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AN EMPIRICAL ANALYSIS OF THE EFFECTS OF SYRIAN REFUGEES ON THE TURKISH LABOR MARKET

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Abstract

This study examines the effects of the recent influx of Syrian refugees on the Turkish labor market. Exploiting this natural experiment, we estimated the causal impacts of involuntary migration on labor market outcomes. We selected the five refugee-hosting regions with the highest number of refugees as treatment regions and four comparable regions with a low refugee-to-population ratio as control regions. Using a difference-in-differences estimation, we found that informal Turkish workers in the refugee-hosting regions were about 4% more likely to leave their job than workers in regions that did not widely host refugees. Such negative impacts on labor market outcomes became larger in 2014–2015 compared with 2012–2013. Furthermore, while females and older workers withdrew themselves from the labor market, males and younger workers become unemployed after the refugee influx.

Keywords: refugee, migration, Syria, Turkey, difference-in-differences estimation

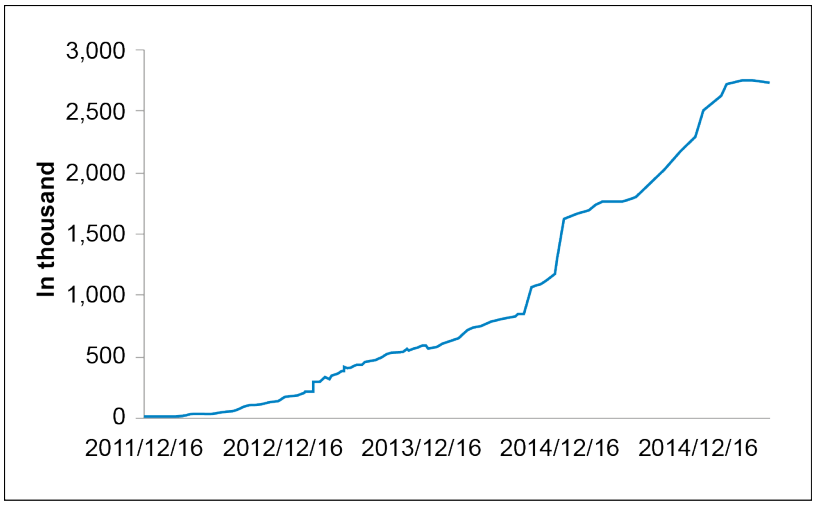
JEL Classification: F22, J00

Contents

1. INTRODUCTION

A competitive labor market model has clear and unambiguous implications for a migration-induced increase in the labor supply. An exogenous increase in the labor supply due to an influx of migrants causes the equilibrium wage rate to fall and, consequently, migrants partially replace native workers in the new equilibrium (Borjas 2003). The causal effect of migration-induced labor supply shocks on native labor force participation is likely to be confounded in the presence of demand shocks related to employment or the wage gap. Without a valid instrument, it is difficult to address such possibilities of reverse causality. In this paper, we used a natural experiment to test the implications of a labor supply shock. We used the refugee influx from Syria into Turkey, which was unprecedented in its size and nature, to identify the effect of the involuntary migration on the local Turkish labor market. The number of registered Syrian refugees in Turkey has increased dramatically from zero into the millions since 2012 (Figure 1). Moreover, sub-regions that are close to the Turkish–Syrian border have received disproportionately large numbers of refugees. This difference in refugee intensity across Turkish sub-regions is reportedly due to the existence of refugee camps and the proximity to Syria. We exploited this difference in refugee intensity across sub-regions to identify the effects of refugees on the Turkish labor market.

Figure 1: The Number of Registered Syrian Refugees in Turkey



Source: UNHCR.

While there is already an abundance of literature on the impact of "voluntary" migration, the economic literature on the impacts of refugees or forced migration is less developed (Ruiz and Vargas-Silva 2013). Today, the Syrian refugee crisis is one of the world's greatest problems. As Kirisci and Ferris (2015) pointed out, initially the number of refugees was limited to several thousand. However, this number increased dramatically, reaching millions, after the Syrian political crisis escalated into a complex civil war in 2014 (Kirisci and Ferris 2015). This devastated the lives of Syrian civilians, and, consequently, millions of people fled their home and became internally and externally displaced. As Figure 1 shows, by December 2016, there were 4,810,710 registered Syrian refugees, of whom 2,764,500 were residing in Turkey (Office of the United Nations High Commissioner for Refugees [UNHCR] 2016).

One of the biggest challenges in the study of the effect of immigration is non-random distribution of immigrants across regions in the host country. Immigrants tend to settle in regions with thriving economies. Thus, the spatial correlations between the number of immigrants and the labor market outcome underestimate the effect of immigration, since thriving economies partially offset the negative impacts of immigration. To overcome this challenge, many studies have focused on the exogenous shocks of a large influx of migrants, which can be utilized as natural experiments (Card 1990; Hunt 1992; Friedberg 2001). For instance, Card (1990) examined the effects of the Mariel Boatlift on the 1980 Miami labor market, applying the sudden arrival of around 125,000 Cuban immigrants in Miami as an exogenous shock to the Miami labor market. Using a difference-in-differences (DID) strategy, he compared pre- and post-migration wages and unemployment rates in Miami and comparable non-migrant hosting cities. The influx of Cuban immigrants into Miami had almost no effect on the wages and unemployment rates of less-skilled Miami workers (Card 1990). Hunt (1992) and Friedberg (2001) also found not significant effects of a large influx of migrants into the labor market of host countries in the cases of France and Israel, respectively.

The existing studies on the effects of the Syrian refugee crisis on the Turkish labor market have mostly compared the labor markets in refugee-hosting border regions with those in comparable non-refugee-hosting regions to identify the causal impact of the refugee influx. Balkan and Tumen (2016), for example, found a causal link between the influx of Syrian refugees and a decrease in the general level of consumer prices in Turkey. In theory, as Syrian refugees supply less expensive informal labor, which substitutes that of native Turkish laborers, employers in sectors with large proportions of informal labor are more likely to exploit such an opportunity. To test this hypothesis, Balkan and Tumen (2016) used a DID strategy, with 2010–2011 as the pre-treatment period and 2012–2014 as the post-treatment period. Their estimates showed that, after the Syrian refugee influx, the prices of goods produced in informal sectors fell by about 4% (Balkan and Tumen 2016). In another study, Ceritoglu et al. (2017) showed that the Turkish employment-to-population ratio in the informal sector declined by about 2.3% after the influx of refugees. The negative effect was pronounced among disadvantaged Turkish laborers, including females and less-educated people, whose informal employment-to-population ratio declined by about 2.6% and 3.4%, respectively (Ceritoglu et al. 2017).

We primarily used micro data from the Turkish Household Labor Force Survey from 2010 to 2015 to estimate the impact of the refugee shock on the labor market outcomes of Turkish labor market participants. This dataset also allowed us to control for the employment status and individual demographic characteristics of the Turkish labor market participants. We obtained the refugee population across Turkish regions from Erdogan (2014). This study gathered data from Turkish government institutions and the UNHCR. Combining these two data sources, we calculated the refugee-to-population ratio and selected the five refugee-hosting regions with the highest number of refugees as treatment regions and four comparable regions with low refugee-to-population ratios as control regions to implement a difference-in-differences estimation. We thus compared the effects of the influx of Syrian refugees in the treatment regions with those in the control regions. Our findings suggest that the influx of Syrian refugees has indeed negatively affected the labor market outcomes of the Turkish people. For instance, our estimate indicates that a Turkish worker employed in the informal sector in one of the five main refugee-hosting regions (treatment group) was 3.9% more likely to leave his or her job than a worker in other regions (control group). We also found heterogeneous impacts by gender and age groups. Females tended to withdraw from the labor market whereas males tended to remain unemployed after the refugee shock. In addition, while younger Turkish workers in the regions in the treatment group became unemployed at a

higher rate, older Turkish workers in the regions in the treatment group were more likely to quit the labor market compared with the regions in the control group after the influx of Syrian refugees.

This paper contributes to the literature on the labor market effects of forced migration in many ways. First, it extends the body of quantitative literature on the Syrian refugee crisis by including the most recent data up to 2015 to capture the effect of the ongoing crisis. As the protracted crisis in Syria has escalated since 2014 and a substantial flow of refugees has poured into Turkey, the inclusion of the most recent data could change the magnitude of the impacts found in previous studies, which used data until 2014. We also divided the post-treatment period into two sub-periods: 2012 to 2013 and 2014 to 2015. Estimating the impact of the refugees in each sub-period allowed us to determine whether the magnitude of the impact of Syrian refugees differs between before and after the escalation of the protracted crisis. Second, we examined the heterogeneous impacts of the crisis on different age cohorts. Ruiz and Vargas-Silva (2013) pointed out that there are "winners" and "losers" from a refugee shock among host community members. The degree of substitutability between refugees and locals may differ across different segments of locals. For some groups of locals, refugees may complement the groups, improving their labor market outcomes, while, for other groups of locals, refugees may substitute the groups, worsening their labor market conditions (Ruiz and Vargas-Silva 2013). To this extent, we focused on the age group and gender of native Turkish labor market participants and investigated whether the degree of substitutability differs by demographic characteristics.

