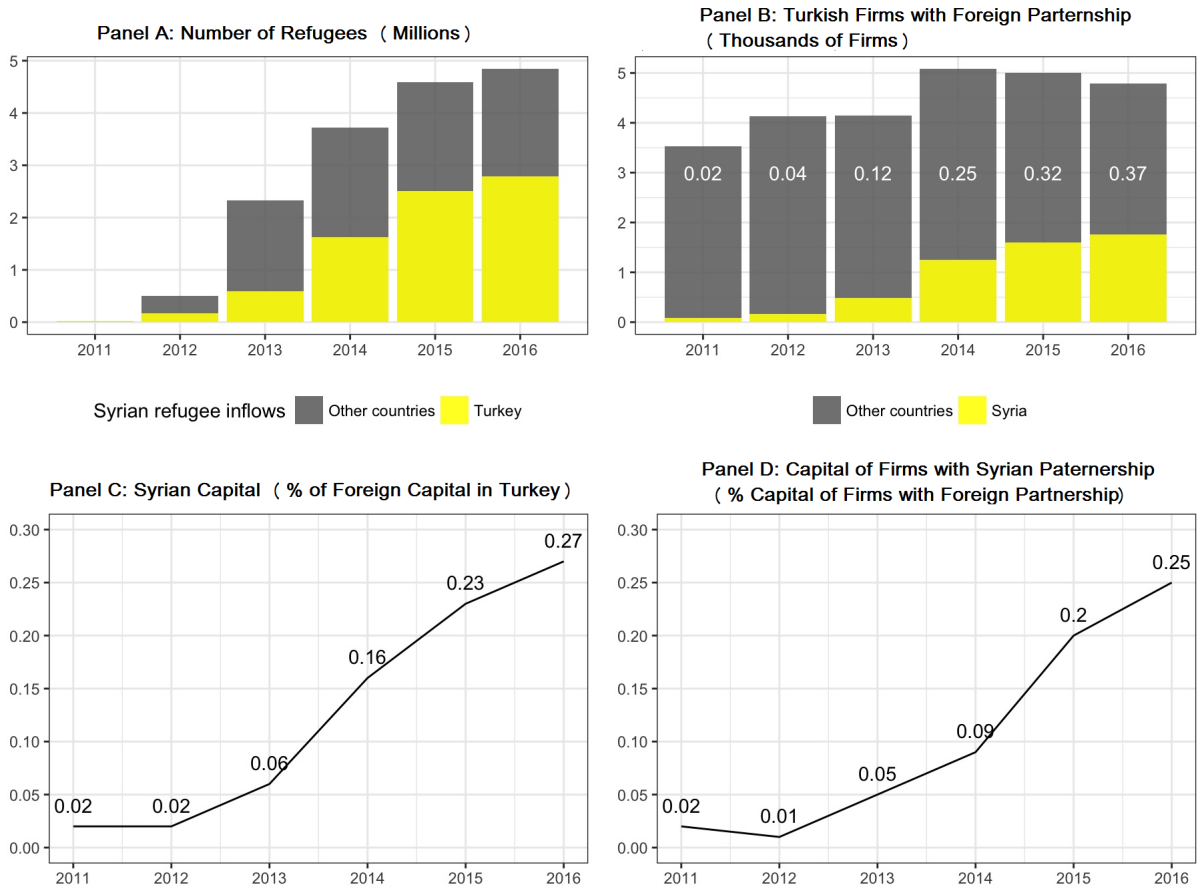
Notes: *: hours worked and wages were transformed using the inverse hyperbolic sine transformation (see Burbidge et al., 1988 and MacKinnon and Magee, 1990 for details). The coefficients can be interpreted as a log transformation on the dependent variable. The HLFS only interviews Turkish nationals. The regressions use data from the Turkish labor force annual surveys from 2005 to 2016. The estimates are by individual and include controls for province, year, age, education, and marital status. Standard error reported in parentheses were clustered at the region-year level. *Data Source:* HLFS.

Table VII: The Effects of Refugees Inflows on Employment, Informality, and Intensive Margins of Labor Supply, Sample: Women, 15-64

Dependent Variable	P(employment)			y*	y*
Sample	All	Formal	Informal	Hours worked	Hourly Wage
Panel A. OLS	(1)	(2)	(3)	(4)	(5)
PctRef: Share of Refugees (% Pop)	-0.004	-0.003	-0.001	-0.016	-0.017
	(0.001)	(0.001)	(0.002)	(0.005)	(0.006)
Adj. R-squared	0.058	0.273	0.351	0.041	0.218
Panel B. 2SLS					
PctRef: Share of Refugees (% Pop)	-0.008	-0.005	-0.002	-0.024	-0.036
	(0.002)	(0.002)	(0.002)	(0.007)	(0.010)
Outcome mean	0.83	0.52	0.31	3.64	2.90
Panel C. First Stage					
Dependent Variable	**PctRef: Share of Refugees (% Pop)**				
Predicted Inflows: Syrian Displ. × Share Arabic 1965		1.445		1.445	1.399
		(0.139)		(0.182)	(0.148)
First Stage F-statistic		107.82		107.81	88.72
Observations (for all panels)		403,629		403,593	325,569

