Refugees and Housing: Evidence from the Mortgage Market

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Abstract

We investigate the impact of large-scale refugee inflows on the housing market by analyzing the case of Syrian refugees in Turkey. Employing a micro-level dataset of the population of mortgaged houses in Turkey between 2010 and 2017, we identify the effects using a difference-in-differences approach and instrumenting the regional distribution of Syrians with a distance-based instrument. The results show that house prices increased in response to the arrival of Syrian refugees. The effects are mostly driven by low-priced housing and fade after 2014. We further show that construction permits and sales increased and the average age of purchased houses declined, indicating an increase in supply. Despite the rise in prices, we find no increase in the loan-to-value ratio of mortgages. Finally, we find suggestive evidence that houses that are sold after the arrival of refugees decline in size, which further points to a squeeze in the housing market for natives.

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1 Introduction

The unfortunate increase in worldwide forced displacement over the years has led to a great deal of academic and policy interest in the impacts of refugees on host communities. Apart from the economic effects on local labor markets and firms, a key area of research is the effect on scarce local amenities and infrastructure. The impact of immigration on amenities can in fact be a larger contributing factor to public opposition to immigration (Card et al., 2012; Edo et al., 2019). Foremost among scarce amenities is housing and a large population inflow will inevitably affect the housing market in an area.

This paper exploits the rapid arrival of Syrian refugees in Turkey after the beginning of the Syrian Civil War to study the consequences of forced displacement on host country housing markets. Rapid refugee inflows can cause excess demand in the short-run, but also contribute to increasing supply in the long-run through a reduction in labor costs. Further channels of effects through native preferences for living in the same neighborhood as refugees and changes in the income of level of natives make the relationship between immigration and housing an empirical question. Using a novel administrative dataset of mortgage credits by banks, we analyze the relationship between local housing markets and refugee intensity. Using data up to 5 years after the arrival of Syrian refugees, we identify the effects of refugee inflows on the housing market both in the short and long-term. Our analysis covers the effects on house prices, mortgage loans, sales, construction permits and house characteristics (i.e. age and size).

The dataset is comprised of the population of mortgaged house sales which are reported by Turkish banks to the Central Bank of the Republic of Turkey (CBRT) between 2010 and 2017. Banks report all mortgaged house sales in Turkey with information on house price, loan, house characteristics like size and exact location (i.e. the parcel). The dataset allows us to control for a rich set of house characteristics when analyzing the impact on price, loan-to-value ratio and sales as well as house characteristics. We use a difference-in-differences and instrumental variables set-up to analyze the effects. Syrian refugees are heavily concentrated in certain provinces of Turkey. Our instrumental variables strategy follows the existing lit-

erature on the impact of the Syrian refugees in Turkey (Del Carpio and Wagner, 2015; Aksu et al., 2019; Tumen, 2019; Akgündüz and Torun, 2020). In particular, the relationship between Syrian refugee intensity in a province and the distance of that province to Syria allows us to make causal claims on the impact of hosting refugees on the housing market. In the case of the housing market, the self-selection of refugees into low-cost (high-cost) regions can bias estimates downwards (upwards), and an instrumental variables approach is needed to claim causality.

Our estimates suggest that refugees increased prices in host provinces. Per percentage point increase in the refugee to native ratio, house prices increase by 0.8% to 2.5%. However, this effect appears to be temporary as the estimates become smaller and less statistically significant after 2014. Analyzing the heterogeneity of the effects, we find that the increase in prices is led by an increase in the price of low-price houses, where the effect size is estimated between 1.8% and 3.5%. The impact on houses with pre-crisis prices above the province median is weaker. We further show that houses with multiple rooms had a price premium after the arrival of the refugees, which is consistent with survey reports of house sharing among Syrian refugees. We further document a negative effect on loan-to-value ratios, indicating that an increase in mortgage availability did not cause the increase in house prices. Despite the increase in prices, we find an increase in the number of houses sold through mortgages. Since Syrians refugees are likely to have limited access to the mortgage market, the increase in sales is consistent with an increase in the rental income of houses. Consistent with excess demand in the early years of the crisis and a fade-out of effects, we find evidence of a higher number of new construction permits and show that the average age of houses sold on the mortgage market declined. However, these new houses are not necessarily better quality, as we find some suggestive evidence of a decline in size.

We make several contributions to the literature. The first strand of literature that we contribute links immigration to house prices. Here, our contribution is largely due to the suddenness of the Syrian shock in Turkey and the level of detail inherent to our data. Several studies have analyzed the impact of immigration on house and rental prices (see for example Saiz (2007) on America, Akbari and Aydede (2012) on Canada, Gonzalez and Ortega (2013)

on Spain, Accetturo et al. (2014) on Italy, Sá (2015) on UK and Degen and Fischer (2017) on Switzerland). The results are mixed, with estimates ranging from large and positive as in Gonzalez and Ortega (2013) to negative in Sá (2015). Most analyses use enclave based (i.e. shift-share) instruments, which Jaeger et al. (2018) caution due to potentially biased estimates. Data in all studies is at the level of provinces or districts rather than individual houses or locations, which further makes identification of the effects difficult since house characteristics and locations can change over time and in response to immigration.[1] Our study of the Syrian refugee crisis in Turkey improves on the existing identification in the literature; first by exploiting a rapid and exogenous inflow of refugees and secondly by employing micro-level data that allows us to control for house location at a very fine level and include controls for house characteristics.

A smaller sub-strand of the literature on immigration and housing prices analyzes the impact of refugee shocks on the housing market. Specifically, three papers estimate the effect of refugee inflows on rental prices. Depetris-Chauvin and Santos (2018) analyze the impact of internally displaced persons on urban rental prices in Colombia and find an increase in low-price rentals and a decrease in high-price rentals, which they link to excess demand for low-price rentals and increased crime in hosting municipalities. Rozo and Sviatschi (2020) analyze the impact of Syrian refugees on the housing market in Jordan and find an increase in housing expenditures and the rental income of individuals who own houses. Most related to our paper is the study of Balkan et al. (2018), who analyze the impact of Syrian refugees on rental prices reported by natives in the Survey of Income and Living Conditions (SILC). The authors report an increase in prices of high-quality rentals and no impact on low-quality rentals. Their analysis is based on the early years of the refugee crisis up to 2013 and assumes that refugee-hosting regions were exogenously affected in 2012 and 2013 in a difference in differences set-up. In studying house prices and characteristics on a longer horizon, our study complements it. However, we have significant data advantages when identifying the effects. An important distinction between SILC data and our mortgage data is that the SILC data

[1] For example, the main specification in Gonzalez and Ortega (2013) is at the province level which corresponds to 50 Spanish provinces, Sá (2015) at the local authority level which corresponds to 170 local authorities in England and Wales, Accetturo et al. (2014) at the district level for 20 large Italian cities, and Depetris-Chauvin and Santos (2018) at the city level for 13 Colombian cities.

only includes information about the respondents' location at the level of 12 NUTS-1 regions, while the mortgage data allows us to use the more detailed information about Syrian refugee distribution at the level of 81 provinces. Analyzing the effects at the 12 region level makes it difficult to control for regional year specific shocks which are important since Turkish regions have very different levels of development.[2] In addition, the authors can only identify effects at the binary level because the number of treated regions is limited at the 12 region level while our study allows for estimates from incremental increases in the ratio of Syrian refugees to natives.

A unique feature of our analysis is the estimation of effects on house characteristics, age and size, and loan-to-value ratios. Since previous studies mainly rely on aggregated regional house price indices, the impact on the characteristics of new housing and mortgages remains understudied. House quality represents an important dimension for overall welfare and loan-to-value ratios can link effects of immigration on local economic conditions to the housing market.

The remainder of the paper is organized as follows. Section 2 provides a general overview of the housing market and the arrival of Syrian refugees in Turkey. Section 3 discusses the supply, demand and preference channels through which the refugee inflows can affect the housing market. Section 4 describes the data. Section 5 presents the results on prices, sales, construction permits and house characteristics. Section 6 concludes.

2 Syrian refugees and the housing market in Turkey

Syrian refugees first arrived in Turkey in November 2011. The legal status of Syrian refugees in Turkey is designated as temporary guests rather than refugees. The initial numbers were small but rose rapidly to 880,000 by 2013. The increase continued up to 2017, with the number of Syrians at 1.4 million in 2014, 2.3 million in 2015, 2.8 million in 2016 and 3.4 million in 2017. The early years of the crisis, 2012-2013, differ somewhat from the later years when the numbers exceed a million. In December 2012, 53% of refugees were located in camps

[2]Previously, Aksu et al. (2019) and Akgündüz and Torun (2020) have shown that controlling for regional trends can significantly alter results when estimating the effects of Syrian refugees on employment and firm outcomes.

(UNHCR, 2012). By 2013, the ratio had fallen to less than 25% (UNHCR, 2013). Also in 2012-2013, most refugees were located in provinces close to the Syrian border and began to disperse across Turkey in 2014 (Tumen, 2016).

Many field studies from face-to-face interviews with Syrian refugees and local citizens have been carried since the beginning of the refugee crisis, several of which are summarized in Table 1. A common finding in surveys is that Syrian refugees live in low-income neighborhoods in Turkey (See Table 1). Cost is likely to be the driving factor in the preference of refugees to settle in low-income areas. Given the rapid increase in the demand for housing, particularly low-cost housing, surveys report that house rental and sale prices significantly went up in especially the bordering Turkish provinces with Syria.[3]

Moreover, accommodation costs are an important share of Syrian households' budgets, which they appear to limit by living with large families (i.e., extended families or multiple families) in big houses (with more bedrooms). Living with multiple families in large houses lowers fixed costs of accommodation. According to the field studies, it is quite common to find large Syrian refugee households, consisting of 10-15 people, living in the same house. Given the high cost of relatively newer buildings (with centralized heating, better insulation, etc.), many Syrian refugees also prefer to live in old houses without a centralized heating system. This preference to minimize costs by sharing the fixed costs of accommodation raises the demand for especially large housing units with typically three or more bedrooms and/or relatively older units.

Foreign nationals can buy property in Turkey without any special permit since 2012.[4] However, special legislation applies to Syrian nationals. Following the unification of Hatay province with Turkey in 1939, property purchases of Syrians in Turkey (and all foreign nationals' property purchases in only Hatay Province) have been regulated. Following the revision of the law in 2012, Syrians became eligible for property purchases in Turkey with a special permit from the relevant state agency. In practice, only wealthy Syrian refugees may utilize this allowance. The alternative, which is also a common practice among Syrian refugees, is to

[3]These findings are also widely reflected in the media outlets, where several new paper articles noted on the increase in the house rental and sale prices in the bordering Turkish provinces with Syria.

[4]See Land Registry Law with order number 644 article 35 legislated in May, 2012

purchase a property through their relatives, who are legal citizens of Turkey, or through the ownership of their firms. Foreign nationals, including Syrians, can start a business (and thus establish a firm) in Turkey, which can legally own housing assets, just like any other assets.[5]

Syrians, just like any other foreign nationals, are allowed to obtain loans from banks in Turkey. General credit provision conditions that apply to Turkish citizens – e.g., proving satisfactory stable income and providing collateral – would make it difficult to utilize this option for the majority of Syrian refugees. For natives, monthly mortgage payments from a loan are capped at half the monthly income. The biggest obstacle to credit markets is that most Syrian refugees are largely employed informally and therefore cannot formally document their income.[6] Nevertheless, some wealthier Syrians, business owners or legal workers may in practice obtain a mortgage loan.

Limited access to credit markets makes it unlikely for the majority of Syrians to purchase houses through the mortgage market. As a result, rentals appear to be a more economically viable alternative. It is therefore worth noting that an increase in house demand may not be due to house purchases by Syrian refugees. It would rather be motivated by the significant increase in the demand for rentals. Given the rapid shift in housing demand for relatively low-cost districts, house prices would be expected to adjust to reflect the increase in the rental rate. Nevertheless, rise in rental prices will place upward pressure on house prices as their investment value goes up.