This paper proceeds as follows. Section 2 describes our empirical strategy, model, and data. Section 3 presents the findings, and the final section contains our conclusions.

2. METHOD

The impacts of an influx of migrants on natives are usually hard to identify due to the self-selection of migrants into the host regions. Migrants tend to choose regions with a thriving economy in their search for a better life. Therefore, regions with high migrant intensity and regions with low migrant intensity are systematically different in their economic characteristics and thus not comparable. To overcome the self-selection problem, it is possible to use a "natural experiment." In a natural experiment situation, the determination of the distribution of migrants occurs independently of the economic characteristics of regions. For instance, in the case of wars and conflicts, refugees choose their destination based on geographical proximity or the existence of refugee camps, not on the economic characteristics of regions, as their primary reason for leaving home is to escape from violence. This creates exogenous variation in the number of refugees across regions; thus, it is possible to identify the causal effect of the influx of refugees.

In this study, we examined a natural experiment that the Syrian conflict caused, adopting a difference-in-differences (DID) estimation methodology. In a DID framework, researchers construct treatment and control groups based on a difference in the level of exposure to an event. Other than the level of exposure to the event, the two groups must be comparable and have parallel trends in an outcome variable before the event happens. The assumption is thus that the trend in the outcome variable of the treatment group would have moved in parallel to that of the control group if the event had not happened. It is therefore possible to assume that the difference in the trends of the outcome variable before and after the event between the treatment and the control

group are the causal impact of the event on the treatment group (Angrist and Pischke 2009).

2.1 Data

To identify the effect of the refugee crisis on the Turkish labor market, we obtained data on the regional distribution of Syrian refugees in Turkey and the employment status of Turks before and after the crisis. In addition, we obtained the demographic characteristics of Turks, such as age, gender, and education, to identify potential heterogeneous impacts across different groups of Turkish people. We obtained data on the regional distribution of Syrian refugees from Erdogan (2014), who gathered Syrian refugee population data from the Disaster and Emergency Management Presidency (AFAD), Republic of Turkey Ministry of Interior, and UNHCR. These data include the number of Syrian refugees both in camps and outside camps in 81 statistical provinces. As of December 2014, there were 2,024,557 Syrian refugees in total (Table 1).

Table 1: Syrian Refugee Population in Turkey

	Level 2	Level 3	Province	Refugees	Subtotal	Total
Treatment	TR62	TR621	Adana	61,226	106,226	1,528,681
	TR62	TR622	Mersin	45,000		
	TR63	TR631	Hatay	204,735	287,547	
	TR63	TR632	Kahramanmaraş	61,215		
	TR63	TR633	Osmaniye	21,597		
	TRC1	TRC11	Gaziantep	253,328	373,260	
	TRC1	TRC12	Adıyaman	33,354		
	TRC1	TRC13	Kilis	86,578		
	TRC2	TRC21	Şanlıurfa	467,000	472,000	
	TRC2	TRC22	Diyarbakır	5,000		
	TRC3	TRC31	Mardin	78,858	289,648	
	TRC3	TRC32	Batman	20,000		
	TRC3	TRC33	Şırnak	190,090		
	TRC3	TRC34	Siirt	700		
Control	TRA1	TRA11	Erzurum	80	80	11,338
	TRA1	TRA12	Erzincan	0		
	TRA1	TRA13	Bayburt	0		
	TRA2	TRA21	Ağrı	100	145	
	TRA2	TRA22	Kars	45		
	TRA2	TRA23	Iğdır	0		
	TRA2	TRA24	Ardahan	0		
	TRB1	TRB11	Malatya	8,343	9,293	
	TRB1	TRB12	Elazığ	900		
	TRB1	TRB13	Bingöl	50		
	TRB1	TRB14	Tunceli	0		
	TRB2	TRB21	Van	600	1,820	
	TRB2	TRB22	Muş	670		
	TRB2	TRB23	Bitlis	400		
	TRB2	TRB24	Hakkari	150		
Others					484,538	484,538
Total						2,024,557

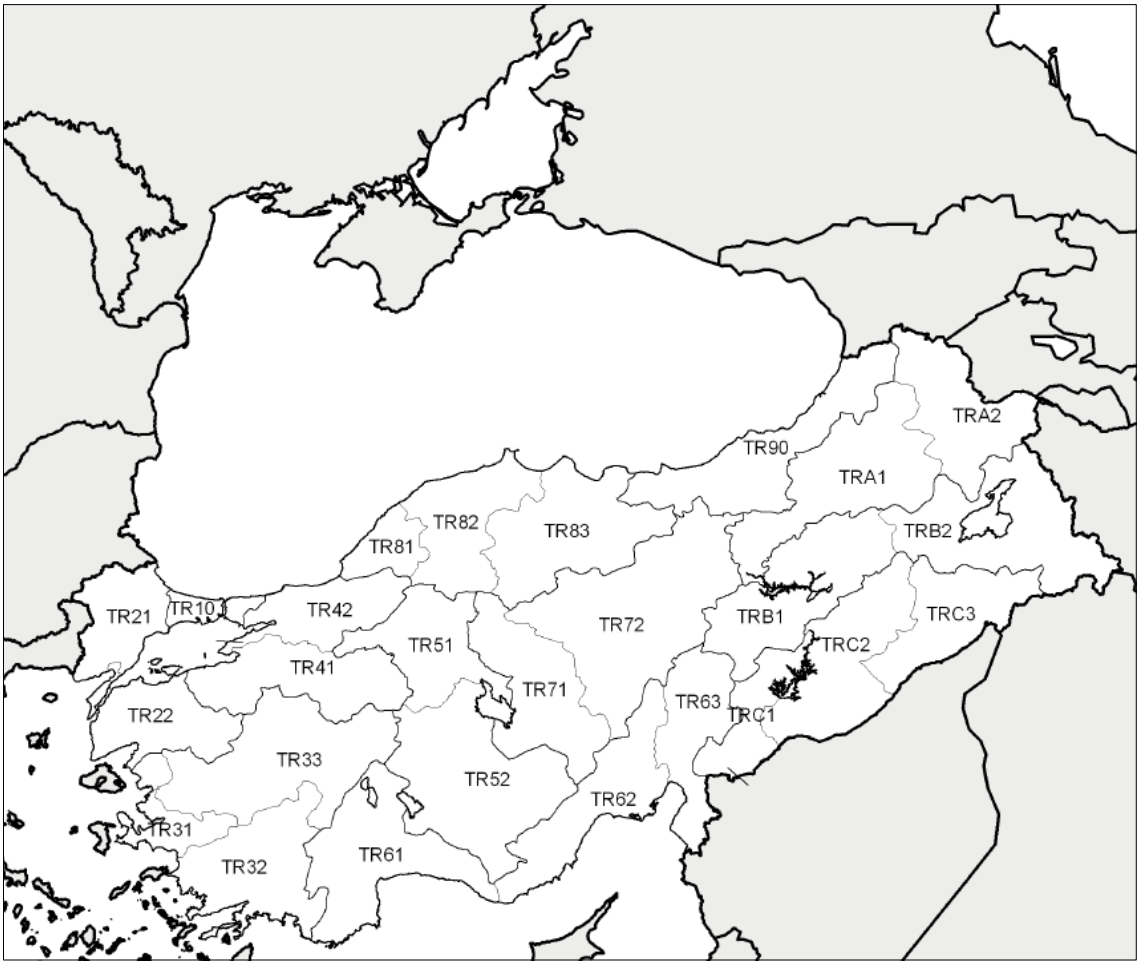
Note: The highlighted regions have refugee camps.

Source: Erdogan (2014).

This study used micro-level data on the labor market and demographic characteristics of Turks. We utilized the Turkish Household Labor Force Survey (HLFS), which is a repeated cross-section survey that the Turkish Statistical Institute (TURKSTAT) conducts annually, with a sample size of about 400,000 per year. The HLFS contains a rich set of variables, including employment status, age, gender, education, social security status in the workplace, and region of residence, recorded using the "Level 2" region classification (containing 26 sub-regions) (Turkish Statistical Institute [TURKSTAT], 2012). We used six consecutive waves of the HLFS, from 2010 to 2015, for the estimations.