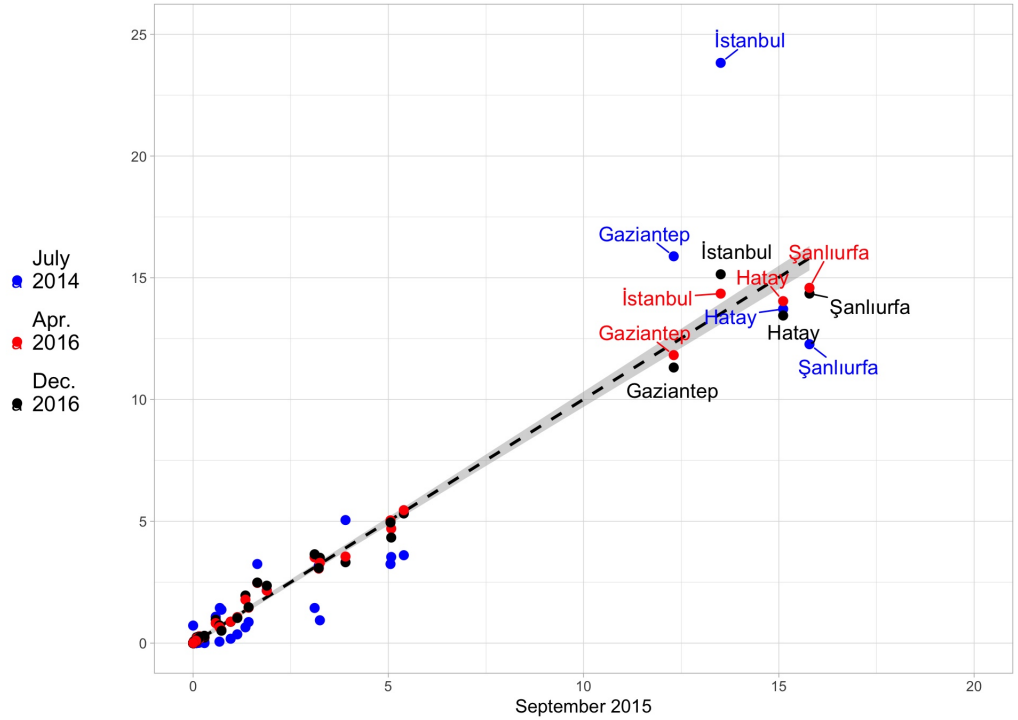
Notes: *: hours worked and wages were transformed using the inverse hyperbolic sine transformation (see Burbidge et al., 1988 and MacKinnon and Magee, 1990 for details). The coefficients can be interpreted as a log transformation on the dependent variable. The regressions use data from the Turkish labor force annual surveys from 2005 to 2016. The estimates are by individual and include controls for province, year, age, education, and marital status. Standard error reported in parentheses were clustered at the region-year level. *Data Source:* HLFS.

Figure I: Syrian Presence in Turkey, 2011-2016



Data Sources: DGMM refugee data (panel A), TOBB data (panels B to D).

Figure II: Time Persistence of Refugee Inflows into Turkish Provinces - DGMM refugee data



Notes: Total refugee population was normalized to 100 for each period.

Figure III: Location of Refugees and Arabic-speaking Populations in Turkey - DGMM refguee data