The impact of Syrian refugees is visually evident in the evolution of house prices in the border region. Figure 1 plots the house price index reported by the CBRT for the NUTS-2 region consisting of Gaziantep, Kilis and Adiyaman. As this region is on the Syrian border, it has been hosting refugees since 2012 and had the highest ratio of Syrians to the native population in 2016. When compared to the house price index for Turkey, Figure 1 shows that prices started to rise in 2012 and did not return to the country level until 2017.

[5]The number of firms established by Syrians rose starting from 2013 (TEPAV, 2017). Over the period of 2013 – 2017, about 6,300 new firms were established by Syrians while the corresponding number was 278 for 2010-2012 period. Following Istanbul with the highest number, most of these firms are located in Syrian refugee populated provinces of Turkey bordering with Syria such as Kilis, Hatay and Gaziantep. See Akgündüz et al. (2018) for an analysis of the effects of Syrian refugee inflows on firm entry.

[6]Syrians were first allowed to receive work permits in January 2016. Between the years 2016 and 2018, only 28 thousand work permits were granted as opposed to more than 4 million Syrians living in Turkey.

3 Literature and theory

There are four channels through which the arrival of refugees can affect the housing market. First, the increase in the population represents a simple increase in housing demand. Second, the entry of Syrian refugees into the labor market can reduce construction costs and therefore raise housing supply. Third, the arrival of Syrian refugees can affect local economic activity and therefore the availability of mortgages for natives and the demand for housing. Finally, natives' preferences towards living in proximity to refugees and decisions to migrate can affect the housing market.

Demand: The most straightforward impact of refugees on the housing market is an increase in demand. By 2017, the ratio of refugees to natives had reached 5% in Turkey and this number is as high as 100% in provinces like Kilis. Even within a given hosting province, refugees are likely to be concentrated in lower-income areas given that they are employed mostly informally. The growth in population density in regions hosting refugees will have boosted housing demand either through direct purchases of Syrians or the increase in rental prices, which can in turn increase the demand for housing investment.[7] The demand effect should be particularly evident in cases of large-scale immigrant inflows, which is what we observe in Turkey with the rapid increase in the number of Syrian refugees and in Spain during the 2000s. Gonzalez and Ortega (2013) attribute a quarter of the growth in Spanish housing prices between 2000 and 2010 to the increase in the immigrant population. The arrival of refugees even in small numbers in the earlier years of the crisis can lead to a perception of a housing squeeze, which can increase demand in hosting regions. Supporting this claim in Sweden, Tyrcha (2020) reports a strong impact on the perception of housing availability from the arrival of refugees.

The reaction of the housing market to the increase in demand will depend mainly on the curvature of the supply curve. If the supply of housing is relatively inelastic in hosting provinces, the increase in demand will lead to a rise in prices while a more flat supply curve will lead to stable prices but increases in the number of new housing units. Since the

[7] We assume that the increase in population immediately translates into an income effect. This assumption is justified by previous studies that find limited effects from Syrian refugees on formally employed natives. While only formally employed natives can realistically buy houses through the mortgage system, the negative effects on informal native employment are also limited (Aksu et al., 2019).

construction of new housing units takes time and the arrival of refugees is unexpected, we would predict the short-run effects of the increase in population to be more pronounced on housing prices. The existing literature largely confirms with the expectation that the supply curve is inelastic in the short-run and elastic in the long-run (Harter-Dreiman, 2004). Even in the long-run, the housing supply curve may never be completely flat due to factors like topography or government regulations and permits on construction (Saiz, 2010; Diamond, 2017).

Supply: Since Syrian refugees are mostly employed informally, studies on their labor market effects generally find a decline in wages and employment of informally employed and low-skill natives (Ceritoglu et al., 2017; Aksu et al., 2019). These findings are in line with Akgündüz and Torun (2020), who find that the task content of the average native employee experienced a reduction in manual task content in favor of more complex tasks. If Syrians are indeed generally employed in low-skill jobs that require manual tasks, they may well reduce the costs for the construction sectors in hosting regions. Such an effect would be in line with Bratsberg and Raaum (2012), who find a decline in wages in the construction sector due to immigrant employment.

The decline in costs due to the employment of Syrian refugees can then shift the supply curve to the right, particularly in the long-run. The supply channel would predict and explain the negative effects of immigration on house prices found in long-run studies like Akbari and Aydede (2012). Unlike the demand effect, which should be stronger in neighborhoods where refugees live, the supply effect is likely to benefit the entire province due to the larger size of regional labor markets compared to neighborhoods.

Economic activity and domestic credit conditions: An indirect mechanism by which Syrian refugees can affect house prices is through their impact on local economies. For instance, Altındağ et al. (2020) report an increase in the use of firm inputs and Akgündüz et al. (2020b) find a rise in firm sales, entry and exports after the arrival of Syrian refugees in hosting provinces. Besides the positive impact of the arrival of Syrians on the local economic activity, no overall adverse effects on average wages of natives were found (Aksu et al., 2019). Put differently, Syrian refugees appear to substitute for natives in informal labor, while com-

plementing the formal employment of natives. These findings suggest that the disposable income of natives in hosting provinces may have increased. A permanent increase in income would improve natives' credit worthiness and thus, raise their borrowing capacity. An increase in borrowing capacity would apply to mortgages as well, as a simple outcome of the widespread mortgage market practice in Turkey that caps monthly mortgage loan payments to the half of borrowers' monthly income. While the degree of the impact would depend on the capacity and willingness of financial institutions to increase mortgage loans in hosting regions, the increase in access to mortgage loans can trigger a rise in loan-to-value ratios and thus prices (Mian and Sufi, 2009; Barone et al., 2021).[8]

Preferences: Native preferences towards living in the same neighborhood with Syrian refugees can significantly affect the demand for these neighborhoods. If there is a strong internal migration response to avoid living in the same regions as Syrian refugees, the demand effect from the arrival of refugees can be tempered by a decline in demand from natives. Natives may be substitutable in the labor force with refugees, which would decrease their economic prospects and lead to out-migration from local labor markets. Previous studies show limited evidence for a large internal migration effect from the arrival of Syrian refugees across Turkish provinces (Del Carpio and Wagner, 2015; Aksu et al., 2019). While there is evidence showing that native workers migrate out due to a decline in their employment prospects, the arrival of additional public employees to provide services such as education and health care appears to offset these effects in overall internal migration (Akgündüz et al., 2020a). The net effect on the housing market from internal migration across provinces is therefore likely to be limited.

Internal migration may also occur between neighborhoods within provinces hosting refugees. A commonly cited cause is an increase in crime, although the impact of immigration on crime is generally estimated to be weak (Bianchi et al., 2012; Ousey and Kubrin, 2018). Even without a tangible cause like economic prospects or crime, ethnic preferences may play a role. Tabellini (2020) finds that immigration can trigger hostile political reactions despite a lack of economic effects. If natives are unwilling to live in the same neighborhood with refugees,

[8]See Follain and Dunsky (1997) for more direct evidence on a positive relationship between income and mortgage loans.

they may migrate to other neighborhoods within the province. As such, we may find an increase in demand in neighborhoods that do not host any refugees. The preference to live away from refugees can even push prices downwards as shown in the case of UK by Sá (2015), who attributes the decline in house prices in immigrant hosting neighborhoods to the out-migration of high-income natives from these neighborhoods. In the long run, such preferences can even lead to the formation of new residential areas with limited ethnic mixing (Moraga et al., 2019).

Overall, the theoretical discussion and the literature findings present a mixed picture of the expected effects of refugees on the housing market of hosting provinces. While increased demand is likely to push prices up, this effect may be off-set in the longer run through a decline in construction costs. In addition, increased economic activity could change the availability of mortgage loans. The effects at the neighborhood level will also vary depending on whether the natives exhibit an aversion to live in the same neighborhood as refugees.

4 Methodology

Our empirical strategy is difference-in-differences based on the province level variation of Syrian refugees. The basic model that we estimate using OLS is given by equation 1, where i refers to each individual house sold, j to province and t to the year and month of sale. Since we expect the effects to vary over time, we define the refugee-native ratios separately for each year, $Ratio^k_{jt}$. The ratio variable for a given year is equal to the refugee-native ratios at the province level for that year and is equal to 0 in 2010 and 2011. Our primary parameter of interest is β_k, which shows the effect of hosting refugees each year. In all models, we include year fixed effects given by T_t and province fixed effects, α_j as well as month fixed effects given by m_{ijt}.

$$y_{ijt} = a_0 + \sum_{k=2013}^{2017} \beta_k Ratio^k_{jt} + X_{ijt} + \alpha_j + T_t + m_{ijt} + \lambda_i + RT_{jt} + e_{ijt} \tag{1}$$

Since our data includes detailed information at the house level, we control for the changes in the composition of houses sold by including a vector of house characteristics, X, that in-

cludes the log of size, the log of age, the number of rooms (by type) of the house and whether there is security, an elevator or a pool in the building.[9] In some specifications, we further control for the heterogeneity in location and buildings by including neighborhood or parcel level fixed effects, λ_i. In specifications where neighborhood or parcel level fixed effects are included, the province level fixed effects, α_j, are dropped due to perfect multicollinearity. We interact the ratio variable with house characteristics to test heterogeneous effects in some models and add interactions between year fixed effects and the given house characteristic in these models.

Since Syrian refugees are, particularly before 2014, concentrated in regions bordering Syria, the difference-in-differences approach relies on the existence of parallel trends between provinces with high Syrian to native ratios and others. Regional differences in development between eastern and western Turkey make it unlikely for the parallel trends assumption to hold. The growing literature on the economic effects of Syrian refugees have tackled this problem by including regional year fixed effects or time trends (Aksu et al., 2019; Akgündüz and Torun, 2020).[10] We follow a similar approach and use three alternative region-time controls, which are shown in equation (1) as RT_{jt}. First, we include 5 region-year fixed effects where the regions are defined as West, South, North, East and Central Anatolia. Second, we use the finer regional definition at the NUTS-1 level and include 12 NUTS-1 region-year fixed effects. Finally, we include linear time trends at the level of 26 NUTS-2 regions. While the first two are flexible in capturing non-linear or year-specific shocks, the final approach allows for finer regional controls.

The Syrian refugee crisis in Turkey provides a shock with plausibly exogenous timing. However, after 2013 Syrian refugees spread across Turkey rather than staying in the border regions. Their province selection may well be endogenous if they choose to settle in provinces with cheaper or more accessible housing. To deal with the potential endogeneity problem caused by self-selection, we use the instrument based on the distance of each province to

[9] The inclusion of house characteristics as controls may be interpreted as undesirable due to the "bad control" problem if these characteristics are affected by the arrival of refugees. However, our purpose is to estimate the effects on the hedonic price rather than the average price of houses. Nevertheless, we include a specification in the tables where house characteristics are omitted.

[10] In their main specifications, Aksu et al. (2019) use 5-region time trends while Akgündüz and Torun (2020) use 12 NUTS-1 region - year fixed effects to control for regional trends in employment and firm outcomes.

the Syrian border proposed by Aksu et al. (2019), which modifies the distance-based instrument of Del Carpio and Wagner (2015).[11] Since we estimate the impact of the ratio of Syrian refugees to native population for each year, we construct the instrument, IV_j^T, for each year as well according to equation 2. There are 12 regions (governorates) in Syria and $d_{s,T}$ is the minimum distance of each to neighboring countries: Turkey, Lebonan, Iraq and Jordan. π_s gives the pre-war population share of each Syrian region while ST_t stands for the total number of Syrian refugees in these four countries in the year t. In essence, the instrument is the distance weighted number of refugees in each province for a given year. When including interaction effects in our models to estimate the heterogeneity of Syrian to native ratio effects by house characteristics, we generate instruments for those interactions by interacting the house characteristics with IV_j^T.

$$IV_j^T = \sum_{s=1}^{12} \frac{\frac{1}{d_{s,T}}\pi_s}{\frac{1}{d_{s,T}} + \frac{1}{d_{s,L}} + \frac{1}{d_{s,J}} + \frac{1}{d_{s,I}}} \frac{ST_t}{d_{p,s}} \tag{2}$$

Serial correlation has been shown to lead to underestimated standard errors in difference-in-differences estimations with regional variation (Bertrand et al., 2004). We choose what is considered to be the most conservative option and cluster the standard errors at the level of 81 provinces (Cameron and Miller, 2015). Unreported robustness tests show that clustering at the province-year level leads to considerably smaller standard errors. Using province level clustering, all our instruments appear to be relevant, with first stage F-tests ranging between a minimum of 20 and a maximum of 100 and on average around 50. The F-tests are found to be larger for later years when the number of Syrian refugees increases.

