

The Impact of Syrian Refugees on the Turkish Labor Market

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Abstract

Currently 2.5 million Syrians fleeing war have found refuge in Turkey, making it the largest refugee-hosting country worldwide. This paper combines newly available data on the distribution of Syrian refugees across Turkey and the Turkish Labour Force Survey to assess their labor market impact. Syrian refugees are overwhelmingly employed informally, since they were not issued work permits, making their arrival a well-defined supply shock to informal labor. Consistent with economic theory our instrumental variable estimates, which also control for distance from the Turkish-Syrian

border, suggest large-scale displacement of natives in the informal sector. At the same time, consistent with occupational upgrading, there are increases in formal employment for the Turkish - though only for men without completed high school education. Women and the high-skilled are not in a good position to take advantage of lower cost informal labor. The low educated and women experience net displacement from the labor market and, together with those in the informal sector, declining earning opportunities.

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1. INTRODUCTION

Refugees pose a massive moral, political and economic challenge for potential host countries.¹ The scale of the challenge is larger than ever, with 60 million people forcibly displaced by conflicts across the world (UNHCR, 2014). War in Syria has produced more refugees than any other conflict of the past two decades: around 4.6 million have fled the country, with an additional 7.6 million internally displaced.² About 2.5 million Syrians have found refuge in Turkey, making it the largest refugee-hosting country worldwide.

This paper combines newly available data on the distribution of Syrian refugees across Turkey and the Turkish Labour Force Survey to assess the impact on Turkish employment and wages. The large majority (85 percent) of Syrians have left the refugee camps and entered the Turkish labor market.³ They are overwhelmingly employed informally, since they were not issued work permits. This makes their arrival a well-defined supply shock to informal labor, and a particularly good context in which to test the predictions of basic economic theory. We instrument for refugee flows using travel distance between 13 origin governorates in Syria and 26 Turkish subregions (338 origin-destination pairs). This allows us to also control for distance from the Syrian border, and thus any confounding factors that are correlated with proximity to Syria.

There is a lack of evidence on the economic consequences of forced displacement for host countries, as emphasized by two recent survey articles, Ruiz and Vargas-Silva (2013) and Mabiso et al. (2014). The paucity of evidence on this major policy issue can foremost be explained by a lack of high quality data, a consequence of the fact that developing countries host 86 percent of the world's refugees (UNHCR, 2014). This paper helps fill that gap and in addition makes two further contributions to this literature. First, existing evidence is predominantly on the impact of refugees in camps.⁴ Hence, papers are typically unable to

¹ See, for example, the recent leader in *The Economist* (April 23, 2015) on the European Union's policy on maritime refugees <http://www.economist.com/news/leaders/21649465-eus-policy-maritime-refugees-has-gone-disastrously-wrong-europes-boat-people>.

² *The Economist* (June 21, 2014) <http://www.economist.com/node/21604577>. The latest figures are for January 2016 from the UNHCR and for July 2015 from the Internal Displacement Monitoring Centre.

³ This has become a major source of concern, with a 2014 survey finding that 56 percent of Turkish people agree with the proposal asserting that "Syrians take our jobs," with that number rising as high as 69 percent in provinces close to the Syrian border (Erdogan, 2014).

⁴ Alix-Garcia and Saah (2009), Maystadt and Verwimp (2014), and Ruiz and Vargas-Silva (2015) on refugees from Burundi and Rwanda in camps in Tanzania; Kreibaum (2014) on Congolese refugees in camps in Uganda; Akgunduz, van den Berg and Hassink (2015a) and Ceritoglu et al. (2015) on Syrian refugees in Turkish camps. Exceptions include Braun and Mahmoud (2014) who present evidence on the influx of German expellees to West Germany after World War II, and Calderon-Mejia and Ibanez (2015) on internally displaced Colombians.

separately identify the labor market effects of refugees from other channels, such as the concentration of the humanitarian sector (typically in the form of camps) in one particular location. However, in 2014 less than 30 percent of refugees worldwide were housed in managed camps, making this paper particularly pertinent for understanding the current crisis.⁵ Second, since the literature has focused on the location of camps identification relies on comparing areas close to the border with those further away. This further confounds estimates of the impact of refugees with any other factors, such as trade, that are correlated with proximity to the border. Our empirical strategy allows us to explicitly control for distance from the Syrian border.⁶

The paper also contributes to the broader literature on immigration by identifying the impact of a well-defined labor supply shock. As Dustmann and Preston (2012) highlight, the literature's use of observed characteristics of immigrants to characterize the type of labor supply shock is problematic. These observables may be a poor reflection of the actual work of immigrants, in particular given evidence on occupational downgrading (see also Mattoo, Neagu and Özden 2008). An important advantage of the Turkish context is that practically none of the Syrian refugees received work permits, but they nevertheless have high employment rates. No matter what their qualifications, all refugees will be employed in the informal sector. We therefore know, with an unusual degree of confidence, that the inflow of refugees represents an increase in the supply of informal labor. Combined with the fact that our empirical strategy controls for distance from the border, this results in a context where we obtain identification from what is arguably close to a pure supply. This type of shock enables a more direct test of the predictions of the theoretical models in the literature (as emphasized by Dustmann, Schönberg and Stuhler 2015).

Economic theory yields sharp predictions on the impact this type of labor supply shock should have. First, the inflow of refugees should lower wages and displace natives from the informal sector. Those groups with the highest propensity to be employed informally should

⁵ With the onward movement of refugees to Western Europe the role of camps continues to decline and, in addition, only a small fraction of internally displaced people lives in camps UNHCR (2014).

⁶ The use of distance as an instrument goes back to at least Card (1995). In various forms it has been used by, for example, McKenzie, Gibson and Stillman (2010), Peri (2012), and Black et al. (2015) for voluntary migration; and in the literature on refugees by Baez (2011), Maystadt and Verwimp (2014), and Ruiz and Vargas-Silva (2015). The most serious potential shortfall of this instrument is that distance may also capture other differences between communities. Our instrument addresses this shortfall by relying on the fact that refugees from different Syrian governorates will use different border-crossings (there are six main crossings) to reach different parts of Turkey, thus allowing us to directly control for distance from the border (which would not be impossible if there was only a single crossing).

be most affected. This is precisely what we find empirically. The inflow of informally employed Syrian refugees leads to large-scale displacement of Turkish workers from the informal sector, around 6 natives for every 10 refugees. Displacement occurs among all types of informally employed Turkish workers irrespective of their gender, age and education. There are particularly large informal job losses for Turkish without any formal education (who still comprise 14 percent of private sector, paid employment).

Second, the impact in the formal sector is theoretically ambiguous. Lower wages in the informal sector will result in substitution from formal to informal workers. However, lower production costs will also expand output and increase the demand for formal workers, i.e. Turkish can take advantage of low cost refugee labor generating additional jobs. On average our IV estimates suggest a positive impact of refugees on the propensity of Turkish to be formally employed, around 3 additional for every 10 refugees. These increases in formal employment all accrue to men without a completed high school education. Women and high-skilled natives experience no gains in formal employment. The likely reason is somewhat different for the two groups. High-skilled Turkish workers are simply not employed in industries with a lot of informality, and hence cannot easily take advantage of lower cost informal labor. To some extent this is also true for women who, for example, are not employed in construction (where the informality rate is over 50 percent and anecdotally a lot of refugees are employed). However, there are also a lot of women in industries that employ refugees, most importantly in agriculture. Agriculture accounts for nearly 20 percent of female, private sector, paid employment. However, the female informality rate in that industry was an astonishing 96 percent (pre-refugee shock), while that for men was 67 percent. Any formal jobs generated in agriculture are therefore unlikely to go to women.

The results are consistent with Turkish workers adjusting to the inflow of refugees by occupationally upgrading from informal to formal jobs and irregular to regular workplaces (consistent with, for example, the work by Peri and Sparber 2009). However, the net impact on employment is negative for women and the least educated Turkish. Some adjustment occurs as Turkish leave, or do not move to, regions with an inflow of refugees. However, most of the adjustment occurs as women and the least educated increasingly drop out of the labor force (there are no increases in unemployment).

Estimating the impact on wages is difficult since the refugee shock will both change the productivity (marginal product) of a particular native worker and impact what types of natives are employed (selection effects). A contribution of the paper is that we decompose our IV estimates of the impact on average wages into a part attributable to composition or

selection effects (due to the refugee inflow) and a residual that reflects changes in marginal products (and unobservables). Entirely consistent with the impact on employment we find that the residual wage (marginal product) change was negative, large and statistically significant for the informal sector, women and low education Turkish (and close to zero for all other groups). At the same time there were very large composition effects. With lower productivity workers dropping out of the labor force selection resulted in average wage increases in the informal sector and for women, despite the fall in marginal products. Accounting for these compositional changes is essential for identifying changes in the actual earnings potential in different sectors (formal and informal) and for different groups of natives (by gender, age or education).