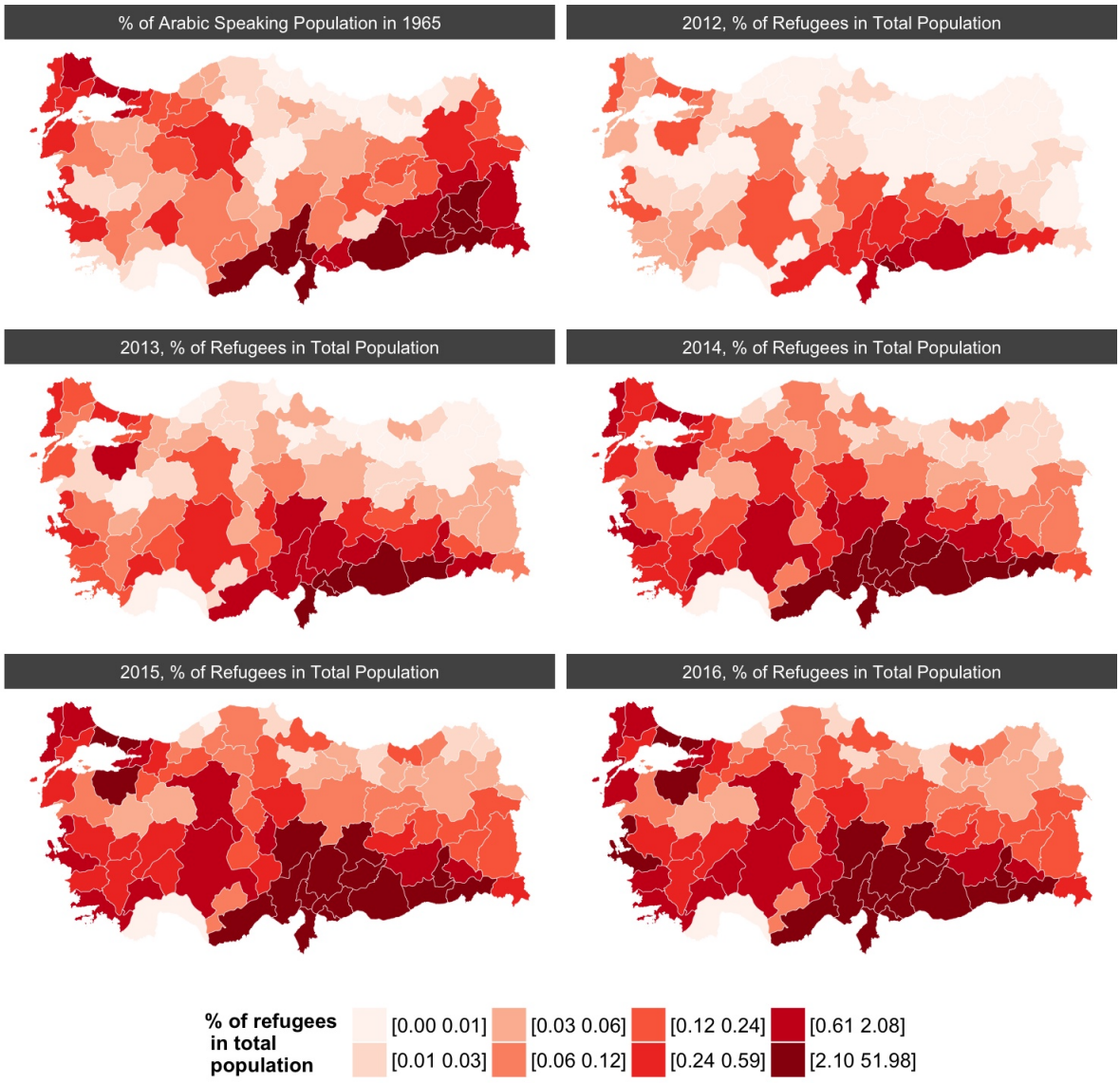


Figure IV: The Ottoman Empire from 1798-1923

Source: Turkish History. Available at: http://www.worldstatesmen.org/Ottoman.jpg

Figure V: Ottoman *Vilayet* of Aleppo in Turkey

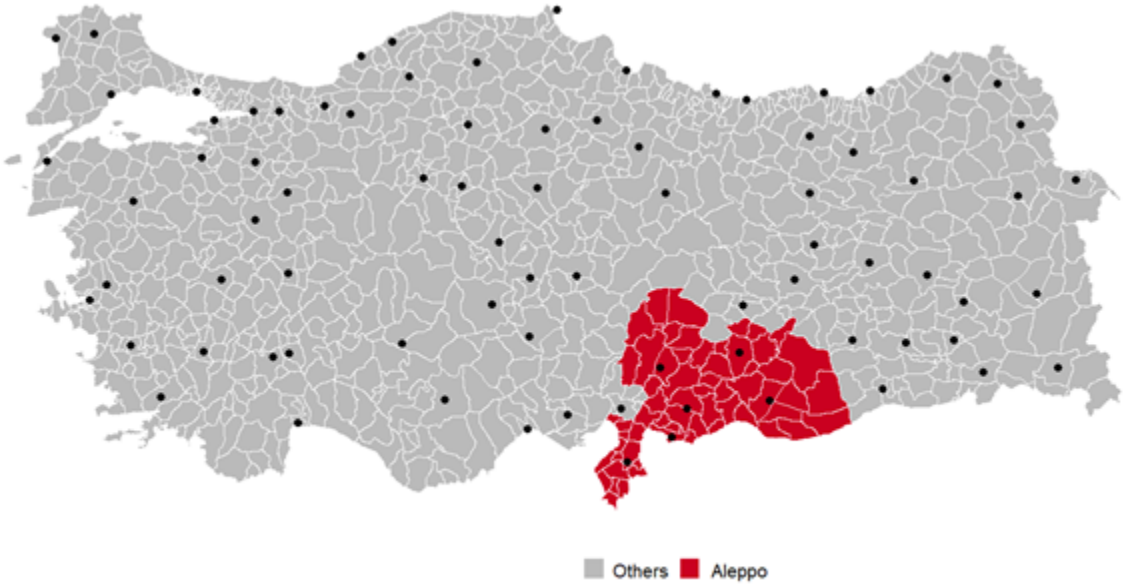