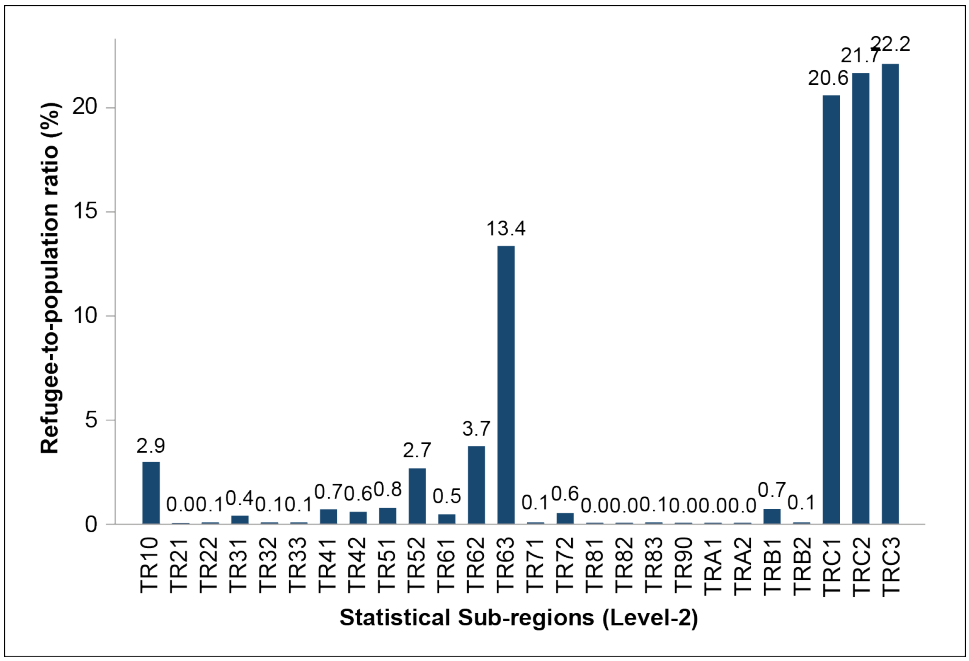
Figures 2 and 3, respectively, provide a map of the 26 statistical sub-regions and the refugee-to-native population ratio of each. The top five sub-regions regarding the refugee-to-population ratio are TRC1–3, all greater than 20%, and TR62 and TR63, with refugee-to-population ratios of 3.7% and 13.4%, respectively. These sub-regions are all in the southeast of Turkey, and TRC1–3 and TR63 border Syria (Figure 2).

Figure 2: 26 Statistical Sub-regions (Level 2)



Source: Eurostat (2008).

Figure 3: Refugee-to-Native Population Ratio



Source: The refugee population is from Erdogan (2014), and the native population is from the HLFS (2015).

From the 26 statistical sub-regions, we chose treatment and control sub-regions based on the intensity of the influx of Syrian refugees. We intended to compare the high-intensity sub-regions and the low-intensity sub-regions and identify the impact of the refugee shock. Ceritoglu et al. (2017) used two criteria to select treatment sub-regions: (i) being close to the Syrian border; and (ii) having a refugee-to-population ratio of 2% or above. Using the same criteria, we selected the five most refugee-hosting sub-regions (TR62, TR63, TRC1, TRC2, and TRC3) as treatment sub-regions and four comparable sub-regions that do not widely host refugees (TRA1, TRA2, TRB1, and TRB2) as control sub-regions. In December 2014, the treatment sub-regions hosted 1,528,681 refugees, while the control sub-regions had 11,338 refugees. The treatment sub-regions alone accounted for more than 75% of the total refugees in Turkey. As Table 2 shows, the demographic characteristics of the treatment and control sub-regions are comparable.

Four outcome variables were of interest: labor force participation, unemployment, informal employment, and formal employment. We classified employed individuals as being in formal employment if they were registered with the social security and as being in informal employment if not. Using HLFS data, we constructed dummy variables indicating whether an individual was employed, unemployed, or not participating in the labor force and, if employed, whether he or she was in the formal or the informal sector. Table 3 provides descriptive statistics of the employment status.

Table 2: Demographic Characteristics

	Treatment Region					
	Pre-treatment			Post-treatment		
Year	2010	2011	2012	2013	2014	2015
Female (%)	52.0	51.8	52.0	52.0	51.7	51.8
Age	34.6	34.9	35.2	35.5	35.2	35.3
Married (%)	64.5	64.0	63.5	63.9	64.1	63.7
High School (%)	22.1	23.4	23.6	24.6	23.3	24.2
Obs.	58,193	56,440	56,255	54,828	59,619	57,558
	Treatment Region (Male)					
Age	34.5	34.9	35.2	35.6	35.2	35.3
Married (%)	63.7	63.5	63.1	63.4	63.2	62.9
High School (%)	28.2	29.6	29.3	30.2	28.9	29.2
Obs.	27,961	27,177	26,986	26,323	28,805	27,771
	Treatment Region (Female)					
Age	34.6	34.8	35.2	35.4	35.2	35.4
Married (%)	65.2	64.5	63.9	64.3	64.9	64.5
High School (%)	16.4	17.6	18.3	19.5	18.2	19.6
Obs.	30,232	29,263	29,269	28,505	30,814	29,787
	Control Region					
	Pre-treatment			Post-treatment		
Year	2010	2011	2012	2013	2014	2015
Female (%)	52.1	51.1	51.0	51.0	50.8	50.7
Age	34.0	34.1	34.4	34.5	34.7	34.7
Married (%)	64.4	63.5	63.3	62.8	62.3	63.1
High School (%)	21.6	23.2	26.1	24.8	22.9	23.3
Obs.	33,683	32,660	31,140	31,314	44,298	42,571
	Control Region (Male)					
Age	34.3	34.2	34.5	34.4	34.8	34.8
Married (%)	63.4	62.0	62.1	61.5	60.8	61.3
High School (%)	30.2	30.9	33.5	32.1	30.2	30.2
Obs.	16,141	15,978	15,274	15,351	21,784	21,008
	Control Region (Female)					
Age	33.8	34.1	34.3	34.5	34.6	34.6
Married (%)	65.3	64.9	64.4	64.1	63.7	64.9
High School (%)	13.7	15.9	19.0	17.8	15.9	16.5
Obs.	17,542	16,682	15,866	15,963	22,514	21,563

Source: The author calculated the mean values for the corresponding individual-level characteristics using the HLFS.

