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Abstract

The effects of migration on labor market outcomes, such as earnings and employment, have been well-studied in literature. However, there is little attention to how natives adjust their skills to educational requirements of jobs they occupy when they face a massive migration shock. This paper analyzes the effect of Syrian refugee inflows into Turkey beginning in 2011 on the education-job matching of the native population. By using the 2004-2019 household labor force surveys and the regional-level Syrian refugee data, we employ a difference-in-differences methodology that takes account endogenous location choices of refugees as well. We find that a one-point increase in the migrant-to-native ratio significantly reduces the overeducation of the native men in informal employment by 9%. However, this effect, according to employment model, is result of the overeducated native men who have been crowded out of this labor market. On the other hand, since we find no displacement effects on younger native men, reducing overeducation effect of migration stems from the switching of them through occupation ladder, arguing that they are more likely to change their occupations to ones that are suitable for their educational background. Finally, since younger women leaves formal labor market in higher migrant regions, negative overeducation effect of migration also implies the crowding out mechanism.

Keywords: refugees, overeducation, immigration, Syria, Turkey, difference-in-differences, instrumental variables

JEL Classification: C26, I25, J24, J61

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1 Introduction

In most developed countries, high enrollment rates in secondary and tertiary education have caused to concern that labor demand has fully absorbed all skilled labor. Indeed, Verhaest and Van der Velden (2013) found in REFLEX survey covering 11 developed countries that average overeducation incidence, which is the ratio of workers having higher level of schooling than a job required, is about 26%. This ratio amounts to 33% for 25 European countries (Galasi, 2008). Moreover, developing countries also suffer from this problem coupled with the expansion in the higher education institutions. According to Sam (2018), the average incidence in 38 developing countries is around 27% since 1990. Consequently, overeducation results in productivity and wage losses due to the less efficient allocation of resources (Verdugo and Verdugo, 1989; Kiker et al., 1997; Filiztekin, 2011; McGowan and Andrews, 2015) .

Turkey is no exception when it comes to overeducation, increasing its incidence rate from 31% to 46% between 2004-2019. During this period, Turkish labor market faced Massive Syrian refugee inflow into Turkish border beginning in 2011. However, no study paid attention to how such refugee influx might have affected occupation positioning of natives based on their educational background even though basically wage and employment effects of this refugee shock on natives have been well documented by numerous studies (Del Carpio and Wagner, 2015; Ceritoglu et al., 2017; Aksu et al., 2022; Cengiz and Tekgüç, 2021). Overeducation might have been also affected by this migrant shock because educational distribution of refugees is different from Turkish labor market. As they join labor market with low wage and without registering in social security system, natives may change their job to compete with them (switching effect effect) or become unemployed due to the crowding out effect (crowding out effect).

Our aim in this study to analyze how natives have adjusted their occupation based on educational backgrounds when they faced a migration shock. We regressed being overeducation against the Syrian refugee/native population ratio capturing other covariates. To identify whether an individual matched or not, we basically utilized ORU (over-, under-educated, and required education) approach developed by Rumberger (1987).

Difference-in-differences estimation with continuous treatment allows us to compare the pre-treatment period of outcomes with treatment considering different migration intensity (see Del Carpio and Wagner (2015); Ceritoglu et al. (2017); Aksu et al. (2022); Cengiz and Tekgüç (2021)). We used Turkish Household Labor Force (THLFS) microdata for the period 2004 and 2019. We also considered endogenous location choices of Syrian refugees to regional labor market conditions using instrumental variable approach with distance-based instruments frequently used in migration literature.

In the literature large amount of papers have addressed the link between migration and mismatch. We split them in to three groups. First one is relate to mismatch determinants of migrants and natives themselves separately (Lindley, 2009; Nielsen, 2011; Nieto et al.,

2015; Lu and Hou, 2020; Schuss, 2020). In the second group, studies are investigating the emigration behaviour of individuals and they found that being overeducated is important determinant when deciding to migrate (Quinn and Rubb, 2005, 2011; Villarreal, 2016). These group of studies also reinforces the necessity of the taking account of the endogeneity between overeducation and migration. Final group, on the other hand, deals with the importance of regional labor market characteristics and mobility opportunities of labor (Büchel and Van Ham, 2003; Ramos and Sanromá, 2013). These studies found that large labor markets and possibility of spatial labor mobility to find a job helps to reduce overeducation. However, according to our knowledge, our paper is the first attempt to empirically analyze the effect of migrant shock on mismatch of natives. A theoretical study by Zhang (2019) is an exception using Pisarides labor search and matching model. It argues that overeducation in high skill labor market exists because of the worse labor market conditions due to the enlargement in the high skill workers (price effect). On the other hand, labor cost decreases as high skilled immigrants are matched. It leads to increase the expected surplus of skilled filled jobs and decrease the overeducation (composition effect). Overall effect, however, is still an empirical issue. Our study is different because education composition of Syrian refugees is overwhelmingly low-skilled and most of them are informally employed. Morreover, Turkish labor market gradually changes its education composition toward higher levels. Finally, in our specification migration is treated as a shock to labor markets rather than a continuous flow like in US.

Our study may be close to those that investigate the relationship between migration and occupational choice or mobility of natives. For example, Foged and Peri (2016) found that less educated people are forced to pursue non-manual intensive occupations in Denmark when they face migration from eight countries. However, scale of this refugee shock is relatively small compared to the our case. There are also studies on whether high-skill immigration affects the occupation choice of natives. Peri and Sparber (2011) and Ma (2020) found that foreign-born graduates and natives are imperfect complements in the US labor market. Crown et al. (2020), on the other hand, pointed out that those skilled migrants would induce natives to specialize in communication and cognitive skill-based occupations. For Turkey, a study by Akgündüz and Torun (2018) is closest to our paper. They found consistent with previous studies that 2.5 million Syrian refugees increase task complexity and induce them to upgrade their ICT-based and abstract tasks, especially among medium-level educated workers.

Hence, our paper fills the gap in the literature in a way that sudden and large scale migration shock changes the utilization of skills in terms of schooling level. Lack of such utilization, which is a mismatch case in our study, would cause productivity losses in the economic activity and wage losses (Filiztekin, 2011; Verdugo and Verdugo, 1989; Kiker et al., 1997).[1]

[1]Reverse relation is also possible. Freeman (1976) states that overeducation in US stems from declining wage gap between skilled and non-skilled workers.