Figure VI: Difference-in-Differences Annual Estimates, Production - AISS data

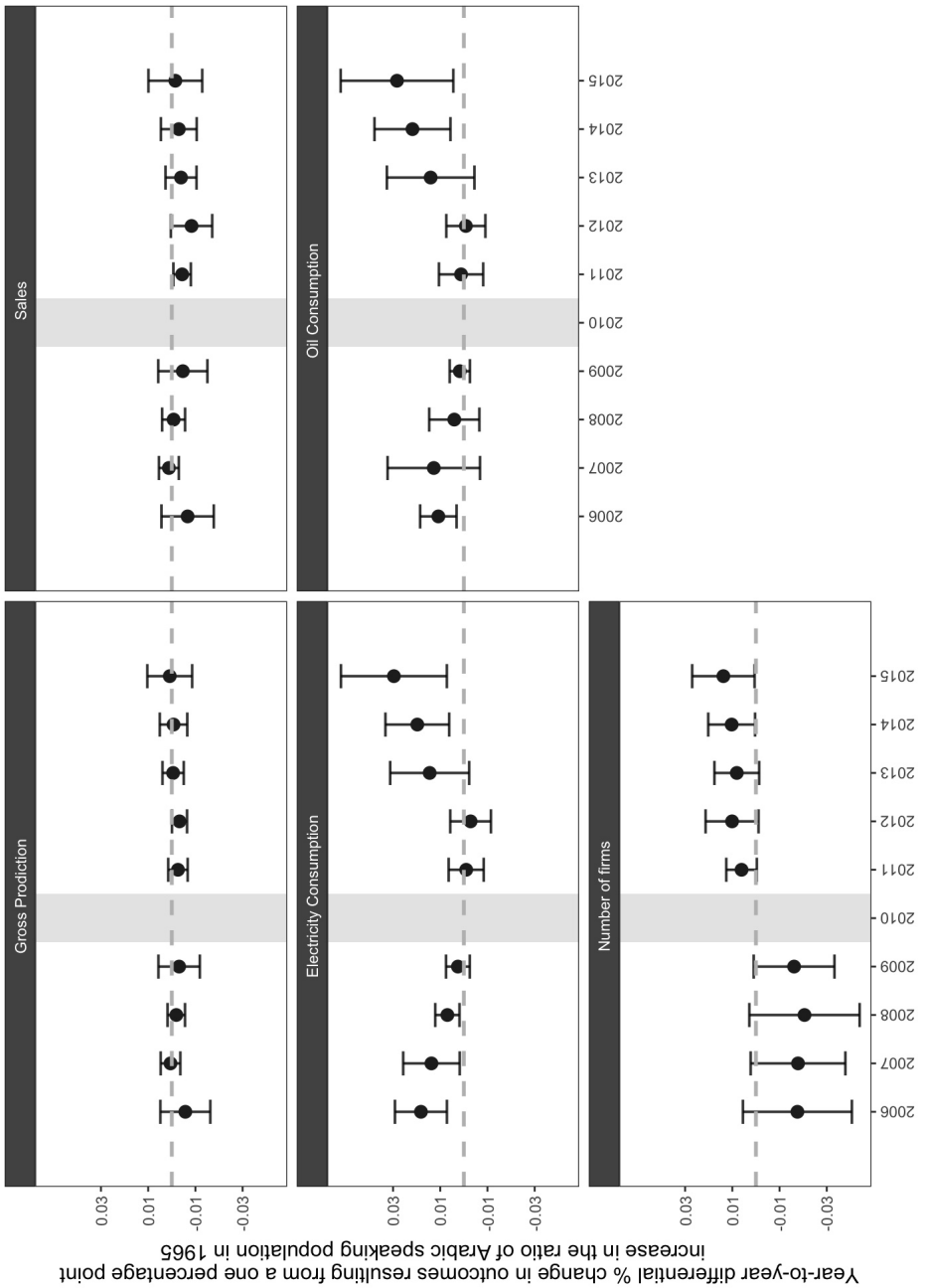


Figure VII: Difference-in-Differences Annual Estimates - TOBB data and province level foreign trade data