Table 3: Labor Market Outcomes of Turkish People

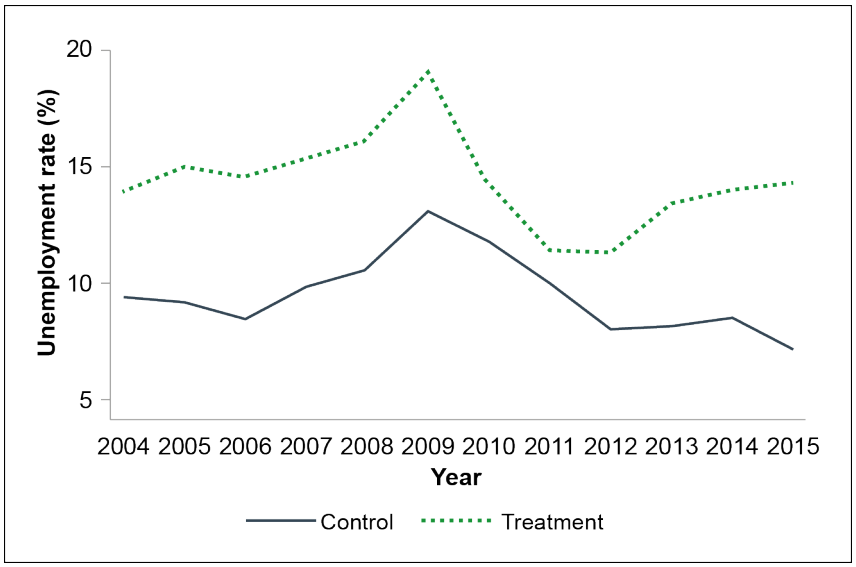
	Treatment Region					
	Pre-treatment			Post-treatment		
Year	2010	2011	2012	2013	2014	2015
Employment/population (%)	39.0	39.9	38.8	39.8	39.9	40.2
Formal employment/population (%)	16.7	18.4	19.6	21.7	20.7	22.1
Informal employment/population (%)	22.2	21.5	19.2	18.1	19.2	18.1
Unemployment/population (%)	6.7	5.4	5.1	6.2	6.3	6.5
Labor force/population (%)	45.6	45.3	43.9	45.9	46.3	46.7
	Treatment Region (Male)					
Employment/population (%)	61.3	62.9	62.0	62.3	62.5	62.3
Formal employment/population (%)	29.2	31.9	34.0	37.0	35.9	37.5
Informal employment/population (%)	32.1	31.0	28.0	25.3	26.6	24.8
Unemployment/population (%)	10.4	8.3	8.0	9.3	10.0	10.0
Labor force/population (%)	71.7	71.3	70.0	71.6	72.4	72.3
	Treatment Region (Female)					
Employment/population (%)	18.3	18.4	17.5	18.9	18.9	19.6
Formal employment/population (%)	5.2	5.8	6.4	7.5	6.5	7.7
Informal employment/population (%)	13.1	12.6	11.1	11.5	12.3	11.9
Unemployment/population (%)	3.2	2.7	2.4	3.3	3.0	3.3
Labor force/population (%)	21.6	21.1	19.9	22.2	21.8	22.9
	Control Region					
	Pre-treatment			Post-treatment		
Year	2010	2011	2012	2013	2014	2015
Employment/population (%)	44.0	45.8	46.3	47.7	49.8	49.9
Formal employment/population (%)	15.9	18.1	19.9	20.2	18.9	19.7
Informal employment/population (%)	28.1	27.8	26.4	27.5	30.9	30.2
Unemployment/population (%)	5.8	5.0	4.1	4.4	4.2	3.5
Labor force/population (%)	49.8	50.9	50.4	52.1	54.0	53.4
	Control Region (Male)					
Employment/population (%)	65.3	67.2	67.0	67.3	68.2	68.0
Formal employment/population (%)	28.4	31.5	34.0	34.0	32.5	33.6
Informal employment/population (%)	36.9	35.8	33.1	33.3	35.7	34.4
Unemployment/population (%)	9.8	8.4	6.6	6.8	6.7	5.6
Labor force/population (%)	75.2	75.6	73.7	74.1	75.0	73.5
	Control Region (Female)					
Employment/population (%)	24.4	25.3	26.4	28.8	32.0	32.3
Formal employment/population (%)	4.3	5.2	6.4	6.9	5.8	6.2
Informal employment/population (%)	20.1	20.1	20.0	21.9	26.2	26.1
Unemployment/population (%)	2.0	1.8	1.6	2.0	1.7	1.4
Labor force/population (%)	26.4	27.1	28.0	30.8	33.7	33.7

Source: The author calculated the mean values for the corresponding individual-level characteristics using HLFS.

2.2 Identification

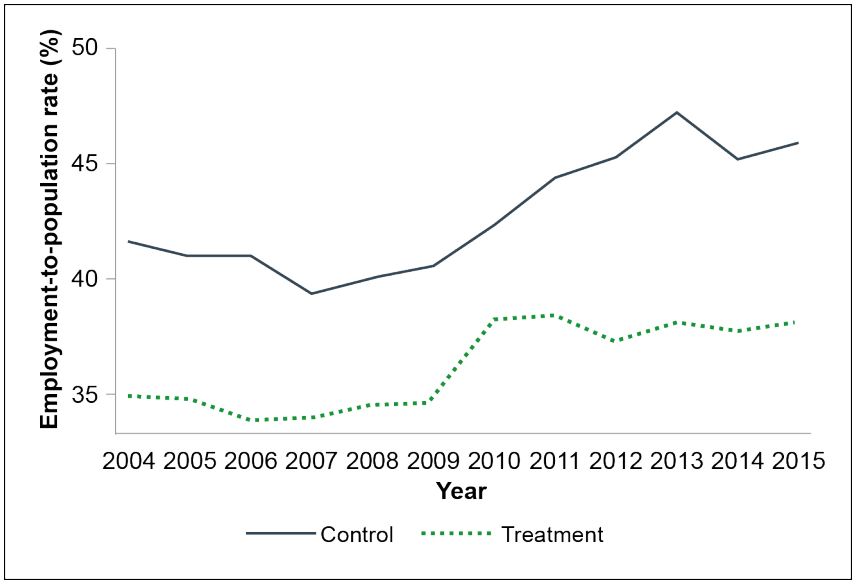
Difference-in-differences estimations require parallel trends in the outcome variables between the treatment and the control sub-regions. Figures 4, 5, and 6 show the trends in the unemployment rate, employment-to-population ratio, and labor force participation ratio, respectively. As is apparent, the treatment and control regions generally show parallel trends before the onset of the Syrian refugee crisis. Therefore, by comparing the differences in the trends of employment status in the treatment and control regions, we were able to isolate the impact of the refugee influx from any other macroeconomic shock that was common to both regions.

Figure 4: Unemployment Rate



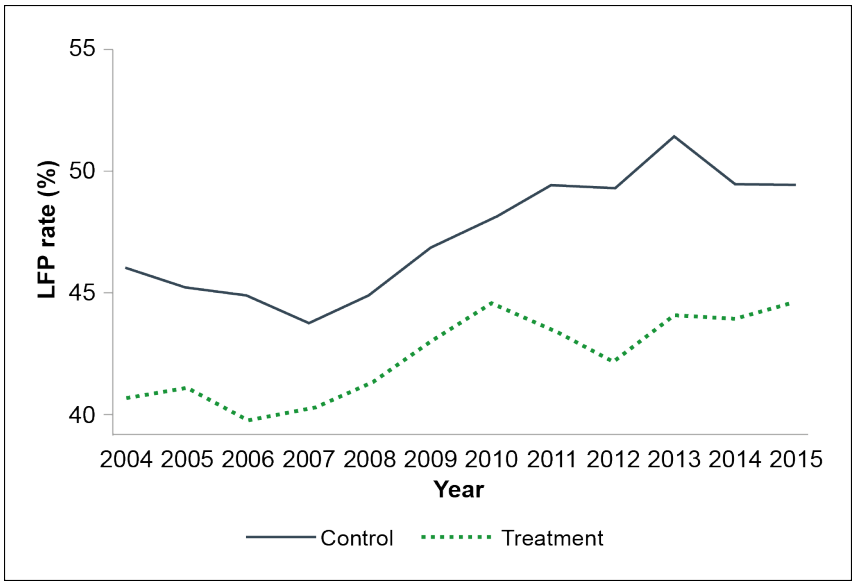
Source: The author calculated the unemployment rate using the HLFS.

Figure 5: Employment-to-Population Ratio



Source: The author calculated the employment-to-population ratio using the HLFS.

Figure 6: Labor Force Participation Ratio



Source: The author calculated the labor force participation rate using the HLFS.

Firstly, we estimated basic difference-in-differences models, with 2010–2011 as the pre-treatment period and 2012–2015 as the post-treatment period, using the abovementioned repeated cross-section data from 2010 to 2015. These models extended the post-treatment period by two years compared with the models in Ceritoglu et al. (2017). The estimation models that include individual control variables ($\boldsymbol{X}_{ijt}$) take the following form:

$$y_{ijt} = \alpha + \varphi_j + \phi_t + \beta\left(R_j \cdot T_t\right) + \boldsymbol{\pi}'\boldsymbol{X}_{ijt} + \varepsilon_{ijt} \quad (1)$$

with *y* indicating the employment status for individual *i* in region *j* in year *t*. We used four dummy variables indicating informal employment, formal employment, labor force participation, and unemployment separately as dependent variables. R_j indicates the treatment status of region *j*, and T_t indicates pre- or post-treatment in year *t*. We included year (ϕ_t) and region fixed-effect terms (φ_j) to control for unobserved temporal and regional effects, respectively. The individual control variables ($\boldsymbol{X}_{ijt}$) include gender, marital status, age, and level of education (whether an individual completed high school or above). The coefficient of interest is β, which captures the causal impact of the refugee influx on the outcome variables.

Secondly, to determine whether the magnitude of the impact of the refugee influx changed over time, we divided the post-treatment period into two shorter periods, 2012–2013 and 2014–2015. In fact, as Figure 1 shows, the incremental change in the number of registered refugees accelerated after 2014. Thus, we may notice a bigger impact in 2014–2015 than in 2012–2013 due to the intensive influx of refugees in 2014–2015. To investigate this hypothesis, we estimated the following models:

$$y_{ijt} = \alpha + \varphi_j + \phi_t + \beta\left(R_j \cdot T1_t\right) + \gamma\left(R_j \cdot T2_t\right) + \boldsymbol{\pi}'\boldsymbol{X}_{ijt} + \varepsilon_{ijt} \quad (2)$$

with $T1_t$ and $T2_t$ indicating 2012–2013 and 2014–2015, respectively. We compared the magnitude of the estimates of β and γ in (2) and identified the period with a bigger impact.