Our baseline results show that increase in the migrant-to-native ratio on Turkish subregions significantly decreases the overeducation probability of native men employed without social security registration. In other words, as the refugee/population ratio increases, natives whose education level is greater than those of a job reduces significantly. However, this reducing overeducation effect of migration may be caused by two mechanisms we mentioned above. To gain further understanding of which one is dominant, we also estimate a binary choice model to determine how natives change their formal and informal employment status when they face a massive migration shock. Therefore, since we confirm that migration shock negatively affect the informal employment status of native men, we conclude that our overeducation result in the regarding sample may be sourced from the crowding out effect. On the other hand, we find that migration-to-population ratio positively affects the formal employment of native men. However, overeducation status does not seems to correct when these natives are employed in formal sector. Similarly, for native women sample, we observe that even though treated regions push out them from formal sector and pull into the informal sector, these mobilities are not related with overeducation probability. Lastly, our sub-sample estimations show that occupational upgrading mechanism exists in low-educated and younger native men working in formal sector. Crowding out mechanism is found in younger native women of formal employment. The remainder of the paper proceeds as follows. Section 2 presents data and give information how we measured vertical mismatch. Section 3 discusses estimation method and identification strategy to overcome the endogeneity problem arising from location choices of refugees. We then present our empirical results for overeducation and employment outcomes of natives in Section 4. Finally, Section 5 concludes.

2 Data and Measurement of Vertical Mismatch

We used three data sources to investigate the effect of Syrian refugee shock on the (mis)match in the Turkish labor market. We obtained the labor market information of the natives from the THLFS dataset, which has cross-sectional structure for the period 2004-2019. It contains social, demographic, and (un)employment information about the Turkish labor force. We exclude those who born in abroad to keep the native population. Since we are interested in the mismatch situation of natives, our sample are reduced to only employed people. Then our focused sample is working age (18-65) population who are employed full-time in the private sector.[2]

[2]We exclude public sector since its employment generally requires certification or diploma to hire worker, meaning that matching is no sensitive to the migrant shock. However, question that the individual is working in public or private sector is asked to respondents beginning from 2009 survey. To extend sample to previous years, we exclude the industries with highest public sector employment: public administration (84), education (85) and human health and health services (86), which are consist of 86% of total public sector employment. Therefore, we exclude these three industries.

Second and third data source is number of Syrian refugees and distance-based instrument variables at NUTS-2 level from 2013 to 2019 provided by Aksu et al. (2022) and Kırdar et al. (2022). They gathered 2013 and 2014 statistics from The Disaster and Emergency Management and Erdogan (2014), respectively. Other periods are from Directorate General of Migration Management. The instrument variable accounts for the number of Syrians in the other three countries (Lebanon, Jordan, and Iraq) receiving refugees.

There are two approaches in the literature to identify whether an individual is matched or not. Self-reporting approach relies on subjective assessment of individuals for their job. However, this may lead to biased reporting especially an individual has no job satisfaction related with his or her job (Nordin et al., 2010). For this reason and lack of such information in the survey, we used objective approach derived from occupation and schooling information, developed by Rumberger (1987). The key issue in this method is to specify the educational requirements of occupations. To do so, two alternative measures are commonly used: mean definition of Verdugo and Verdugo (1989) and the modal procedure (mode) of Kiker et al. (1997). The mean definition calculates average schooling year of each occupation. Therefore, if a person has years of schooling level greater (less) than the mean job schooling plus (minus) one standard deviation then this approach assigns this worker as over- (under-) educated.[3] However, this approach may be problematic in two aspects. Firstly, since average schooling year has been constantly increasing over time, in some point, all workers in an occupation may be matched. Conversely, over- and under-educated employees has equal share, no body lies in between (required education). Secondly, schooling years between undereducation and overeducation change depending on the occupation averages. Because of these drawbacks, Kiker et al. (1997) developed mode criteria, which defines the educational requirement of an occupation as the most observed schooling year within that occupation. Indeed, this approach would assign some individuals to the required education category by calculation method. The difference between overeducation and undereducation for similar persons is also constant over time. We used both criteria in the estimations but gave more importance to the mode approach because of the advantages mentioned above.[4] However, our procedure is slightly different for both approaches while assigning required schooling years to occupations. Since we have a time dimension in our data and primarily study the effect of a regional variation of a variable over time, entering Syrian refugees into the job market may affect the required education level, especially for basic or routine-based occupations. To avoid such biases, we imposed average values of required schooling years pre-treatment period (2011) for each occupation to other periods.

We specified schooling years based on latest education levels of individuals. 5, 8, 12, 16

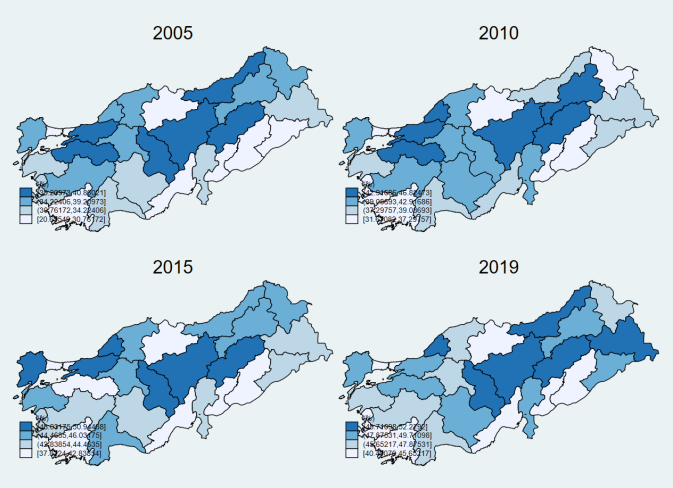
[3] In this study we focus on overeducation case because it becomes more common due to the increases in schooling years of people in Turkey and other developing countries as well.

[4] In appendix A we provide estimates using mean approach when calculating required level of education and obtain quite similar results compared with mode approach.

years are equivalent to primary, secondary, high, or vocational high school and university degree, respectively. We also assign one year to those who are literate and not having any diploma using literacy course plans for adults in Turkey.

It is evident from Figure 1 that, the share of over-educated individuals increased in most regions. Mediterranean regions seem light-colored, meaning that overeducation shares slightly reduced in those regions. Erzurum subregion in interior Northeast Anatolia region is also relatively decreased their overeducation share. Gaziantep, Sanliurfa regions are almost unaffected with respect to overeducation due to the migration shock. Bursa subregion on the other hand reduced their relative position in treatment period.

Figure 1: Over-educated workers by NUTS-2 region (mode approach)



Source: Authors' own calculations using THLFS data.