The fact that we find large displacement effects due to an inflow of refugees provides a contrast for much of the voluntary immigration literature, which typically finds very modest impacts (positive and negative). It is worth recalling though that unlike most voluntary immigration flows the arrival of Syrian refugees was (i) relatively sudden and (ii) not driven by the availability of jobs in Turkey. Hence, it is unsurprising that – at least in the short-run – the impact is more negative than is the case for host countries of voluntary migrants. The results are, however, very much aligned with recent work on voluntary migration flows driven by push factors. Glitz (2012) analyzes ethnic German migration from Eastern Europe and the former Soviet Union to Germany after the end of the Cold War, Aydemir and Kirdar (2013) the arrival of ethnic Turks from Bulgaria in 1989, and Dustmann, Schönberg and Stuhler (2015) the impact of Czech day migrants to Germany. All three papers find displacement effects of a comparable magnitude to ours (and even larger).⁷

Particularly closely related to this paper is Ceritoglu et al. (2015), which also addresses the impact of Syrian refugees on the Turkish labor market.⁸ The paper uses earlier data, from 2012 and 2013, and a difference-in-difference strategy. It argues that since the refugee flows

⁷ The classic Card (1990) Mariel boatlift paper did not find displacement (or wage) effects. An issue that has given rise to recent controversy, see Borjas (2015, 2016) and Peri and Yasenov (2015). Early work by Hunt (1992) and Carrington and De Lima (1996), who study the impact of the repatriates from the African colonies to France and Portugal respectively, and Braun and Mahmoud (2014), looking at expelled ethnic Germans, and Calderon-Mejia and Ibanez (2015), on internal displacement in Colombia, also find negative effects on employment and wages

⁸ The other concurrent work on the same topic is Akgunduz, van den Berg and Hassink (2015a), who find no evidence of labor market impacts. The paper has since been revised and renamed, Akgunduz, van den Berg and Hassink (2015b), with an interesting focus on firm dynamics in response to the arrival of refugees. The paper no longer includes employment outcomes. They find increasing firm entry in provinces hosting refugees (and no increase in firm exits), which helps explain our finding that the arrival of refugees encourages formal job creation.

were involuntary their settlement pattern in Turkish border provinces can be considered quasi-experimental. It then compares changes in outcomes in the border regions with camps with those for a control group of regions (in eastern Anatolia).⁹ Like this paper, they find displacement in the informal sector, some formal job creation, and negative impacts concentrated among women and the low educated. It finds no impact on wages (even for the displaced groups). There are three important ways in which this paper complements and goes beyond their work. First, rather than take a difference-in-difference approach, where identification comes from places close to the border compared to those further away, we instrument for refugee flows and control for distance from the border. Plausibly both approaches are valid, depending on how important endogenous refugee location choices were in the years 2012, 2013 and 2014.¹⁰ In that case, our work is complementary, tracing out the initial impact of refugees in camps and what happens subsequently as they diffuse throughout Turkey. Second, Ceritoglu et al., as is typical in this literature, estimate the combined impact of the arrival of refugees, the construction of camps and provision of aid and any other border related shocks (such as changes in trade patterns due to war in Syria). In contrast, as discussed, we provide evidence for a well-defined labor supply shock. Finally, we are able to explain both Ceritoglu et al. and this paper's puzzling finding that average wages among displaced groups of natives do not decline. We show that this is the result of refugee-induced changes in the composition of Turkish employment. Once these are accounted for, we estimate that marginal products do actually fall considerably in the informal sector and for women.

The paper proceeds as follows. Section 2 provides background on the Syrian refugees in Turkey and descriptive statistics. Section 3 outlines our empirical strategy and Section 4 presents the results. Extensive placebo tests and robustness checks are presented in Section 5. Section 6 concludes.

⁹ Note that our main results are highly robust to the same, more homogeneous, group of subregions, as well other variations in the subregions used for analysis.

¹⁰ UNHCR and AFAD data suggest that the share of refugees outside camps was around 15 percent in 2012, 40 percent in 2013 and 85 percent in 2014. Also note that in 2014 AFAD dramatically improved their counting of refugees outside camps, hence the 2012 and 2013 shares are likely significantly underestimated.

2. BACKGROUND AND DATA

2.1 Background

Since the inception, in March 2011, of the continuing war in Syria 4.6 million registered refugees have fled Syria, primarily to Turkey (2.5 million), Lebanon (1.1 million), Jordan (635,000), Iraq (245,000), and Egypt (118,000), and increasingly to Western Europe.¹¹ In 2011 there was only a very small outflow of refugees from Syria, reaching 8,000 in Turkey in December 2011. The number of refugees to Turkey then started to grow rapidly in 2012 and continues to do so. Starting in 2014 the Turkish government issued new identity cards to Syrian refugees designed to give more straightforward access to a wider range of basic services outside of the camps; these services include aid, job offers, education, and health care.¹² The registration drive accompanying the new identity cards also dramatically improved the counting of refugees outside camps, providing a far more accurate picture of the number and distribution of Syrian refugees across Turkey. In late 2014, the final year of the analysis in this paper, there were 1.6 million Syrian refugees in Turkey, 86 percent of which lived outside camps (Erdogan, 2014).

Figure 1 depicts the ratio of Syrian refugees to total population for the 26 NUTS 2 subregions in Turkey (the map depicts the provinces which constitute these NUTS 2). The highest ratios are found in Gaziantep (13 percent), Hatay (9 percent), Mardin (7 percent) and Sanliurfa (5 percent) all of which are located on the Turkish-Syrian border, and host 62 percent of all Syrian refugees in Turkey.¹³ Areas further away from the border are less affected, with Adana, Istanbul and Konya at a refugee-population ratio of around 2 percent, the next set of subregions most strongly impacted; and all other subregions with a ratio of under 1 percent.

Turkey has had a generous open-door policy toward Syrian refugees, but until late 2014 the refugees had been labeled “guests” under a hazily defined temporary protection measure. Importantly for this paper, for the period studied the overwhelming number of Syrian refugees if employed will have been so informally. In principle, Syrians who entered the country through the official border crossings and who have passports can apply for residence

¹¹ UNHCR data from January 2016 available at <http://data.unhcr.org/syrianrefugees/regional.php>. Refugees were registered by the UNHCR in Egypt, Iraq, Jordan and Lebanon, and by the Government of Turkey.

¹² New York Times (December 29, 2014) http://www.nytimes.com/2014/12/30/world/europe/turkey-strengthens-rights-of-syrian-refugees.html?_r=0, and Hurriyet Daily News (January 12, 2015) <http://www.hurriyetdailynews.com/turkey-provides-15-million-id-cards-for-syrian-refugees.aspx?pageID=238&nID=76788&NewsCatID=341>.

¹³ Istanbul has the largest number of refugees (21 percent).

permits and subsequently for the right to work. In practice, this is a long and cumbersome process and by late 2015 at most several thousand had been issued.¹⁴

The economic impact of Syrian refugees in Turkey extends beyond changes in the potential labor supply of informal workers in important ways. There has been extensive humanitarian aid provided to the refugees, overwhelmingly by the Turkish government. Reportedly, by early 2015 the Turkish state had spent \$6 billion (with total outside contributions \$300 million).¹⁵ Much of these funds have been spent on food, various services, non-food items such as medicines, clothing, shelter, and housing-related goods. In particular, there are 20 accommodation centers (camps) in 10 cities in Turkey.

2.2 Data Sources

We use the Turkish Household Labor Force Survey (LFS) micro-level data sets compiled and published by the Turkish Statistical Institute. The data contains a rich set of labor market variables along with individual-level characteristics and the region of residence. We primarily rely on two years of LFS data: 2011 (just before the arrival of the refugees) and 2014 (the last year available).¹⁶

By design the LFS does not contain any information on Syrian refugees. The Disaster and Emergency Management Presidency of Turkey (AFAD) provides information on the number of Syrian refugees. The numbers used in this paper are taken from Erdogan (2014), who draws on information from AFAD and the Ministry of Interior and reports the number of refugees by NUTS 2 subregion. To construct our instrument we use the Syrian Labor Force Survey for 2010 (the year before the beginning of the war). Finally, Google Maps was used to derive the travel distance between each governorate in Syria and the most populous city in each NUTS 2 subregion in Turkey.

¹⁴ Most recently, in January 2016, labor market access for Syrian refugees in Turkey was eased considerably. Importantly, they now can benefit from vocational training under the Turkish Employment Agency, employers will be able have to Syrians comprise up to 10 percent of their staff, and seasonal workers are exempted from the work permit, see <http://www.resmigazete.gov.tr/eskiler/2016/01/20160115-23.pdf>. It is of course too early to evaluate the impact of these legislative changes.

¹⁵ Hurriyet Daily News (February 2015) <http://www.hurriyetdailynews.com/turkey-urges-worlds-help-on-syrian-refugees-as-spending-reaches-6-billion.aspx?pageID=238&nID=78951&NewsCatID=359>.

¹⁶ Starting with 2014 there was a change in the design of the Household Labour Force Survey to ensure full compliance with European Union standards. This has caused some difficulty in making comparisons across years. However, our identification strategy does not use aggregate variation across years for identification and should hence be unaffected by the changes to the design of the survey.

2.3 Variable Definitions and Descriptive Statistics

Our sample of interest is the Turkish working-age population (15 to 64 years of age). Detailed descriptions of the variables used in this paper are provided in Appendix A. Summary statistics are presented in Tables 1, 2 and 3.

Our main employment indicator is all private sector, paid employment, including self-employment. This measure is disaggregated into formal and informal employment, full and part-time, and those employed in regular and irregular workplaces.¹⁷ We separately consider those employed in the public sector and employers. The other labor force status indicators we use are: unemployment, not in the labor force, in school and retired. We consider three education categories: low (less than completed primary education), medium (at least completed primary education but no high school completion), high (high school completion and above). We use monthly wages as our earnings measure and restrict the sample to respondents who report having usual working hours of less than 14 or more than 84 hours per week. Results are robust to using hourly wages and deflating wages by a regional consumer price index.

Table 1 provides descriptive statistics for the years 2011 and 2014.¹⁸ Labor force participation is very low in Turkey, around 54 percent of the working-age population in 2011, though it has been rising. The reason is that female labor force participation is particularly low at about one-third. The majority of employment is private sector, around one-third of the working-age population, compared to 6 percent employed in the public sector. There are a large number of unpaid workers (7 percent) and unemployment is at 5 percent of the working-age population, an unemployment rate of about 10 percent. School attendance has been rising over the period, from 12 to 16 percent of the working-age population, and the fraction retired has been steady at about 5 percent. Correspondingly, educational attainment has been rising though still 13 percent of the working-age population has no formal education, 57 percent at least completed primary education but not high school, and high school completion has risen from 30 to 34 percent.

¹⁷ Of those who have an irregular workplace 60 percent are agricultural workers, 14 percent work in construction, 7 percent in transportation and 5 percent in retail and in manufacturing each, and 3 percent as household employees.

¹⁸ Note that in 2014 new regulations for the Household LFS were carried out within the framework of European Union criteria. Consequently, statistics are not necessarily entirely comparable across years. Since we do not use aggregate time-series variation for identification this does not affect our empirical strategy, see Section 3. For those interested, the Turkish Statistical Institute provides consistent time-series on their website.