Finally, this work identified heterogeneous impacts across different groups of native Turkish people. Along with a regression using all individuals, we divided the sample based on gender, education, and age and estimated each separately. Specifically, we divided the sample into two education groups (less than high school and high school or above) and four age cohorts aged from 20 to 59 based on 10-year intervals (Table 4). The separate regressions by age cohorts take the following forms:

$$y_{ijt}^{k} = \alpha + \varphi_j + \phi_t + \beta\left(R_j \cdot T_t\right) + \boldsymbol{\pi}' \boldsymbol{X}_{\boldsymbol{ijt}}^{\boldsymbol{k}} + \varepsilon_{ijt}^{k} \quad (3)$$

with *k* indicating one of cohorts 1–4. We separately estimated (3) for each of the four cohorts. If the size of the estimates of β differs across cohorts, we can interpret it as indicating that the substitutability of natives with refugees differs between different age cohorts.

Table 4: Age Cohorts

	Cohort 1		Cohort 2		Cohort 3		Cohort 4	
2015	20	29	30	39	40	49	50	59
2014	19	28	29	38	39	48	49	58
2013	18	27	28	37	38	47	48	57
2012	17	26	27	36	37	46	47	56
2011	16	25	26	35	36	45	46	55
2010	15	24	25	34	35	44	45	54
Obs.	144,238		124,650		108,344		83,892	

3. RESULTS

3.1 Findings

Tables 5 to 8 present the results for the impact of Syrian refugees on the labor market outcomes of Turks. Overall, the influx of Syrian refugees appears to have adversely affected host-country Turks. Table 5 shows that Syrian refugees reduced the likelihood of Turks having an informal job in the treatment regions compared with the control regions, with pronounced adverse effects among females and less-educated workers. Regarding labor force participation, Turkish people generally withdrew from the labor market. In particular, as Table 6 shows, females and less-educated workers in the refugee-hosting regions were likely to leave the labor market after the influx of Syrian refugees. Contrary to our intuition, males were more likely to join the labor market in the treatment regions compared with the control regions, with a 1.4% increase for males in general and a 2.4% increase for higher-educated males. Moreover, the presence of refugees appears to have increased the likelihood of Turks being unemployed in the refugee-hosting regions (Table 7), with males being the most severely affected, experiencing a 2.9% increase. Further, although the magnitude is small, Table 8 suggests that the influx of Syrian refugees increased the likelihood of Turks being employed in the formal sector. This positive effect is pronounced among males, with a 1.5% increase.

Table 5: Informal Employment

	Total	Male	Female	Low Ed.	High Ed.
Treat_after	–0.039***	–0.029***	–0.049***	–0.050***	–0.009**
	[–15.90]	[–7.51]	[–16.09]	[–16.82]	[–2.32]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.081	0.067	0.057	0.073	0.027
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after	–0.037***	–0.009	–0.059***	–0.017***	
	[–7.58]	[–1.48]	[–16.58]	[–3.71]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.029	0.010	0.050	0.013	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 6: Labor Force Participation

	Total	Male	Female	Low Ed.	High Ed.
Treat_after	–0.015***	0.014***	–0.044***	–0.026***	0.015***
	[–6.10]	[4.11]	[–12.67]	[–9.18]	[2.84]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.273	0.129	0.065	0.279	0.169
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after	0.010**	0.024***	–0.056***	–0.002	
	[2.42]	[4.05]	[–15.03]	[–0.16]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.127	0.121	0.046	0.023	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 7: Unemployment

	Total	Male	Female	Low Ed.	High Ed.
Treat_after	0.016***	0.029***	0.004***	0.015***	0.019***
	[12.35]	[11.95]	[3.70]	[10.84]	[5.93]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R–squared	0.029	0.011	0.041	0.036	0.027
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after	0.034***	0.016***	0.000	0.025***	
	[11.71]	[3.87]	[0.25]	[4.64]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.010	0.028	0.009	0.029	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 8: Formal Employment

	Total	Male	Female	Low Ed.	High Ed.
Treat_after	0.008***	0.015***	0.000	0.008***	0.005
	[3.83]	[4.19]	[0.28]	[4.35]	[0.94]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.252	0.199	0.169	0.155	0.148
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after	0.013***	0.017**	0.003**	–0.010	
	[3.30]	[2.41]	[2.52]	[–1.12]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.101	0.163	0.008	0.018	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Comparing the results of Ceritoglu et al. (2017) with our study based on more recent data, we found that, while our estimates have similar signs, the magnitude of our estimates is larger. This might suggest that the large-scale inflow of Syrian refugees in 2014 and 2015 has compounded the effects on the labor market in the bordering regions. Tables 9 to 12 present the results from the regressions with the two post-treatment periods, 2012–2013 and 2014–2015. Overall, the estimates of the impact in 2014–2015 are larger than those in 2012–2013. Table 9 shows that the impact of Syrian refugees on informal employment was –5.1% in 2014–2015 and –2.5% in 2012–2013. Furthermore, Table 11 suggests that the impact on unemployment was 2.3% in 2014–2015 but 0.9% in 2012–2013.

Table 9: Informal Employment (with Two Treatment Periods)

	Total	**Male**	**Female**	**Low Ed.**	**High Ed.**
Treat_after2012_2013	–0.025***	–0.020***	–0.029***	–0.036***	0.006
	[–8.50]	[–4.35]	[–7.97]	[–10.43]	[1.26]
Treat_after2014_2015	–0.051***	–0.037***	–0.066***	–0.060***	–0.023***
	[–18.42]	[–8.49]	[–18.99]	[–18.11]	[–4.98]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.081	0.067	0.057	0.073	0.027
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after2012_2013	–0.034***	0.008	–0.038***	–0.003	
	[–5.77]	[1.19]	[–9.00]	[–0.64]	
Treat_after2014_2015	–0.040***	–0.023***	–0.075***	–0.029***	
	[–7.33]	[–3.54]	[–18.78]	[–5.48]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.029	0.011	0.051	0.013	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 10: Labor Force Participation (with Two Treatment Periods)

	Total	Male	Female	Low Ed.	High Ed.
Treat_after2012_2013	–0.012***	0.008*	–0.030***	–0.019***	0.004
	[–4.07]	[1.92]	[–7.27]	[–5.49]	[0.65]
Treat_after2014_2015	–0.018***	0.019***	–0.056***	–0.032***	0.025***
	[–6.33]	[4.96]	[–14.09]	[–10.00]	[4.13]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.273	0.129	0.065	0.279	0.169
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after2012_2013	0.005	0.013*	–0.038***	–0.007	
	[0.98]	[1.88]	[–8.62]	[–0.64]	
Treat_after2014_2015	0.015***	0.034***	–0.070***	0.004	
	[3.04]	[5.00]	[–16.62]	[0.32]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.127	0.121	0.046	0.023	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 11: Unemployment (with Two Treatment Periods)

	Total	Male	Female	Low Ed.	High Ed.
Treat_after2012_2013	0.009***	0.017***	0.000	0.009***	0.006
	[5.58]	[6.30]	[0.31]	[5.65]	[1.55]
Treat_after2014_2015	0.023***	0.038***	0.008***	0.020***	0.031***
	[15.37]	[14.17]	[5.73]	[12.78]	[8.55]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.029	0.011	0.041	0.037	0.028
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after2012_2013	0.023***	0.004	–0.001	0.010	
	[6.78]	[0.77]	[–1.24]	[1.55]	
Treat_after2014_2015	0.043***	0.026***	0.002	0.039***	
	[13.32]	[5.76]	[1.42]	[6.46]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.010	0.029	0.009	0.029	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 12: Formal Employment (with Two Treatment Periods)

	Total	Male	Female	Low Ed.	High Ed.
Treat_after2012_2013	–0.025***	–0.020***	–0.029***	–0.036***	0.006
	[–8.50]	[–4.35]	[–7.97]	[–10.43]	[1.26]
Treat_after2014_2015	–0.051***	–0.037***	–0.066***	–0.060***	–0.023***
	[–18.42]	[–8.49]	[–18.99]	[–18.11]	[–4.98]
Year FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.081	0.067	0.057	0.073	0.027
Observations	558,559	270,559	288,000	427,060	131,499
	Male Low Ed.	**Male High Ed.**	**Female Low Ed.**	**Female High Ed.**	
Treat_after2012_2013	–0.034***	0.008	–0.038***	–0.003	
	[–5.77]	[1.19]	[–9.00]	[–0.64]	
Treat_after2014_2015	–0.040***	–0.023***	–0.075***	–0.029***	
	[–7.33]	[–3.54]	[–18.78]	[–5.48]	
Year FE	Yes	Yes	Yes	Yes	
Region FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	
R-squared	0.029	0.011	0.051	0.013	
Observations	189,562	80,997	237,498	50,502	

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Tables 13 to 16 present the results from the regressions by age cohort. It is evident that the influx of Syrian refugees has exerted a heterogeneous impact on Turks across different age, gender, and education groups. As Table 13 suggests, it has affected females and less-educated Turks more than males and higher-educated Turks. The negative and relatively large estimates imply that females and less-educated Turks left informal employment after the influx of refugees. Moreover, Tables 14 and 15 suggest that the response to the refugee influx has been different across ages and genders. Overall, while younger cohorts have tended to remain unemployed, older cohorts have exited the labor market, and, while males have remained unemployed, females have tended to exit the labor market.