3 Identification method and estimation

We used difference-in-difference estimation with continuous treatment, which allows us to analyze whether regions with high refugee intensity behave differently compared to ones with less refugee intensity. We also capture other determinants affecting the probability of matching or mismatching of a worker. We estimate the following equation:

$$y_{ist} = \alpha + X_{ist}^{'}\Phi + \beta ratio_{st} + D_k + D_{kt} + D_o + D_s + D_{rt} + \varepsilon_{ist} \tag{1}$$

where y_{ist} is a dummy variable that is equal to 1 if worker i in subregion s at time t has more schooling years than an occupation should adequately required, zero otherwise. X_{ist} represents worker level control variables. These include eleven age group categories (18-19, 20-21, 22-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64), five education categories (literate but no diploma, primary education, secondary education, high school,

or vocational high school, and two- or four-year college degree and above), experience in last workplace, attendance to education, occupation, firm size, working in informal employment, gender, and marital status. D_o, D_s, D_t, D_k, and D_{kt} are occupation, NUTS-2 region, time, NACE-2 and NACE-2 $\times$ year fixed effects, respectively. We also include NUTS-1 region $\times$ year fixed effects (D_{rt}) to control regional unobservable shocks for each year. As a robustness check, we also used five region of Turkey.[5] and interacted with year. Finally, variable of parameter β shows the effect of the ratio of Syrian refugee to total subregion (NUTS-2) population on the dependent variable.

Estimating the equation above with OLS is problematic especially when there is endogeneity between explanatory variables and the error term ε_{ist}. Our variable of interest may suffer from this problem because Syrian refugees choose their location based on employment and economic conditions. Given the fact that employment conditions are correlated with the matching of workers with appropriate jobs, we need to take into account the potential endogenous relationship between Syrian/population ratio the and error term.[6] Therefore, we utilized an instrumental variable approach. In the migration literature, distance-based instruments have been frequently used for massive inflow. For example, Del Carpio and Wagner (2015) weighted the total number of Syrians with distance between governorate and Turkish subregions, and the fraction of Syrian population in each governorate at the pre-war period. Akgündüz and Torun (2018), on the other hand, used the origin of Syrian refugees in Turkey and calculate ted fraction of them within total Syrian refugees. Finally, Kırdar et al. (2022) took into account the distances of governorates to other bordering countries (Iraq, Jordan, and Lebanon). We also adopted these instruments because Syrians might choose the closest country to their town. This instrument can be formulated as follows,

$$I_{st} = \sum_{g=1}^{13} \frac{\left(\frac{1}{d_{g,T}}\right)\omega_g}{\left(\frac{1}{d_{g,T}} + \frac{1}{d_{g,I}} + \frac{1}{d_{g,L}} + \frac{1}{d_{g,J}}\right)} \frac{R_t}{d_{g,j}}$$

Where $d_{g,T}$, $d_{g,I}$, $d_{g,L}$, $d_{g,J}$ are distance between governorate g and Turkey, Iraq, Lebanon, and Jordan respectively. ω_g is pre-war population share of governorate g. R is total number of refugees in four countries. $d_{j,g}$ is distance of each subregion j to Syrian governorate.

We also estimate this equation for different sub-samples to see how different native groups responds to migrant shock. Given that the most Syiran refugees are low educated and employed in low skill occupations, correspondent natives may fall into lower occupations below their educational background. On the other hand, increasing demand to goods and services due to the refugees may force employers to hire qualified labor or upgrade

[5]We defined these regions as follows: 1. West (NUTS-1 classification 1 to 4), 2. central (NUTS-1 classification 5 and 7), 3. South (NUTS-1 classification 6), 4. North (NUTS-1 classification 8 and 9), 5. East (NUTS-1 classification 10 to 12).

[6]In particular, as Wanner et al. (2021) put forward, educational mismatch are associated with emigration behavior of natives and migrants' returning home decisions or migration to the third countries. They found negative relationship between overeducation and emigration, especially among non-Europeans.

the occupation level of existing employment. Sign, magnitude, and significance of the coefficient of interest would identify which effect dominates.
We should keep in mind that equation (1) and mechanisms above cover only those who are in employed status. On the other hand, some people may be crowded out by immigrants because of the competition with Syrian migrants. In order to see whether displacement effect works, we estimate a employment model as follows:

$$z_{ist} = \alpha + X_{ist}^{'}\Phi + \theta ratio_{st} + D_s + D_{rt} + \varepsilon_{ist} \tag{2}$$

Where z_{ist} is dummy variable which takes 1 if labor force status of individual i is employed. A negative and significant coefficient θ in this setting points us that composition overeducation effect may work by crowding out some native from labor market. A positive one, on the other hand, would enrich the switching effect of employment further. Given the availability of informal employment for refugees in Turkey (Demirci and Kırdar, 2023), estimating equation (1) and (2) for formal and informal employment separately can shed light on different mechanisms. For example, a negative (positive) coefficient β in formal sector may come from crowding out of overeducated (non-overeducated) natives. If negative effect of informal employment in equation (2) is obtained, it confirms this mechanism. However, as Foged and Peri (2016) applied, our approach does not fully explain the crowding out and switching mechanisms because we could not track the employment outcomes of them after they face migration shock.

3.1 Placebo tests of instruments

Validity of identification we put forward above requires that instrumental variables are not correlated with pre-shock unobserved residual trends in equation (1) except $ratio_{jt}$ variable. Violation of this assumption fails to hold exclusion restriction (i.e. parallel trends). We implement this test with three steps. Firstly we obtain residuals using personal characteristics and fixed effects of equation 1. Secondly we regress this residuals on the trend variable for each region and get 26 coefficients. Finally, we correlate the these coefficients with 2019 value of instrument. Not significant relationship confirms that overeducation trends between treatment and control group in pre-shock period are the same.
Table 1 shows the placebo test for main specification. The fact that positive and significant correlation in some specifications of native women of formal employment and native men of informal employment is observed violates the exclusion restriction. However, including the interaction of region and year fixed effects in column 7 and 8 of in men sample turns out insignificant and keeps the validity of the assumption that instrument is not correlated with trends. On the other hand, adding five big region in column 3 of women sample leads

positive and significant. Since our preferred specification is those with NUTS $\times$ year fixed effects and overeducation effect of migrants on native women is mostly insignificant as we explain below, this finding does not become suspicious our interpretations in overeducation model.

4 Results

4.1 Effects on Overeducation by Gender

Table 2 provides the estimates of the effect of immigrants on overeducation probability of native men in formal and informal sectors. This table only reports the coefficient of interest β in equation (1). Columns 1 to 4 show OLS estimates, while 4 to 8 show 2SLS estimates for different set of fixed effects. First and fifth column has no any covariate. In these columns migration shock increases being overeducated of natives. However, once we add controls demographic (education, marital status, age group, gender) and employment related (region, occupation, industry, year, industry $\times$ year, firm size, working in informal employment) fixed effects in second and sixth columns, estimates substantially change and turn to be statistically insignificant. This evidence imply that demographic characteristics and labor market conditions of workforce is crucial determinant when analyzing the overeducation effect of migration.