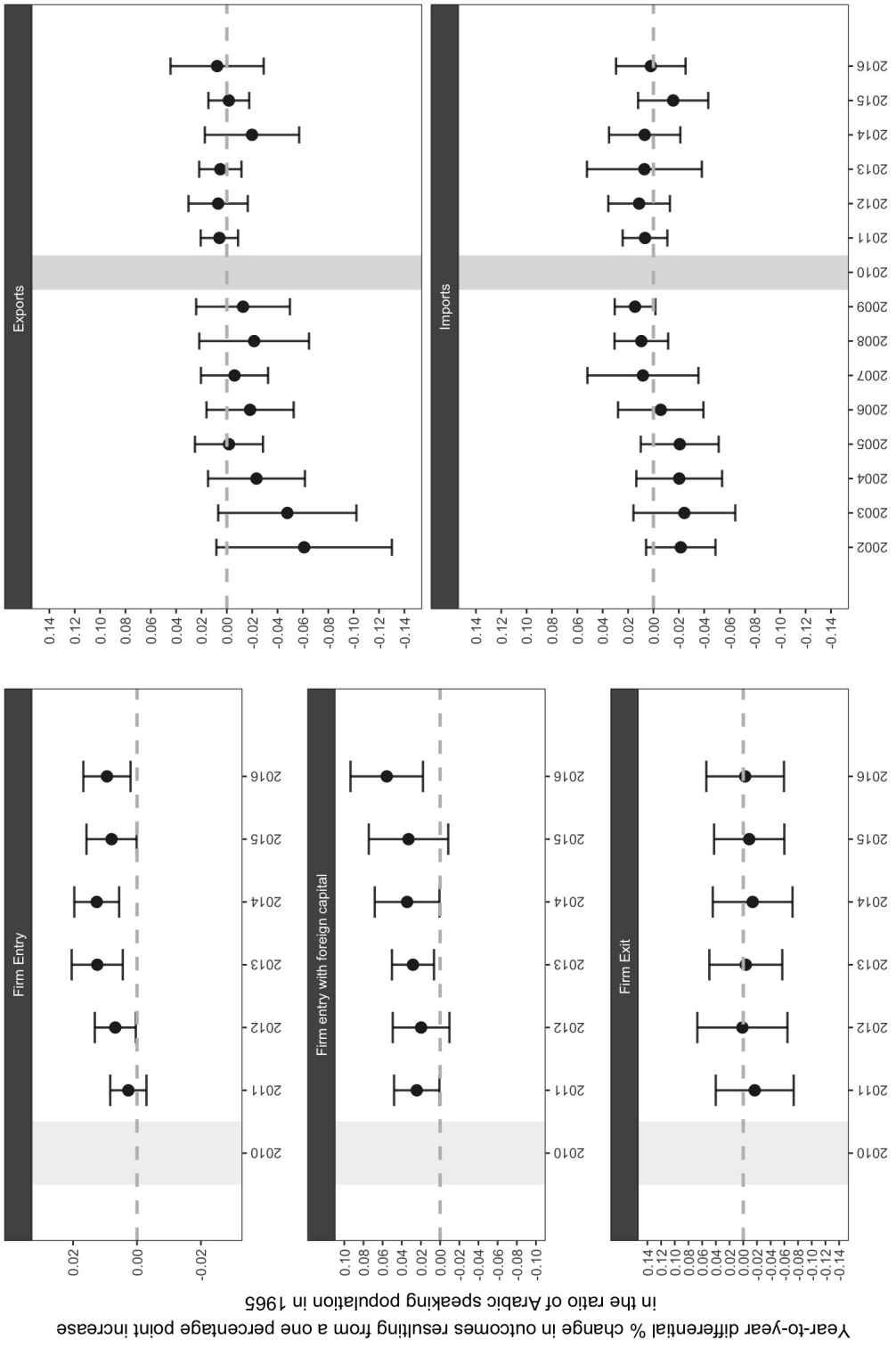


Figure VIII: Difference-in-Differences Annual Estimates, Input Demands - AISS data

