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Migration and House Prices – A Spatial Econometric Analysis of Stockholm

Abhinav Jain (25539) and Lexi Tänneryd (25229)

Abstract

Global migration and its impact on local and national economies has become a diverse field of study since the turn of the century, especially so in Europe given the drastic change in migration flows and the fortification of European economies. The effects of migration on the housing market are of special importance, as many European countries face housing shortages. This paper examines the effects of external migration to Sweden on the housing market for owner-occupied apartments in the Stockholm County using an Ordinary Least Squares regression followed by an Instrumental Variable regression with a shift-share instrument to address any endogeneity problems. Using data for 25 municipalities from 2006-2021, this paper finds no significant causal effect of immigration on the housing market.

Keywords: Housing Supply, Housing Demand, Regional Housing Market, Migration, Internal Migration, Residential Location Factor.

JEL: R310, R280, R230, R210.

Supervisor:	Jaakko Meriläinen
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Discussants:	Alvin Martinsson and Jim Lind
Examiner:	Johanna Wallenius

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1. Introduction

Migration has been one of the most contentious subjects of policy debate since the turn of the century, especially so in Sweden and the EU. The supposed effects of migration on the economy have become a catalyst for rapid political change, but empirical evidence is mixed and often context specific. One such economic facet is the housing market, which has seen several crises in the last 20 years, and unprecedented growth in prices alongside an ever-worsening shortage in many European countries. Previous literature in the European context has shown that migration can often contribute to a rise in house prices, usually by around 1-2%, but the literature is often spread across urban and rural areas and limited to countries with more labor migrants than humanitarian migrants. There is a clear need for a more close-up, regional policy focus – examining the effects in urban, high-migration areas, and tailoring policy accordingly.

Figure 1 depicts the change in foreign-born population in Stockholm alongside the change in the average sale prices of apartments in Stockholm from the years 2006-2021, and *Figure 2* depicts the change in foreign-born alongside the housing price index during the same period for the whole country. The graphs depict a correlation between an increase in the foreign-born population and an increase in the general level of house prices, and this thesis sets out to examine if a causal relationship between the two can be determined. Having considered previous research and relevant economic theory, our research question is hence formulated as follows: *To what extent have external immigration patterns affected aggregate owner market sale prices of condominiums in the Stockholm County from 2006-2021?*

This paper utilizes a fixed-effect Ordinary Least Squares (OLS) methodology complemented by an Instrumental Variable analysis to analyse data for 25 municipalities in Stockholm County from the years 2006-2021. The dataset comprises of foreign-born persons, average sale prices of apartments in Stockholm County, and a number of control variables.

Both the OLS regressions and the Instrumental Variable analysis find no significant causal effect of immigration patterns on the average sale price of apartments. This is a novel finding given the results in recent European and Swedish literature and demonstrates the need to reevaluate migration effects on economic sectors in a post-2015 policy dynamic.

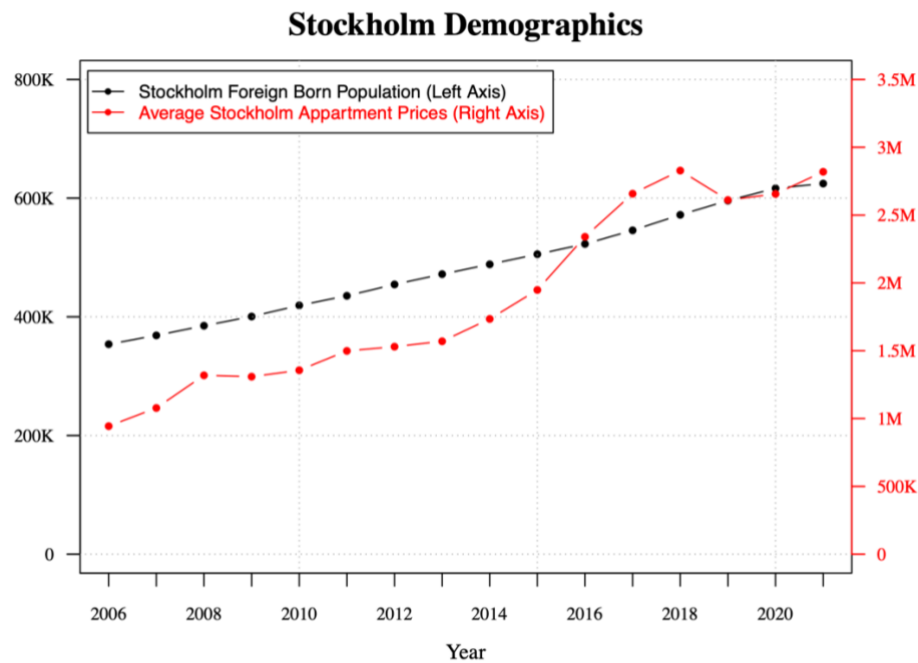


Figure 1: Foreign-born population and average apartment sale prices in Stockholm (MSEK) between 2006-2021. (SCB, 2024)