Interesting results emerge from last columns of each estimation method, which additionally capture the region and its interaction with time fixed effects. When we include five region $\times$ year fixed effects, OLS and 2SLS estimators do not provide significant results. Replacing these with NUTS-1 $\times$ year fixed effects provide significant result only in OLS estimation. Since 2SLS results tackle selection issue, this specification should base for interpretation. Coefficients are negative and statistically insignificant in formal employment, meaning that effect of migration on the likelihood of being overeducated is null. In informal sector side, while interacting year dummies with five region does not provide significant overeducation effect, defining region as NUTS-1 provides very significant and negative coefficients. In other words, likelihood of being overeducated decreases by at least 9% of a worker when controlling all covariates. This evidence is relevant because one-fourth of men workforce is employed in informal sector. Among two we prefer this specification because NUTS-1 is relatively more plausible than the five region definition due to being the official definition considering populations and economic levels of regions and capturing more local shocks. In addition due to the fact that our identification assumption in whole sample estimation mainly holds for these specifications, we present the estimates of them for different sub-samples below.[7] Hence, our interpretations are mostly fed by these estimates as well.

Figure 2 and 3 plots the changes in the coefficient estimates for each year. We see in

[7] We gladly share the full specifications upon request.

former figure that estimates except 2016 are not statistically different than zero. It is consistent with average affect in column 8 of Table 2 as we explain above. On the other hand, estimates are around zero until 2011 and most of them become significantly negative in latter figure. This figure also confirms the average effect apparently and imply that higher migrant-to-native ratio causes to lower overeducation in informal sector.
In Table 3 we report estimated effects of migrant-to-native ratio on overeducation status for women. While closer inspection of the Table shows that there is significant and positive effect of migration if no control variables and fixed effects are captured at first panel, it disappears as the covariates are added. Although weak evidence is seen in full specification of OLS estimator, it also vanishes in 2SLS. On the other hand we do not find any significant estimate in informal sector. Further analysis using event study in figure 4 and 5 also indicates that no evidence is found for associations between migration shock and overeducation. This evidence implies that Syrian refugee shock does not considerably change the job education matching composition of women. On the other hand, this situation may differ in sub-samples. Therefore, the next section of the analysis is concerned with how different groups of natives respond to migration shock.

4.1.1 Overeducation by age group of natives

The population in Turkey is quite young compared to developed countries. Figuring out how to use this resource efficiently requires availability of jobs that match with education level employees have. In this sense, unexpected labor supply increase in treated regions may constitute a different consequences for existing workforce and change the career trajectory of those especially at early stages in labor market because of their unexperienced status. This section investigates how and extent to which migrant shock transmit into the likelihood of overeducation. The results obtained from the regression analysis estimating equation (1) for three age group (18-34, 35-54, and 55-64) of men are shown in Table 4. Our preferred specifications (column 4 and 8) in young age group including NUTS-1 $\times$ year fixed effects show the strong evidence of negative overeducation effect of migration shock. In contrast to the Table 2, a significant negative effect is also observed in formal sector. Compared to corresponding result in informal sector, on the other hand, migration are shown to have less effect. Finally, overeducation appears to be unaffected by native-to-population ratio in other age groups for both formal and informal sectors.
If we now turn to the analysis carried out for native women, it can be seen in Table 5 that migration shock significantly reduces probability of overeducation of young age groups by 15.4% despite of null effect in whole sample estimation. This finding also imply the importance of this demographic characteristic to evaluate the migration effects. No significant evidence is found in informal sector and other age groups. Exception to this argument is older sample in formal sector, having weak and positive overeducation

effect of migration. We elaborately discuss below these results by combining with the employment model results.

4.1.2 Overeducation by education level of natives

Syrian refugees in Turkey are mostly low-educated and their participation to labor market may cause to change occupations that are not associated with their low education of some natives. This effect may vary between education level of natives because labor demand to high educated workers increases due to the enhancing economic dynamism in general. This section is related with the adjustments of natives with different education groups in terms of job-education compatibility when they face a massive migrant shock.

Table 6 illustrates the overeducation model results of native men by splitting education level into two groups. While low educated natives who completed primary and secondary education, high educated group consist of tertiary education (vocational high school and four year college degree). Former group results at top half panel show very significant and negative coefficient in informal sector. In other words, regions with high migrant-to-population ratio are more likely to have lower overeducation probability in this sector. We also see reducing overeducation effect of migration in formal sector. However, this evidence is statistically significant at 10% level. In high education sample, we found null effect of migration shock.

Turning now to the statistical evidence on the mismatch effect of migration for native women in Table 7, it can be seen that no stronger coefficient is obtained. We only have weak evidence of negative effect in formal sector of low education. However, it is needed to be tested to identify whether this estimate stems from crowding out or not. These findings implies that even though migration leads to adverse effects of labor market outcomes of women (Del Carpio and Wagner, 2015; Ceritoglu et al., 2017; Aksu et al., 2022), this does not constitute overeducation mismatch.

4.2 Effects on Employment by gender and sub-samples

Our analysis implemented so far covers only employed people in a given year. However, some natives might have been displaced by the migrant shock. We test this crowding out effect using equation (2). Table 8 shows the whole sample and different subsample estimates for native men. We report only OLS and IV estimations with different region definition $\times$ year fixed effects as shown in formal and informal employment below. Whole sample estimates show that as Syrians settle in a region they generate native employment in formal sector. Focusing on the specification (column 4) we choose, quantitatively, every 100 Syrian arrivals leads to place 17 unemployed natives in the formal labor market. However, this estimate turns out negative in informal sector, implying that migration shock

displaces native men and migrants are employed without social security registration. These evidence is also consistent with Aksu et al. (2022). Figure 6 and 7 plotting the estimates of 2 with NUTS-2 $\times$ year fixed effects also confirm our average estimates. While Former figure plots negative or null effect of migration shock in pre-period, post-period estimates show positive effects that are significant at 10% level in four period until 2018. Latter figure illustrates the opposite after migration shock period and significant at 10%.

If we combine these results with overeducation model in Table 2, we conclude that source of significant negative effect of migration in informal sector may stem from the crowding out mechanism. As migrants are being employed in informal sector, overeducated workers are displaced and this leads to lower overeducation coefficient. On the other hand, because of the insignificant coefficient in overeducation model, it does not mean that these displaced workers find jobs sutiable for their education when they are employed in formal sector.

However, evidence from employment model varies across subsamples in terms of magnitude. In younger aged males estimates become stronger for both employment samples. In senior aged sample it holds for formal sector but not informal sector. There is no significant estimate in older aged sample. Finally if we divide sample by education level, crowding out effect is seen in informal sector. On the other hand, an increase in the migration density increases the being employed in formal sector by 20%. These results suggest that migrants are not crowding out native men from formal sector but from informal sector. If we reconsider the findings of overeducation model, reducing overeducation effect of migration in young age sample of informal sector mainly comes from the leaving overeducated workers. Moreover, since same cohorts' overeducation is negatively affected and their employment positively affected by migration, these two finding point to a composition mechanism indicated by Zhang (2019). Put differently, increasing demand to goods and services due to the migration shock would create labor demand or leverage occupation of existing native employment.