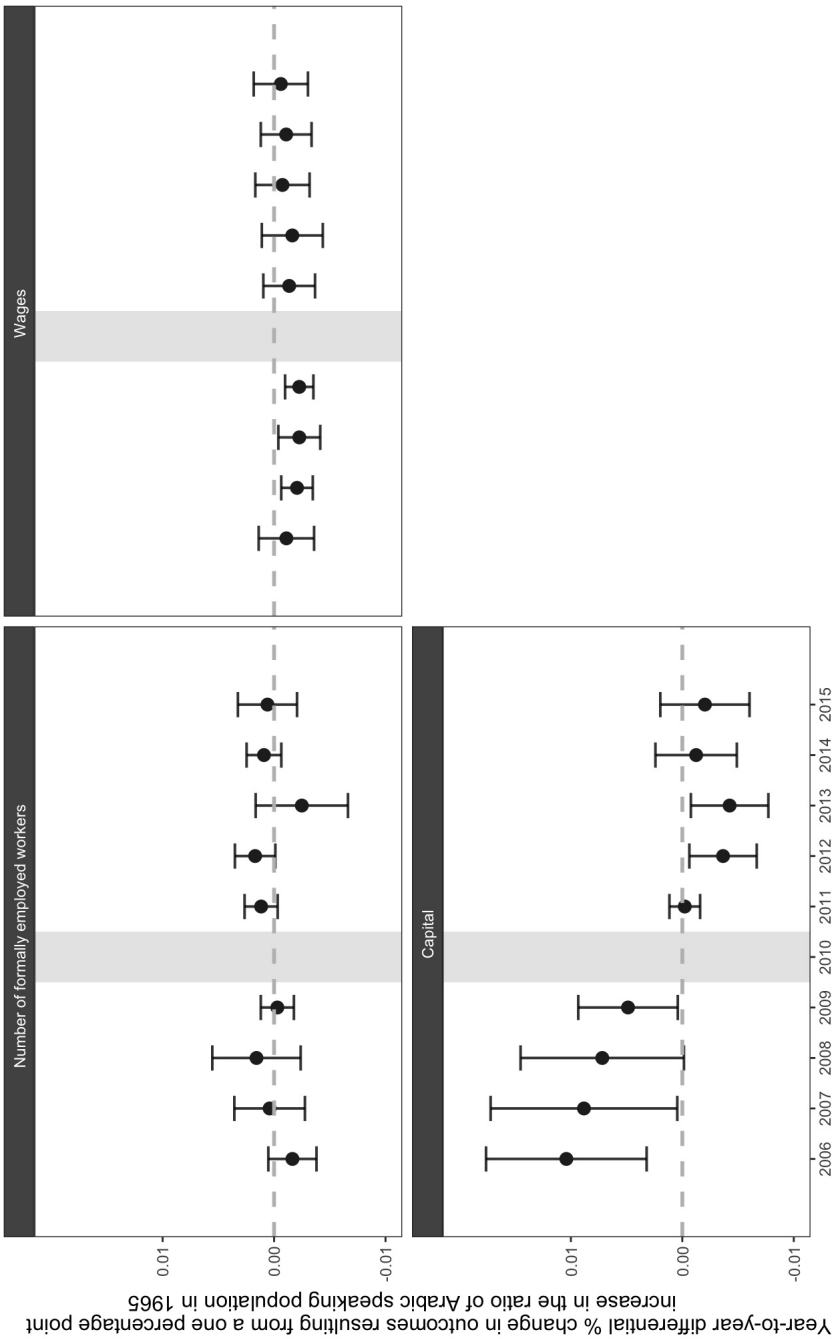
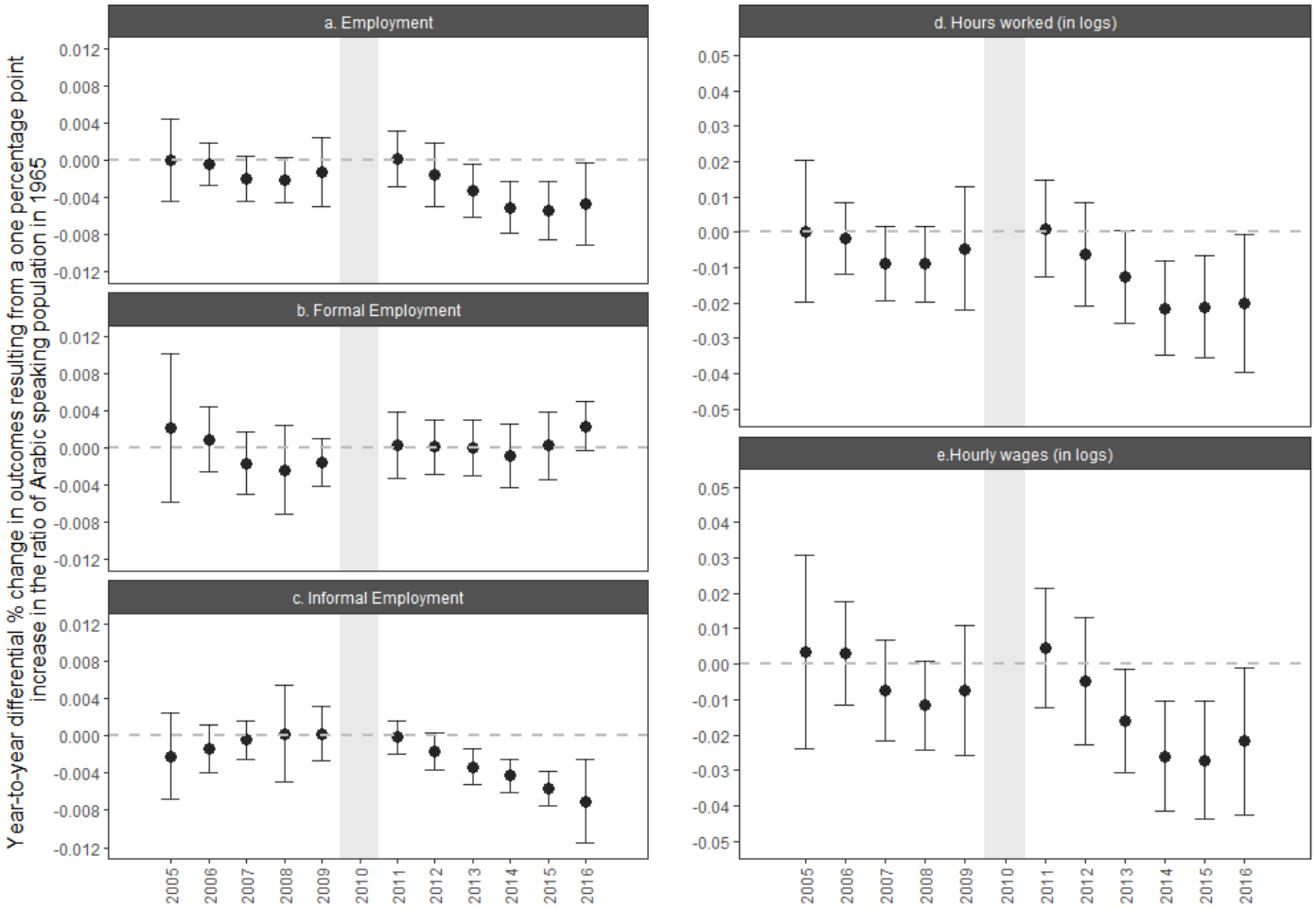