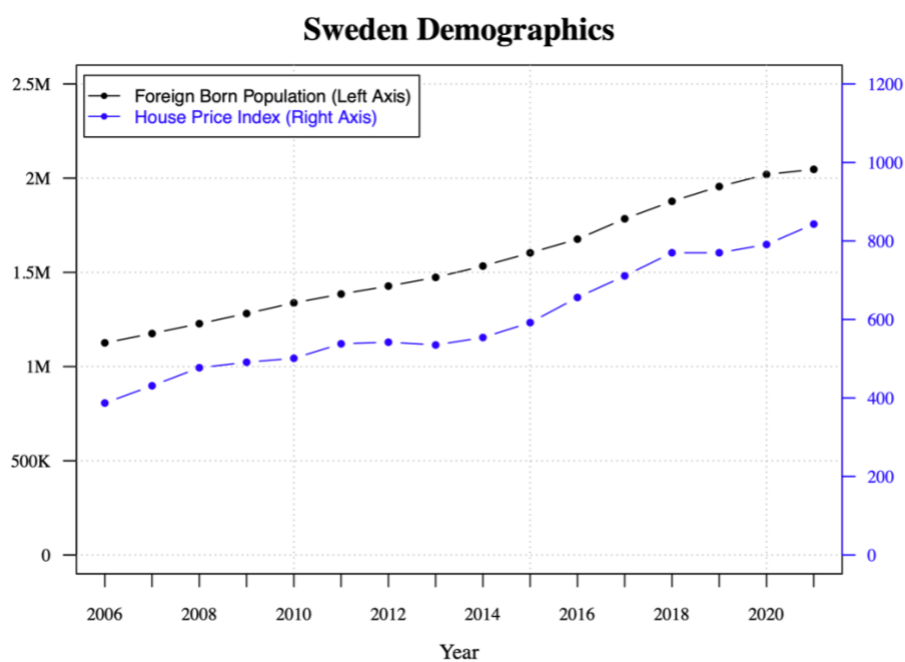


Figure 2: Foreign-born population and standardised house price index (1980 = 100) in Sweden between 2006-2021. (SCB, 2024)

2. Background

2.1. Immigration

Sweden has a rich history of migration as a modern state dating back to the mid 20th century. The first institutional wave of migration to Sweden began in 1954 upon the formation of the Nordic Council, when Sweden began recruiting migrant labor from countries such as Austria, Belgium, Greece, and Yugoslavia. This policy lasted until 1972, after which the demographic makeup of migrants shifted to consist primarily of family reunification migrants (those migrating to join relatives already residing in Sweden). This was also the first time in Sweden's history it began to accept non-EU refugees and humanitarian migrants. A de-facto policy of multiculturalism was adopted during this time, but the unprecedented acceptance of migrants across the country caused social frictions, and anti-immigration political bodies gained popularity (Byström & Frohnert, 2017).

The modern age of Swedish migration policy begins in 1995 with entrance into the Schengen Area. The most significant influx during this period was during the 2015 EU migrant crisis when Sweden accepted 162,000 refugees from mostly middle eastern countries – the most asylum seekers per-capita globally. Though Sweden took pride in its humanitarian intent at the time, the events of 2015 led to a complete overhaul of Swedish asylum policy in 2016 titled the *Temporary Asylum and Family Reunification Law*, which categorized refugees by type and abolished the issuance of permanent residence in favour of 3-year permits. The quota refugee program – a program under which Sweden resettles 5,000 refugees annually – remained unaffected by this policy but has faced its own share of criticism due to the rise of far-right parties in the political sphere (Parusel, 2015).

As of 2021 Vaxholm is the municipality in Stockholm County with the lowest proportion of foreign-born residents, comprising just 0.2% of Stockholm county's total foreign-born population. Stockholm municipality has the highest concentration of foreign-born

residents, a total of 252,750 persons or approximately 40% of the total in the county. There has been an average annual growth of 3.7% in foreign-born population in the municipality between the years 2006 and 2021. By 2021, Stockholm County accounted for approximately 32% of the nation's foreign-born residents (SCB, 2022).



Figure 3: Sweden and Stockholm County divided into its municipal geography. (Authors' own, (n.d.))

2.2. Housing Market Development

The development of the Stockholm housing market into its current state began with the implementation of the Millions housing program from 1965 to 1974. The program involved

the construction of a million new residences across all of Sweden, which had a population of 8 million at the time making the project a huge undertaking. The housing was targeted at all sectors including low-income subsidised housing, student accommodations, blue-collar housing, and middle-income residents. As economic development continued through the 1970s and the general level of wealth rapidly rose for Swedes, they often chose to move into single-family homes leaving the millions program housing populated by lower-income residents – a phenomenon that propagated itself for the decades following as well. Of the million homes built, many also stood empty due to an overestimation of demand, and as humanitarian migration and family reunification migration began in 1972, many migrants were housed in millions program settlements (Hall & Vidén, 2005).

The excess supply caused by the millions program did not last very long. As refugee migration began in the mid-1990s, millions program developments quickly filled up due to a government practice that housed refugees based purely on availability of housing despite the official policy line that required placement of refugees based on labour market conditions (Östh et al., 2018). This created a de-facto socioeconomic segregation between urban areas and more rural or suburban areas, which is still prevalent today especially in Stockholm and its suburbs. There are rent-controlled apartments within the Stockholm metropolitan area, but the average waiting time for these apartments is 9.2 years making them near-impossible to attain. The overcrowding of urban areas prompted the government to step in with the Planning & Building Act of 2011, removing barriers to construction so as to boost housing supply and curb extreme price growth and waiting times, but no significant effects have been seen so far (Andersson & Turner, 2014).