The informal sector is very large in Turkey; in 2011 nearly 40 percent of private sector, paid employees were employed informally (not registered with the social security administration). However, the fraction of Turkish workers employed informally fell substantial to about 34 percent in 2014. Highly correlated with informality is being employed in an irregular workplaces (for example, in fields, markets, at home, or mobile), which reflects working conditions for 28 percent of the private sector, paid employees. Part-time work (less than 30 hours) is at about 8 percent.

Table 2 provides statistics – for paid, private sector employees – on the fraction of informally employed in various categories in 2011 (before the inflow of Syrian refugees). The reason this is particularly important is that, to the degree that they are employed, Syrian refugees will be working informally. Hence, the degree of informality in an employment category or for a certain group of workers is informative about the degree to which we would expect the labor market conditions of such a group to be adversely affected by the inflow of refugees. The table also provides mean and median wages in 2011 for each of these groups. If the inflow of refugees affects the employment rates in each of these groups then mean wages in Turkey will change due to composition effects, in addition due to changes in the marginal product of workers. In particular, it is clear that mean and median wages are lower for categories of workers with higher rates of informality. Hence, if refugees displace informal Turkish workers then observed mean wages in Turkey might rise due to selection, even as marginal products fall (due to the increase in labor supply).

In 2011 informality was 25 percent among those employed in regular workplaces, but 77 percent among those employed in irregular workplaces. The fraction of full-time employees who work informally was 36 percent, while it was 83 percent among the part-time employed. Women are more likely to be employed informally (46 percent) than men (38 percent) The young (ages 15 – 24) with 48 percent more so than the older (38 percent). Informality also decreases with educational attainment. Before the inflow of refugees it was 80 percent among the lowest educated (no formal education), 46 percent among those with formal education but less than high school completion, and 19 percent among those with high school completion and higher degrees.

Turkish monthly mean and median wages among private sector, paid, employees in 2011 were 870 and 700 Turkish Lira respectively. Note that in purchasing power parity terms the conversion rate between Turkish Lira and US dollars is nearly exactly one-to-one. Wages are strongly correlated with the share of informal workers within a group. Formal workers have around double the monthly earnings of informal workers. Similarly, workers in regular

workplace receive double the wage of those employed in irregular workplaces. Part-time workers of course earn a lot less than full-time workers, and the young (ages 15 – 24) a lot less than older workers. Women earn 12 percent less than men, and are 22 percent more likely to be informally employed. Those without any formal education are more than three times as likely to be informally employed than those Turkish who at least completed high school, and on average earn 52 percent less. Those with some formal education, but no high school completion, are 1.4 times more likely to be informally employed, and earn 39 percent less.

Table 3 presents the 2011 (pre-refugee) distribution of private sector, paid employees across industries, for both women and men (Columns 1 and 3 each sum to 100). For each industry it also reports the fraction employed informally, again separately for men and women. Notably, the table shows that on the whole women are both more likely to be employed in industries with high informality and more likely to be informally employed in a given industry than men. Agriculture is an important source of employment for both genders (around 18 percent of private sector, paid employment). Informality is very high in agriculture, 68 percent for men and a quite astonishing 96 percent for women. Manufacturing industries with high rates of informality (specifically, textiles, clothes, leather, food and wood) employ a 15 percent of men and 22 percent of women, and informality is high among men (27 percent) and even more so for women (48 percent). An exception is construction, which is practically entirely male dominated and has a 54 percent informality rate for men. Wholesale and retail is a roughly equally important source of employment for both genders and the informality rate is about the same. Education and especially household work are female dominated occupations, and the informality rate in household work is 93 percent.

2.4 Characteristics of Syrian Refugees

The Turkish LFS does not, by design, survey refugees. Moreover, currently there is a lack of large-scale, representative surveys of refugees across Turkey and any administrative data that might exist is not publicly available. Fortunately, our empirical strategy does not rely on the availability of refugee characteristics. Important for the interpretation of our findings, however, is the labor force participation rate of Syrian refugees in Turkey. Based on informal discussions with U.S. State Department employees working with refugees in Turkey, it seems that the labor force participation rate of Syrian refugees (of working-age) is very substantial,

though somewhat lower than that of the Turkish at 30 - 50 percent. Child labor is also quite prevalent, though there have been extensive efforts made to ensure that refugee children attend school.¹⁹

Publicly available information on refugees comes from an AFAD survey of 2,700 households in June and July 2013. Figure 2, using data from AFAD (2013), provides an overview of the Syrian governorates from which the refugees to Turkey originated. The refugees primarily come from northwest Syria. The largest source regions are Aleppo (36 percent), Idleb (21 percent) al-Raqqah (11 percent), Lattakia (9 percent), and Hamah (8 percent). Consistent with travel distance being a good predictor of refugee flows to Turkey, 80 percent of respondents report that they chose to flee to Turkey, instead of another country, due to the ease of transportation. The refugees in Turkey, unlike the later 2015 refugee flows to Western Europe, are nearly 50 percent female. Slightly over 50 percent are minors (under the age of 18). These facts reflect that to large extent Syrian families fled to Turkey together. Educational attainment is lower than for the Turkish (though not compared to Turkish border regions), with around 15 percent illiterate and about 20 percent having completed high school or obtained a higher degree. Reported mean and median monthly household earnings were, respectively, 447 and 300 Turkish Lira.

3. EMPIRICAL STRATEGY

3.1 Estimating Equations

To estimate the impact of Syrian refugees in Turkey on outcome Y for individual i in year t and subregion r we consider the following estimating equation:

$$Y_{itr} = \gamma R_{rt} + f_t(D_r) + g(X_{irt}) + \delta_r + \delta_t + \varepsilon_{irt}, \quad (1)$$

where the main variable of interest is the number of Syrian refugees R , normalized by the working-age population, of a subregion. Further, we include subregion δ_r and year δ_t fixed effects, flexible individual level controls X , and a time-varying control for the distance, D , of each subregion to the Syrian-Turkish border. The inclusion of subregion fixed effects means

¹⁹ According to AFAD (2013) while about 83 percent of the children 6-11 years old in the camps attended a school, only about 14 percent of the children 6-11 years old out of the camps attended a school. Since then, by all accounts, school attendance rates outside have camps have improved substantially.

that identification comes from variation within a subregion over time. The inclusion of year fixed effects means that only deviations from annual averages are used for identification.

The main sample of interest is the Turkish working-age population. Hence, when considering employment outcomes (total employment, formal, informal, regular, irregular, full and part-time) the empirical specification given by equation (1) means that a coefficient (on the refugee variable R_{rt}) $\gamma > 0$ means that the inflow of refugees increases the employment rate of natives, and $\gamma < 0$ implies that refugees displace Turkish people in the labor market. If $\gamma = 0$ then there is no displacement of native Turkish by refugees, and $\gamma = -1$ corresponds to one-to-one displacement. Since the variation in the independent variable of interest (R_{rt}) and our instrument, see below, is by Turkish subregion and year we cluster standard errors by subregion-year in all specifications in this paper.²⁰

The inclusion of a time-varying control for distance from the Syrian border $f_t(D_r)$ implies that identification does not come from comparing Turkish subregions close to those further away from the border. Instead, identification relies on deviations of the magnitude of refugee inflows compared to what predicted inflows would be based on distance from the border. Distance from the Syrian border is a good predictor of refugee flows, the refugee camps are located along the border and the refugee–population ratio is highest in those subregions. However, it may also be correlated with changes to the economic outcomes of natives; thus resulting in a spurious correlation between refugee flows and Turkish outcomes. First, the war in Syria will have a direct economic effect on Turkey, for example due to changes in trade patterns, in particular on border regions. Second, underlying economic trends may be correlated with distance from the border. There is mixed evidence on whether the poorer southeastern and eastern parts of Turkey are more recently experiencing some degree of economic convergence with the much wealthier northwestern and western regions (see, for example, Akcagun, Ocal and Yildirim 2013). But the fact the refugee flows are geographically quite concentrated raises the concern of a spurious correlation with underlying economic trends. Third, policy changes or other shocks during this period may have disproportionately affected border regions. Notably, the 2012 education reform, which extended compulsory schooling from 8 to 12 years, will have disproportionately affected border regions where high school attendance was particularly low prior to the reform. Fourth,

²⁰ With only two time periods and only 26 subregions of Turkey it is likely not advisable to cluster standard errors to deal with serial correlation (Angrist and Pischke, 2009). Indeed, clustering by subregion frequently results in smaller standard errors, hence we report standard errors clustered by subregion and year.

Turkish border regions have seen major investment in refugee camps and aid to refugees (20 camps and several billion US dollars in spending). Far less investment has occurred in areas with refugees outside camps. Hence, any empirical strategy that compares border and non-border regions (or the location of camps) for identification will conflate the labor market supply shock of the arrival of refugees with the demand shock due to the inflow of aid. These demand shocks can be large (compared to the magnitude of the supply shock) and even have long-lasting effects, see for example Duranton and Maystadt (2015).

The functional form we choose, in all specifications, is the natural logarithm of distance to the border. Log distance is the standard and economically motivated functional form used in gravity models of trade, see Andersen (2011) for an overview, and in gravity-type models of international migration, see Beine, Bertoli and Fernandez-Huertas (2014) for a review. Moreover, a parsimonious specification is important for the precision of our estimates since there are only 26 subregions in Turkey used for identification of both the coefficient on the refugee and the distance from the border variables.²¹

The other major concern with estimating equation (1) is that location decisions of Syrian refugees may be endogenous – even when controlling for distance from the border. For example, if Syrians disproportionately move to places in Turkey where there are a lot of economic opportunities there would arise a spurious positive correlation between them and positive economic outcomes for the Turkish working-age population. To address the endogeneity of refugee flows we instrument for refugee numbers in a subregion. The instrument is described in detail in Section 3.3 below.

3.2 A Wage Decomposition: Identifying the Role of Composition Effects

There are two ways in which an influx of refugees can affect the wages of the native Turkish. First, a direct effect whereby refugees impact the productivity (marginal product) of natives with fixed characteristics (observed and unobserved). Second, an indirect effect whereby refugees change the composition of natives – with different productivities – in a region and thereby change the observed average wage.