3.2 Discussion

Overall, our results show that Syrian refugees have negatively affected the Turkish labor market, as it appears that, in the refugee-hosting regions, some Turks who were previously employed in informal sectors left their job. The negative impacts in the informal sectors have been especially pronounced among females and less-educated workers. Further, we found that labor force participation decreased and unemployment increased for the total sample after the influx of Syrian refugees.

Table 13: Informal Employment by Generation

		Total	Male	Female	Low Ed.	High Ed.
Cohort 1	Treat_after	–0.043***	–0.020***	–0.066***	–0.072***	–0.002
		[–9.77]	[–2.71]	[–12.93]	[–12.82]	[–0.25]
	R-squared	0.093	0.064	0.042	0.095	0.035
	Observations	144,238	69,159	75,079	95,773	48,465
Cohort 2	Treat_after	–0.054***	–0.028***	–0.077***	–0.078***	–0.005
		[–10.76]	[–3.50]	[–12.37]	[–11.84]	[–0.66]
	R-squared	0.104	0.113	0.076	0.093	0.031
	Observations	124,650	58,454	66,196	84,454	40,196
Cohort 3	Treat_after	–0.049***	–0.046***	–0.056***	–0.053***	–0.025***
		[–8.43]	[–5.41]	[–7.19]	[–7.73]	[–2.75]
	R-squared	0.089	0.107	0.079	0.067	0.014
	Observations	108,344	53,171	55,173	86,830	21,514
Cohort 4	Treat_after	–0.034***	–0.022**	–0.046***	–0.036***	–0.011
		[–5.09]	[–2.18]	[–5.14]	[–4.80]	[–0.90]
	R-squared	0.082	0.072	0.068	0.074	0.024
	Observations	83,892	41,779	42,113	70,422	13,470
	Year FE	Yes	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes	Yes

		Male Low Ed.	Male High Ed.	Female Low Ed.	Female High Ed.
Cohort 1	Treat_after	–0.039***	0.009	–0.098***	–0.019**
		[–4.01]	[0.76]	[–15.22]	[–2.56]
	R-squared	0.029	0.007	0.041	0.015
	Observations	42,844	26,315	52,929	22,150
Cohort 2	Treat_after	–0.044***	–0.005	–0.096***	–0.007
		[–3.73]	[–0.52]	[–12.59]	[–0.85]
	R-squared	0.040	0.016	0.065	0.013
	Observations	33,637	24,817	50,817	15,379
Cohort 3	Treat_after	–0.052***	–0.024**	–0.057***	–0.032***
		[–4.71]	[–2.04]	[–6.69]	[–2.68]
	R-squared	0.040	0.013	0.068	0.013
	Observations	38,451	14,720	48,379	6,794
Cohort 4	Treat_after	–0.022*	–0.007	–0.047***	–0.034*
		[–1.82]	[–0.47]	[–4.96]	[–1.91]
	R-squared	0.033	0.019	0.063	0.025
	Observations	31,844	9,935	38,578	3,535
	Year FE	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 14: Labor Force Participation by Generation

		Total	Male	Female	Low Ed.	High Ed.
Cohort 1	Treat_after	–0.001	0.057***	–0.056***	–0.025***	0.029***
		[–0.11]	[7.95]	[–9.07]	[–4.46]	[3.06]
	R–squared	0.251	0.195	0.110	0.294	0.194
	Observations	144,238	69,159	75,079	95,773	48,465
Cohort 2	Treat_after	–0.028***	0.019***	–0.067***	–0.044***	0.004
		[–6.03]	[4.11]	[–9.08]	[–7.82]	[0.53]
	R-squared	0.429	0.066	0.122	0.446	0.263
	Observations	124,650	58,454	66,196	84,454	40,196
Cohort 3	Treat_after	–0.023***	0.002	–0.051***	–0.028***	0.003
		[–4.55]	[0.39]	[–5.94]	[–4.93]	[0.35]
	R-squared	0.419	0.065	0.088	0.412	0.291
	Observations	108,344	53,171	55,173	86,830	21,514
Cohort 4	Treat_after	–0.043***	–0.028***	–0.057***	–0.042***	–0.045***
		[–6.66]	[–3.32]	[–6.08]	[–5.96]	[–2.88]
	R-squared	0.289	0.071	0.059	0.285	0.241
	Observations	83,892	41,779	42,113	70,422	13,470
	Year FE	Yes	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes	Yes

		Male Low Ed.	Male High Ed.	Female Low Ed.	Female High Ed.
Cohort 1	Treat_after	0.042***	0.071***	–0.082***	–0.019
		[4.79]	[5.58]	[–11.94]	[–1.40]
	R-squared	0.194	0.202	0.052	0.139
	Observations	42,844	26,315	52,929	22,150
Cohort 2	Treat_after	0.028***	0.009	–0.088***	0.002
		[4.12]	[1.45]	[–10.92]	[0.09]
	R-squared	0.065	0.066	0.069	0.071
	Observations	33,637	24,817	50,817	15,379
Cohort 3	Treat_after	0.007	–0.007	–0.060***	0.015
		[1.08]	[–1.06]	[–6.73]	[0.54]
	R-squared	0.066	0.033	0.071	0.022
	Observations	38,451	14,720	48,379	6,794
Cohort 4	Treat_after	–0.024**	–0.036**	–0.055***	–0.100***
		[–2.47]	[–2.13]	[–5.68]	[–2.68]
	R-squared	0.068	0.087	0.062	0.065
	Observations	31,844	9,935	38,578	3,535
	Year FE	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 15: Unemployment by Generation

		Total	Male	Female	Low Ed.	High Ed.
Cohort 1	Treat_after	0.036***	0.057***	0.018***	0.031***	0.040***
		[12.74]	[11.12]	[6.18]	[9.83]	[6.22]
	R-squared	0.038	0.017	0.061	0.052	0.027
	Observations	144,238	69,159	75,079	95,773	48,465
Cohort 2	Treat_after	0.019***	0.030***	0.009***	0.024***	0.008
		[6.27]	[5.46]	[3.05]	[6.79]	[1.37]
	R-squared	0.034	0.021	0.048	0.053	0.034
	Observations	124,650	58,454	66,196	84,454	40,196
Cohort 3	Treat_after	0.011***	0.026***	–0.005*	0.011***	0.008
		[3.65]	[5.01]	[–1.90]	[3.30]	[1.39]
	R-squared	0.027	0.017	0.022	0.037	0.016
	Observations	108,344	53,171	55,173	86,830	21,514
Cohort 4	Treat_after	–0.001	0.006	–0.008***	0.001	–0.012*
		[–0.36]	[1.13]	[–4.35]	[0.45]	[–1.79]
	R-squared	0.030	0.015	0.012	0.035	0.016
	Observations	83,892	41,779	42,113	70,422	13,470
	Year FE	Yes	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes	Yes

		Male Low Ed.	Male High Ed.	Female Low Ed.	Female High Ed.
Cohort 1	Treat_after	0.060***	0.042***	0.007***	0.036***
		[9.41]	[4.70]	[3.15]	[3.98]
	R-squared	0.018	0.021	0.017	0.039
	Observations	42,844	26,315	52,929	22,150
Cohort 2	Treat_after	0.056***	–0.001	0.004*	0.025**
		[6.93]	[–0.18]	[1.67]	[2.56]
	R-squared	0.014	0.032	0.015	0.043
	Observations	33,637	24,817	50,817	15,379
Cohort 3	Treat_after	0.031***	0.014**	–0.005**	–0.001
		[4.55]	[2.05]	[–2.32]	[–0.10]
	R-squared	0.010	0.013	0.014	0.029
	Observations	38,451	14,720	48,379	6,794
Cohort 4	Treat_after	0.010	–0.008	–0.006***	–0.026**
		[1.62]	[–0.94]	[–3.42]	[–2.49]
	R-squared	0.013	0.015	0.009	0.021
	Observations	31,844	9,935	38,578	3,535
	Year FE	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