In Stockholm County as of 2020 the most common form of housing is owner-occupied dwellings in multi-dwelling buildings at 38% of the total housing stock, followed by rented dwellings in multi-dwelling buildings, at 28% of the total stock. Owner-occupied one-or-two-

dwelling buildings makes up 24% of the total stock (SCB, 2020). This is in contrast to the rest of Sweden, where owner-occupied one-or-two-dwelling buildings are the most common type of residence in 266 out of the 290 total municipalities. In Stockholm County around 30% of all tenant-owned apartments are owned by foreign-born persons, and around 46% of all rented apartments are leased by foreign-born persons (SCB, 2023). The average sale price of a tenant-owned apartment in Stockholm County was SEK4.1m as of 2022, as compared to SEK2.3m in 2012 and SEK1.1m in 2002. This shows that prices are doubling every 10 years. Prices have increased 263% since 2002, 77% since 2012, and 8.6% since 2020 (SCB, 2022). These changes are roughly indicative of the real estate price index for all available housing in Stockholm County and are evidence of a pressing price inflation issue.

3. Literature Review

The relationship between immigration and house prices has only entered the sphere of academic research relatively recently. Prior to 2005, research on the effects of immigration was limited to the labour market (Borjas, 1994; Dustmann et al, 2005). The formative paper exploring the effects of immigration on the housing market, Saiz (2007), finds that between 1983 and 1997, immigration into American cities increased demand for housing, increasing aggregate rent levels to which house prices caught up later. Saiz (2007) introduced in this paper the subsequently widely adopted ‘shift-share’ instrumental variable to overcome a common endogeneity issue of spatial immigration choices being influenced by the housing market. To introduce exogenous variation, Saiz (2007) proposes an instrument that predicts the inflows of immigrants by city and year based on the fact that immigrants settle in areas that have high concentrations of previously settled immigrants (Altonji & Card, 1991).

As this research expanded to gateway cities in Canada (Akbari & Aydede, 2012; Ley et al., 2002) and Australia (Moallemi & Melser, 2019), results are conflicting and prove to be

context dependent. Ley et al. (2002), in their study of Canadian cities, found using a correlation methodology that an increase in immigrant populations in major cities between 1971 and 1986 led to inflated prices of dwellings, led in part by gentrification and social polarization. A subsequent study of 7 census metropolitan areas by Akbari and Akdede (2012) found that the immigrant population increased by 13.6% between 2001 and 2006, and ownership rates of houses also increased during this period, but the maximum rise in prices resulting from immigration amounts to only 0.10-0.12%. Additionally, they find no statistically significant effect of recent immigration (1996-2006) on the housing market. In Australia, Moallemi and Melser (2019) investigated three census periods from 2006-2016 using the same shift-share approach developed by Bartik (1991) and popularized by Saiz (2007) to determine that a 1% increase in immigrant population directly leads to a 0.9% increase in house prices.

These results are consistent with a lot of other, more contemporary, results in the field. For example, a study in Germany finds that a 1% increase in immigration leads to a 3% increase in the median apartment price (Unal et al., 2022). A similar study in Switzerland finds a 2.7% increase in house prices for a 1% increase in immigration (Degen & Fischer, 2017), with immigration explaining two-thirds of the total price increase. A recent Spanish study implementing the shift-share approach while also incorporating the ideas of rent price fluctuations and native relocation effects accordingly also finds that a 1% increase in immigrant population leads to a 3.3% increase in house prices (Sanchis-Guarner, 2023).

Though there would appear to be a degree of uniformity across contemporary literature on the topic, the concept of native relocation effects can lead to conflicting results. In an extremely comprehensive study, Sà (2015) uses the Saiz (2007) model as a foundation and incorporates income effects and the preferences of natives for immigration. These changes place focus on the effects of native emigration from cities with higher immigrant populations, especially the out-migration of natives with higher incomes. Sà (2015) finds that an increase

in immigrant share of 1% leads to a decrease in house prices of 1.7%, which directly opposes the seminal work of Saiz (2007) and most subsequent literature and highlights the importance of considering domestic immigration flows.

The Swedish context borrows from other European work in that there is a tightness of housing supply, especially in urban areas, and this inelasticity is often attributed to recent increases in immigrant inflows (Tyrcha, 2020). It also bears similarity to the findings of Sà (2015) in the UK as there are significant income gaps between native and immigrant groups with male immigrants on average earning 5.5% less than native male labor market participants (Le Grand & Szulkin, 2001). There have been several studies on the effects of immigration on the housing market in Sweden, each with certain variations on the standard methodology. Tyrcha (2020) in a detailed study of all municipalities in Sweden, also using the shift-share approach, finds that a 1% increase in external migration leads to a 0.8% increase in house prices. Müller (2018) in a previous study finds near identical results. Tyrcha borrows from Sà and also disaggregates the effect of internal migration, which amplifies the effect of external migration on house prices to 1.2%. Another extension of the research is Tyrcha's categorization of municipalities into urban and rural, and subsequently large urban and small urban. The effects alter significantly once these distinctions are made, with a 1.5% effect in large urban municipalities and a 0.9% effect in rural municipalities.