We decompose the mean wage (\bar{w}) impact of refugee flows as follows. Consider two states of the world: without Syrian refugees ($R = 0$) and with Syrian refugees ($R = 1$). The mean wage

²¹ Results are qualitatively robust to the use of a high-order polynomial of distance from the border. However, standard errors increase substantially.

is the weighted average of the wage of g groups (w_g), where the weights depend on the number of people in each group (N_g) and the fraction of individuals in that group who are employed (π_g). Specifically:

$$\bar{w}_{R=j} = \frac{\sum_g N_g \pi_{g,R=j} w_{g,R=j}}{\sum_g N_g \pi_{g,R=j}} \quad j = (0,1), \quad (2)$$

where we allow both the employment rate and the wage in each group to depend on the presence of Syrians in Turkey. The change in the mean wage ($\Delta\bar{w} = \bar{w}_{R=1} - \bar{w}_{R=0}$) can be decomposed into two components:²²

$$\Delta\bar{w} = \underbrace{\left(\frac{\sum_g N_g \pi_{g,1} \Delta w_g}{E_1} \right)}_{\Delta\bar{w}^U \text{ (Wage Term)}} + \underbrace{\left(\frac{\sum_g N_g \pi_{g,1} w_{g,0}}{\sum_g N_g \pi_{g,1}} - \frac{\sum_g N_g \pi_{g,0} w_{g,0}}{\sum_g N_g \pi_{g,0}} \right)}_{\Delta\bar{w}^X \text{ (Selection Term)}} \quad (3)$$

The second term ($\Delta\bar{w}^X$) is the change in average wages due to changes in the observable composition of the employed (from $\pi_{g,0}$ to $\pi_{g,1}$). The first term ($\Delta\bar{w}^U$) is the part of the change in average wages that cannot be explained by selection on observables, but rather due to changes in marginal products or selection on unobservables.

To empirically implement this decomposition requires estimating $\Delta\bar{w}$ and $\pi_{g,1}$ and calculating $N_g, \pi_{g,0}$ and $w_{g,0}$ from the data in the baseline year 2011 (when there were no Syrian refugees in Turkey yet). Finally, the unexplained wage term of the decomposition is the residual $\Delta\bar{w}^U = \Delta\bar{w} - \Delta\bar{w}^X$. A causal interpretation of this decomposition requires estimates of the causal impact of Syrian refugees on mean wages in Turkey ($\Delta\bar{w}$) and the employment probabilities of each group ($\pi_{g,1}$ for all g).

To estimate the impact of Syrian refugees on the employment probabilities of each group, we use an estimating equation equivalent to equation (1) without individual-level covariates. We allow an indicator $E_{irt} = (0,1)$ of whether a person is employed to depend on the ratio of refugees to working-age Turkish people R_{rt} in a subregion r in year t , include region and year fixed effects, δ_r and δ_t , and a time-varying function of distance to the border $f_t(D_r)$. The following regression is run separately for each group:

²² Found by adding and subtracting $\frac{\sum_g N_g \pi_{g,1} w_{g,0}}{\sum_g N_g \pi_{g,1}}$ to the expressions for $\Delta\bar{w} = \bar{w}_1 - \bar{w}_0$.

$$E_{irt} = \gamma_g R_{rt} + f_{t,g}(D_r) + \delta_{r,g} + \delta_{t,g} + \varepsilon_{irt,g} \quad \forall i \in g, \quad (4)$$

where we categorize people into one of 183 categories defined by their gender, age, education, formal or informal and full- or part-time employment status.²³ We estimate equation (4) using two-stage least squares. Then we obtain the predicted employment rate for each group after the inflow of refugees $\hat{\pi}_{g,1} = \pi_{g,0} + 0.020 \hat{\tau}_g$, where 2.0 percent is the mean ratio of refugees to Turkish people in 2014. The wage estimates for the whole sample, see equation (1), provide the causal impact of the arrival of refugees on the log wages of employed Turkish workers (with a coefficient $\hat{\gamma}_w$). Then the absolute refugee-induced wage change is given by $\Delta \bar{w} = \bar{w}_1 - \bar{w}_0 = (e^{\hat{\gamma}_w * 2} - 1) * \bar{w}_0$.

3.3 Instrument

To allow for a causal interpretation of the impact of refugee flows, see equations (1) and (4), we instrument for the ratio of refugees to working-age population (R_{rt}).²⁴ Our instrumenting strategy is based on the idea that travel distance, from the Syrian governorate from which the refugee is fleeing to each potential destination Turkish subregion, is a key determinant of refugee location decisions. We use Google Maps to calculate the travel distance T_{sr} from each Syrian governorate capital (s), to the most populous city in each Turkish NUTS 2 subregion (r). The instrument for the number of refugees at a given point of time in each Turkish subregion is given by:

$$IV_{rt} = \sum_s \frac{1}{T_{sr}} \pi_s R_t, \quad (5)$$

where R_t is the total number of registered Syrians in Turkey in a year and π_s the fraction of the Syrian population that lived in each governorate in 2010 (pre-war).²⁵ Since all our

²³ The education categories are at most primary school, secondary school, and higher education. The age categories are 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, and 60–64 years. There are 183 groups since we exclude groups containing less than 40 observations.

²⁴ An additional advantage of the IV approach is that it helps deal with measurement problems. Despite the improved measures of refugee numbers in Turkey by subregion starting in 2014, there is likely considerable measurement error, resulting in attenuation bias in the OLS estimates. For the IV estimates to be consistent, it is only necessary that - conditional on the fixed effects and control variables - the flows of Syrian refugees are uncorrelated with the instrument.

²⁵ Using data from AFAD (2013) we can also weight the aggregate refugee numbers using the Syrian source governorates of refugees in 2012-13 (see Figure 2). Results are qualitatively robust to this alternative instrument and first-stage F-statistics about the same. We prefer the use of the pre-war distribution of population in Syria,

empirical specifications include year fixed effects the aggregate refugee flow is not used for identification. Instead, the instrument relies on the travel distance between 338 destination-origin pairs: 13 Syrian governorates (we combine the Damascus and Rif-Dimashq Governorates) and 26 Turkish subregions.

The key threat to the validity of any distance-based instrument is that regions that are close to a border crossing may systematically differ from those further away. To our knowledge uniquely, we are able to directly deal with this concern by, as discussed above, directly controlling for the travel distance from the closest Syrian border-crossing to the most populous city in each Turkish NUTS 2 subregion. If there were only a single border crossing between Turkey and Syria, the estimation could no longer separately identify the impact of the instrument from the direct effect of distance from the border. Instead, identification relies on the fact that there are multiple border-crossings between Turkey and Syria. There are six main border crossings between Turkey and Syria with proper roads, all of which remained open during this period.²⁶ Syrians from different governorates have a differential likelihood of using any one of these. The identifying assumption of the instrument, once distance controls and fixed effects are included, is that the location of refugees depends on the travel distance from various regions of Syria, while other systematic trends including the direct impact of the war on economic activity in Turkey depends on distance from the border.²⁷

In Figure 3 we plot the actual and predicted refugee to Turkish working-age population ratios for all 26 subregions of Turkey in 2014 (using only the residual identifying variation from the instrument, not the distance control or fixed effects). The figure shows the close fit of instrumented and actual flows for all subregions. The instrument is significant at the one percent significance level in every specification estimated in this paper. Despite controlling directly for distance from the border the instrument still provides sufficient identifying variation.

In Table 4 we present all 26 subregions of Turkey in rank order of their actual and residual (when controlling for log distance from the border) refugee to Turkish working-age population ratios in 2014. Column 1 presents the decreasing rank order of subregions based

since the actual source governorates of Syrian refugees are more likely correlated with economic shocks in different parts of Turkey.

²⁶ They are in the following Turkish provinces: two in Hatay, one in each Gaziantep, Kilis, Mardin and Sanliurfa.

²⁷ Calderon-Mejia and Ibanez (2015) use a related instrument for internal forced displacement flows. They use cities' distances from multiple massacres of civilians in rural areas of Colombia to construct their instrument.

on actual values and Column 2 those based on residual values. The treatment regions for the difference-in-difference estimates in Akgunduz, van den Berg and Hassink (2015a, 2015b) and Ceritoglu et al. (2015) are along the border (plus Adana).²⁸ These are the first five regions in Column 1. Once we control for distance the rank order changes substantial, see Column 2. Some subregions on the border, specifically Gaziantep and Hatay, still have disproportionately high refugee inflows. However, Mardin drops to 17th and Adana drops to 24th. The correlation between the actual and residual refugee flows is 0.68. Clearly, controlling for distance from the border quite substantially changes the identifying source of variation.

4. RESULTS

In this section we first describe the impact of the inflow of Syrian refugees on the employment of the Turkish population, and discuss plausible underlying mechanism for our findings. We then estimate the impact on wages, and decompose this impact into changes due to the impact on the observed composition of Turkish employment (caused by the inflow of refugees) and changes in marginal products (and unobserved characteristics). Finally, we discuss adjustment mechanisms for the Turkish population.

4.1 Impact on Native Employment

Tables 5a and 5b present OLS and IV estimates, respectively, of the impact of the refugee inflow on Turkish employment. We present results for total private sector, paid employment, formal, informal, regular and irregular, full-time and part-time. The baseline estimates without individual controls, only controlling for subregion and year fixed effects and the time-varying impact of log distance, are presented in Panel A of each table. Panel B shows the results for a full specification including individual covariates: fully interacted dummy variables for gender, education and year, as well as a gender, education and year-specific second-order polynomial in potential experience.