Table 9 presents employment model estimation results for native men. Here, contrary to Table 8 of native men, we obtain negative and positive effect of migration in formal and informal sectors, respectively. These evidence are also checked out in yearly regressions in preferred specification and can be seen in Figure 8 and 9. Formal employment coefficient estimates is around zero by 2011 and turn out negative after 2011. Informal employment estimates, on the other hand, have positive value even though four of them are insignificant. As a result, both figures provide can be thought as robustness to average effect estimates.

Reconciling these results with overeducation model in Table 3, since formal and informal sector samples produces insignificant estimates, it can be argued that (mis)matching composition of native women does not change substantially even when they change their workplace or employment status.

Further analysis of the analysis for native women reveals a different story regarding employment and overeducation results. Younger cohorts in formal employment suffer from crowding out and their probability in being informal employment increases in treated regions, as seen in second line of column 4 and 8 in Table 9. This estimates coincide with negative overeducation effect in preferred specification of formal sector in 5. What possibly emerges from the results reported here is that overeducated native women are displaced in the formal labor market as Syrians find job. Moreover, even if they move to the informal sector, overeducation status does not significantly change. Similar interpretation can be made for low educated native women. In other sub-sample employment estimations except high education and older aged cohorts, we capture negative in formal sector and positive effect in informal sector significantly. However, this does not translate to the overeducation, arguing that labor market mobility due to the migration shock does not change the overeducation composition.

5 Conclusion

Growing body of literature has analyzed the labor market effects of Syrian refugees. They argued that wage and employment of natives are little affected by the migrant shock contrary to the canonical migration model. In addition, complementary effects have been revealed among high educated natives, causing to increase their the employment and wages. At the same time, some studies found occupational upgrading, arguing that skill mix of natives move toward more complex tasks when they face migrant shock. This study combined both the education and occupation natives hold and analyzed how mismatching (overeducation) between two is affected by the migrant shock.

The results of this investigation show that Syrian refugee flow contributed to reduce overeducation of native men in informal employment even if we control endogenous location choices of migrants. However, as employment model shows, this reducing effect is sourced from the displacement effect of migration shock because it lowers the probability of working in informal employment. On the other hand, we did not found significant overeducation effect for native women as they are crowded out from formal employment and attain to informal employment in regions with more migrant-to-population ratio.

In addition, heterogeneous effects of migration on overeducation are found when overeducation effect of different sub-samples of Turkish natives is tested separately. Separating by age group, likelihood of being overeducated of younger native men are negatively affected by migration shock in formal and informal employment. In this demographic analysis former is signalling the switching effect (occupational upgrading) because of the positive employment effect. Latter refers to the crowding out effect through negative employment effect in informal employment. Similar findings are also obtained in native men with

low education attainment. Since we find significant negative effect of overeducation and employment in younger women in formal sector, crowding out mechanism again operates here. Taken together, these findings suggest a role for informality and employment in understanding sources of changes in overeducation against a sudden labor supply shock. Policymakers should take account these dimensions to direct migration and labor policies.

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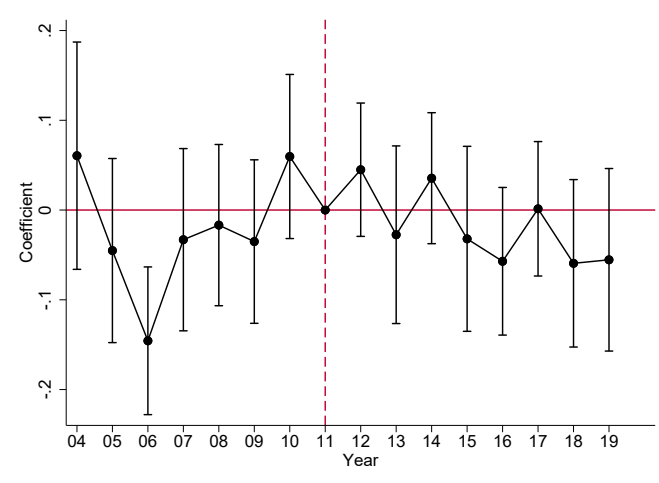
Table 1: Placebo test of instrumental variables impact on residual trends of overeducation, main specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FORMAL SECTOR				INFORMAL SECTOR			
MEN								
Instrument in 2019	0.025	0.007	0.006	0.009	0.099	0.026**	0.009	0.007
	(0.051)	(0.014)	(0.012)	(0.009)	(0.058)	(0.009)	(0.009)	(0.009)
WOMEN								
Instrument in 2019	0.170	0.128**	0.095**	0.043	0.032	0.036	0.011	-0.008
	(0.179)	(0.046)	(0.038)	(0.062)	(0.066)	(0.021)	(0.021)	(0.014)
Controls	-	+	+	+	-	+	+	+
Five region x year FE	-	-	+	-	-	-	+	-
NUTS-1 x year FE	-	-	-	+	-	-	-	+

Notes: 2004-11 period. Each coefficient shows the impact of instrument 2019 value on the residual trend slope of overeducation. The equations we predict the residuals include controls, region fixed effects and its time interactions, and as shown above. Controls are occupation, experience categories, region, industry, year, education categories, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Figure 2: Syrian refugees and overeducation of native men in formal sector: Coefficient estimates for each year



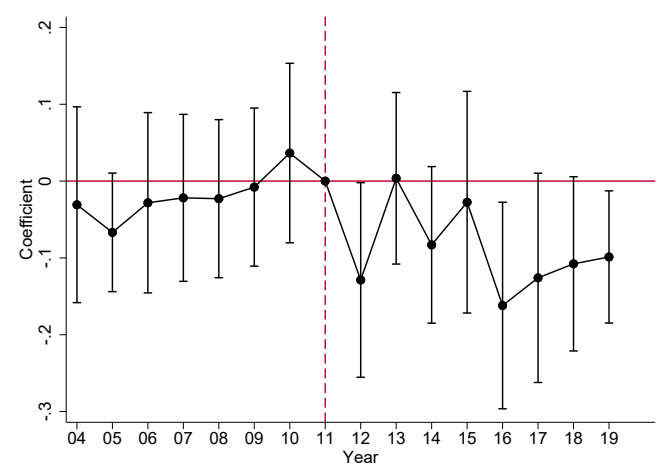
Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native men in formal employment. Identification is equivalent to equation (1) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Table 2: Effect of Migrant-to-Native Ratio on Overeducation of Native Men in the Formal and Informal Sectors