3.1. Hypothesis

Based on the findings of previous literature in an EU context and the relevant domestic policy implications, we hence formulated our hypothesis as follows: *We expect municipalities in Stockholm County with higher annual inflows of external migrants to have higher annual increases in the average sale price of condominiums, due to a combination of labour-market migration of higher-wage immigrants into urban areas and housing supply tightness created by government resettlement policy of refugees in suburban areas.*

3.2. Contribution to Existing Literature

This paper contributes to the existing literature primarily in two ways – spatially, and in terms of time-period considered. Spatially, this paper considers only the 25 municipalities in Stockholm County, whereas other papers have considered all 290 municipalities in Sweden. This was a conscious choice, as though it narrows the sample size, it provides a more nuanced understanding of the geo-demographic makeup of the inner-Stockholm municipalities and the surrounding suburban and more rural municipalities, which is vastly different to the geo-demographic makeup of the rest of Sweden. Stockholm County has a population of approximately 2.5m, around 23% of the population of Sweden, and is home to around 670,000 foreign-born persons, 30% of the total foreign-born persons in Sweden (SCB, 2024). Another strong motivation to zoom-in on Stockholm was the housing crisis that has permeated much of the urban landscape for the last decade or so – a crisis which isn't necessarily reflected in the rest of Sweden bar Göteborg and Malmö, the other two urban metropolitan cities, even then at nowhere near the severity with which it has affected social settlement patterns in Stockholm (Emanuelsson, 2015).

In terms of time-period, this paper examines the years from 2006-2021 – a 6-year update on the next most recent study in Sweden (Tyrcha, 2020). This allows us to crucially consider the years after the 2015 migrant crisis, a year in which Sweden took in over 160,000 refugees; more per capita than any other country in Europe (Hagelund, 2020). Examining the years post-2015 is necessary to paint a complete picture of the effects of migration on the housing economy and completes the roadmap to the current market dynamic. We also utilize 1980 as the base year for the shift-share instrument rather than 1984 (Tyrcha, 2020), as it was the earliest year for which data was available. Another change from the methodology of Tyrcha (2020) is our choice to use sale prices of condominiums as our output variable, rather than one

and two-family homes, as 66.6% of total dwellings in Stockholm County are either rented or owner-occupied apartments, compared to 25.7% owned or rented one & two-family homes.

4. Data

4.1. Data Sources

The data is organized on a municipal level as a panel dataset. Data for all the variables is collated from 2006-2021, for 25 of the 26 total municipalities in the Stockholm County region. The excluded municipality is Nykvarn, as it was formed from the splitting of Södertälje municipality in 1999 and hence data is not available for the entire time frame of the study. The data for all variables has been obtained on request from SCB (*Statistiska centralbyrån*), BRÅ (*Brottsförebyggande Rådet*) & *Svensk Mäklarstatistik* (2024). Population data for the base-year instrumental variable is from 1980, the first year for which appropriate data on foreign-born persons is available on a municipal level. Descriptive statistics for the dataset are available in section (10.1) in the appendix.

4.2. Independent Variable

The independent variable ($\frac{\Delta FB_{it}}{Pop_{i,t-1}}$) is the change in the number of residing foreign-born persons (FB) in a municipality (i) during year (t), divided by the total population (Pop) of each municipality (i) in the previous year ($t-1$). This variable accounts for all foreign-born persons moving into a municipality and does not disaggregate or categorize these persons into country of origin or migration type as past literature has done. Using the change (Δ) in foreign-born per municipality rather than the number of foreign-born residents per municipality makes the independent variable less sensitive to citizenship attainment or other types of recategorization of residents and removes the threat of natural shocks and confounding factors. The independent

variable is constructed of data obtained by the Swedish Statistics Agency (*Statistiska Centralbyrån*), also referred to as SCB.

4.3. Dependent Variable

The dependent variable (γ_{it}) is change in logged average sale prices of condominiums each year for each municipality. The data comes from Svensk Mäklarstatistik and is collected from brokerage firm business systems and aggregated by SCB in real time. Average sale price is recorded as the amount paid upon sale of the condominium, rather than the average price in SEK/sqm as utilized by previous studies, as this provides a more representative and relevant picture of the value of condominiums on the market by considering building quality, construction age, and neighbourhood effects.

4.4. Control Variables

Table 1 below contains a summary of all the variables used in the study. Swedish Born Population is the change of the share of Swedish born citizens residing in a municipality, controlling for internal migration for each municipality. Age is the average age in the municipality. Income is the logged average of income in the municipality. Crime Rate is the total number of reported crimes per 1,000 people in the municipality. Education Level is the percentage of population of the municipality with a bachelor's degree or higher. Unemployment Rate is the percentage of unemployed individuals in the working population in the municipality. Housing level is the annual number of new constructions of single or multi-dwelling buildings per 1,000 people in the municipality. Other studies in Sweden have included weather as a control variable, however we have chosen to omit this given the relative uniformity across weather trends within the Stockholm County.

Municipal Level Controls
Average Age
Change in Share of Swedish Born
Logged Average Income (kr)
Education Levels (%)
Unemployment Rate (%)
Crime Rate (per 1000 inhabitants)
Housing Levels (per 1000 inhabitants)

Table 1: Contains the controls used in OLS 2 and the IV analysis.