Table 16: Formal Employment by Generation

		Total	Male	Female	Low Ed.	High Ed.
Cohort 1	Treat_after	0.006*	0.020***	–0.007**	0.016***	–0.009
		[1.92]	[3.73]	[–2.35]	[5.29]	[–1.20]
	R-squared	0.187	0.193	0.166	0.120	0.153
	Observations	144,238	69,159	75,079	95,773	48,465
Cohort 2	Treat_after	0.007	0.017**	0.001	0.011**	0.001
		[1.64]	[2.14]	[0.24]	[2.34]	[0.06]
	R-squared	0.344	0.200	0.248	0.231	0.136
	Observations	124,650	58,454	66,196	84,454	40,196
Cohort 3	Treat_after	0.016***	0.022***	0.010**	0.014***	0.019
		[3.31]	[2.61]	[2.36]	[2.82]	[1.52]
	R-squared	0.373	0.191	0.238	0.249	0.172
	Observations	108,344	53,171	55,173	86,830	21,514
Cohort 4	Treat_after	–0.007	–0.012	–0.004	–0.007	–0.022
		[–1.42]	[–1.26]	[–1.10]	[–1.29]	[–1.22]
	R-squared	0.250	0.114	0.112	0.165	0.173
	Observations	83,892	41,779	42,113	70,422	13,470
	Year FE	Yes	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes	Yes

		Male Low Ed.	Male High Ed.	Female Low Ed.	Female High Ed.
Cohort 1	Treat_after	0.020***	0.020*	0.009***	–0.036***
		[3.24]	[1.89]	[4.23]	[–3.42]
	R-squared	0.127	0.214	0.023	0.100
	Observations	42,844	26,315	52,929	22,150
Cohort 2	Treat_after	0.016	0.016	0.005*	–0.017
		[1.52]	[1.31]	[1.78]	[–0.99]
	R-squared	0.093	0.082	0.022	0.026
	Observations	33,637	24,817	50,817	15,379
Cohort 3	Treat_after	0.028***	0.003	0.003	0.048*
		[2.70]	[0.19]	[0.95]	[1.75]
	R-squared	0.078	0.034	0.010	0.010
	Observations	38,451	14,720	48,379	6,794
Cohort 4	Treat_after	–0.012	–0.021	–0.002	–0.040
		[–1.13]	[–1.03]	[–0.88]	[–1.15]
	R-squared	0.035	0.089	0.006	0.045
	Observations	31,844	9,935	38,578	3,535
	Year FE	Yes	Yes	Yes	Yes
	Region FE	Yes	Yes	Yes	Yes
	Controls	Yes	Yes	Yes	Yes

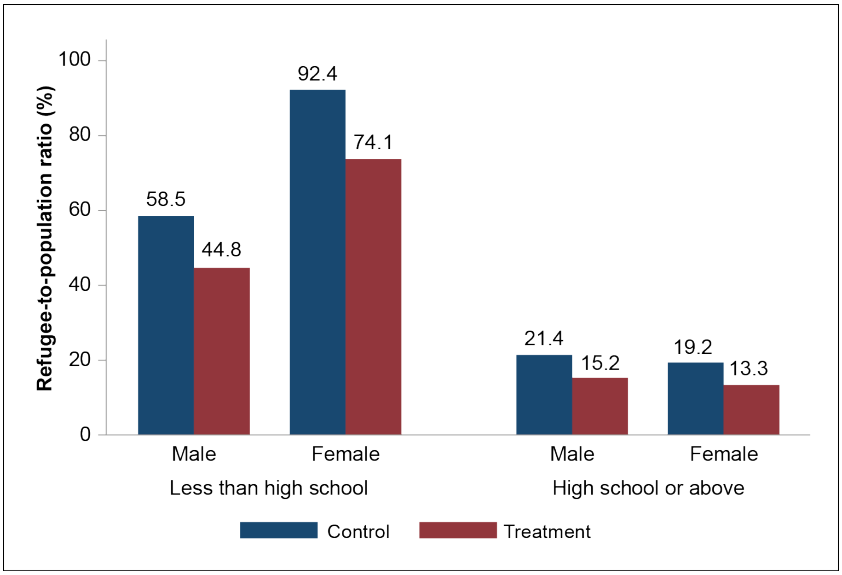
* p<0.10, ** p<0.05, *** p<0.01.

Note: The numbers in parentheses are t-values.

We also discovered that the influx affected Turks heterogeneously, by gender, age, and level of education. Our results suggest that males and females responded differently to the influx of refugees, with male labor force participation increasing and some remaining unemployed and female labor force participation decreasing, as they exited the labor market. Furthermore, it appears that, while younger cohorts experienced an increase in the likelihood of being unemployed, older cohorts experienced a decrease in the likelihood of participating in the labor market. Younger Turks who lost their job seem to have remained in the labor market, whereas older Turks have exited the labor market entirely.

It is possible to explain the pronounced negative impact on less-educated workers and females by the fierce competition between those groups and Syrian refugees in the informal sector. Since Syrian refugees had no work permit as of 2015, they had no choice but to work in the informal sector. As explained in section 2.1, the study used social security as the measurement criterion for informality. Using the same criterion, Tansel and Acar (2017) analyzed the possibility of transition across formal/informal sectors in Turkey. They found that the formal salaried state is more stable than the other states and that mobility into the formal salaried state is very restricted. It seems to be difficult to enter the formal labor market for native informal laborers when Syrian refugees have replaced them. As Figure 7 shows, informal employment is prevalent among less-educated Turks: 44.8% (58.5%) of the male workforce and 74.1% (92.4%) of the female workforce without a high school diploma are in the informal sector in the treatment (control) sub-regions, whereas only 15.2% (21.4%) of the male workforce and 13.3% (19.2%) of the female workforce with a high school diploma or above are in the informal sector in the treatment (control) sub-regions. Moreover, as Figure 7 and Table 2 indicate, females are less educated and more likely to work in the informal sector than males. Only 19.6% (16.5%) of females are high school graduates, whereas 29.2% (30.2%) of males are high school graduates in the treatment (control) sub-regions in 2015. As a result, Syrian refugees may have competed especially with female and less-educated Turks for informal jobs.

Figure 7: Informal Employment-to-Labor Force Ratio



Source: The author calculated the informal-to-labor force ratio using the HLFS.

Furthermore, socio-cultural barriers in the Turkish society seem to have prompted females to withdraw from the labor market after the Syrian refugee shock. Women's weak attachment to the labor market is one of the major characteristics of the labor market in Turkey. The labor force participation rate of females is only 22.9% (33.7%) while that of males is 72.3% (73.5%) in the treatment (control) sub-regions in 2015 (Table 3). Previous studies have pointed out that the social role of women and the influence of the patriarchal society play a significant role in deterring women's labor force participation (Atasoy 2017; T.R. Prime Ministry, State Planning Organization, and World Bank 2009). Traditionally, the Turkish population views domestic chores and childcare/elderly care as female duties. While women may be able to outsource their household duties to housekeepers, they will not participate in the labor market when the market wage level is below their reservation wage, which is equivalent to their total value of housework. As the influx of Syrian refugees seems to have put downward pressure on the market wage, women whose wage declined to the level of their reservation wage may have decided to leave the labor market. Additionally, the influx of Syrian refugees may have created a sense of worsening peace and security among host community members. This perception may have prompted household heads to take working females out of workplaces to protect them from the perceived danger.

We can associate the different responses to the refugee shock between younger cohorts and older cohorts with the physical, labor-intensive market structure in the informal sector. Older workers may have withdrawn from the labor market because employers may prefer young refugees to older Turks in the informal, physical, labor-intensive sector. This could have a significant impact, since physical, labor-intensive agriculture is the largest employer in the informal sector. Table 17 shows the occupational distribution of the treatment and control sub-regions based on the International Standard Classification of Occupations 08 (ISCO 08) (International Labour Organization [ILO] 2012). In the informal sector, the total proportion of agricultural workers (Codes 61, 62, 63, and 92) is 58.3%. They are likely to have competed severely for jobs with Syrian refugees. As the physical labor sector could prefer older workers less, once they lose the competition and leave their workplace, they will be discouraged from finding jobs again and exit the labor market entirely.