5 Data

Our primary dataset is collected by the CBRT to monitor price changes in the Turkish housing market. During the approval stage of mortgage credits, banks use real estate appraisal companies' valuation reports that are logged to and are used by the CBRT to generate and pub-

[11] As an unreported robustness test, we estimated the effects using the distance based instrument employed by Akgündüz and Torun (2020), which follows the instrument of Del Carpio and Wagner (2015). The results are similar.

licly report the Residential Property Price Index (RPPI) at the NUTS-2 level every month.[12] We have access to the micro data that is used to generate regional aggregates. Covering years 2010-2017, the dataset covers the prices of all houses sold with mortgage financing in Turkey. While the dataset also includes valuation reports from mortgage applications for houses that were not sold, we exclude these observations from the data.

Valuation reports include a rich set of observable house characteristics. In particular, we have the following information for each house: price, loan, building quality, construction year, gross area (in square meters), number of rooms, bathrooms, and balconies, and heating system types. In addition, we also have information about whether the building has security, car parking, a swimming pool, and an elevator. We construct loan-to-value ratios by dividing the mortgage loan obtained from the bank with the price of the house.[13] The valuation reports further contain detailed geographical information about the house at the province, county, neighborhood and parcel level. We use geographic information to include location fixed effects at the neighborhood and parcel levels.[14]

We merge this micro-level house price data with the number of Syrian refugees across 81 provinces in Turkey from 2013 to 2017. Information on the province-level distribution of Syrian refugees is collected from press releases for the year 2013.[15] After 2013, data on the number of Syrian refugees at the end of each year in each province is obtained from the Ministry of the Interior's Immigration Management Directorate. Syrian refugees first arrive in Turkey in November 2011, but the initial numbers are negligible and were entirely housed in camps. We therefore assume that the number of Syrian refugees in 2010 and 2011 was 0. We exclude 2012 from the analysis because data on the number of refugees provided by the UNHCR suggests that refugees were largely in camps in 2012. The total number of Syrian refugees is 170,912 by the end of 2012 and reaches 3.6 million by February 2019. While the numbers rise rapidly, the share of refugees in each province is relatively stable. The minimum

[12]The RPPI can be accessed through the official statistics website of the CBRT: https://evds2.tcmb.gov.tr/index.php?.

[13]To avoid data mistakes and outliers, we exclude all loan-to-value ratios above 0.9. Legally, the maximum loan-to-value ratio during the sample period was 0.8. The number of observations where the loan-to-value ratio exceeds the 0.9 limit is less than 0.01% of the sample.

[14]Parcel level information is close to being equivalent to the building in which a flat or house is located in the Turkish real estate system. The title deeds of residences identify the location of the house based on the parcel information. Supporting the idea that parcel fixed effects can be treated as building fixed effects, we found that regressing house size in square meters on parcel fixed effects results in R-squared values above 0.70 in our sample.

[15]The 2013 data on Syrian refugee distribution we use has the additional quirk that it is in 1000s rather than exact numbers for each province.

cross-correlation of the annual number of Syrian at the province level is 0.85. We construct the ratio of the Syrian refugees to the native population obtained from Turkish Statistics. The province level population figures do not include the number of Syrian refugees. Refugees are legally designated as temporary guests rather than residents while the population counting by Turkish Statistics is based on residents' registry.

Merged with the Syrian to the native population ratios, our dataset is comprised of 2.35 million observations. While the variation is at the level of 81 provinces, being able to include neighborhood and parcel fixed effects allow for fine level controls of location and building heterogeneity. There are more than 25,000 neighborhoods and 435,045 million unique parcels in our data.[16] Neighborhoods are entered into the dataset as a text variable and there exist a number of small typos, which we corrected by grouping neighborhood entries based on their Levenshtein distance.[17] When fixed effects for these two variables are included in a specification, only locations that are observed in at least two years can be included in the sample. While including neighborhood fixed effects results in a marginal drop in the sample size and the resulting sample size is 1.6 million when parcel fixed effects are included.

The summary statistics for prices, total sales, and house characteristics are presented in Tables 2, 3, and 4 respectively. The price variable is normalized for all houses by dividing it by the size of the house in square meters. To avoid outliers driving the results, we winsorize the (per square meter) price variable at 1% and 99% thresholds for each province-year group. Between 2010 and 2017, house prices in Turkey increased from 1147 to 2111 Turkish lira per square meter which corresponds to an 84 percent increase in nominal terms. There is significant regional variation behind average house prices (see Figure 3). Since there is considerable variation in inflation in Turkey, we deflate house prices by CPI to eliminate the increase in house prices due to changes in the inflation rate. Table 1 shows the log of CPI-adjusted mean values of housing prices by year. We calculate the price per square meter of each house (in Turkish lira), and use its log transformation as our dependent variable. Table 3 summarizes the characteristics of all houses we use in our main sample. It shows that the average size of

[16]These figures are based on the number of fixed effects included in specifications with neighborhood and parcel fixed effects. Only location fixed effects with at least two observations from different years can be included in the estimations.

[17]We used the Stata add-on of Barker and Pöge (2017) to implement the grouping. Not correcting the typos in the neighborhood name entries and treating each unique entry as a separate neighborhood makes negligible difference to the results.

the houses in our data is 113 square meters and the average building year is 2005. Means for security staff, elevator, parking area, and swimming pool show the percentage of houses having these facilities. These variables are included in most specifications as controls for building characteristics.

In order to directly test the impact of refugee inflows on housing supply, we use data from the Turkish Statistical Institute on new construction permits. This data set is provided at the year-province level and the number of new residential building construction permits can be isolated. We exclude the permits for non-residential buildings in order to estimate the effects on housing supply. A single permit can be given for a multi-dwelling building, implying that permits should be interpreted as the number of buildings that begin construction rather than the number of individual dwellings. We take the ratio of new construction permits to the population at the province level for easier interpretation.[18] The relevant summary statistics are provided by Table 5. On average, a new permit is issued per 1000 persons in a province each year, with some variation across years but no clear upward or downward trend.

Not all houses are sold through mortgages in Turkey, which has implications for the interpretation of our results. Around a third of total houses sold in Turkey are sold through mortgages during the years of our analysis according to Turkish Statistics data. There is considerable province level heterogeneity in the ratio of mortgaged house sales to total house sales. For interpretation, the key is whether mortgaged sales are a randomly selected sample of all sales. There is no available data to compare house characteristics of mortgaged and other sales. Nevertheless, we can speculate that if there is a selection, banks prefer to loan to higher value houses since they are worth more as a collateral. As such, if the impact of immigration on high (low) value houses is greater, our estimates will be larger (smaller) than the average effect on all houses.

[18] The estimated effects are qualitatively similar when we use the log of new construction permits.

6 Results

6.1 Impact on house prices

The results showing the effects of the arrival of Syrian refugees on house prices in a province are presented in Table 6. Panel A shows OLS estimates while panel B shows 2SLS estimates. In the first column, we only include year, month and province fixed effects. In column 2, a vector of house characteristics is added. In column 3, regional trends are controlled for by using 5 region-year fixed effects. Column 4 includes neighborhood fixed effects while columns 5 and 6 replace the 5 region-year fixed effects with NUTS-1 level 12 region-year fixed effects and linear time trends at the 26 NUTS-2 region level. In column 7, we replace the neighborhood fixed effects with parcel fixed effects and present the estimates with 5 region-year fixed effects. Columns 8 and 9 again replace the 5 region-year fixed effects with NUTS-1 level 12 region-year fixed effects and linear time trends at the 26 NUTS-2 region level.

In all columns and both panels, the estimated coefficients are positive, suggesting that house prices increased in response to the arrival of Syrian refugees. Also common to all estimates is the decline in the size of the coefficients over time. By 2017, some point estimates even turn negative. There is little difference in coefficients in OLS and IV estimates, which points to a limited role for endogeneity and self-selection after controlling for location and house characteristics. As expected, standard errors tend to be smaller in the OLS estimates. In column 3, where no neighborhood or parcel fixed effects are used, we find that one percentage point increase in the Syrian to the native population ratio is associated with a 1% increase in house prices in 2013 and 2014. However, neither OLS nor IV estimates are particularly precisely estimated or strongly statistically significant. Including neighborhood and parcel level fixed effects increases the size of the coefficient estimate and produces more statistically significant results. The largest IV estimates are obtained in column 9 where one percentage point increase in the Syrian to the native population ratio increases prices by around 2.5%.

Overall, the impact of Syrian refugees on host province housing prices appears to be positive. This effect is more precisely estimated and larger when we control for the location of the house in the province, indicating a degree of heterogeneity in the effects across houses.

The positive effect is in line with a positive demand shock from the arrival of Syrian refugees. The fading out of the effect further supports the hypothesis that the long-run supply curve is flatter and therefore the price effect is strongest in the early years of an immigration shock before new construction can take place.

6.2 Heterogeneity of price effects

We know from surveys of Syrian refugees that they are concentrated in low-price areas. If refugees are generally staying in low-price housing, there will be heterogeneity in the demand effect, with weaker effects on high-cost housing and stronger effects on low-price housing. We test this hypothesis empirically in Table 7. Rather than estimating a single parameter for each year, we interact the ratio variable with an indicator variable (*high price*) that is equal to 1 for parcels above the median price for a province in 2011.[19] Table 7 presents the results for the nine specifications shown in Table 6 in two panels for OLS and IV estimations.

The results in all specifications show that the positive effects on prices are stronger for houses located in a parcel that had a price level below the median in 2011. According to the IV estimates, the 2013-2014 impact on low-cost housing prices ranges between 1.2% and 3.3% per percentage point increase in the refugee to native ratio. Similar to the main results, the effects decline over time. Figure 4b shows the average of the 9 specifications over the years. The IV results start at 2.5% in 2013 and decline to 0.5% by 2017. Interactions between refugee ratios and above median price variables show that high price houses are affected less by the arrival of Syrian refugees. Figure 4c shows the mean of the sum of main and interaction effects for each year. There is initially a positive effect for high price houses according to the OLS estimates, but the effect is around half the impact on low price houses. The size of the effect starts at around 1% and declines to 0. For the IV model, the effects are even smaller and turn negative in later years.

Surveys of Syrian refugees explicitly report that refugees tend to live in older houses due to price and location. We capture a similar price effect when we allow for heterogeneity based on the age of the house. In Table 8, we estimate the interaction between older houses aged

[19] We can define high price parcels from sales in 2011, which limits the sample size for this exercise.

more than 4 and the ratio of Syrian refugees to the native population in a given year. While the interaction effects have a smaller size than the interaction with the price of the house, we still find a positive additional effect in the order of 0.2% to 0.5% for old houses. In line with the heterogeneity with respect to price, the interaction effects with age disappear in later years.

A third source of heterogeneity we empirically test is related to the survey findings that Syrians share houses with multiple rooms. We may expect a higher demand for houses with multiple rooms to increase the demand for large houses. Since we directly observe the number of rooms in a house, we simply generated a variable that indicated whether a house has more than 3 rooms (the median value) and interacted it in our specifications with the ratio of Syrian to the native population. The results of these estimations are shown in Table 9. While the interactions are not quite as large as the interactions with high-price housing, we find an additional positive effect for houses with more than 3 rooms. The additional effect for houses with multiple rooms is larger and more consistently statistically significant at conventional levels in the IV panel, indicating an effect of about 0.5%. Unlike the main effect, the interaction coefficients remain large until 2017, indicating no evidence for a fade out.

The results on prices are in line with a strong demand effect on the housing market. According to survey evidence, Syrians tend to live in older, low-price houses and often rent rooms rather than complete houses. Consistent with the increased demand, we find that the overall price effect is almost entirely driven by low-price houses and there is an additional premium on houses with multiple rooms. The fading out of the effects further suggests that the supply curves are inelastic in the short run but are flatter in the long run. Except for the negative effect on high-price houses in later years, we find no evidence for a supply effect through a decline in the costs of construction. The lack of a consistently positive effect on high-price houses further suggests no role for the mobility of natives towards high-price housing because of a preference to avoid living in the same neighborhoods as Syrian refugees.