The OLS estimates, Table 5a, show that refugee flows are positively correlated with Turkish employment. This positive correlation is driven by increasing formal, full-time employment and employment in irregular workplaces. The IV estimates, see Table 5b, show that the

²⁸ Akgunduz, van den Berg and Hassink (2015a, 2015b) also include Malatya.

causal impact of an inflow of refugees is to decrease native employment.²⁹ In the full specification 10 refugees displace around 3 native Turkish workers, though that impact is only significant at the 10 percent significance level. This is the result of large-scale displacement among informal workers and those employed in irregular workplaces, with 10 refugees displacing 6-7 Turkish workers. At the same time there is a substantial increase in formal employment and employment in regular workplaces due to the refugees. For every 10 refugees 3-4 formal jobs in regular workplaces are created in a region. Refugee inflows result in a pronounced change in the composition of Turkish employment. There is displacement from informal job in irregular workplace where natives compete with refugees, toward formal jobs in regular workplaces. On net there is likely displacement, entirely explained by a decrease in part-time jobs, but the changes in the composition of employment of Turkish workers are far more substantial. The fact that the native employment is positively correlated with refugee flows in the OLS estimates and negatively correlated in the IV estimates, suggests that refugees tend to locate in Turkish regions experiencing growth in employment (positive demand shocks) for reasons unrelated to the arrival of the refugees. This highlights the importance of instrumenting for refugee flows.

Table 6 presents IV results with each panel corresponding to a different category of native (female, male, ages 15 – 24, ages 25 – 64, low, medium and high educational attainment). The columns, as in Tables 5a and 5b, correspond to total private sector, paid employment, formal, informal, regular and irregular, full-time and part-time. Among all categories of natives the inflow of refugees results in large-scale displacement of informally employed workers and those in irregular workplaces. The magnitude of this impact is similar across groups.³⁰ Though displacement is particularly large, consistent with one-to-one displacement, for those without any formal education.

However, not all groups benefit from the increases in formal employment and job creation in regular workplaces. Specifically, women see no gains in formal, regular employment. As a consequence Turkish women experience large-scale net displacement, much of which can be explained by a decrease in part-time work. The net displacement effects are very large, 7 women for every 10 refugees. In contrast, Turkish men see large increases in formal and

²⁹ The first-stage is significant at the one percent significance level. The t-statistics for the instrument are 3.7 and 3.9 for the basic and full specifications respectively.

³⁰ For all groups we cannot reject the null hypothesis that the effect on formal employment is equal to the average impact in Table 5b.

regular employment, which fully offset the decreases in informal, irregular employment resulting in no net displacement (the point estimate is close to zero and the confidence intervals quite tight).

Those Turkish without any formal education also experience large (and statistically significant) net displacement, consistent with one-to-one displacement. This is the result of particularly large displacement of informal workers and those in irregular workplaces, and a significant but much smaller increase in formal jobs. For those with medium educational attainment the displacement effect in informal employment is much more moderate. For this group there is only a change in the composition of employment (from informal to formal), but no net displacement. Interestingly, higher skilled workers (with at least high school completion) do experience net displacement. The propensity of this group to be employed in formal jobs or those in regular workplaces is unaffected by the refugee inflow. However, those who are high skilled but informally employed – which is only 19 percent of the higher skilled, hence likely a particularly unsuccessful group – experience statistically significant displacement (the same is true for those in an irregular workplace or working part-time).³¹

4.2 Economic Interpretation

Syrian refugees in Turkey were unable to apply for actual refugee status, with very few exceptions, instead they are described as foreigners under temporary protection. As a consequence they have not been issued work permits, and are only able to work informally. This is true for all Syrian refugees, irrespective of their qualifications. Nevertheless, the existing evidence suggests that a large fraction of the refugees do work. Hence, we know that the labor supply shock caused by the arrival of refugees is entirely in informal employment. This will likely have differential effects in formal and informal labor markets.

In the informal labor market the arrival of refugees is a supply shock. Those Turkish workers who were employed informally before the arrival of refugees are now competing directly with them. As a result, the marginal product in the informal sector should decrease and thus a Turkish worker's potential wage in that sector. This will also result in the displacement of informally employed Turkish workers, assuming that native workers supply to the informal labor market is elastic.

³¹ The impact across age groups is very similar. The main difference is that the young (ages 15 – 24) actually experience increases in part-time employment, while those older experience increases in full-time employment.

In the formal labor market the arrival of refugees acts as a demand shock. Whether that demand shock is positive or negative depends on two factors. First, formal and informal labor is to some degree substitutable, as the cost of informal labor falls employers will – for a fixed level of output – substitute from formal to informal labor. This will decrease the demand for formal labor. Second, the reduction in the cost of informal labor will decrease the costs of production allowing firms to expand output. This increases the demand for all types of labor, including formal labor. The net impact on the demand for formal labor is theoretically ambiguous; it is an empirical question whether it is positive or negative.³²

In addition to the labor supply shock, refugees also consume goods and services resulting in an increase in demand. This increase in demand will be particularly large in regions where camps have been built. The construction and management of these camps, which by all accounts are some of the best-equipped refugee camps anywhere, channels considerably resource to the affected areas (and are primarily paid for by the central government). Moreover, there is substantial investment of Syrian capital in the creation of new firms in Turkey (World Bank, 2015). Akgunduz, van den Berg and Hassink (2015b) estimate that around 40 percent of the newly established firms are being opened with backing of foreign capital. This will of course increase the demand for all types of labor.

Our empirical results are entirely consistent with this simple framework for understanding the labor market impact of the inflow of Syrian refugees. First, as predicted, the refugee shock causes large-scale displacement of Turkish out of informal employment. This is true for all categories of workers: male, female, young and older, and by educational attainment.

Second, the impact on formal employment is more mixed. On average the impact of the inflow of refugees on the formal employment of natives is positive. An increase in the supply of informal labor increases the demand for formal jobs for Turkish workers.³³ However, that is not true for all types of Turkish workers. There is no increase in formal employment for either women or high-skilled natives due to the inflow of refugees. The economic interpretation is that there is less complementarity between the types of formal jobs women

³² See Ozden and Wagner (2015) for an extensive discussion of these two effects, and an empirical strategy for identifying their magnitude. In general, the magnitude of the substitution effect depends on how easily employers can substitute formal and informal labor. The magnitude of the output expansion effect (called the scale effect) depends on the elasticity of product demand and the elasticity of supply of capital. The greater both elasticities are, the more output expands as a result of the cost reduction caused by the refugee inflow.

³³ Akgunduz, van den Berg and Hassink (2015b) find that firm entry increased in provinces hosting refugees (and there is no concurrent increase in firm exits), which helps explain the increased demand for formal labor.

and high-skilled engage in and informal labor. High-skilled workers are simply not employed in industries with a lot of informality. Similarly for women, there is practically no formal female employment in agriculture or construction, two industries in which anecdotally there is a lot of employment of refugees (see Table 3). Hence, Turkish women are in a much worse position to take advantage of the opportunities afforded by the inflow of low-cost informal labor.

Finally, note that the arrival of refugees has two countervailing effects on prices. First, lower labor costs should decrease producer prices. Second, increased demand for goods and services, as refugees are consumers as well as providers of labor, should increase consumer prices. In practice, we find that the inflow of refugees increases consumer prices, as measured by the Turkish Consumer Price Index (CPI) for NUTS 2 subregions. Specifically, we regress the log of the CPI on the refugee to population ratio, using the specification given by equation (1). We obtain a point estimate of 0.16, significant at the 5 percent significance level (the standard error is 0.081). At the average refugee to population of ratio of 2 percent the impact is a modest 0.3 percent increase in average consumer prices in a subregion.

4.3 Impact on Native Wages

Identifying the impact of refugees on Turkish wages is difficult. The reason is that, as described above, there are very large changes in the composition of Turkish employment due to the arrival of Syrian refugees. In particular, there are decreases in informal, female and part-time employment, but increases in formal and male employment. Formal jobs on average pay double as much as informal jobs and men earn more than women, by around 15 percent (see Table 2). Moreover, the large observed changes in the composition of the Turkish workforce are likely accompanied by large changes in unobserved characteristics as well. For both reasons, the estimated causal impact of refugees on average wages in a Turkish subregion will not simply reflect changes in the marginal product of existing workers but also changes in the composition of the workforce.

In Column 1 of Table 7 we report the IV estimates of the impact of refugees on average wages. In Column 2 we report the change in average wages attributable to the causal impact of Syrian refugees on the observed composition of Turkish employment in a subregion (at 2011 wages). The decomposition is described in Section 3.2, above. Column 3 shows the residual change in wages (once accounting for changes in observed characteristic). These reflect actual changes in marginal product, which is what we typically mean when thinking about wage changes. They also reflect changes in unobserved characteristics of those

employed in a Turkish subregion (that are not fully captured by the observables). All wage changes are reported in Turkish Lira and are calculated at the average refugee to population ratio of 2 percent. We report results in levels (rather than log points) since it is more straightforward to conduct the decomposition in wage levels.³⁴

The overall impact of refugees is to increase average Turkish wages for those employed in a subregion. The average impact is positive and very large, 42 Turkish Lira per month which is 5 percent of average wages (see Table 2). However, all of that increase is explained by the causal impact of refugees on the composition of the workforce, not due to a change in the marginal product of workers. On average the marginal product of Turkish workers is unaffected.

For informal workers we too see large and significant increases in wages, by 49 Turkish Lira or 9 percent of 2011 average wages. This may seem surprising since we have identified large-scale displacement of informal Turkish workers by refugees. We would expect these employment changes to be a reflection of a decreasing earnings potential of Turkish in the informal sector. The decomposition clarifies what is happening. The change in the observed characteristics of those employed in the informal sector (less women, less part-time, less low educated) accounts for a huge 128 Turkish Lira per month change in average wages. Hence, the residual wage impact – which reflects changes in marginal products and unobservables – is actually large and negative. We find that on average the wages of a Turkish worker in the informal sector with the same observed characteristics is decreasing quite dramatically, by 79 Turkish Lira per month on average. Syrian refugees increase the supply of informal labor, thereby decreasing wages in the informal sector causing Turkish workers to leave that sector. The type of Turkish workers who are displaced on average have lower wages than those who remain, and so observed wages actually increase due to composition effects. In contrast, for those employed in formal jobs the IV estimates suggest no significant (statistically or economically) change in average wages and no impact on wages due to the change in the observed characteristics of formal workers. In the formal sector, we would expect increasing wages resulting in increasing employment. However, the productivity of workers who switch from informal to formal employment due to refugees are likely less productive than the

³⁴ The underlying wage regressions have log wages as their dependent variable. We then transform the results in wage levels. Standard errors are then calculated using the delta method. As a consequence the wage impacts for sub-groups of workers (for example, formal and informal) do not add up to the average impact on all workers.

average formal worker in 2011 (which is why they were previously employed informally). This change in unobservables may explain why we do not observe average wage increases in the formal sector.