Age is included as a control as the highest percentage of individuals residing in owner-occupied housing are between the ages of 35-44 years old (69% as of 2015), followed by 16–24-year-olds at 56.5% (Christophers & O’Sullivan, 2018), indicating an effect of age on home ownership and participation in the housing market. Income is a foundational control, as individuals with higher average income levels are more likely (and able) to purchase property, therefore affecting demand and aggregate sale price levels. A recent study of Swedish property ownership also showed, however, that purchasing property can lead to significant accumulation of wealth (Sodini et al., 2023), creating a cross-sectional effect on municipalities, where municipalities with higher housing demand and ownership rates also have higher aggregate income levels and vice versa. Crime Rate is the reported crimes in a municipality, and a crucial control as studies have shown that an increase in the local crime rate generally devalues properties in the area (Braakmann, 2017; Buonanno et al., 2012). More specifically, a study of apartments in Stockholm has shown that crime hotspots can cause prices to change by SEK66,000 for every 1km the apartment is moved away from the location of the crime (Ceccato & Wilhelmsson, 2019).

The control for education level is based on the model of Sà (2015) and is especially important to the Swedish context – a recent study showed that education levels are highly significant drivers of housing price increase across all 290 municipalities in Sweden (Jugovac, 2019). The unemployment rate control is also based on the model of Sà (2015) and can affect

housing prices through changes in demand based on disposable income levels. Outside the Swedish context the effects are clear; a recent study concluded that a three-percentage-point increase in the unemployment rate lowers house prices by 10.74% (Gan et al., 2018). Within the welfare state context of Swedish unemployment effects, the nature of possible effects is less clear but significant enough to warrant inclusion. The final micro-level control is Housing levels, accounting for the new construction of buildings and providing insight into the supply side of pricing. Studies of the development of Stockholm housing have shown that housing prices have inflated significantly from what would be indicated by supply levels, indicating that the demand-side exerts significantly more influence on price-setting (Herold, 2021), and though construction has been relatively static over this paper's study period, there have been shocks in construction levels that make controlling for housing supply necessary.

5. Empirical Strategy

5.1. Ordinary Least Squared Regressions

5.1.1. OLS 1

The following model estimates the effect of a change in the share of foreign-born population on the average sale price of condominiums without controls and fixed effects.

$$\gamma_{it} = \beta_0 + \beta_1 \frac{\Delta FB_{it}}{Pop_{i,t-1}} + u_{it}$$

Expression 1: OLS 1

β_0 is the intercept coefficient, and β_1 is the coefficient expressing the independent variables effect on the dependent variable. u_{it} is the error term expressed for variation in the regression which cannot be explained by included variables or controls. In this case, β_1 can be interpreted as the percentage change in average sale price of condominiums given a 1% increase in the share of foreign-born population.

5.1.2. OLS 2

OLS 2 utilizes the same basic construction as *OLS 1*, with the addition of eleven control variables for each municipality over the time period. The controls are expressed by $\beta_x X_{it}$, and were described in section (4.4). Additionally, the model includes fixed effects for each year and municipality in the dataset. δ_t expresses the year fixed effect, isolating and controlling for randomness within each one-year period. δ_i controls for each independent municipality's randomness and individual characteristics. The fixed effect model assumes that the effects of unmeasured variables can be captured by time-invariant municipal-specific fixed effects.

$$\gamma_{it} = \beta_0 + \beta_1 \frac{\Delta FB_{it}}{Pop_{i,t-1}} + \beta_x X_{it} + \delta_i + \delta_t + u_{it}$$

Expression 2: OLS 2

5.2. Instrumental Variable Regression

The OLS regressions presented above control for a variety of economic and social factors at both a micro and macro level but are unable to account for a fundamental requirement of the study – the randomness of immigration patterns. Migrants have free will to choose their location of residence and will base this choice on certain factors thereby removing randomness. An example of this choice factor is migrants deciding to move into a municipality due to lower house prices which often imply a lower cost of living. The opposite could also be true – migrants deciding to move into a municipality due to higher house prices, and therefore a perceived higher standard of living. To restore the randomness of treatment, the basis upon which this choice is made must be controlled for with an instrumental variable, as is standard in the literature.

The instrumental variable (IV) used in this study is a shift-share instrument, emulating the formative research of Card (2001) and Saiz (2007). The IV expresses the share of foreign-born residents each municipality has during the year 1980 ($\frac{FB_{i,1980}}{Pop_{i,1980}}$), times the yearly change

of foreign-born people residing in each municipality (ΔFB_t). Finally, the whole expression is divided by the municipality's total population the previous year (Pop_{it-1}).

$$\frac{\sum \left(\frac{FB_{i,1980}}{Pop_{i,1980}} \right) \times \Delta FB_t}{Pop_{it-1}}$$

Expression 3: Instrumental Variable Expression

This expression, also known as a shift-share instrument, the network effect, ethnic enclave, or supply-push instrument, essentially acts as a predictor for current migration flows into municipalities based on historic migration flows. The ethnic enclave can be described as a pull-effect for migration where immigrants are more likely to settle in areas that have higher immigrant populations, especially higher populations of immigrants from the same birth country as those moving in. This phenomenon is especially relevant to Sweden, as Åslund (2005) found that the two most prominent deciding factors of immigrant mobility choices are presence of people from one's birth country, and high overall immigrant populations – in line with previous results from the US.