6.3 Impact on sales and composition

The estimated effects on mortgaged house sales are presented in Table 10. To estimate the effect on sales, we aggregate the number of houses sold to the month-province level and use the same specification as in prices with the exclusion of house characteristics and neighborhood or parcel fixed effects. Consistent with increased demand and activity in the housing market, we find generally positive effects. Similar to the price effects, the impact on the number of sales largest in the 2013 and 2014 where we find increases of 1 to 1.5%. Nevertheless, the increase in sales remains large and statistically significant until 2017 in most specifications.

In Table 11, we provide results from a more direct test of a supply increase in the housing market by estimating the effects on the number of new construction permits for residential buildings issued per population at the province-year level. Between 2013-2015, we find a statistically significant and positive effect across the presented specifications. The effect starts as high as an increase of 0.4 new construction permits per 1000 persons for each percentage point increase in the Syrian to the native population ratio in 2013. The effect size declines but remains statistically significant until 2015.[20] The impact disappears in 2016-2017 when the total number of refugees in Turkey is relatively stable. Unlike the effects on the number of mortgaged house sales which may be an indicator of both demand and supply, the impact on new construction permits confirms that the inflow of refugees triggered new construction and increased housing supply in hosting regions.

Next, we investigate whether the average house characteristics changed in response to the arrival of Syrian refugees. Specifically, we show the effects at the house level for three outcomes in Table 12: age and size (in square meters). To cover all mortgaged houses including those in new construction zones, we exclude neighborhood and parcel fixed effects but vary the controls in each specification for regional time trends. The first panel shows the effects on average house age, where the estimates are uniformly negative. The effects are statistically significant except when NUTS-2 level regional time trends are included. The coefficient averages for each year are shown in Figure 5a. The negative effect peaks in 2014

[20] This result overlaps with Cengiz and Tekgüç (2021) who find an increase in construction permits in hosting regions with data up to 2015.

at around 1.5% per percentage point increase in Syrian to the native population ratio, and remains above 0.5% in all years except 2017. A decline in average house age may be indicative of two mechanisms. First, if new natives are buying newly constructed houses due to an increase in supply, building age can fall. Second, natives may be moving to newer neighborhoods in response to Syrians settling in urban and older neighborhoods. The first explanation based on a supply increase appears more likely given the fading out of the effect of refugees on house prices and the increase in the construction of new buildings.

We find more limited evidence for an effect on size. Panel B shows the estimates for the size effects. While they are largely negative, few estimated parameters are statistically significant. A negative effect would be in line with the price premium for the larger houses we explored. The decline in the size of housing purchased indicates that the higher prices have placed a downward pressure on the quality and size of housing that natives can afford.

6.4 Impact on loan-to-value ratios

Table 13 shows the impact of Syrian refugee inflows on loan-to-value ratios of mortgages issued. If the Syrians' impact on local economic activity and local credit markets is strong enough, one would expect a strong positive feed to the loan-to-value ratios during the years of housing price increases observed in Table 6. Unlike the estimated effects on prices, we find a negative effect on loan-to-value ratios that ranges between -0.05 and -0.3 percentage points between 2013 and 2015. The estimates are statistically significant once we include finer controls for house location and region-year specific trends. The estimated effects turn insignificant and positive, though are small, in 2017.

The estimates on loan-to-value ratios suggest that the rise in housing prices does not seem to be driven by an increase in the income of natives. In fact, the negative estimates suggest that the mortgage credits did not keep up with the increase in prices between 2013 and 2015 when the price effect of refugee inflows was largest. In other words, the increase in house prices with higher Syrian population is not driven by credit markets adjustments resulted from the positive impact of higher economic activity.

7 Conclusion

We investigated the impact of Syrian refugee inflows in Turkey on the housing market using data on the population of house mortgages. Since the mortgage market is in practice mostly available for natives, our results capture the impact on housing prices for natives. We present findings on house prices, loan-to-value ratios, house characteristics, mortgaged sales and construction.

We find an increase in prices that is concentrated in low-price housing. The prices for low-price housing increased by nearly 2.5% per percentage increase in the Syrian to the native population ratio during the early years of the refugee crisis until 2015. Average prices have also increased by up to 1.5% per percentage increase in refugee to population ratio in the same period. Given that Syrian refugees are heavily concentrated and the ratio of Syrians to natives reached over 20% in multiple border provinces by 2015, the effect on house prices appears very significant. We further document that these effects faded over time, with estimated effects that are statistically insignificant and small by 2017. The results point to a large demand shock and an inelastic supply curve in the short-run, which adjusted to the inflow in later years. This interpretation is supported by an increase in new residential construction permits and a decrease in the average age of houses sold in provinces hosting refugees. There is further no corresponding increase in loan-to-value ratios to indicate a rise in the availability of mortgages. The effects we observed in the Turkish housing market indicate a similar response to refugees in the housing market as the findings of Rozo and Sviatschi (2020) for Jordan.

Our results should be interpreted alongside other studies of the impact of Syrian refugees on the Turkish economy. Our results underline the difficulties in maintaining amenities and infrastructure quality when migration inflows are sudden and concentrated in specific regions. The sharp increase in low-priced housing is especially worrying from a welfare perspective given that the hardest-hit segments of the working native population were informal workers with low wages (Ceritoglu et al., 2017; Aksu et al., 2019; Akgündüz and Torun, 2020). Although the effects in the housing market are temporary, they last several years, which can

adversely affect low-income natives in host provinces.

Data availability statement

The data underlying this article were provided by Central Bank of the Republic of Turkey by permission. Interested researchers need to obtain permission from the Central Bank of the Republic of Turkey to work with the dataset. The authors would be willing to share any relevant codes to assist in replication efforts.

References

Accetturo A, Manaresi F, Mocetti S, Olivieri E. 2014. Don't stand so close to me: the urban impact of immigration. *Regional Science and Urban Economics* **45**: 45–56.

Akbari AH, Aydede Y. 2012. Effects of immigration on house prices in Canada. *Applied Economics* **44**: 1645–1658.

Akgündüz YE, Bağır YK, Altan A. 2020a. Immigration and inter-regional job mobility: Evidence from Syrian refugee inflows in Turkey. *Unpublished study* .

Akgündüz YE, Bağır YK, Cilasun SM, Kirdar MG. 2020b. Consequences of a massive refugee influx on firm performance and market structure. Technical report, Institute of Labor Economics (IZA).

Akgündüz YE, Torun H. 2020. Two and a half million Syrian refugees, tasks and capital intensity. *Journal of Development Economics* : 102470.

Akgündüz YE, van den Berg M, Hassink W. 2018. The impact of the syrian refugee crisis on firm entry and performance in turkey. *The World Bank Economic Review* **32**: 19–40.

Aksu E, Erzan R, Kırdar MG. 2019. The impact of mass migration of Syrians on the Turkish labor market. Technical report, CREAM Discussion Paper 15.

Alptekin K, Ulutaş DA, Gündüz DU. 2018. An analysis of temporary guest status persons in Konya. *Sosyal Politika Calismaları Dergisi* **18**: 87 – 114. ISSN 2148-9424.

Altındağ O, Bakis O, Rozo S. 2020. Blessing or burden? Impacts of refugees on businesses and the informal economy. *Journal of Development Economics* : 102490.

Balkan B, Tok E, Torun H, Tumen S. 2018. Immigration, housing rents, and residential segregation: evidence from Syrian refugees in Turkey. Working Paper 21123, IZA Discussion Paper.

Barker M, Pöge F. 2017. Strdist: Stata module to calculate the Levenshtein distance, or edit distance, between strings .

Barone G, David F, De Blasio G, Mocetti S. 2021. How do house prices respond to mortgage supply? *Journal of Economic Geography* **21**: 127–140.

Bertrand M, Duflo E, Mullainathan S. 2004. How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics* **119**: 249–275.

Bianchi M, Buonanno P, Pinotti P. 2012. Do immigrants cause crime? *Journal of the European Economic Association* **10**: 1318–1347.

Bratsberg B, Raaum O. 2012. Immigration and wages: Evidence from construction. *The economic journal* **122**: 1177–1205.

Cameron AC, Miller DL. 2015. A practitioner's guide to cluster-robust inference. *Journal of human resources* **50**: 317–372.

Card D, Dustmann C, Preston I. 2012. Immigration, wages, and compositional amenities. *Journal of the European Economic Association* **10**: 78–119.

Cengiz D, Tekgüç H. 2021. Is it merely a labor supply shock? impacts of syrian migrants on local economies in turkey. *ILR Review* : 0019793920978365.

Ceritoglu E, Yunculer HBG, Torun H, Tumen S. 2017. The impact of Syrian refugees on natives' labor market outcomes in Turkey: evidence from a quasi-experimental design. *IZA Journal of Labor Policy* **6**: 5.

Degen K, Fischer AM. 2017. Immigration and Swiss house prices. *Swiss Journal of Economics and Statistics* **153**: 15–36.

Del Carpio XV, Wagner M. 2015. *The impact of Syrians refugees on the Turkish labor market*. The World Bank.

Depetris-Chauvin E, Santos RJ. 2018. Unexpected guests: The impact of internal displacement inflows on rental prices in Colombian host cities. *Journal of Development Economics* **134**: 289–309.

Diamond R. 2017. Housing supply elasticity and rent extraction by state and local governments. *American Economic Journal: Economic Policy* **9**: 74–111.

Edo A, Giesing Y, Öztunc J, Poutvaara P. 2019. Immigration and electoral support for the far-left and the far-right. *European Economic Review* **115**: 99–143.

Follain JR, Dunsky RM. 1997. The demand for mortgage debt and the income tax. *Journal of Housing Research* : 155–199.

Gonzalez L, Ortega F. 2013. Immigration and housing booms: Evidence from Spain. *Journal of Regional Science* **53**: 37–59.

Harter-Dreiman M. 2004. Drawing inferences about housing supply elasticity from house price responses to income shocks. *Journal of Urban Economics* **55**: 316–337.

Jaeger DA, Ruist J, Stuhler J. 2018. Shift-share instruments and the impact of immigration. Technical report, National Bureau of Economic Research.

Kavas A, Avsar I, Kadkoy O, Bilgic EC. 2019. Syrians in Istanbul and post-war ghettos. *TEPAV* .

Kilinc P. 2017. Syrian refugees in the perception of local people and social impacts: Case of Elazig. *the Journal of Academic Social Sciences* **62**: 543–564.

Mian A, Sufi A. 2009. The consequences of mortgage credit expansion: Evidence from the us mortgage default crisis. *The Quarterly Journal of Economics* **124**: 1449–1496.

Moraga JFH, Ferrer-i Carbonell A, Saiz A. 2019. Immigrant locations and native residential preferences: Emerging ghettos or new communities? *Journal of Urban Economics* **112**: 133–151.

Ousey GC, Kubrin CE. 2018. Immigration and crime: Assessing a contentious issue. *Annual Review of Criminology* **1**: 63–84.

Ozturkler H, Goksel T. 2015. Impact of Syrian refugees economic on Turkey: a synthetic modeling. *ORSAM* **6**.

Rozo SV, Sviatschi M. 2020. Is a refugee crisis a housing crisis? Only if housing supply is unresponsive. *Journal of Development Economics* : 102563.

Sá F. 2015. Immigration and house prices in the Uk. *The Economic Journal* **125**: 1393–1424.

Saiz A. 2007. Immigration and housing rents in american cities. *Journal of urban Economics* **61**: 345–371.

Saiz A. 2010. The geographic determinants of housing supply. *The Quarterly Journal of Economics* **125**: 1253–1296.

Savran S, Sat A. 2019. Exploring the locational preferences of Syrian migrants in Ankara and a case study of Onder, Ulubey, and Alemdağ neighborhoods as an ethnic urban enclave. *Journal of Ankara Studies* **7**: 283–302.

Sonmez M. 2018. Spatial distribution and futurity of Syrian refugees in the city of Gaziantep.

Tabellini M. 2020. Gifts of the immigrants, woes of the natives: Lessons from the age of mass migration. *The Review of Economic Studies* **87**: 454–486.