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
FORMAL SECTOR								
Refugees/pop.	0.454***	-0.026*	-0.022	-0.050**	1.028***	-0.012	-0.017	-0.034
	(0.080)	(0.014)	(0.016)	(0.022)	(0.192)	(0.016)	(0.018)	(0.023)
First stage F-stat.					394.9	1093	970.7	837.3
Observations	612,388	606,938	606,938	606,938	612,398	606,938	606,938	606,938
INFORMAL SECTOR								
Refugees/pop.	0.820***	0.014	0.001	-0.062**	1.325***	0.010	-0.028	-0.091***
	(0.078)	(0.019)	(0.021)	(0.027)	(0.171)	(0.021)	(0.021)	(0.030)
First stage F-stat.					545.8	1249	936.7	592.3
Observations	218,100	195,268	195,268	195,268	218,100	195,268	195,268	195,268
Controls	-	+	+	+	-	+	+	+
Five region x year FE	-	-	+	-	-	-	+	-
NUTS-1 x year FE	-	-	-	+	-	-	-	+

Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Figure 3: Syrian refugees and overeducation of native men in informal sector: Coefficient estimates for each year



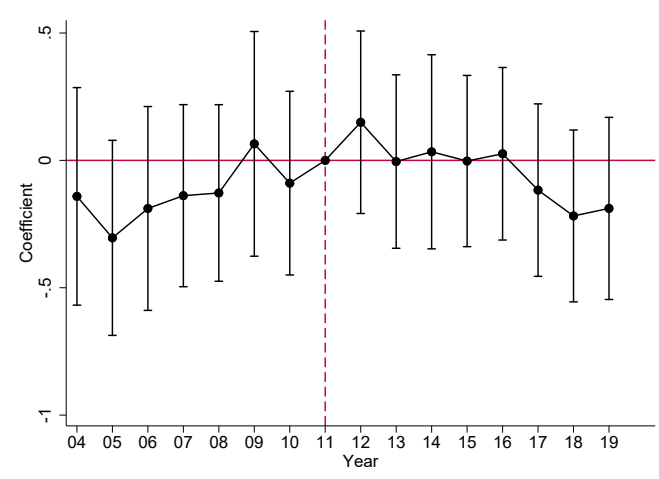
Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native men in formal employment. Identification is equivalent to equation (1) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Table 3: Effect of Migrant-to-Native Ratio on Overeducation of Native Women in the Formal and Informal Sectors

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
FORMAL SECTOR								
Refugees/pop.	0.457***	0.005	-0.053	-0.091*	1.114***	0.092*	-0.061	-0.083
	(0.086)	(0.041)	(0.040)	(0.051)	(0.191)	(0.055)	(0.049)	(0.063)
First stage F-stat.					323.8	669.2	701.4	562.3
Observations	161,572	159,744	159,744	159,744	161,572	159,744	159,744	159,744
INFORMAL SECTOR								
Refugees/pop.	-0.010	-0.016	-0.034	0.055	-0.109	-0.012	-0.038	0.034
	(0.067)	(0.029)	(0.032)	(0.040)	(0.078)	(0.032)	(0.037)	(0.046)
First stage F-stat.					632.5	1422	592	455.1
Observations	72,381	65,857	65,857	65,857	72,381	65,857	65,857	65,857
Controls	-	+	+	+	-	+	+	+
Five region x year FE	-	-	+	-	-	-	+	-
NUTS-1 x year FE	-	-	-	+	-	-	-	+

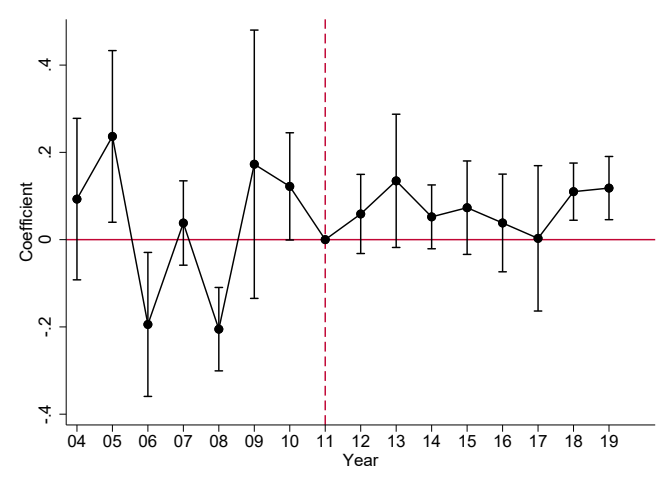
Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Figure 4: Syrian refugees and overeducation of native women in formal sector: Coefficient estimates for each year



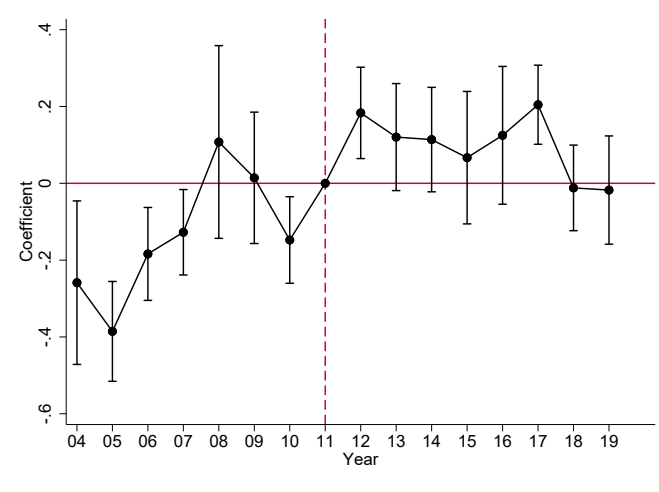
Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native women in formal employment. Identification is equivalent to equation (1) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Figure 5: Syrian refugees and overeducation of native women in informal sector: Coefficient estimates for each year



Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native women in informal employment. Identification is equivalent to equation (1) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Figure 6: Syrian refugees and formal employment of native men: Coefficient estimates for each year



Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native men in labor force. Identification is equivalent to equation (2) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Table 4: Effect of Migrant-to-Native Ratio on Overeducation of Native Men in the Formal and Informal Sectors by Age Group

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
18-34								
Refugees/pop.	-0.013	-0.095***	-0.029	-0.068**	-0.023	-0.096***	-0.037	-0.099***
	(0.023)	(0.028)	(0.025)	(0.031)	(0.026)	(0.033)	(0.027)	(0.034)
First stage F-stat.			1019	862.9			1079	578.5
Observations	307,870	307,870	307,870	307,870	102,667	102,667	102,667	102,667
35-54								
Refugees/pop.	0.004	0.027	0.039	0.046	0.026	-0.013	-0.002	-0.053
	(0.025)	(0.032)	(0.026)	(0.034)	(0.029)	(0.045)	(0.031)	(0.049)
First stage F-stat.			933	812.1			867.4	605.5
Observations	284,047	284,047	284,047	284,047	76,932	76,932	76,932	76,932
55-64								
Refugees/pop.	-0.220**	-0.223*	-0.204**	-0.223	-0.068	-0.119	-0.075	-0.129
	(0.093)	(0.132)	(0.102)	(0.142)	(0.074)	(0.088)	(0.080)	(0.098)
First stage F-stat.			930.1	787.3			647.4	528
Observations	14,857	14,857	14,857	14,857	15,309	15,309	15,309	15,309
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Table 5: Effect of Migrant-to-Native Ratio on Overeducation of Native Women in the Formal and Informal Sectors by Age Group