Given that the ethnic enclave assumption holds for the Swedish context, the other key foundation to the instrumental variable's validity is the exclusion restriction. The exclusion restriction demands in this case that migration in the base year, 1980, is not driven by external factors mutual to drivers of house prices in the timeframe of the study. This is verifiable as the previously explored tightness of housing supply creates a market environment without the possibility of dynamic adjustment effects; changes in migration patterns have long-lasting effects on the housing market as in many regions in Stockholm there is no possibility to construct high levels of new housing. The migration levels in 1980 are therefore only able to affect current housing prices through their predictive influence on current migration trends.

The instrumental variable regression is done in two separate stages. The first stage of the instrumental variable regression is depicted in Expression 4 below. The instrumental variable effect is described through $\alpha_1 z$.

$$\underbrace{x_{1,it}}_{S1:Outcome} = \alpha_0 + \underbrace{\alpha_1 z}_{IV} + \underbrace{\alpha_x x_{it}}_{Controls} + \underbrace{\delta_i + \delta_t}_{Fixed\ Effects} + v_{it}$$

Expression 4: IV 1st Stage

The second stage of the regression, depicted below in Expression 5, includes the effect of the estimated outcome variable in stage 1, $\beta_1 \hat{x}_{1,it}$, regressed on the first stage outcome variable, the change in logged apartment prices γ_{it} .

$$\gamma_{it} = \beta_0 + \underbrace{\beta_1 \hat{x}_{1,it}}_{S1:Outcome} + \underbrace{\beta_x x_{it}}_{Controls} + \underbrace{\delta_i + \delta_t}_{Fixed\ Effects} + u_{it}$$

Expression 5: IV 2nd Stage

The outcome of stage 2 will then describe the indirect effect of the instrument on the dependent variable in question, whilst mitigating external bias by controlling for the same variables, and fixed effects, in both stages.

6. Results

Below the results from the OLS and the IV regressions are presented. The relevant coefficients are presented below, and the full regression outputs are available in the appendix.

6.1. OLS Results

Comparison between OLS Estimations		
	Dependent variable:	
	Change in Logged Average Apartment Prices	
	OLS (1)	OLS Controls (2)
Change in Share Foreign Born	-0.759 (0.945)	-1.502 (1.917)
Constant	0.084*** (0.009)	
Fixed Effect	No	Yes
Controls	No	Yes
Observations	400	400
R ²	0.002	0.048

Note: Standard errors are presented in brackets below each coefficient. Regressions include year- and municipal fixed effects. The micro-level controls used are described in Table 1.

*p<0.1; **p<0.05; ***p<0.01

Table 2: Contains the results from regressions based on OLS 1 and 2 in section (5.1.1) and (5.1.2)

Table 2 presents the results for OLS 1 and 2. Column 1 presents the OLS 1 results, which was run based on a linear model without fixed effect and controls as mentioned in section (5.1.1). The values are to be interpreted as the percentage change in average sale price of condominiums given a 1% increase in the share of foreign-born population, in all municipalities in Stockholm County. β_1^{OLS1} is insignificant and thus fails to explain the variation in logged average apartment prices. The intercept, β_0^{OLS1} , can be interpreted as the initial starting effect of the share of foreign-born population on the average sale price of condominiums, which in this case is 0.084% and highly significant to the 99% level. Column

2 presents OLS 2 with fixed effect and controls as mentioned in section (5.1.2). The $\beta_1^{OLS 2}$ is again insignificant and therefore cannot be estimated to affect the variation in logged average apartment prices. The fixed effects model considers unobserved changes over time in each independent municipality, isolating the effects of each municipality over time, in the dataset.

6.2. Instrumental Variable Results

Instrumental Variable First and Second Stage		
	Dependent variable:	
	Change in Share Foreign Born	Change in Logged Apartment Prices
	Instrumental Variable	
	First Stage $X \sim Z$ (1)	Second Stage $Y \sim \hat{X}$ (2)
Instrumental Variable (z)	3.180*** (0.283)	
Predicted x_1 from first stage ($\hat{x}_1$)		0.096 (1.365)
Fixed Effect	Yes	Yes
Controls	Yes	Yes
Observations	400	400
R ²	0.542	0.044
IV F-statistic	126.3	
<i>Note: Standard errors are presented in brackets below each coefficient. Regressions include year- and municipal fixed effects. The micro-level controls used are described in Table 1. The IV F-statistic for the first stage is presented at a 126.3 level.</i>		
*p<0.1; **p<0.05; ***p<0.01		

Table 3: Contains results from regressions based on IV regressions described in section (5.2)

The output of the first stage of the instrumental variable regression can be observed in Table 3, column 1, where $\beta_1^{F1: IV}$ is at a 3.180% level, significant at 99%. This implies a 1% increase in the instrument (a 1% increase in the predetermined housing behavior of immigrants) predicts a 3.180% increase of foreign-born residents per municipality. The instrumental variable thus estimates past foreign-born populations positively and significantly affect current immigration trends to those municipalities. The first-stage IV f-statistic is 126.3, indicating that it is a strong

instrument. Column 2 presents the second stage of the IV regression, where $\beta_1^{F2:IV}$ (i.e. a 1% increase in foreign-born residents) is insignificant and fails to provide evidence of a causal relationship between changes in foreign-born population and average sale prices of apartments. The IV exclusion restriction is justified by looking at the reduced effect stage ($\hat{\delta}$), where the IV variable (z) only affects the dependent variable (y) through the endogenous variable (x). As seen in output (10.3), column (3) in appendix, the instrumental variable is insignificant in explaining the dependent variable estimation and thus validates the exclusion restriction.