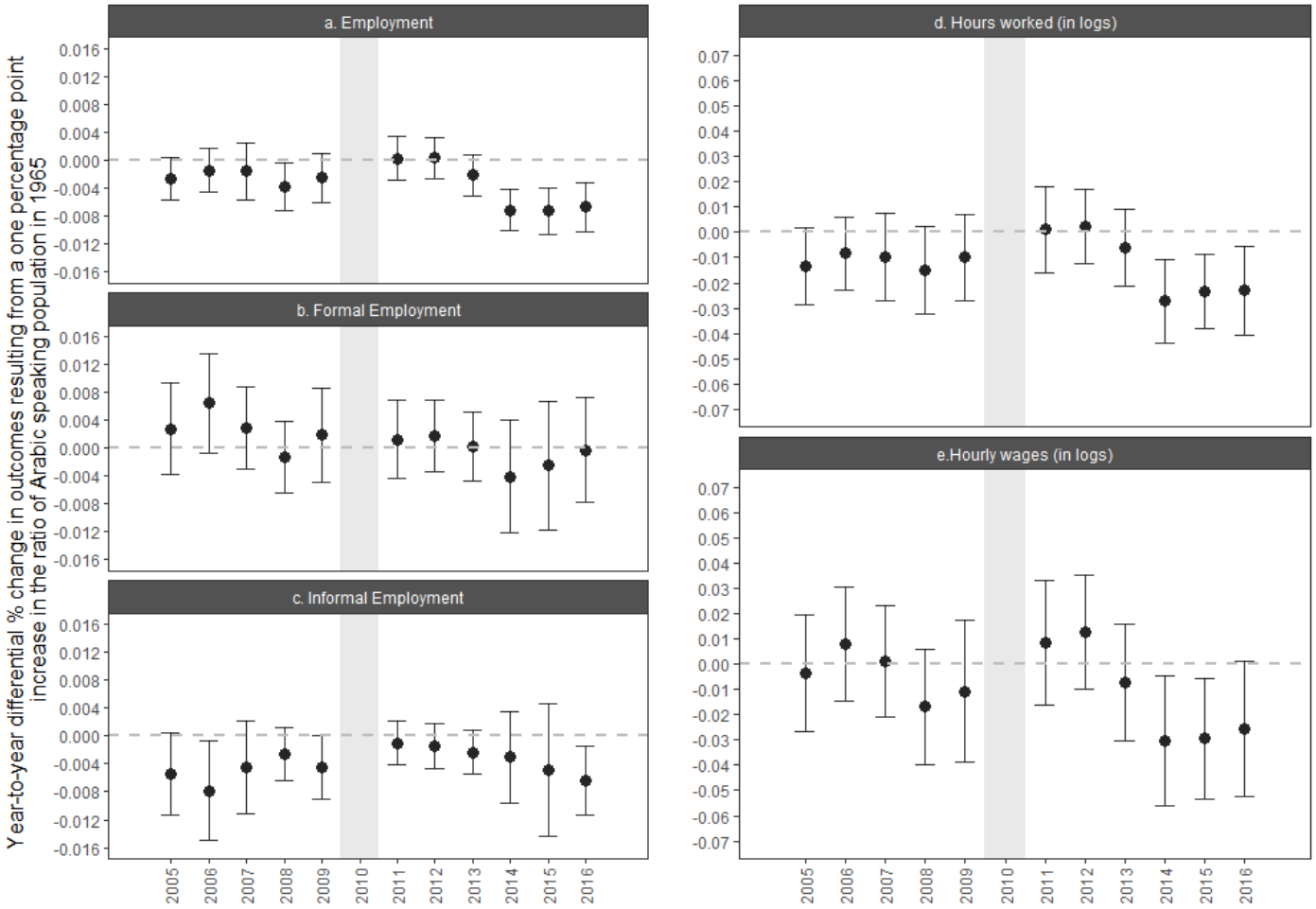