Tumen S. 2016. The economic impact of Syrian refugees on host countries: Quasi-experimental evidence from Turkey. *American Economic Review* **106**: 456–60.

Tumen S. 2019. Refugees and 'native flight' from public to private schools. *Economics Letters* **181**: 154–159.

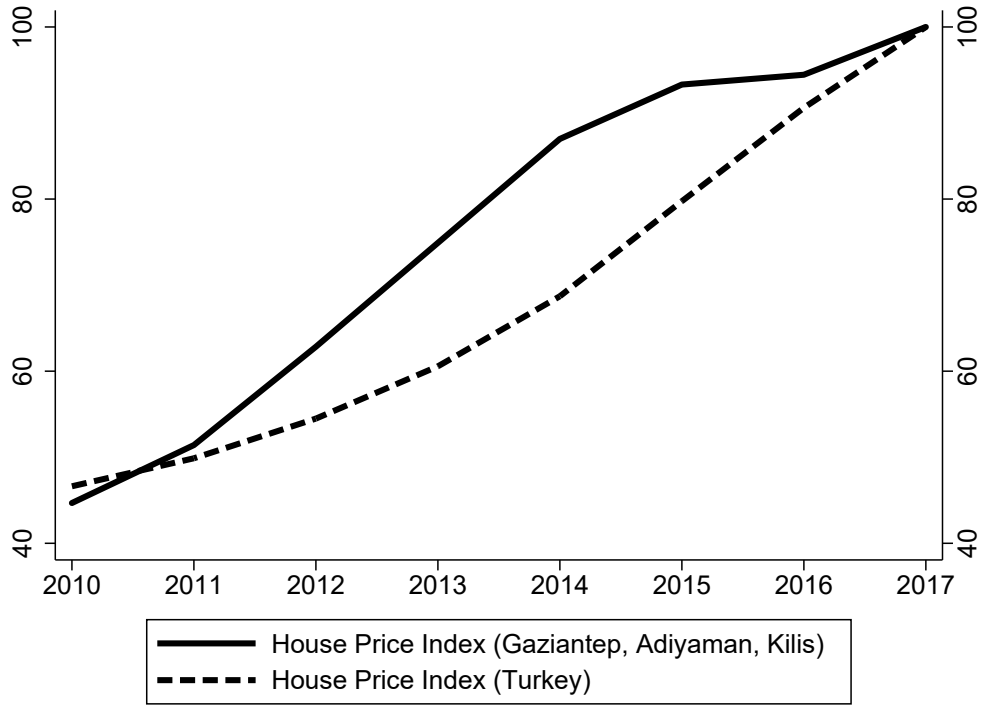
Tyrcha A. 2020. Migration and perceptions of housing availability in Sweden. *Papers in Regional Science* .

UNHCR. 2012. Unhcr Turkey Syrian refugee daily sitrep December 2012. Daily report, The United Nations Refugee Agency.

UNHCR. 2013. Unhcr Turkey Syrian refugee daily sitrep December 2013. Daily report, The United Nations Refugee Agency.

Figures and Tables

Figure 1: Hedonic price index



Notes: Data is obtained from the Central Bank of the Republic of Turkey Statistics Portal. The figures plot the annual average of the monthly data provided for the NUTS-2 region with the highest ratio of Syrians to native population (17.1%) as of 2016 - Gaziantep, Adiyaman Kilis.

Figure 2: Syrian refugees to population ratio by province (2016)

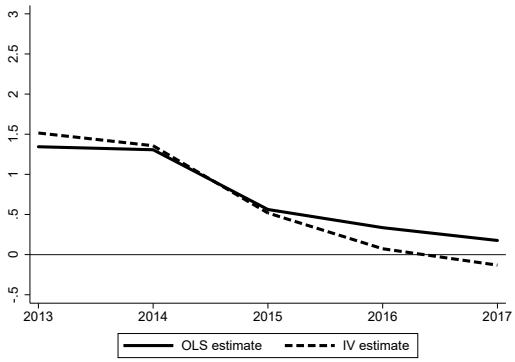
Notes: Authors' calculations from Ministry of Interior and Turkish Statistics data. Figure maps 2016 refugee to population ratios by province.

Figure 3: Average house prices

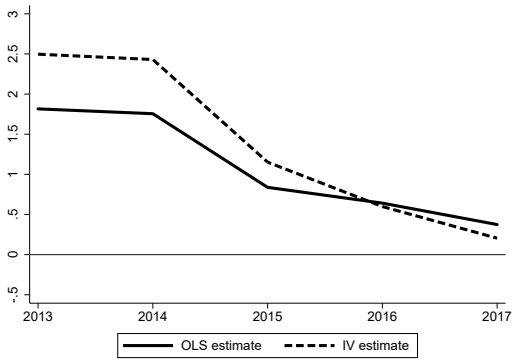
Notes: Authors' calculations from Mortgage Registry data for the years 2010-2017. Figure maps the average of (log) meter square prices by province

Figure 4: Average estimated price effects by year

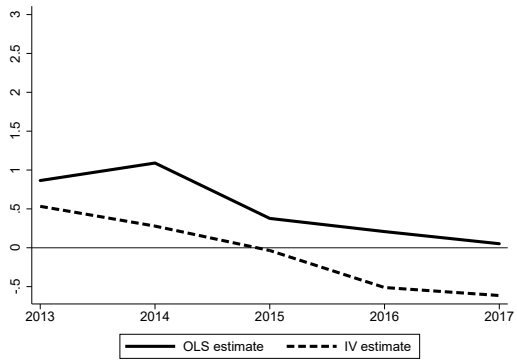
(a) Main



(b) Low-price



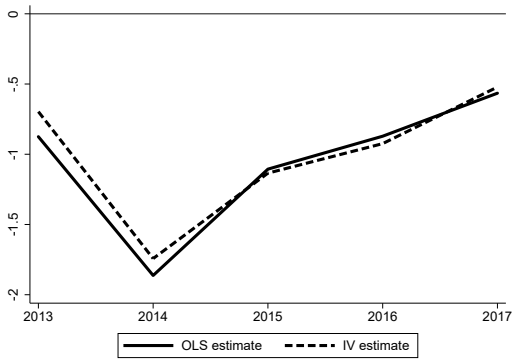
(c) High-price



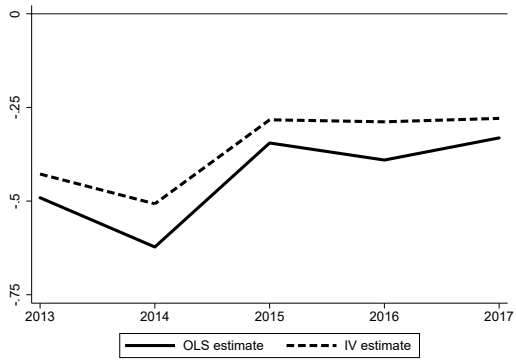
Notes: Figure (a) shows the average coefficients estimated from 9 specifications in table 7 for each year. Figures (b) and (c) show the average coefficients from 9 specifications for low-price (b) and high-price (c) houses in table 8.

Figure 5: Average estimated effects on house characteristics by year

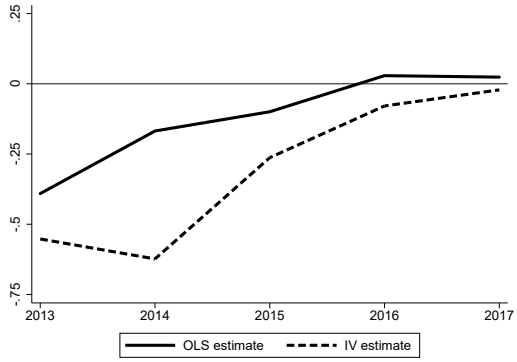
(a) Age



(b) Size



(c) Quality



Notes: Figures show the average coefficients estimated from 4 specifications in table 8 for each year.

Table 1: Regional surveys and findings

Title	Authors	Year	Region	Method	Findings
Syrians in Istanbul and Post-War Syrian Ghettos (in Turkish)	A. Kavas, I. Avsar, O. Kadkoy and E. C. Bilgic	2019	Istanbul	Face to Face Interviews	Syrian refugees mostly prefer to live in low cost neighborhoods of Istanbul. They tend to live in extended families or multiple families in the same house. Rental rate and house prices increased in Syrian refugee populated neighorhoods.
Exploring the Locational Preferences of Syrian Migrants in Ankara (In Turkish)	S. Savrav and N. a. Sat	2019	Ankara	Face to Face Interviews	Syrian refugees live mostly in low cost neighborhoods of Ankara, where house prices and rental rates are relatively cheaper.
A Study on Syrians Under Temporary Protection in Konya	K. Alptekin, D. A. Ulutas and D. U. Gunduz	2018	Konya	Face to Face Interviews (with NGOs)	Syrian refugees live mostly in low cost neighborhoods of Konya.
Syrian Refugees in the Perception of Local People and Social Impacts: Case of Elazig (In Turkish)	P. Budak, M. S. Demir, M. Tan and M. Sati	2017	Elazig	Face to Face Interviews	Syrian refugees raised rental rates in the province.
Spatial distribution and futurity of Syrian refugees in the city of Gaziantep (In Turkish)	M. E. Sonmez	2016	Gaziantep	Local census, income and house price and rental rate data	Syrian refugees live mostly in low cost neighborhoods of Gaziantep.
Impact of Syrian Refugees Economic on Turkey: A Synthetic Modelling (In Turkish)	H. Ozturkler and T. Göksel	2015	Border provinces	Face to Face Interviews	Syrian refugees raised rental rates in all the provinces and house sales in most provinces.

Table 2: Summary statistics - yearly prices

	Mean	p50	sd	p10	p90	N
2010	6.800	6.768	0.447	6.310	7.357	269,742
2011	6.787	6.744	0.421	6.314	7.332	254,132
2013	6.862	6.791	0.421	6.389	7.429	356,313
2014	6.894	6.815	0.441	6.404	7.497	321,876
2015	6.929	6.840	0.471	6.432	7.604	345,965
2016	6.958	6.879	0.471	6.432	7.604	391,605
2017	6.941	6.875	0.464	6.410	7.574	411,612

Authors' calculations from mortgage registry data. The price variable is defined per meter square. It is then log-transformed and winsorized at the 1% and 99% thresholds for each province-year group.

Table 3: Summary statistics - total sales at month-province level

	Mean	p50	sd	p10	p90	N
2010	4.393	4.369	1.582	2.485	6.234	955
2011	4.361	4.382	1.569	2.303	6.165	954
2013	4.759	4.700	1.501	2.890	6.509	964
2014	4.712	4.673	1.454	2.890	6.420	965
2015	4.841	4.754	1.408	3.045	6.515	965
2016	4.981	4.970	1.466	3.178	6.727	967
2017	5.126	5.088	1.376	3.434	6.792	967

Authors' calculations from mortgage registry data. The number of sales is aggregated to the province-month level and log-transformed.

Table 4: Summary statistics - building characteristics

	Mean	Median	SD	p10	p90	N
Loan-to-value ratio	0.606	0.656	0.164	0.356	0.750	2,564,313
Year of construction	2005.719	2010	11.083	1989	2015	2,342,533
Age (log)	1.602	1.386	1.156	0	3.258	2,333,702
Size (m2)	113.815	108	85.325	68	160	2,351,245
Size (log)	4.665	4.682	0.362	4.220	5.075	2,351,245
Building quality	2.362	2	0.575	2	3	2,351,212
Number of living rooms	1.010	1	0.144	1	1	2,351,245
Number of rooms	2.738	3	0.830	2	4	2,351,245
Number of bathrooms	1.251	1	0.480	1	2	2,351,236
Number of balconies	1.573	2	0.799	1	2	2,350,822
Security staff	0.095	0	0.294	0	0	2,351,245
Heating system	2.183	2	0.873	1	4	2,351,211
Elevator	0.439	0	0.496	0	1	2,351,232
Parking area	0.438	0	0.496	0	1	2,351,245
Swimming pool	0.062	0	0.241	0	0	2,351,245

Authors' calculations from mortgage registry data. For the age variable, which is log transformed, we add 1 to avoid dropping new houses. These variables constitute the vector of building controls in the regression results.