7. Discussion

To summarise, the OLS regressions failed to produce significant results even after the addition of fixed effects, and no comment can therefore be made about the effect or bias within the OLS results. An instrumental variable analysis was employed to mitigate any endogeneity issues and also failed to provide evidence of a significant causal relationship. This result therefore can't verify the hypothesis previously described. The first stage of the IV regression, however, is significant at a 99% level, implying that the ethnic enclave assumption is valid to the Stockholm County region, and that the base year of 1980 utilised in the construction of the instrument is early enough to ensure that the instrument validates the exclusion restriction.

The insignificance of results could be due to a variety of factors. The presence of reverse causality in the OLS regressions is likely, as prices of housing also can influence the movement decisions of foreign-born populations – individuals may choose to move into more expensive neighbourhoods due to conceptions of safety or success, or cheaper neighbourhoods due to affordability concerns. There also could be omitted variables skewing the estimation outcomes, hence the introduction of a fixed effects estimation, however the coefficient results for both models remained insignificant, indicating that there is no clear OLS or IV relationship between the increase in the number of foreign-born residents in a municipality, and the average

condominium prices in the municipality. Given the nuanced policy effects unique to Stockholm immigration patterns, external validity may pose challenges particularly regarding the generalizability of the findings to broader geographical contexts. While our analysis is rooted in the distinct socioeconomic and geodemographic landscape of Stockholm, the methodology of this paper is consistent with previous studies.

Another possible cause of insignificance in the regressions is the relatively small size of the dataset used. The choice to only examine Stockholm County limited the number of data entries, as did the decision to specify apartments rather than all housing types. Potential extensions of this study could include one-and-two-dwelling homes, improving the validity for areas of Stockholm that are higher in concentration of houses as opposed to apartments, and the study could also be extrapolated to other urban migration centres such as Göteborg and Malmö. Another omission from the study is an inclusion of the countries of origin of migrants. Studies such as Tyrcha (2020) and Sanchis-Guarner (2023) examined country-of-origin data for migrants as well, painting a fuller picture and distinguishing between labour migration, refugee or asylum migration, and family reunification migration in order to disaggregate results. The effects of labour migration on the housing market are distinct from those of refugee migration, but the unavailability of public data on a municipal level of migration types of countries of origin made that disaggregation impossible. The extension of this study to include migration types would be extremely insightful if the data is ever made available.

The use of a shift-share instrumental variable, though standard in the literature, has recently come under investigation with regard to its effectiveness. A recent study showed that shift-share instruments only fulfil the exclusion restriction if the share selected is valid. This means that the share selection must be consistent with economic intuition, and the lag time must be sufficient (Apfel, 2024). The base year utilised in this paper is 1980, 26 years before the start of the study (sufficient lag time) and there are no discrepancies with migration flows

that contradict economic intuition. Another criticism of Jaeger et al. (2020) is that if the spatial distribution of immigrant inflows is stable over time, the instrument is likely to be correlated with ongoing responses to previous supply shocks. In the Swedish context, the distribution of immigrant inflows has varied widely over the last 20 years, peaking in 2015 but falling significantly in 2020, thus overcoming this potential issue as well.

The results from the instrumental variable analysis are also insignificant, in contrast to past studies of Sweden and other European countries. Though there is no evidence to support a causal link between immigration and apartment prices, this is still an important result. Recent debate and policy measures regarding the housing market have been concerned with a shortage of housing in Stockholm County's metropolitan areas, with both average rent levels and waiting times for rent-controlled apartments higher than ever, often perceived to be as a result of a demand surge due to increased immigration levels. This is especially true for suburban municipalities with higher concentrations of apartments such as Solna, Sundbyberg and Stockholm, which also have higher immigrant populations. The results of this paper suggest that this perception is incorrect – the surge in pricing is more likely driven by increases in demand due to internal migration trends instead (as previously exemplified in Sá, 2015), or even factors unrelated to migration entirely. The results also imply that Sweden's refugee placement policy is successful in that it does not place an undue strain on the housing market regardless of recent relaxations allowing refugees to self-select their housing.

Finally, native relocation effects are crucial to interpreting the effects of the study. Tyrcha (2020) found that a relocation effect of higher-income native residents from urban centres to suburban areas applies pressure to house prices in suburban areas, and internal migration from rural areas to urban areas in search of job opportunities can often act as a demand driver for prices as well. In this study it is possible that native relocation effects especially within the Stockholm County are why the results are insignificant, and a beneficial

future extension to this study would be to examine, using the methodology of Sá (2015), the effects of internal migration trends on the housing market. Beyond this it is difficult to pin down explanations of the rapid increases in house prices onto one exact reason, rather it is likely a combination of economic factors and policy decisions regarding space and construction.