Table 17: Occupational Distribution Based on ISCO 08 (2015)

Occupation Code	Occupation	Formal	Share (%)	Informal	Share (%)
1	Managers	1,403	6.6	340	1.5
2	Professionals	3,263	15.5	107	0.5
3	Technicians and Associate Professionals	1,329	6.3	159	0.7
4	Clerical Support Workers	1,675	7.9	160	0.7
5	Services and Sales Workers	4,316	20.5	3,723	16.0
6	Skilled Agricultural, Forestry, and Fishery Workers	1,667	7.9	11,895	51.1
7	Craft and Related Trades Workers	2,734	13.0	2,395	10.3
8	Plant and Machine Operators and Assemblers	2,022	9.6	863	3.7
9	Elementary Occupations	2,694	12.8	3,621	15.6
Total		21,103	100.0	23,263	100.0

Note: The calculation used observations from the treatment and control sub-regions.

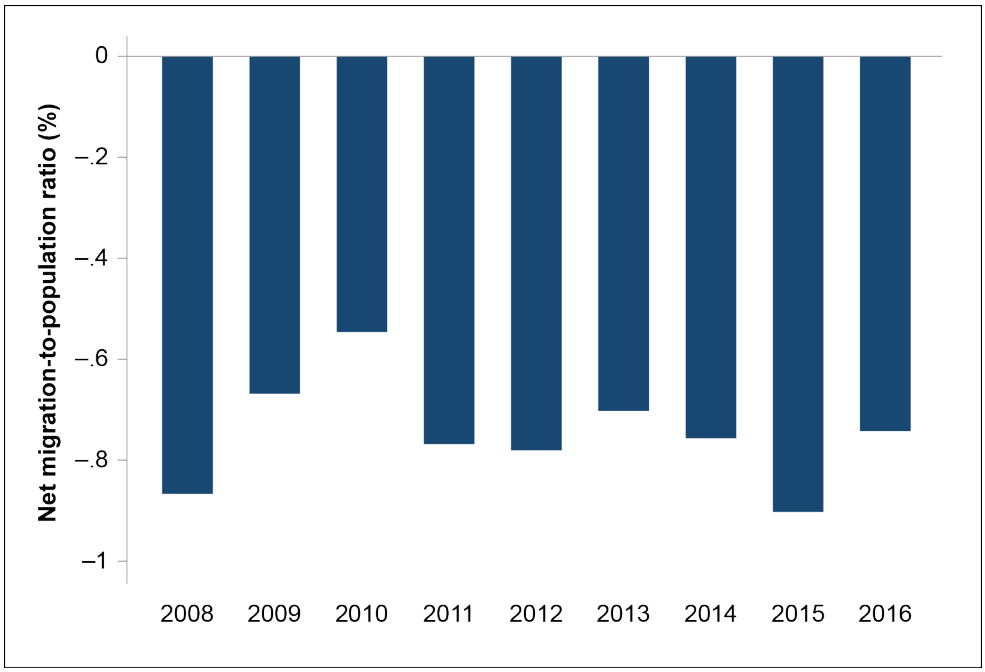
Source: The author calculated the occupational distribution using the HLFS. The definition of each occupation category can be found in the *International Standard Classification of Occupations: Structure, Group Definitions, and Correspondence Tables* (ILO 2012).

Furthermore, the increased violence in Syria since 2014 may explain the larger impacts of the refugee crisis in 2014–2015 than in 2012–2013. We found that the negative impact on the likelihood of Turks having an informal job doubled in 2014–2015 compared with the impact in 2012–2013. The probability of being unemployed also more than doubled in 2014–2015. These pronounced impacts in 2014–2015 correspond to the rapid increase in the number of refugees after 2014 (Figure 1). Fueled by the increased violence in Syria, the average monthly number of refugees arriving in Turkey had reached 55,000 by late 2014, while the number was around 20,000 in the second half of 2012 (İçduygu and Şimşek 2016). Our estimates are likely to capture the impact of this large exodus since 2014.

Our results contrast with those of other studies of migration, such as Card (1990), which reported that the sudden influx of Cuban migrants into Miami had no impact on the local labor market. He noted that a decrease in net domestic migration to Miami after the Boatlift might have partially offset the potential negative impact on the local labor market. In contrast, the southeastern part of Turkey, which accepted most of the Syrian refugees, is less developed than other parts, especially the west of Turkey. Because of the low demand in the labor market and the low living standard, the southeastern part of Turkey is a major source of internal migration to the developed and urban areas of Turkey (Figure 8). As suggested by Borjas (2003), it indicates that one possibility for mitigating the negative impact of refugees is the native labor forces' emigration from the treatment sub-regions to other parts of Turkey. The study, which examined the labor market consequences of recent internal migration, found that native males in urban areas experienced adverse effects from the inflow of internal migrants and that the adverse effects were most pronounced for the older and highly educated populations (Berker 2011). Tunalı (2000), who examined the decision making on internal migration and the outcome in Turkey, also pointed out that the actual gains of internal migrants are a type of lottery despite their optimal decisions in the sense of expected returns: only a few migrants obtain high returns from migration. These studies suggest that internal migration is a risky choice, especially for young and less-educated people, who experience the greatest impact from the influx of Syrian refugees in the bordering regions. Furthermore, the number of migrants/refugees in relation to the native labor force is significantly different between the two cases. In Miami, the estimated number of Mariel immigrants was between 120,000 and 125,000 while the size of the native labor force was 678,200 in 1979, which translates into an immigrant-to-native labor force ratio of 17.7–18.4% (Card 1990). In contrast, the number of Syrian refugees is around 1.5 million (Table 1), while the size of the native labor force is around 4.4 million,[1] in the treatment sub-regions in 2014, which reduces to a refugee-to-native labor force ratio of 34%. As Turkey experienced a far more intensive influx of refugees than Miami, it could not absorb the refugees into the labor market without native displacement.

[1] The author calculated the size of the labor force in the treatment sub-regions in 2014 using the HLFS.

Figure 8: The Net Migration-to-population Ratio in the Treatment and Control Sub-regions



Source: The author calculated the net migration-to-population ratio using the Address Based Population Registration System Results from Turkstat.

One of the limitations of the study is that time series data on the Syrian refugee population are not publicly available, which caused us to adopt a two-step procedure using the refugee data that Erdogan (2014) reported. Our identification for the DID estimation thus relied on a binary variable indicating whether Syrian refugees existed in a given statistical region. As a result, our estimates could not account for any difference in the size of the Syrian refugee population across regions. More accurate data on the distribution of Syrian refugees in Turkey would thus enable us to identify the effects of refugees on the Turkish labor market more precisely.

4. CONCLUSION

Our estimates revealed that the sudden influx of Syrian refugees has negatively affected the labor market outcomes of Turkish workers in the bordering regions. It has particularly affected Turkish workers who were previously employed in the informal sector. Furthermore, our results suggest the need to implement policies that support vulnerable segments of Turkish employees. We discovered that the refugees had displaced Turkish informal-sector workers. Since social security programs do not cover informal workers, their living conditions will worsen significantly once they are forced out of their job. To prevent their living conditions from deteriorating, the Turkish Government must increase the efforts to include informal workers in social programs. Programs such as unemployment benefits, job training, and matching to potential employers may be helpful in alleviating the temporary shock to informal workers that an influx of refugees causes. Further, we found that females withdrew from the labor market after the influx of Syrian refugees. Deteriorating working conditions, such as declining wages, could drive females to exit the labor market. As international experience indicates that helping women into jobs is associated with poverty reduction,

higher economic growth, and better governance, the withdrawal of females from the labor market could have negative consequences for the economy of the host communities. As it is apparent that the high cost of hiring childcare and housekeeping services is a major barrier to women seeking jobs in Turkey, the Turkish Government may be able to help females remain in the labor market by expanding the availability of affordable housekeeping services.

Future work should extend our empirical framework by implementing a more rigorous econometric strategy. Borjas (2003) noted two concerns about the use of geographic correlations between the intensity of immigration and the labor market outcome as evidence of the effect of immigration. First, immigrants may tend to settle in cities with thriving economies, and, second, natives may respond to the impact of immigration and may move their labor or capital to other cities. These factors would re-equilibrate the labor market, because of which geographic correlations would underestimate the impact of immigration. One possible way to address this issue is to consider the variation in the intensity of immigration across education–work experience cohorts. We could not adopt this approach, as our data on refugees did not contain detailed information on educational attainment and work experience. Once these detailed data become available, we look forward to implementing this education–work experience cohort analysis to examine the labor market effects of forced immigration in greater depth.

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