Table 5: Summary statistics - new residential construction permits per population

	Mean	p50	sd	p10	p90	N
2010	0.013	0.013	0.006	0.007	0.022	81
2011	0.006	0.005	0.005	0.002	0.013	81
2013	0.010	0.009	0.005	0.005	0.016	81
2014	0.012	0.011	0.006	0.006	0.019	81
2015	0.011	0.011	0.005	0.005	0.018	81
2016	0.012	0.012	0.005	0.006	0.019	81
2017	0.016	0.017	0.007	0.006	0.025	81

Authors' calculations from Turkish statistics data. The numbers of new permits for residential construction are reported at the year-province level. We divide the number of new permits with the province population to arrive at the presented ratio of construction permits per person.

Table 6: Impact of Syrian refugees on house prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OLS									
Ratio-2013	1.7731**	1.6571**	1.1000*	1.2869**	0.5109	1.5148**	1.5603***	0.9197**	1.7728**
	(0.7749)	(0.7981)	(0.5724)	(0.6338)	(0.4247)	(0.6854)	(0.5642)	(0.4586)	(0.7119)
Ratio-2014	1.5294*	1.4381*	1.0604	1.3855*	0.4858	1.3822**	1.6860***	0.9063	1.6388**
	(0.7908)	(0.7805)	(0.6426)	(0.7250)	(0.5784)	(0.6549)	(0.6139)	(0.5560)	(0.6644)
Ratio-2015	0.6565	0.6353	0.4973	0.6562	0.0615	0.5742*	0.8956*	0.3405	0.7427*
	(0.4394)	(0.4456)	(0.4203)	(0.4873)	(0.2922)	(0.3397)	(0.4742)	(0.3227)	(0.3823)
Ratio-2016	0.3697	0.3595	0.3226	0.4734	-0.0887	0.2736	0.7018	0.1923	0.4185
	(0.4068)	(0.4179)	(0.4276)	(0.5007)	(0.3396)	(0.2546)	(0.4681)	(0.3438)	(0.2914)
Ratio-2017	0.1175	0.1369	0.1724	0.2949	-0.0950	0.0523	0.5304	0.1816	0.1945
	(0.3541)	(0.3669)	(0.3775)	(0.4381)	(0.3434)	(0.1920)	(0.3964)	(0.3365)	(0.2281)
IV									
Ratio-2013	1.3982	1.2670	1.0908	1.1530	0.8058	2.3115***	1.5824*	1.3324	2.6959***
	(1.1059)	(1.1539)	(0.9435)	(0.9564)	(0.8188)	(0.8696)	(0.8948)	(0.8602)	(0.7247)
Ratio-2014	1.1622	1.0054	1.0315	1.0224	0.5998	2.1332**	1.5469	1.1848	2.5221***
	(1.2830)	(1.2680)	(1.0877)	(1.1115)	(0.9461)	(0.9278)	(1.0303)	(0.9822)	(0.7865)
Ratio-2015	0.1371	0.1315	0.4387	0.4335	0.1530	0.9098*	0.8059	0.5412	1.1167**
	(0.7718)	(0.7533)	(0.6831)	(0.7037)	(0.5775)	(0.4657)	(0.7260)	(0.6643)	(0.4416)
Ratio-2016	-0.4353	-0.4303	0.0895	0.0612	-0.2079	0.4287	0.4290	0.1734	0.5492
	(0.7076)	(0.7022)	(0.6784)	(0.7099)	(0.5982)	(0.3511)	(0.7353)	(0.6903)	(0.3464)
Ratio-2017	-0.7402	-0.6769	-0.1008	-0.1378	-0.3397	0.2038	0.2457	0.0505	0.3165
	(0.5513)	(0.5415)	(0.5811)	(0.6214)	(0.5390)	(0.2781)	(0.6620)	(0.6415)	(0.2925)
N	2,351,245	2,333,143	2,333,143	2,333,143	2,308,834	2,308,834	1,694,017	1,694,017	1,694,017
Month	+	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+	+
Building controls		+	+	+	+	+	+	+	+
5 region year FE			+	+			+		
12 region year FE					+			+	
26 region trends						+			+
Neighborhood FE				+	+	+			
Building FE							+	+	+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions for each year are used instruments for the ratio variable. Controls included in each column are shown at the bottom of the table. Building controls include age, whether the house is new, size, number of rooms (by type), a measure of building quality provided by the expert evaluation, the type of the heating system, and whether the building has an elevator, pool or safety staff.

Table 7: Impact of Syrian refugees on house prices - price heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OLS									
Ratio 2013	2.5738***	2.3606**	1.9747**	1.8856**	1.1261*	1.7395**	1.8012***	1.1146*	1.7640**
	(0.8806)	(0.9225)	(0.7928)	(0.7490)	(0.6114)	(0.6715)	(0.6730)	(0.5946)	(0.6891)
Ratio-2014	2.2924**	2.2480**	1.9568**	2.2181***	0.8701	1.4158*	2.1914***	1.0193	1.5877**
	(0.9374)	(0.9246)	(0.7452)	(0.8036)	(0.7923)	(0.7217)	(0.7613)	(0.7370)	(0.6870)
Ratio-2015	1.2083**	1.2218**	1.1081*	1.1232*	0.2963	0.6029*	1.0486*	0.3036	0.6289
	(0.5687)	(0.5879)	(0.6165)	(0.6349)	(0.4314)	(0.3553)	(0.6023)	(0.4349)	(0.3807)
Ratio-2016	1.0278**	1.0602**	1.0556	1.0223	0.1682	0.1479	0.9308	0.1928	0.1663
	(0.4919)	(0.5197)	(0.6541)	(0.6602)	(0.4665)	(0.2533)	(0.6074)	(0.4600)	(0.2685)
Ratio-2017	0.5752	0.6202	0.7416	0.6945	0.2284	-0.2488	0.6746	0.2524	-0.1660
	(0.4250)	(0.4463)	(0.5349)	(0.5256)	(0.4473)	(0.2675)	(0.4898)	(0.4403)	(0.2663)
High x Ratio-2013	-1.9891***	-1.6765***	-1.4607***	-0.7426***	-0.6758***	-0.8128***	-0.4351**	-0.3258*	-0.4393***
	(0.4154)	(0.3989)	(0.4268)	(0.2620)	(0.2457)	(0.2343)	(0.1825)	(0.1948)	(0.1649)
High x Ratio-2014	-1.3132	-1.3527	-1.1336	-0.6389	-0.5128	-0.6044	-0.1159	-0.0906	-0.2267
	(1.0023)	(0.8277)	(0.7340)	(0.4137)	(0.3216)	(0.3679)	(0.2441)	(0.2281)	(0.2309)
High x Ratio-2015	-0.9538**	-0.9205***	-0.8746***	-0.4826*	-0.3413	-0.2881	-0.1378	-0.0520	-0.0937
	(0.4004)	(0.3385)	(0.3010)	(0.2771)	(0.2080)	(0.1850)	(0.1508)	(0.1538)	(0.1573)
High x Ratio-2016	-0.9378**	-0.9451**	-1.0135***	-0.5511*	-0.4010**	-0.1150	-0.0544	-0.0006	0.1202
	(0.4623)	(0.4162)	(0.3589)	(0.2823)	(0.1863)	(0.1166)	(0.1430)	(0.1300)	(0.1475)
High x Ratio-2017	-0.5878*	-0.5879**	-0.7668***	-0.4099**	-0.3498**	0.1191	-0.1532	-0.0703	0.1274
	(0.3103)	(0.2922)	(0.2541)	(0.1581)	(0.1359)	(0.1004)	(0.1312)	(0.1261)	(0.1394)
IV									
Ratio 2013	3.3797***	3.1925***	2.5885**	2.1241**	1.8612*	2.9516***	1.9181**	1.7019*	2.7578***
	(1.1104)	(1.1991)	(1.2522)	(0.9856)	(0.9929)	(0.9009)	(0.8675)	(0.8807)	(0.7127)
Ratio-2014	3.1919***	3.1704***	2.7595**	2.0991*	1.7499	2.8264***	1.8793*	1.5553	2.6453***
	(1.1607)	(1.1564)	(1.3473)	(1.0848)	(1.1205)	(0.9413)	(1.0272)	(1.0466)	(0.7752)
Ratio-2015	1.2748	1.3193	1.5618*	1.2292*	0.8534	1.2010**	1.0722	0.7586	1.0950**
	(0.8141)	(0.8029)	(0.8416)	(0.7350)	(0.6951)	(0.4762)	(0.7217)	(0.6998)	(0.4404)
Ratio-2016	0.5438	0.6173	1.3021	0.8904	0.4420	0.3409	0.7000	0.3428	0.2092
	(0.8410)	(0.8294)	(0.8309)	(0.7319)	(0.7272)	(0.5300)	(0.7241)	(0.7489)	(0.4743)
Ratio-2017	-0.0983	0.0051	0.9153	0.5811	0.3112	-0.2386	0.4391	0.1886	-0.2633
	(0.6785)	(0.6507)	(0.7644)	(0.7149)	(0.7514)	(0.5139)	(0.7086)	(0.7616)	(0.4555)
High x Ratio-2013	-3.9381***	-3.2347**	-2.9610**	-1.7192**	-1.6613**	-1.7315***	-0.9251**	-0.8998**	-0.6065***
	(1.4514)	(1.2548)	(1.2932)	(0.6558)	(0.6700)	(0.5988)	(0.3644)	(0.3828)	(0.2292)
High x Ratio-2014	-4.3981***	-3.9255***	-3.5774**	-1.9654***	-1.7922**	-1.9543***	-0.7264**	-0.6264*	-0.4010**
	(1.5374)	(1.3518)	(1.4730)	(0.7234)	(0.6898)	(0.6911)	(0.3383)	(0.3307)	(0.1975)
High x Ratio-2015	-2.3099***	-2.0285***	-2.0366***	-1.2273***	-0.9655***	-0.9325***	-0.5098***	-0.3230*	-0.3512**
	(0.6788)	(0.5660)	(0.7002)	(0.3239)	(0.2669)	(0.2546)	(0.1806)	(0.1777)	(0.1583)
High x Ratio-2016	-2.1392***	-1.9175***	-2.1905***	-1.2404***	-0.9246***	-0.5977**	-0.4945**	-0.2827	-0.2055
	(0.6440)	(0.5394)	(0.7190)	(0.3368)	(0.2835)	(0.2960)	(0.2220)	(0.2256)	(0.2394)
High x Ratio-2017	-1.6466***	-1.4338***	-1.7621***	-0.9465***	-0.7871***	-0.1426	-0.3871*	-0.2695	0.0056
	(0.6069)	(0.4979)	(0.5660)	(0.2382)	(0.2524)	(0.2891)	(0.2138)	(0.2525)	(0.2939)
N	593,435	585,657	585,657	576,984	576,984	576,984	482,471	482,471	482,471
Month	+	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+	+
Building controls		+	+	+	+	+	+	+	+
5 region year FE			+	+			+		
12 region year FE					+			+	
26 region trends						+			+
Neighborhood FE				+	+	+			
Building FE							+	+	+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions and their interactions with high-price houses for each year are used instruments for the ratio of Syrian to the native population ratio and the interaction between the ratio and high price housing. High-priced houses are defined as houses located in parcels that had a price above the province median in 2010-2011. Controls included in each column are shown at the bottom of the table. Building controls include age, whether the house is new, size, number of rooms (by type), a measure of building quality provided by the expert evaluation, the type of the heating system, and whether the building has an elevator, pool or safety staff. The interactions between high-priced housing and year is added as a control in all models.