For women we identify the same pattern of wage changes as for informal workers. Average female wages in a subregion increase due to refugees, but once we account for selection effects we find large decreases in female wages (for fixed observed characteristics). This is exactly what we would expect given that we had found that women are displaced in the informal sector but experience no increase in their formal employment. For men estimated wage changes are positive, but not statistically significant. The same is true for Turkish workers of different ages and those with medium and high educational attainment. Finally, the average wages of low educated workers (those with no completed formal education) are not significantly impacted by the arrival of refugees. However, as we saw in Table 5, low educated Turkish workers experience very large changes in their employment composition. Specifically, there is a practically one-for-one displacement in the informal sector and part-time employment, accompanied by large increases in formal employment. Clearly, it is lower wage low educated workers who are displaced by refugees. The marginal product for low educated Turkish workers with fixed observed characteristics actually decreases enormously. The residual wage change is a massive 369 Turkish Lira decrease per month, though this likely also reflects a significant decrease in the unobserved productivity of Turkish workers who remain in a subregion.

4.4 Native Turkish Margins of Adjustment

The previous sections have documented large-scale changes in the composition of the employed Turkish workforce due to the inflow of Syrian refugees. One way in which Turkish workers adjust to an inflow of low cost, informal workers is by switching from informal to formal employment, and from irregular to regular workplaces. Naturally, there may be a number of other adjustment mechanisms.

Table 8 reports IV estimates of the impact on refugees on unemployment, the fraction of Turkish out of the labor force, attending school attendance and retired in a subregion. There is no statistically significant change in the fraction unemployed (the point estimates are consistently negative) or attending school (the point estimates are consistently positive) in a subregion. We also find no impact of refugees on public sector employment or the probability of being an employer (results not reported in the paper). There is no statistically significant impact on retirement, except for the highest skill group that sees an increase in the fraction

retired. All adjustment on the extensive margin occurs via an increase in the fraction of people in a subregion who are out of the labor force. The impact is statistically significant for women, with no significant impact for men. The magnitude of the point estimate is consistent with the interpretation that the decrease in the net overall employment of women due to refugees, reported in Table 6, is entirely the result of women leaving the labor force. The impact on female wages, reported in Table 7, suggests that much of this decrease in labor force participation is due to falling potential earnings. However, there may also be non-labor market reasons why women leave the labor force. For example, in a 2014 survey 62 percent of Turkish agreed with the proposal that “Syrian refugees disturb the peace and cause depravity of public morals by being involved in crimes, such as violence, theft, smuggling and prostitution,” while only 23 percent disagree (Erdogan, 2014).

Another plausibly important adjustment margin is that Turkish respond to the Syrian refugees by relocating across NUTS 2 subregions. We test for population movements in response to the inflow of refugees in two distinct ways. First, by estimating the impact of refugees on the population growth (in percent) in each Turkish NUTS 2 subregion. Second, the Turkish LFS asks respondents whether they had previously lived in a different province (one of Turkey’s 81 NUTS 3 regions), and if so in what year they moved to their current province. We estimate the impact of refugees on the probability a native moved to a subregion in the past year.

Table 9 reports OLS and IV estimates of the impact of refugee on net population growth in subregion (Columns 1 and 2) and gross population inflows (Columns 3 and 4). Net population growth is estimated at the level of NUTS 2 subregions. Population inflows to a subregion are estimated at the individual level (and standard errors clustered by subregion-year). All regressions include subregion and year fixed effects and a year-specific control for log distance from the Syrian border. The first column presents the estimates for the whole sample, subsequent columns for different sub-samples by gender, age and education.

For the full sample the net population growth in a subregion is positively correlated with refugee flows, while the IV point estimate is negative (though neither estimate is statistically significant). The probability of a Turkish person migrating to a subregion is negatively correlated with refugee flows (the OLS estimate is highly statistically significant). The IV estimate is of a similar magnitude, but no longer statistically significant. This same pattern broadly holds for both women and men. The only other statistically significant IV estimates are a decrease in the population aged 15 – 24, an age group that is likely more mobile, and of those with medium educational attainment. There is also a decrease in the inflow of low

education Turkish to a subregion. In sum, there is some evidence that the inflow of Syrian refugees results in a decrease in the number of Turkish living in a subregion. The evidence, however, is weak and the impact unlikely to be very large.

5. PLACEBO TESTS AND ROBUSTNESS CHECKS

5.1 Placebo Tests

The key threat to the validity of our instrument is that there are subregion specific economic trends that are correlated with the instrument, and not fully controlled for by the inclusion of the log distance of a Turkish subregion from the Syrian border. *A priori* this seems unlikely since the instrument is also based on travel distances, but we can test for the existence of such trends in a pre-period. Specifically, we run regressions that are analogous to those reported in Tables 5, 6 and 7 using data from the LFS 2009 and 2011. As a placebo test we pretend that the Syrian refugees had arrived between 2009 and 2011, rather than between 2011 and 2014, to see if the instrument is correlated with Turkish outcomes in this pre-period.

Table 10a presents the results of our placebo tests. For the overall sample there is no statistically significant trend that is correlated with subsequent (instrumented) refugee flows in formal or informal employment, or in log wages. For subgroups of natives (by gender, age or education) we find only one statistically significant pre-trend at a 5 percent significance level.³⁵ However, we do find five estimates that are significant at the 10 percent level, which suggests there may be some (marginally) significant pre-trends. These possible pre-trends suggest that we may be overestimating some of the positive total wage impact of refugees and on female formal employment. However, we would be underestimating the negative impact on informal employment for older workers and the high skilled, but overestimating it for younger workers. Clearly, to the extent that there might be pre-trends they are not simply positive or negative trends that increase or decrease demand for all types of labor. Rather they would have to far more subtle changes in the demand for specific types of workers. In sum, there is no strong evidence of pre-trends, but we cannot rule out that there may be some. One way to address this concern is to reduce the regions of Turkey used in the analysis and focus on a more homogeneous sample. We do so in Section 5.3 below.

³⁵ This would be expected even if there were no significant pre-trends.

5.2 The Impact of the 2012 Education Reform

We cannot rule out that during the period 2011 to 2014 significant economic changes, other than the inflow of refugees, occurred in Turkey that happen to be correlated with the instrument. The only major policy change in this period that we were able to identify (the impact of which may be correlated with refugee flows) is the 2012 education reform. This reform, most significantly, adds four years to mandatory schooling, increasing the period from eight years to 12 years. School children in grade 8 (typically age 14) and younger were affected by the reform starting in 2013, making it compulsory for them to continue their schooling. In 2011, our baseline year, Turkey's border regions with Syria had significantly lower school attendance rates among ages 15 – 18, 54 percent compared to 66 percent in the rest of Turkey, and hence were disproportionately affected by the reform. Since the 2012 education reforms coincided with the influx of refugees from Syria and disproportionately affected the same regions, our estimation strategy is potentially confounding the events.

To test whether it is likely that the education reform biases our estimates we check whether the refugee flows are correlated with 2011 levels in school attendance across Turkish subregions. As expected the positive correlation between refugee flows and 2011 school attendance rates is significant at the one percent significance level (controlling for the gender, age and education composition of a subregion the point estimate is -0.17). Even once we instrument for refugee flows the correlation remains significant at the one percent significance level (a point estimate of -0.30). However, once we control for the log distance for the Syria border there is no longer a statistically significant relationship, in either the OLS or IV, between school attendance rates in 2011 and subsequent refugee flows. This suggests that, on account of the inclusion of our distance from the border control, we can rule out the 2012 education reform confounding our estimates.

5.3 Robustness to Varying Sample of Turkish NUTS 2 Subregions

Throughout this paper we use all 26 NUTS 2 subregions of Turkey for identification. However, the results are robust to varying the particular sample of subregions. We report results for two alternative samples. First, we drop the Gaziantep subregion from the estimation. Gaziantep has the highest refugee to population ratio among all regions and reportedly towns with a refugee share of over 30 percent. The inclusion of Gaziantep may skew results if there are any non-linearities in the impact of refugees. Second, we follow Ceritoglu et al. (2015) in only considering nine subregions of Turkey. These are the five Syrian border regions of southeastern Anatolia (Hatay, Gaziantep, Sanliurfa, Mardin, and

including Adana) and four subregions of eastern Anatolia (Erzurum, Agri, Malatya, Van). These nine subregions make for a more homogeneous sample of Turkey (see Ceritoglu et al. 2015 for extensive evidence highlighting the common levels and trends in labor market outcomes for this sample). This is especially important since in the full sample we were not able to entirely rule out the existence of some pre-trends, for some subgroups of the Turkish population, that are correlated with refugee flows (see Section 5.1 above).

Table 11 presents the IV estimates of the impact of refugees on total, formal and informal employment when we drop the Gaziantep subregion (Panel A) and when restrict the sample to nine subregions of southeastern and eastern Anatolia (Panel B). We show results separately for the whole sample and by gender. Our findings are highly robust to the particular choice of sample.³⁶ The estimates in both Panels A and B are very similar to our main results (see Tables 5b and 6). Specifically, as in our main results, we find large-scale displacement in informal employment and job growth in formal employment. The net impact on total employment is negative and statistically significant. The impacts by gender also closely reflect our main results. Women experience particularly pronounced displacement in the informal sector and no formal job gains. In contrast, for men displacement in the informal sector is fully offset by employment growth in formal sector, with no net job losses. Clearly, our main findings do not depend on the particular sample of subregions we analyze, and importantly are robust to restricting the analysis to a more homogenous group of regions.