Figure IX: Difference-in-Differences Annual Estimates - HLFS, Sample: Men, 15-64



Notes: The HLFS only interviews Turkish nationals. The regressions use data from the Turkish labor force annual surveys from 2005 to 2016. The estimates are by individual and include controls for year, province, age, education, and marital status. Standard error reported in parentheses were clustered at the region-year level.

Figure X: Difference-in-Differences Annual Estimates - HLFS, Sample: Women, 15-64



Notes: The HLFS only interviews Turkish nationals. The regressions use data from the Turkish labor force annual surveys from 2005 to 2016. The estimates are by individual and include controls for year, province, age, education, and marital status. Standard error reported in parentheses were clustered at the region-year level.

Appendix I: Characteristics of Syrian Refugees in Turkey

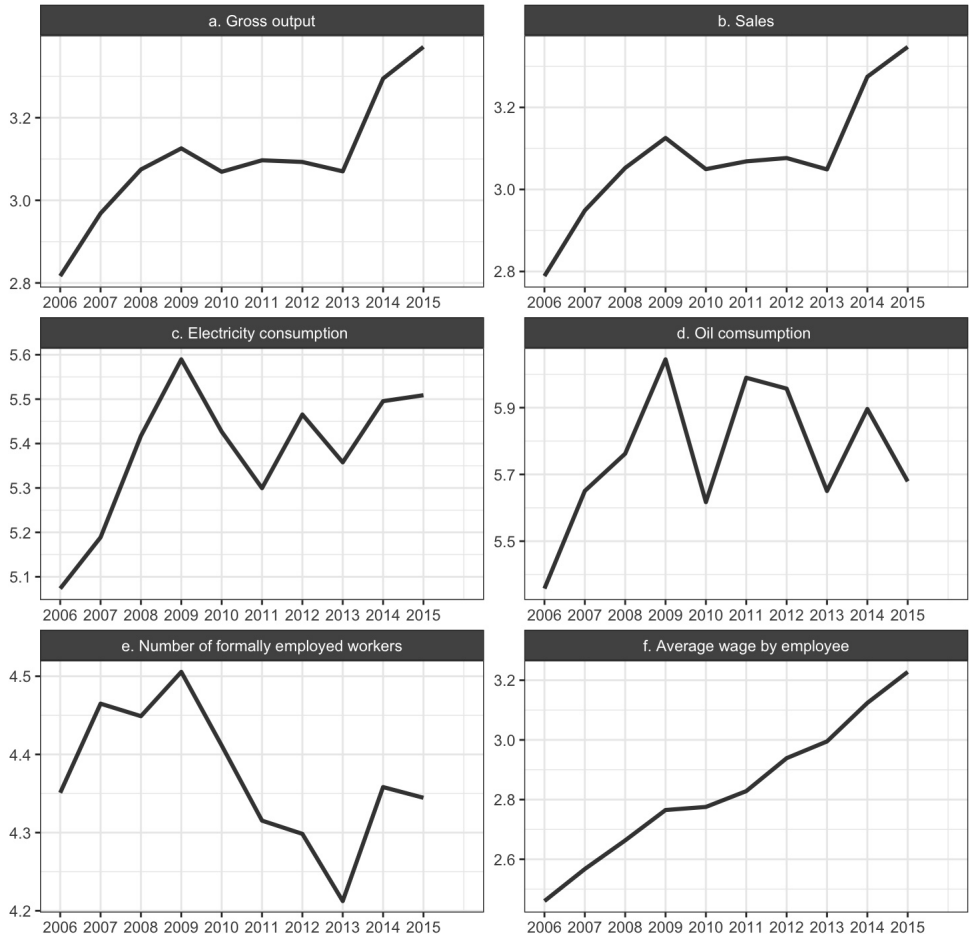
Demographic Characteristics of Syrian Refugees in Turkey, January 2017

I. Gender (%)	
Male	53.2
II. Age (%)	
0-4	13.7
5-11	16.2
12-17	14.8
Minors (18<)	**44.7**
18-59	51.9
60+	3.3
III. Education (%)*	
Illiterate (includes young children)	32.0
No degree (literate)	12.5
Primary	15.8
Secondary	9.9
Some College +	2.0
Unknown	27.8
Total number of refugees:	3,168,757

Notes: *Education data are only available for registered 2.5 million refugees as of April 2016. The information on gender and age comes from the UN Refugees Office as of January of 2017.

Appendix II: Firm Outcomes Time Trends

Annual trends on firms outcomes (Nominal Values in Logs) - AISS data



Appendix III: Quality of Constructed Measure of Inflows of Refugees

Constructed vs. Observed Measure of Province-Level Inflows of Refugees