Table 8: Impact of Syrian refugees on house prices - age heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OLS									
Ratio 2013	1.8410**	1.6501*	1.1277*	1.1871*	0.4062	1.3832**	1.3856***	0.8159*	1.6241**
	(0.8803)	(0.8838)	(0.6647)	(0.6593)	(0.4536)	(0.6886)	(0.5110)	(0.4316)	(0.6720)
Ratio-2014	1.1404	1.1340	0.7714	1.1786	0.3088	1.2189*	1.4060***	0.7767	1.5376**
	(0.8252)	(0.7971)	(0.6249)	(0.7186)	(0.5832)	(0.6597)	(0.5292)	(0.4999)	(0.6245)
Ratio-2015	0.5304	0.5224	0.4057	0.5515	-0.0183	0.4831	0.7536*	0.2813	0.7005*
	(0.4344)	(0.4356)	(0.4097)	(0.4673)	(0.2909)	(0.3227)	(0.4046)	(0.2893)	(0.3613)
Ratio-2016	0.2248	0.2319	0.2229	0.3717	-0.1706	0.1897	0.5706	0.1385	0.3980
	(0.4056)	(0.4116)	(0.4223)	(0.4866)	(0.3462)	(0.2377)	(0.4026)	(0.3174)	(0.2756)
Ratio-2017	0.0064	0.0330	0.0910	0.2124	-0.1737	-0.0048	0.4424	0.1454	0.2203
	(0.3547)	(0.3678)	(0.3824)	(0.4353)	(0.3470)	(0.1803)	(0.3527)	(0.3184)	(0.2191)
Old x Ratio-2013	-0.3172	-0.0442	-0.0785	0.2273	0.2653	0.2981	0.2507**	0.1709*	0.2463
	(0.5530)	(0.4593)	(0.4312)	(0.1721)	(0.1709)	(0.1816)	(0.1251)	(0.1022)	(0.1482)
Old x Ratio-2014	0.9994	0.8852*	0.9266*	0.5399***	0.4857***	0.4040**	0.5219**	0.2254	0.1555
	(0.7096)	(0.5034)	(0.5254)	(0.1747)	(0.1574)	(0.1669)	(0.2095)	(0.1505)	(0.1397)
Old x Ratio-2015	0.2723	0.3425*	0.3116*	0.2860***	0.2202**	0.2507***	0.2017	0.0763	0.0705
	(0.2144)	(0.1793)	(0.1830)	(0.0981)	(0.0875)	(0.0919)	(0.1289)	(0.0902)	(0.1021)
Old x Ratio-2016	0.3609	0.3934**	0.3347*	0.2673**	0.2220**	0.2309**	0.1884	0.0735	0.0471
	(0.2315)	(0.1934)	(0.1920)	(0.1056)	(0.0996)	(0.0936)	(0.1217)	(0.0758)	(0.0809)
Old x Ratio-2017	0.2548*	0.2744**	0.2307*	0.1746**	0.1777**	0.1305**	0.0498	0.0187	-0.0876
	(0.1502)	(0.1309)	(0.1313)	(0.0735)	(0.0750)	(0.0593)	(0.0761)	(0.0631)	(0.0556)
IV									
Ratio 2013	1.6929	1.3291	1.2617	1.0181	0.6609	2.1234**	1.3611	1.0881	2.3175***
	(1.2081)	(1.2530)	(1.1138)	(1.0049)	(0.8579)	(0.8956)	(0.8975)	(0.8444)	(0.7092)
Ratio-2014	1.2306	0.9452	1.0395	0.8464	0.4324	1.9523**	1.3034	0.9377	2.1929***
	(1.2298)	(1.2371)	(1.1558)	(1.1239)	(0.9526)	(0.9106)	(1.0164)	(0.9481)	(0.7344)
Ratio-2015	0.1372	0.0756	0.3831	0.3082	0.0435	0.8054*	0.6676	0.4132	0.9840**
	(0.6723)	(0.6966)	(0.6953)	(0.6914)	(0.5694)	(0.4450)	(0.7171)	(0.6454)	(0.4110)
Ratio-2016	-0.4331	-0.4775	0.0311	-0.0459	-0.3018	0.3576	0.3493	0.1104	0.5187
	(0.5929)	(0.6425)	(0.6981)	(0.7088)	(0.6018)	(0.3453)	(0.7353)	(0.6811)	(0.3256)
Ratio-2017	-0.7344	-0.7239	-0.1534	-0.2117	-0.4059	0.1701	0.2204	0.0378	0.3563
	(0.4541)	(0.4984)	(0.5885)	(0.6183)	(0.5399)	(0.2864)	(0.6710)	(0.6427)	(0.2983)
Old x Ratio-2013	-0.9316	-0.3128	-0.5162	0.2812	0.3244*	0.4171**	0.3285**	0.3865**	0.5861**
	(1.0203)	(0.6637)	(0.7192)	(0.1814)	(0.1825)	(0.1978)	(0.1558)	(0.1746)	(0.2358)
Old x Ratio-2014	-0.5364	-0.0337	-0.1194	0.4018**	0.3947**	0.4417**	0.4082***	0.4243***	0.5749***
	(0.9780)	(0.6005)	(0.6140)	(0.1597)	(0.1619)	(0.1885)	(0.1197)	(0.1353)	(0.2023)
Old x Ratio-2015	-0.1709	0.0775	0.1161	0.3094***	0.2732***	0.2788**	0.2366***	0.2221***	0.2173*
	(0.5621)	(0.3735)	(0.2958)	(0.1004)	(0.1018)	(0.1359)	(0.0675)	(0.0756)	(0.1211)
Old x Ratio-2016	-0.1780	0.0302	0.1201	0.2521**	0.2297*	0.1784	0.0934	0.0644	-0.0110
	(0.5762)	(0.3905)	(0.3068)	(0.1097)	(0.1162)	(0.1380)	(0.0733)	(0.0852)	(0.1239)
Old x Ratio-2017	-0.0919	0.0558	0.1185	0.1454*	0.1359*	0.0683	-0.0600	-0.0769	-0.1887**
	(0.3685)	(0.2269)	(0.1805)	(0.0764)	(0.0762)	(0.0823)	(0.0590)	(0.0574)	(0.0741)
N	2,353,684	2,335,463	2,335,463	2,304,971	2,304,971	2,304,971	1,679,370	1,679,370	1,679,370
Month	+	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+	+
Building controls		+	+	+	+	+	+	+	+
5 region year FE			+	+			+		
12 region year FE					+			+	
26 region trends						+			+
Neighborhood FE				+	+	+			
Building FE							+	+	+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions and their interactions with old houses for each year are used instruments for the ratio of Syrian to the native population and the interaction between the ratio and old houses. Old houses are defined as houses older than 4 years. Controls included in each column are shown at the bottom of the table. Building controls include age, whether the house is new, size, number of rooms (by type), a measure of building quality provided by the expert evaluation, the type of the heating system, and whether the building has an elevator, pool or safety staff. The interactions between high-priced housing and year is added as a control in all models.

Table 9: Impact of Syrian refugees on house prices - size heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OLS									
Ratio 2013	1.7489**	1.6567**	1.0874**	1.2375**	0.4724	1.4652**	1.5686***	0.9309**	1.7830**
	(0.7565)	(0.7693)	(0.5418)	(0.6171)	(0.4096)	(0.6736)	(0.5601)	(0.4549)	(0.7103)
Ratio-2014	1.5687**	1.4377*	1.0505*	1.3535*	0.4616	1.3616**	1.6662***	0.8931	1.6317**
	(0.7816)	(0.7569)	(0.6199)	(0.7077)	(0.5642)	(0.6359)	(0.6133)	(0.5569)	(0.6628)
Ratio-2015	0.6682	0.6393	0.4987	0.6368	0.0421	0.5546*	0.8907*	0.3352	0.7381*
	(0.4409)	(0.4422)	(0.4155)	(0.4810)	(0.2872)	(0.3314)	(0.4755)	(0.3233)	(0.3845)
Ratio-2016	0.3777	0.3602	0.3225	0.4554	-0.1080	0.2512	0.6987	0.1864	0.4125
	(0.4147)	(0.4160)	(0.4246)	(0.4980)	(0.3379)	(0.2444)	(0.4689)	(0.3441)	(0.2881)
Ratio-2017	0.1171	0.1266	0.1664	0.2752	-0.1139	0.0236	0.5280	0.1793	0.1868
	(0.3592)	(0.3632)	(0.3733)	(0.4370)	(0.3434)	(0.1847)	(0.3963)	(0.3375)	(0.2249)
Large x Ratio-2013	0.3756	0.0778	0.1621	0.3821*	0.3451	0.3697	-0.0244	-0.0368	-0.0832
	(0.5315)	(0.4211)	(0.4414)	(0.2149)	(0.2142)	(0.2440)	(0.1190)	(0.1179)	(0.1444)
Large x Ratio-2014	-0.0736	0.0523	0.0868	0.2645	0.2438	0.1546	0.2310*	0.1922	0.0760
	(0.4659)	(0.3590)	(0.3759)	(0.2330)	(0.2172)	(0.2051)	(0.1199)	(0.1198)	(0.1286)
Large x Ratio-2015	0.0915	0.0338	0.0299	0.1798*	0.2015**	0.1704*	0.0853*	0.0943*	0.0622
	(0.1991)	(0.1385)	(0.1465)	(0.0936)	(0.1009)	(0.0869)	(0.0478)	(0.0503)	(0.0497)
Large x Ratio-2016	0.1379	0.0695	0.0217	0.1636**	0.1912**	0.2008**	0.0479	0.0749	0.0761
	(0.1996)	(0.1464)	(0.1504)	(0.0818)	(0.0860)	(0.0873)	(0.0616)	(0.0594)	(0.0607)
Large x Ratio-2017	0.1716	0.1191	0.0534	0.1518*	0.1584**	0.2207**	0.0371	0.0380	0.0899
	(0.1928)	(0.1612)	(0.1491)	(0.0766)	(0.0759)	(0.1018)	(0.0641)	(0.0616)	(0.0709)
IV									
Ratio 2013	1.2957	1.2785	1.0710	1.0856	0.7473	2.2477***	1.5633*	1.3136	2.6742***
	(1.1029)	(1.1165)	(0.8997)	(0.9292)	(0.7918)	(0.8415)	(0.8836)	(0.8469)	(0.7071)
Ratio-2014	1.0905	1.0083	1.0048	0.9409	0.5244	2.0594**	1.4975	1.1364	2.4763***
	(1.2854)	(1.2330)	(1.0445)	(1.0714)	(0.9082)	(0.8878)	(1.0181)	(0.9675)	(0.7618)
Ratio-2015	0.1029	0.1272	0.4243	0.3884	0.1091	0.8646*	0.7871	0.5213	1.0999**
	(0.7857)	(0.7436)	(0.6670)	(0.6868)	(0.5608)	(0.4533)	(0.7215)	(0.6578)	(0.4388)
Ratio-2016	-0.4862	-0.4513	0.0615	0.0038	-0.2650	0.3668	0.4040	0.1460	0.5272
	(0.7310)	(0.6962)	(0.6621)	(0.6912)	(0.5792)	(0.3392)	(0.7284)	(0.6808)	(0.3434)
Ratio-2017	-0.7935	-0.7166	-0.1408	-0.1976	-0.3969	0.1338	0.2214	0.0255	0.2932
	(0.5668)	(0.5320)	(0.5588)	(0.6011)	(0.5184)	(0.2605)	(0.6506)	(0.6286)	(0.2873)
Large x Ratio-2013	1.0909	0.0910	0.1936	0.5307*	0.5116*	0.5032*	0.2281	0.2347	0.2288
	(0.8277)	(0.4978)	(0.4675)	(0.2910)	(0.2919)	(0.2826)	(0.2715)	(0.2766)	(0.3016)
Large x Ratio-2014	0.9383	0.2037	0.2661	0.6425	0.6243	0.5784	0.5271*	0.5299*	0.4772
	(0.8455)	(0.4656)	(0.4837)	(0.4086)	(0.4030)	(0.3859)	(0.2708)	(0.2913)	(0.3264)
Large x Ratio-2015	0.5898	0.2341	0.2184	0.3939**	0.4067**	0.3910**	0.2411**	0.2672*	0.2357*
	(0.4500)	(0.2250)	(0.2348)	(0.1895)	(0.1949)	(0.1938)	(0.1185)	(0.1362)	(0.1390)
Large x Ratio-2016	0.7818*	0.4276*	0.3468	0.4869**	0.4966**	0.5409**	0.2618**	0.2887**	0.3065**
	(0.4566)	(0.2449)	(0.2547)	(0.2128)	(0.2171)	(0.2329)	(0.1227)	(0.1366)	(0.1442)
Large x Ratio-2017	0.7801*	0.5301*	0.4419	0.5027**	0.5000**	0.5899**	0.2419**	0.2502*	0.3307**
	(0.4235)	(0.2905)	(0.2907)	(0.1991)	(0.2004)	(0.2470)	(0.1194)	(0.1264)	(0.1639)
N	2,351,245	2,333,143	2,333,143	2,333,143	2,308,834	2,308,834	1,694,017	1,694,017	1,694,017
Month	+	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+	+
Building controls		+	+	+	+	+	+	+	+
5 region year FE			+	+			+		
12 region year FE					+			+	
26 region trends						+			+
Neighborhood FE				+	+	+			
Building FE							+	+	+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions and their interactions with large houses for each year are used instruments for the Syrian to the native population ratio and the interaction between the ratio and large houses. Large houses are defined as houses with more than the sample median of three rooms. Controls included in each column are shown at the bottom of the table. Building controls include age, whether the house is new, size, number of rooms (by type), a measure of building quality provided by the expert evaluation, the type of the heating system, and whether the building has an elevator, pool or safety staff. The interactions between high-priced housing and year is added as a control in all models.