6. CONCLUSIONS

This paper combines newly available data on the 2014 distribution of 1.6 million Syrian refugees across subregions of Turkey and the Turkish LFS, to assess the impact on Turkish labor market conditions. The Syrian refugees in Turkey are overwhelmingly employed informally, since they were not issued work permits, and so their arrival was a well-defined supply shock to informal labor. Consistent with economic theory our IV estimates, which also control for distance from the Turkish-Syrian border, suggest large-scale displacement of natives in the informal sector. At the same time, consistent with occupational upgrading, there are increases in formal employment for the Turkish. This increase though only occurs among men without completed high school education. The employment patterns of women and the high-skilled mean they are not in a good position to take advantage of lower cost

³⁶ Results are also robust to dropping all subregions with close to no refugees.

informal labor. The low educated and women experience net displacement from the labor market and, together with those in the informal sector, declining earning opportunities.

It should be highlighted that these estimates represent the short-run impact of the inflow of refugees to Turkey. Until recently Turkey's position had been that these refugees were temporary and would return to Syria soon. Going forward the key issue is how refugees will continue to integrate into the Turkish labor market and society. In particular, in January 2016 Turkey decide to grant Syrian refugees increased access to labor markets. The other major source of uncertainty is the large-scale onward migration of refugees to Western Europe, which likely not only affects the number but also the composition of refugees in Turkey.

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APPENDIX A

This appendix provides a detailed description of all the variables used in the paper.

Native working-age population: all outcomes are measured for the Turkish native working-age population. Natives are defined as those people born in Turkey. In our two-year sample only 1.4 percent of respondents are not born in Turkey (this does not include the Syrian refugees since these were not surveyed). The working-age population is defined as everyone ages 15 to 64. We also exclude those who are employed but neither in the private nor public sector (0.34 percent of respondents).

Employment: our main employment variable is an indicator whether the person is in private sector paid employment. This excludes those employed in the public sector, employers and unpaid family workers, but does include the self-employed.

Formal / informal employment: in Turkey it is mandatory for everyone earning money to be registered with the social security authority (and pay contributions). Everyone in private sector employment (see above definition of employment) who self-declare they are registered with the social security authority is defined as being formally employed. Those who self-declare they are not registered with the social security authority are defined as informally employed. The sum of formal and informal employment adds up to our main employment variable.

Regular / irregular workplace: LFS respondents are asked in what type of workplace they are employed. Everyone in private sector employment (see above definition of employment) who responds 'regular workplace' is defined as working in a regular workplace. Those who respond 'field, garden, marketplace, mobile or irregular workplace and home' are defined as working in an irregular workplace. The sum of regular and irregular workplace adds up to our main employment variable.

Public sector employment: an indicator for whether the respondent is employed in the public sector.

Employer: an indicator for whether the respondent is an employer at their main workplace.

Unemployed: an indicator for whether a respondent is not employed, but looking for a job.

Not in labor force: an indicator for whether a respondent is not employed and not looking for a job.

Note that employment, public sector employment, employer, unemployed and not in labor force add up to the total native working-age population.

In school: an indicator for whether the respondent currently attends regular education (schooling). This does not preclude also being employed.

Retired: an indicator for a respondent who declares that they are not engaged in job search because they are retired.

Full / part-time employment: an indicator for whether a person works full or part-time for all people in private sector employment (see above definition of employment). Full-time employment is defined as usual working hours of 30 or more hours per week, part-time employment as usual working hours of less than 30 hours per week. We do not use the indicator provided in the LFS data since there seems to be some confusion in which category 30 hours per week falls (with these evenly divided between full and part-time).

Education: we classify people into three education categories. Low education is defined as those with no completed formal education. Medium education is defined as those with at least completed primary education but no high school completion. Higher education is defined as people who have at least completed high school.

Wages: the earnings measure we use is the response to the question “how much did you earn from your main job activity during the last month?” In the LFS 2011 there is further information on how much of that income was irregular, for example a bonus payment, but the LFS 2014 no longer provides that breakdown. There is also a measure of the “number of hours per week worked in the main job” (both usual and total hours), which can be used to construct hourly wages. Since the hours worked measure does not correspond exactly to the earnings measure and introduces additional measurement error, our preferred wage measure is the monthly wage. We exclude wage observations where respondents report having usual working hours of less than 14 or more than 84 hours per week.

Table 1: Statistics for Turkish Working-Age Population (in %)

	2011	2014
Labor force participation	53.7	57.2
Female LFP	31.3	33.0
Private sector employment	33.1	36.3
Public sector employment	6.1	6.5
Employer	2.5	2.3
Unpaid	6.6	6.3
Unemployment	5.4	5.8
Retired	4.8	4.9
In school	12.4	15.6
Low education	14.2	12.8
Medium education	56.2	57.8
Higher education	29.6	33.7
Share of Private Sector, Paid Employment (in %)		
Informal	39.5	33.4
Irregular	28.5	27.9
Part-Time	8.1	8.1

Note: data from Turkish Household LFS. Variable descriptions are provided in Appendix A.

Table 2: Informality and Wages For Employed, Pre-Refugee 2011

		Monthly Wage (Turkish Lira)	
	Share Informal	Mean	Median
All	39.5%	870	700
Formal	0%	1013	800
Informal	100%	537	540
Regular Workplace	24.6%	923	750
Irregular Workplace	77.0%	461	450
Full-time	35.7%	886	740
Part-time	82.8%	317	200
Female	46.1%	787	650
Male	37.7%	894	750
Ages 15 - 24	48.0%	594	630
Ages 25 - 64	37.8%	947	780
Low education	79.4%	547	600
Medium education	45.8%	707	700
Higher education	18.7%	1151	850

Note: Data from Turkish Household LFS. Employment is defined as private sector, paid employment. Variable descriptions are provided in Appendix A. The purchasing power parity conversion rate of the Turkish Lira to the US dollar was 0.99 in 2011.

Table 3: Industry Distribution and Informality by Gender for Private Sector, Paid Employment, Pre-Refugee 2011(in %)

	Male		Female	
	(1) Industry Share	(2) Share Informal	(3) Industry Share	(4) Share Informal
Agriculture	17.3	67.5	18.4	95.5
Mining	0.7	11.0	0.1	0.0
Manufacturing (textiles, clothes, leather, food, wood)	14.6	26.7	22.2	48.0
Other Manufacturing	9.6	9.8	5.0	10.5
Construction	11.7	53.5	1.4	13.0
Wholesale, Retail	18.0	33.0	15.7	29.6
Transportation (land)	5.3	44.4	0.6	18.9
Accommodation, Food, Beverages	6.3	41.3	4.7	35.2
Education	0.8	18.0	3.3	13.6
Household work	0.2	35.5	6.1	92.7
Other services	15.5	24.3	22.5	20.6

Note: Data from the Turkish Household LFS. Employment is defined as private sector, paid employment. The columns "Industry Share" report the distribution of private sector, paid employees across industries, by gender (the columns each sum to 100). The columns "Share Informal" report the fraction of employees in each industry who are employed informally (by gender).

**Table 4: Rank Order of Turkish NUTS 2 Subregions by 2014
Actual and Residual Refugee to Working-Age Population Ratio**

Rank	(1) Actual	(2) Residual
1	Gaziantep	Gaziantep
2	Hatay	Hatay
3	Mardin	Istanbul
4	Sanliurfa	Sanliurfa
5	Adana	Tekirdag
6	Istanbul	Bursa
7	Konya	Izmir
8	Ankara	Kocaeli
9	Bursa	Balikesir
10	Malatya	Manisa
11	Kocaeli	Konya
12	Kayseri	Zonguldak
13	Antalya	Aydin
14	Izmir	Antalya
15	Kirikale	Samsun
16	Van	Kastamonu
17	Aydin	Mardin
18	Samsun	Ankara
19	Manisa	Trabzon
20	Balikesir	Kirikale
21	Tekirdag	Agri
22	Trabzon	Van
23	Zonguldak	Erzurum
24	Agri	Adana
25	Erzurum	Kayseri
26	Kastamonu	Malatya

Note: residual variation in the refugee to working-age population ratio controls for the log distance from the border the closest border-crossing to Syria.

Table 5a: Impact of Refugees on Native Employment - Full Sample - OLS Estimates

	Total	Formal	Informal	Regular	Irregular	Full	Part
Panel 1: Baseline Covariates							
Refugee / Pop.	0.108*	0.157***	-0.049	-0.037	0.145*	0.106**	0.002
	(0.060)	(0.054)	(0.078)	(0.055)	(0.079)	(0.044)	(0.074)
R-squared	0.01	0.04	0.01	0.04	0.02	0.04	0.01
Panel 2: Full Covariates							
Refugee / Pop.	0.122*	0.163***	-0.041	-0.02	0.142*	0.120***	0.002
	(0.065)	(0.045)	(0.080)	(0.041)	(0.080)	(0.044)	(0.073)
R-squared	0.25	0.24	0.08	0.22	0.12	0.26	0.02
Obs.	670,380	670,380	670,380	670,380	670,380	670,380	670,380

Note: Employment is defined as private sector, paid employment. The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. The baseline specification includes year and subregion fixed effects, as well as the year-specific log distance to the border. The full specification also includes fully interacted dummy variables for gender, education and year, as well as a gender, education and year-specific second-order polynomial in potential experience. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 5b: Impact of Refugees on Native Employment - Full Sample - IV Estimates

	Total	Formal	Informal	Regular	Irregular	Full	Part
Panel 1: Baseline Covariates							
Refugee / Pop.	-0.186	0.441***	-0.627**	0.471*	-0.657**	0.165	-0.351**
	(0.194)	(0.166)	(0.269)	(0.253)	(0.299)	(0.103)	(0.161)
First-stage T-statistic	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Panel 2: Full Covariates							
Refugee / Pop.	-0.320*	0.294**	-0.615**	0.350*	-0.671**	0.022	-0.342**
	(0.186)	(0.127)	(0.254)	(0.196)	(0.277)	(0.112)	(0.159)
First-stage T-statistic	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Obs.	670,380	670,380	670,380	670,380	670,380	670,380	670,380

Note: Employment is defined as private sector, paid employment. The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. The baseline specification includes year and subregion fixed effects, as well as the year-specific log distance to the border. The full specification also includes fully interacted dummy variables for gender, education and year, as well as a gender, education and year-specific second-order polynomial in potential experience. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 6: Impact of Refugees on Native Employment - by Subgroup - IV Estimates