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
18-34								
Refugees/pop.	-0.080*	-0.154***	-0.102**	-0.154**	-0.082	0.065	-0.080	0.038
	(0.046)	(0.056)	(0.051)	(0.062)	(0.067)	(0.090)	(0.078)	(0.101)
First-stage F-stat.			714.4	567.2			618.1	450.3
Observations	95,858	95,858	95,858	95,858	30,047	30,047	30,047	30,047
35-54								
Refugees/pop.	-0.044	0.027	0.016	0.087	-0.035	-0.050	-0.053	-0.059
	(0.068)	(0.090)	(0.088)	(0.116)	(0.033)	(0.046)	(0.039)	(0.051)
First-stage F-stat.			605.2	465			539	418
Observations	61,909	61,909	61,909	61,909	30,757	30,757	30,757	30,757
55-64								
Refugees/pop.	-0.690	-0.785	0.464	0.213	0.042	0.016	0.079**	0.083*
	(0.636)	(0.762)	(0.818)	(0.973)	(0.038)	(0.046)	(0.036)	(0.046)
First-stage F-stat.			230.8	195.9			340.1	245.9
Observations	1,685	1,685	1,685	1,685	4,725	4,725	4,725	4,725
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Table 6: Effect of Migrant-to-Native Ratio on Overeducation of Native Men in the Formal and Informal Sectors by Education Level

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
LOW EDUCATION								
Refugees/pop.	-0.038**	-0.056**	-0.029	-0.044*	-0.011	-0.068***	-0.037**	-0.095***
	(0.018)	(0.026)	(0.019)	(0.026)	(0.018)	(0.025)	(0.018)	(0.026)
First-stage F-stat.			1023	859.8			978.7	602.8
Observations	329,258	329,258	329,258	329,258	155,978	155,978	155,978	155,978
HIGH EDUCATION								
Refugees/pop.	-0.002	-0.056**	-0.007	-0.044	0.009	-0.089	-0.022	-0.097
	(0.025)	(0.028)	(0.027)	(0.030)	(0.048)	(0.079)	(0.056)	(0.087)
First-stage F-stat.			902	791.3			805.4	551.5
Observations	277,650	277,650	277,650	277,650	39,129	39,129	39,129	39,129
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Table 7: Effect of Migrant-to-Native Ratio on Overeducation of Native Women in the Formal and Informal Sectors by Education Level

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
LOW EDUCATION								
Refugees/pop.	-0.104	-0.176*	-0.144	-0.207*	-0.053	0.022	-0.047	0.009
	(0.077)	(0.101)	(0.095)	(0.117)	(0.033)	(0.041)	(0.039)	(0.048)
First-stage F-stat.			784.5	733.1			601.8	476.9
Observations	62,739	62,739	62,739	62,739	52,884	52,884	52,884	52,884
HIGH EDUCATION								
Refugees/pop.	-0.032	-0.070	-0.049	-0.076	0.063	0.216**	0.053	0.178
	(0.048)	(0.059)	(0.053)	(0.065)	(0.090)	(0.102)	(0.096)	(0.114)
First-stage F-stat.			646.1	470.6			463.5	357.5
Observations	96,855	96,855	96,855	96,855	12,773	12,773	12,773	12,773
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

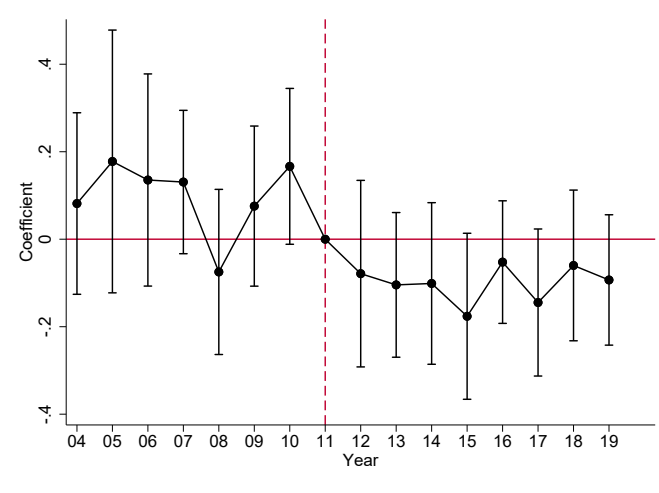
Notes: Each coefficient shows the effect of Syrian refugee/native ratio on overeducation for 2004-19 period. Controls are experience categories, region, occupation, industry, year, education, marital status age group, industry $\times$ year, firm size, gender, and working in informal employment fixed effects. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Table 8: Effect of Migrant-to-Native Ratio on Employment of Native Men in the Formal and Informal Sectors by Different Sub-samples

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
ALL SAMPLE								
Refugees/pop.	0.116***	0.197***	0.112***	0.170***	-0.234***	-0.220***	-0.209***	-0.186***
	(0.033)	(0.047)	(0.038)	(0.054)	(0.031)	(0.041)	(0.032)	(0.042)
First-stage F-stat.			953.3	764.4			953.3	764.4
Observations	1,946,202	1,946,202	1,946,202	1,946,202	1,946,202	1,946,202	1,946,202	1,946,202
18-34								
Refugees/pop.	0.008	0.206***	0.048	0.189***	-0.263***	-0.288***	-0.249***	-0.269***
	(0.042)	(0.057)	(0.045)	(0.064)	(0.049)	(0.060)	(0.051)	(0.064)
First-stage F-stat.			1033	756.5			1033	756.5
Observations	822,513	822,513	822,513	822,513	822,513	822,513	822,513	822,513
35-54								
Refugees/pop.	0.182***	0.230***	0.176***	0.206***	-0.205***	-0.187***	-0.182***	-0.148***
	(0.054)	(0.068)	(0.060)	(0.079)	(0.032)	(0.046)	(0.034)	(0.047)
First-stage F-stat.			934.7	779.7			934.7	779.7
Observations	829,328	829,328	829,328	829,328	829,328	829,328	829,328	829,328
55-64								
Refugees/pop.	0.126***	0.022	0.009	-0.025	-0.061**	0.003	-0.038	0.044
	(0.036)	(0.041)	(0.033)	(0.037)	(0.029)	(0.036)	(0.031)	(0.040)
First-stage F-stat.			828.1	695.5			828.1	695.5
Observations	294,361	294,361	294,361	294,361	294,361	294,361	294,361	294,361
LOW EDUCATION								
Refugees/pop.	0.116***	0.211***	0.106**	0.200***	-0.284***	-0.285***	-0.264***	-0.261***
	(0.041)	(0.053)	(0.043)	(0.059)	(0.040)	(0.050)	(0.040)	(0.050)
First-stage F-stat.			1014	757.1			1014	757.1
Observations	1,260,107	1,260,107	1,260,107	1,260,107	1,260,107	1,260,107	1,260,107	1,260,107
HIGH EDUCATION								
Refugees/pop.	0.072	0.123*	0.073	0.070	-0.042*	-0.011	-0.009	0.037
	(0.044)	(0.068)	(0.053)	(0.078)	(0.022)	(0.033)	(0.026)	(0.037)
First-stage F-stat.			847.2	750.1			847.2	750.1
Observations	686,095	686,095	686,095	686,095	686,095	686,095	686,095	686,095
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