Table 10: Impact on mortgaged sales

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS				IV			
Ratio-2013	1.4095***	1.1028***	1.6484***	1.4047***	1.3716***	1.0325	1.5584***	0.9379
	(0.3380)	(0.3883)	(0.2568)	(0.3261)	(0.5174)	(0.6463)	(0.5724)	(0.6383)
Ratio-2014	1.4682***	1.0080**	1.5987***	1.4260***	1.2244**	0.8072	1.4925***	0.6894
	(0.4020)	(0.4234)	(0.2289)	(0.3999)	(0.5901)	(0.6854)	(0.5080)	(0.7944)
Ratio-2015	0.8513***	0.5765***	0.8225***	0.8230***	0.7467***	0.4084	0.7493***	0.4183
	(0.1088)	(0.1514)	(0.1015)	(0.0991)	(0.2124)	(0.3377)	(0.2462)	(0.3565)
Ratio-2016	0.5386***	0.2900*	0.5481***	0.5115***	0.5422***	0.2495	0.5974**	0.1630
	(0.1095)	(0.1549)	(0.1239)	(0.0954)	(0.1942)	(0.2874)	(0.2601)	(0.3216)
Ratio-2017	0.4803***	0.1883	0.4312***	0.4570***	0.5946***	0.2195	0.5229**	0.1764
	(0.1280)	(0.1606)	(0.1082)	(0.1236)	(0.2024)	(0.2427)	(0.2397)	(0.3175)
N	6,737	6,737	6,737	6,737	6,737	6,737	6,737	6,737
Month	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+
5 region year FE		+				+		
12 region year FE			+				+	
26 region trends				+				+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. The dependent variable is the log of the number of mortgaged sales. The regressions are estimated at the province-month level. In all IV estimates, the weighted distance of a province to Syrian regions for each year are used instruments for the ratio of refugee to native population.

Table 11: Impact on construction permits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS				IV			
Ratio-2013	0.0373***	0.0376***	0.0387***	0.0370***	0.0325***	0.0384***	0.0419***	0.0369***
	(0.0033)	(0.0040)	(0.0040)	(0.0034)	(0.0063)	(0.0072)	(0.0084)	(0.0063)
Ratio-2014	0.0326***	0.0367***	0.0306***	0.0329***	0.0222***	0.0304***	0.0239**	0.0275***
	(0.0105)	(0.0106)	(0.0073)	(0.0118)	(0.0065)	(0.0059)	(0.0099)	(0.0069)
Ratio-2015	0.0078***	0.0078***	0.0078***	0.0080***	0.0067**	0.0090***	0.0094***	0.0099***
	(0.0015)	(0.0019)	(0.0016)	(0.0022)	(0.0031)	(0.0032)	(0.0035)	(0.0036)
Ratio-2016	-0.0020	-0.0010	-0.0019	-0.0018	-0.0042	-0.0012	-0.0024	-0.0004
	(0.0017)	(0.0019)	(0.0014)	(0.0026)	(0.0030)	(0.0031)	(0.0030)	(0.0037)
Ratio-2017	-0.0061**	-0.0020	-0.0025	-0.0059*	-0.0095**	-0.0008	-0.0011	-0.0053
	(0.0026)	(0.0025)	(0.0023)	(0.0031)	(0.0040)	(0.0044)	(0.0044)	(0.0039)
N	6,737	6,737	6,737	6,737	6,737	6,737	6,737	6,737
Month	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+
5 region year FE		+				+		
12 region year FE			+				+	
26 region trends				+				+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. The dependent variable is the ratio of new residential building construction permits to the province population. The regressions are estimated at the province-year level. In all IV estimates, the weighted distance of a province to Syrian regions for each year are used instruments for the ratio of refugee to native population.

Table 12: Impact on house characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS				IV			
Age								
Ratio 2013	-0.5575	-0.7364	-1.5287**	-0.6769	0.6975	-1.3325	-1.9872***	-0.1643
	(0.5326)	(0.7476)	(0.7056)	(0.5742)	(0.9358)	(0.8254)	(0.5659)	(0.7876)
Ratio-2014	-1.6501***	-1.9109***	-1.9706***	-1.9197***	-0.2999	-2.4388***	-2.7071***	-1.5248**
	(0.5945)	(0.6149)	(0.6716)	(0.6404)	(0.9808)	(0.5295)	(0.5438)	(0.6259)
Ratio-2015	-0.9265***	-1.2099***	-1.1285**	-1.1589***	-0.2278	-1.5860***	-1.6627***	-1.0612**
	(0.3393)	(0.4114)	(0.4333)	(0.4141)	(0.5840)	(0.2857)	(0.3241)	(0.4249)
Ratio-2016	-0.7191*	-0.9531**	-0.8372*	-0.9768**	0.0175	-1.4238***	-1.3935***	-0.8972**
	(0.3752)	(0.4357)	(0.4787)	(0.4466)	(0.5293)	(0.4260)	(0.4884)	(0.4424)
Ratio-2017	-0.3713	-0.6216	-0.6019	-0.6663	0.4295	-1.0298**	-0.9518*	-0.5342
	(0.3737)	(0.4113)	(0.4657)	(0.4424)	(0.5272)	(0.4815)	(0.5308)	(0.4723)
N	2,336,024	2,336,024	2,336,024	2,336,024	2,336,024	2,336,024	2,336,024	2,336,024
Size								
Ratio 2013	-0.5493**	-0.4795*	-0.2370	-0.6985**	-0.1670	-0.4563	-0.3122	-0.7756
	(0.2607)	(0.2654)	(0.2404)	(0.3062)	(0.4745)	(0.4634)	(0.4428)	(0.4850)
Ratio-2014	-0.7148**	-0.6031*	-0.2921	-0.8803**	-0.2034	-0.5276	-0.3991	-0.8992*
	(0.3213)	(0.3043)	(0.2800)	(0.3440)	(0.5408)	(0.4985)	(0.4965)	(0.5065)
Ratio-2015	-0.3887*	-0.3078	-0.1664	-0.5166**	-0.1068	-0.2908	-0.2035	-0.5310
	(0.2067)	(0.1913)	(0.1773)	(0.2456)	(0.3313)	(0.3461)	(0.3426)	(0.3781)
Ratio-2016	-0.4569*	-0.3427	-0.1898	-0.5723**	-0.1607	-0.2838	-0.1516	-0.5574
	(0.2424)	(0.2354)	(0.2392)	(0.2731)	(0.3581)	(0.4309)	(0.4271)	(0.4323)
Ratio-2017	-0.4053*	-0.2645	-0.1560	-0.4994*	-0.1797	-0.2638	-0.1599	-0.5135
	(0.2319)	(0.2178)	(0.2250)	(0.2582)	(0.3256)	(0.3930)	(0.3941)	(0.3939)
N	2,353,684	2,353,684	2,353,684	2,353,684	2,353,684	2,353,684	2,353,684	2,353,684
Month	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+
5 region year FE		+				+		
12 region year FE			+				+	
26 region trends				+				+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions for each year are used instruments for the ratio of Syrian refugees to native population. Age and size (in meter squares) variables are log transformed. Controls included in each column are shown at the bottom of the table.

Table 13: Impact of Syrian refugees on loan-to-value ratios

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OLS									
Ratio-2013	-0.1138	-0.1442	-0.1333	-0.1561*	-0.0516	-0.1600*	-0.2132***	-0.1220**	-0.2240***
	(0.0691)	(0.0868)	(0.0815)	(0.0919)	(0.0621)	(0.0848)	(0.0683)	(0.0482)	(0.0657)
Ratio-2014	-0.1113	-0.1549*	-0.1285	-0.1576**	-0.0460	-0.1965***	-0.1903***	-0.1051**	-0.2278***
	(0.0698)	(0.0837)	(0.0789)	(0.0785)	(0.0547)	(0.0628)	(0.0619)	(0.0481)	(0.0628)
Ratio-2015	-0.0320	-0.0598	-0.0424	-0.0592	0.0058	-0.0834***	-0.0721*	-0.0177	-0.0885**
	(0.0247)	(0.0403)	(0.0433)	(0.0458)	(0.0267)	(0.0245)	(0.0383)	(0.0202)	(0.0355)
Ratio-2016	-0.0048	-0.0420	-0.0414	-0.0536	0.0095	-0.0651***	-0.0483	0.0043	-0.0608**
	(0.0288)	(0.0450)	(0.0510)	(0.0522)	(0.0421)	(0.0216)	(0.0447)	(0.0331)	(0.0264)
Ratio-2017	0.0442*	0.0040	0.0086	-0.0053	0.0398	-0.0269	-0.0180	0.0188	-0.0457
	(0.0225)	(0.0371)	(0.0425)	(0.0463)	(0.0383)	(0.0226)	(0.0420)	(0.0361)	(0.0284)
IV									
Ratio-2013	-0.0400	-0.0445	-0.0661	-0.0870	-0.0534	-0.1871**	-0.1542**	-0.1152*	-0.3186***
	(0.0920)	(0.1319)	(0.1121)	(0.1058)	(0.0795)	(0.0782)	(0.0760)	(0.0587)	(0.0517)
Ratio-2014	-0.0669	-0.0691	-0.0581	-0.0617	-0.0242	-0.2381***	-0.1411*	-0.1161*	-0.3964***
	(0.1025)	(0.1367)	(0.1098)	(0.0917)	(0.0698)	(0.0811)	(0.0747)	(0.0682)	(0.0799)
Ratio-2015	0.0369	0.0268	0.0154	0.0208	0.0428**	-0.0739**	-0.0163	0.0014	-0.1470***
	(0.0540)	(0.0729)	(0.0483)	(0.0371)	(0.0210)	(0.0317)	(0.0295)	(0.0241)	(0.0510)
Ratio-2016	0.1120*	0.0935	0.0489	0.0582	0.0847***	-0.0186	0.0582	0.0829**	-0.0772*
	(0.0616)	(0.0747)	(0.0498)	(0.0414)	(0.0265)	(0.0287)	(0.0436)	(0.0339)	(0.0417)
Ratio-2017	0.1441***	0.1134*	0.0839*	0.0948**	0.1137***	-0.0043	0.0715	0.0877**	-0.1041***
	(0.0512)	(0.0587)	(0.0433)	(0.0381)	(0.0252)	(0.0242)	(0.0467)	(0.0393)	(0.0339)
N	2,326,001	2,307,948	2,307,948	2,283,838	2,283,838	2,283,838	1,672,231	1,672,231	1,672,231
Month	+	+	+	+	+	+	+	+	+
Year	+	+	+	+	+	+	+	+	+
Province	+	+	+	+	+	+	+	+	+
Building controls		+	+	+	+	+	+	+	+
5 region year FE			+	+			+		
12 region year FE					+			+	
26 region trends						+			+
Neighborhood FE				+	+	+			
Building FE							+	+	+

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at province level. Ratio is the ratio of Syrian refugees to the native population at the level of 81 provinces. In all IV estimates, the weighted distance of a province to Syrian regions for each year are used instruments for the ratio variable. Controls included in each column are shown at the bottom of the table. Building controls include age, whether the house is new, size, number of rooms (by type), a measure of building quality provided by the expert evaluation, the type of the heating system, and whether the building has an elevator, pool or safety staff.