	Total	Formal	Informal	Regular	Irregular	Full	Part
Female							
Refugee/ Pop.	-0.689**	0.021	-0.71***	0.013	-0.702***	-0.219	-0.470**
	(0.292)	(0.106)	(0.248)	(0.080)	(0.239)	(0.136)	(0.201)
Observations	341,971	341,971	341,971	341,971	341,971	341,971	341,971
Male							
Refugee/ Pop.	0.073	0.585**	-0.512*	0.677*	-0.605*	0.279	-0.206
	(0.216)	(0.234)	(0.284)	(0.381)	(0.350)	(0.219)	(0.136)
Observations	328,409	328,409	328,409	328,409	328,409	328,409	328,409
Ages 15 - 24							
Refugee/ Pop.	-0.231	0.334***	-0.566**	0.267*	-0.499*	-0.346	0.115*
	(0.202)	(0.129)	(0.263)	(0.143)	(0.263)	(0.215)	(0.068)
Observations	158,047	158,047	158,047	158,047	158,047	158,047	158,047
Ages 25 - 64							
Refugee/ Pop.	-0.280	0.293**	-0.573**	0.429*	-0.708**	0.240**	-0.520***
	(0.194)	(0.120)	(0.250)	(0.222)	(0.281)	(0.122)	(0.201)
Observations	512,333	512,333	512,333	512,333	512,333	512,333	512,333
Low Education (no formal education)							
Refugee/ Pop.	-0.858**	0.318**	-1.176**	0.278	-1.136**	-0.235	-0.622**
	(0.430)	(0.131)	(0.498)	(0.184)	(0.499)	(0.177)	(0.290)
Observations	93,229	93,229	93,229	93,229	93,229	93,229	93,229
Medium Education (formal education but not completed high school)							
Refugee/ Pop.	0.009	0.355**	-0.347	0.549*	-0.540*	0.320**	-0.311*
	(0.202)	(0.159)	(0.235)	(0.311)	(0.276)	(0.160)	(0.168)
Observations	379,173	379,173	379,173	379,173	379,173	379,173	379,173
Higher Education (high school and above)							
Refugee/ Pop.	-0.378*	0.105	-0.483***	-0.026	-0.353**	-0.256	-0.122**
	(0.223)	(0.194)	(0.183)	(0.175)	(0.156)	(0.226)	(0.058)
Observations	197,978	197,978	197,978	197,978	197,978	197,978	197,978

Note: Employment is defined as private sector, paid employment. The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. All specifications include subregion fixed effects and fully interacted fixed effects for gender, education and year, as well as a gender, education and year-specific second-order polynomial in potential experience, as well as the year-specific log distance to the border. First-stage t-statistic for the instrument is between 3.6 and 4.0 for all categories of natives. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 7: Overall and Decomposition of Impact of Refugees on Native Wages (IV Estimates) in Turkish Lira per Month.

	(1) Overall	(2) Due to Observables	(3) Residual
All Employed	42.1**	42.3	-0.2
Formal	-4.3	-1.0	-3.3
Informal	48.8*	127.8	-79.0***
Female	70.5	199.0	-128.4**
Male	36.2	1.6	34.6
Ages 15 - 24	17.9	28.7	-10.8
Ages 25 - 64	32.0	46.8	-14.8
Low Education	26.9	396.2	-369.3***
Medium Education	13.3	19.9	-6.6
High Education	46.0	42.3	3.7

Note: All estimates are for private sector, paid employees. Detailed variable definitions are provided in Appendix A. The decomposition is described in Section 3.2. All wage changes are calculated at a refugee to population ratio of 2 percent. All observations are weighted by the LFS sample weights. Column 1 is based on the IV estimate of refugees on log wages in a subregion, standard errors are obtained using the delta method. Column 2 reports the wage change due to changes in observed characteristics of workers in a subregion (at 2011 wages). We use 183 worker categories, based on gender, age, education, formal or informal and full- or part-time employment status. Column 3 reports the residual wage changes (subtracting Column 2 from Column 1). In the first-stage the instrument is significant at the one percent significance level in all regressions. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 8: Impact of Refugees on Native Outcomes - by Subgroup - IV Estimates

	Unemployment	Not in Labor Force	School	Retired
	Full Sample			
Refugee/ Pop.	-0.61 (0.449)	0.910* (0.485)	0.183 (0.138)	-0.02 (0.067)
Observations	670,380	670,380	670,380	670,380
	Female			
Refugee/ Pop.	-0.224 (0.201)	1.016** (0.436)	0.222 (0.144)	0.006 (0.036)
Observations	341,971	341,971	341,971	341,971
	Male			
Refugee/ Pop.	-0.995 (0.698)	0.766 (0.586)	0.17 (0.157)	-0.041 (0.115)
Observations	328,409	328,409	328,409	328,409
	Ages 15 - 24			
Refugee/ Pop.	-0.783 (0.518)	0.995 (0.631)	0.578 (0.383)	
Observations	158,047	158,047	158,047	
	Ages 25 - 64			
Refugee/ Pop.	-0.509 (0.403)	0.773* (0.396)	-0.100* (0.061)	-0.014 (0.084)
Observations	512,333	512,333	512,333	512,333
	Low Education (no formal education)			
Refugee/ Pop.	-0.249 (0.225)	1.242** (0.541)	-0.04 (0.071)	-0.012 (0.043)
Observations	93,229	93,229	93,229	93,229
	Medium Education (formal education but not completed high school)			
Refugee/ Pop.	-0.600 (0.482)	0.688* (0.409)	0.275 (0.185)	-0.119 (0.083)
Observations	379,173	379,173	379,173	379,173
	Higher Education (high school and above)			
Refugee/ Pop.	-0.901 (0.606)	0.766 (0.548)	0.264 (0.276)	0.184** (0.079)
Observations	197,978	197,978	197,978	197,978

Note: The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. All specifications include subregion fixed effects, fully interacted fixed effects for gender, education and year, a gender, education and year-specific second-order polynomial in potential experience, the year-specific log distance to the border. First-stage t-statistic for instrument is 3.6 - 4.0 for all categories of natives. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 9: Impact of Refugees on Native Mobility Across Subregions (OLS and IV)

	(1)	(2)	(3)	(4)
	Net Population Change (in percent)		Gross Population Inflows (in percentage points)	
	OLS	IV	OLS	IV
Total Population				
Refugee/ Pop.	0.193 (0.341)	-0.198 (0.245)	-0.034*** (0.012)	-0.029 (0.047)
Observations	52	52	670,380	670,380
Female				
Refugee/ Pop.	0.067 (0.192)	-0.192 (0.135)	-0.037** (0.013)	-0.057 (0.050)
Observations	52	52	341,971	341,971
Male				
Refugee/ Pop.	0.126 (0.170)	-0.006 (0.152)	-0.031** (0.013)	-0.002 (0.046)
Observations	52	52	328,409	328,409
Ages 15 - 24				
Refugee/ Pop.	-0.034 (0.204)	-0.452** (0.230)	-0.031 (0.020)	-0.007 (0.077)
Observations	52	52	158,047	
Ages 25 - 64				
Refugee/ Pop.	0.227 (0.235)	0.254 (0.279)	-0.036*** (0.011)	-0.033 (0.038)
Observations	52	52	512,333	512,333
Low Education (no formal education)				
Refugee/ Pop.	0.082 (0.186)	-0.157 (0.225)	-0.033 (0.022)	-0.049* (0.027)
Observations	52	52	93,229	93,229
Medium Education (not completed high school)				
Refugee/ Pop.	-0.026 (0.390)	-0.771* (0.467)	-0.021 (0.013)	0.003 (0.025)
Observations	52	52	379,173	379,173
Higher Education (high school and above)				
Refugee/ Pop.	0.136 (0.387)	0.729 (0.524)	-0.051 (0.045)	-0.126 (0.146)
Observations	52	52	197,978	197,978

Note: The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. All specifications include subregion and year fixed effects, as well as the year-specific log distance to the border. *, **, *** denote significance at the 10, 5, 1 percent significance level.

Table 10: Placebo Tests for Pre-Trends, 2009 - 11, IV Estimates

	Formal	Informal	Log Wage
	Total Employment		
Refugee/ Pop.	-0.058 (0.171)	0.296 (0.252)	1.254 (0.824)
Observations	656,642	656,642	122,386
	Female		
Refugee/ Pop.	0.262** (0.121)	0.371 (0.310)	2.361* (1.355)
Observations	337,825	337,825	38,099
	Male		
Refugee/ Pop.	-0.358 (0.380)	0.204 (0.302)	1.110* (0.638)
Observations	318,817	318,817	125,390
	Ages 15 - 24		
Refugee/ Pop.	0.333 (0.266)	-0.572* (0.312)	0.047 (1.270)
Observations	158,835	158,835	28,789
	Ages 25 - 64		
Refugee/ Pop.	-0.192 (0.244)	0.606* (0.315)	0.973 (0.681)
Observations	497,807	497,807	134,700
	Low Education (no formal education)		
Refugee/ Pop.	0.113 (0.184)	0.601 (0.541)	0.013 (1.821)
Observations	98,553	98,553	6,257
	Medium Education (but not completed high school)		
Refugee/ Pop.	-0.35 (0.261)	0.057 (0.226)	-0.654 (0.706)
Observations	373,264	373,264	75,438
	Higher Education (high school and above)		
Refugee/ Pop.	0.338 (0.208)	0.652* (0.335)	1.054 (0.983)
Observations	184,825	184,825	81,794

Note: Employment is defined as private sector, paid employment. The independent variable is the ratio of refugees to working-age population in a NUTS 2. Detailed variable definitions are provided in Appendix A. All observations are weighted by the LFS sample weights. Standard errors are clustered by NUTS2-year. All specifications include subregion fixed effects and fully interacted fixed effects for gender, education and year, as well as a gender, education and year-specific second-order polynomial in potential experience, as well as the year-specific log distance to the border. The instrument is significant at the one percent significance level in the first-stage for every specification *, **, *** denote significance at the 10, 5, 1 percent significance level.