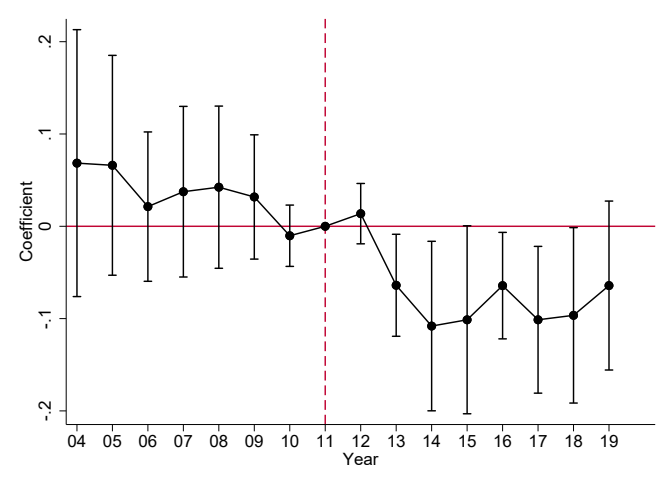
Notes: Each coefficient shows the effect of Syrian refugee/native ratio on employment status for 2004-19 period. Controls are, region year, education, marital status, age group, gender. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Figure 7: Syrian refugees and informal employment of native men: Coefficient estimates for each year



Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native men in labor force. Identification is equivalent to equation (2) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Figure 8: Syrian refugees and formal employment of native women: Coefficient estimates for each year



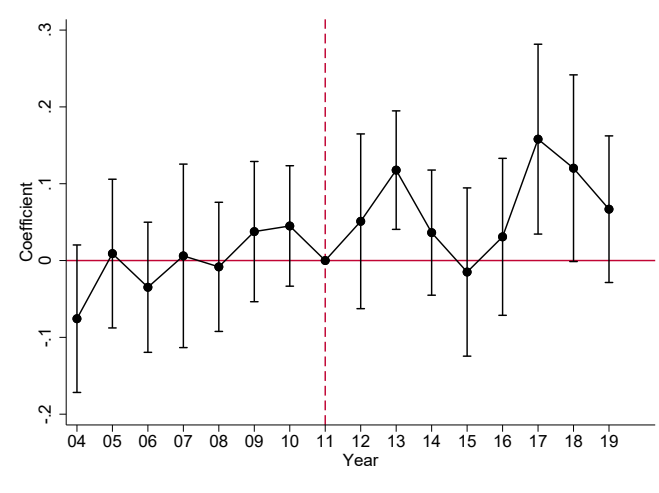
Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native women in labor force. Identification is equivalent to equation (2) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.

Table 9: Effect of Migrant-to-Native Ratio on Employment of Native Women in the Formal and Informal Sectors by Different Sub-samples

	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
	FORMAL SECTOR				INFORMAL SECTOR			
ALL SAMPLE								
Refugees/pop.	-0.046**	-0.114***	-0.086***	-0.128***	0.028	0.055*	0.061***	0.081***
	(0.019)	(0.025)	(0.023)	(0.027)	(0.020)	(0.028)	(0.023)	(0.029)
First-stage F-stat.			920.5	744.1			920.5	744.1
Observations	2,124,223	2,124,223	2,124,223	2,124,223	2,124,223	2,124,223	2,124,223	2,124,223
18-34								
Refugees/pop.	-0.022	-0.098***	-0.065**	-0.126***	0.017	0.038	0.045*	0.062**
	(0.023)	(0.034)	(0.028)	(0.038)	(0.021)	(0.029)	(0.024)	(0.031)
First-stage F-stat.			996.5	726.7			996.5	726.7
Observations	886,247	886,247	886,247	886,247	886,247	886,247	886,247	886,247
35-54								
Refugees/pop.	-0.114***	-0.223***	-0.189***	-0.263***	0.058**	0.076**	0.087***	0.102***
	(0.033)	(0.041)	(0.038)	(0.041)	(0.025)	(0.037)	(0.028)	(0.038)
First-stage F-stat.			892.2	756			892.2	756
Observations	915,153	915,153	915,153	915,153	915,153	915,153	915,153	915,153
55-64								
Refugees/pop.	0.019*	-0.019*	-0.001	-0.015	0.023	0.047*	0.045**	0.069***
	(0.010)	(0.011)	(0.009)	(0.011)	(0.020)	(0.025)	(0.022)	(0.026)
First-stage F-stat.			828.6	695.4			828.6	695.4
Observations	322,823	322,823	322,823	322,823	322,823	322,823	322,823	322,823
LOW EDUCATION								
Refugees/pop.	-0.052***	-0.131***	-0.088***	-0.140***	0.020	0.052*	0.052**	0.081***
	(0.018)	(0.023)	(0.020)	(0.023)	(0.020)	(0.028)	(0.023)	(0.030)
First-stage F-stat.			993.5	762.9			993.5	762.9
Observations	1,604,772	1,604,772	1,604,772	1,604,772	1,604,772	1,604,772	1,604,772	1,604,772
HIGH EDUCATION								
Refugees/pop.	-0.024	-0.013	-0.027	-0.035	0.039	0.046	0.060**	0.055
	(0.036)	(0.053)	(0.041)	(0.058)	(0.024)	(0.032)	(0.028)	(0.036)
First-stage F-stat.			722.9	627.4			722.9	627.4
Observations	519,451	519,451	519,451	519,451	519,451	519,451	519,451	519,451
Controls	+	+	+	+	+	+	+	+
Five region x year FE	+	-	+	-	+	-	+	-
NUTS-1 x year FE	-	+	-	+	-	+	-	+

Notes: Each coefficient shows the effect of Syrian refugee/native ratio on employment status for 2004-19 period. Controls are, region year, education, marital status, age group, gender. NUTS-1 or five region $\times$ year fixed effects are added as shown above. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are clustered at NUTS-2 $\times$ year.

Figure 9: Syrian refugees and informal employment of native women: Coefficient estimates for each year



Notes: This figure plots the coefficient of the regressions examining the yearly effects from 2004 to 2019 for native women in labor force. Identification is equivalent to equation (2) with NUTS-1 $\times$ year fixed effects. Variable of interest (Syrian refugee/population) is instrumented with distance-based shift share variables discussed in section 3.