8. Conclusion

Stockholm has been engulfed in a housing crisis for nearly a decade now, and an investigation of the driving factors behind housing prices and the general unaffordability and inaccessibility of housing in urban areas is rapidly increasing in importance. The results of this study fail to find a statistically significant causal link between external migration and housing prices in Stockholm County, which is a unique finding in the literature. Other studies having considered all 290 municipalities in Sweden have found statistically significant effects, however this paper provides cause for a differentiation of policy between rural and urban areas, as there are determinedly different outcomes based on regionality and geodemographics.

This is a gradually expanding area of literature across Europe and must be treated with concern. Studies of Spain, Germany, and Switzerland within Europe, and Australia, Canada, and the U.S.A. outside, have all consistently found positive and significant results across a variety of time periods and regionalities. This paper contributes to the literature in the context of Europe and more specifically Sweden's migration and housing policy and is especially important given the difficulty with which Swedish policy addresses immigration concerns in the current political dynamic. Some future policy areas of concern identified in this paper are unnatural and thus far unexplained inflation in house prices – and hence an artificially propped up housing market, the need for efficient and streamlined increases in housing supply especially in urban areas, a shift from the reliance on *Millions Program* housing including more

incentives for planning and building, and improved faith in the refugee placement program – allowing more freedom to asylum seekers and refugees to pick their own housing as ethnic enclaves, though present within Stockholm’s ethnographic makeup, do not contribute to changes in house prices. This paper provides a small step in what must be a large-scale understanding of the effects of immigration on the Swedish economy in order to better improve the lives of all residents of Sweden.

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10. Appendix

10.1. Descriptive Statistics

Descriptive Statistics						
	N	Mean	Median	SD	Min	Max
Change in Logged Apartment Prices	400	0.080	0.080	0.100	-0.250	0.600
Change in Share Foreign Born	400	0.010	0.010	0.010	0	0.030
Change in Share Swedish Born	400	0.010	0.010	0.010	-0.010	0.030
Logged Average Income	400	12.740	12.730	0.120	12.460	13.070
Inflation Levels (%)	400	0.010	0.010	0.010	0	0.030
Education Levels (%)	400	0.170	0.150	0.060	0.080	0.330
Unemployment Rate (%)	400	0.200	0.200	0.040	0.140	0.310
Housing Levels (per 1000 inhabitants)	400	0.430	0.420	0.040	0.360	0.570
Crime Rate (per 1000 inhabitants)	400	12.300	11.970	3.640	4.630	24.020
Annual Change GDP	400	2.050	2.320	2.760	-4.340	6.150
Annual Change Government Debt	400	-0.020	-0.030	0.070	-0.110	0.140
Annual Change Household Debt Levels	400	0.020	0.010	0.020	-0.010	0.060
Instrumental Variable	400	0.960	0.610	0.860	-0.010	3.580

10.2. Full OLS Regression Output

Comparison between OLS Estimations		
	<i>Dependent variable:</i>	
	Change in Logged Average Apartment Prices	
	<i>OLS</i>	<i>OLS Controls</i>
	(1)	(2)
Change in Share Foreign Born	-0.759 (0.945)	-1.502 (1.917)
Change in Share Swedish Born		-0.185 (0.992)
Logged Average Income		0.144 (0.260)
Average Age		-0.003 (0.013)
Crime Rate		0.00001* (0.00001)
Education Levels		-1.552 (1.142)
Unemployment Rate		-0.056 (0.370)
Housing Levels		-0.0003 (0.001)
Constant	0.084*** (0.009)	
Fixed Effect	No	Yes
Controls	No	Yes
Observations	400	400
R ²	0.002	0.048

Note: Standard errors are presented in brackets below each coefficient. Regressions include year- and municipal fixed effects. The micro-level controls used are described in Table 1.

*p<0.1; **p<0.05; ***p<0.01

10.3. Full Instrumental Variable Output – Including Reduced Form Stage

Instrumental Variable Stages			
	Regression Stages		
	First Stage	Second Stage	Reduced Form
	X~Z (1)	Y~ $\hat{X}$ (2)	Y~Z (3)
Instrumental Variable (z)	3.180*** (0.283)		-2.727 (7.178)
Predicted x_1 from first stage ($\hat{x}_1$)		0.096 (1.365)	
Change in Share Swedish Born	0.228*** (0.028)	-0.438 (0.758)	-0.361 (0.729)
Logged Average Income	0.010*** (0.003)	-0.161* (0.086)	-0.169** (0.083)
Average Age	-0.0001 (0.0002)	-0.002 (0.004)	-0.001 (0.003)
Crime Rate	0.00000*** (0.00000)	0.00000 (0.00000)	0.00000 (0.00000)
Education Levels	-0.013** (0.006)	-0.017 (0.157)	-0.006 (0.148)
Unemployment Rate	0.026*** (0.007)	-0.418** (0.192)	-0.412** (0.195)
Housing Levels	-0.00000 (0.00001)	-0.0002 (0.0002)	-0.0002 (0.0002)
Fixed Effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	400	400	400
R ²	0.542	0.049	0.044
IV F-statistic	126.3		

Note: Standard errors are presented in brackets below each coefficient.

Regressions include year- and municipal fixed effects. The micro-level controls used are described in Table 1. The IV F-statistic for the first stage is presented at a 126.3 level.

*p<0.1; **p<0.05; ***p<0.01