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Immigration and Housing Prices in Swedish Counties

Bachelor Thesis

by

Arian Fakhravar & Viktor Fredriksson

submitted to supervisor

Petra Thiemann

Lund, 190404

Abstract

Immigration and housing prices are two topics that have been subject to vivid discussion for politicians and people in Sweden in the last decade. The country has at the same time experienced a sharp increase in both immigration and housing prices. Policies have been implemented by the Swedish government to obstruct the rapid development in both areas. Although these phenomena continues to affect and engage a lot of people, the literature on the relation between the two is scarce. In this paper, we estimate the relation between immigration and housing prices with a fixed-effects model using a panel data set of all 21 counties in Sweden in the period 2000-2015. To account for endogeneity issues in our main explanatory variable, we adopt a "shift-share" instrumental variable strategy based on historical settlement patterns. The OLS results suggest that an increase in immigration of 1% relative to the total population in a county is associated with an increase in housing prices between 2,41-3,82%. However, the results are insignificant. When testing for relevance, our instrument turns out to be weak. Hence, the IV estimator is unreliable and the results are inconclusive.

Keywords

immigration, housing prices, Sweden, shift-share

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1. Introduction

During the last 90 years, immigration has almost exclusively outnumbered emigration in Sweden on annual basis (Migrationsverket, 2019a). The nature of immigration has changed during the years, including both labour immigration and refugee inflows due to different uprisings around the world (Schierup & Ålund, 1991; Knocke, 2000). The political attitudes toward immigration have generally reflected economic conditions: liberal in prosperous periods and restrictive in economic slowdowns (Rosenberg, 1995). Sweden has lately earned a reputation for its positive attitude toward immigration (Schierup & Ålund, 2011), and was one of the first countries to adopt immigration integration policies (Wiesbrock, 2011). Between 2012 and 2018, due to the Syrian war and the European refugee crisis, Sweden registered one asylum request for every 25 inhabitants, a record in Europe during this period (The Local, 2018). In a famous speech in the summer of 2014, the former Swedish prime minister Fredrik Reinfeldt called upon the country's citizens to show tolerance and patience for refugees fleeing wars (The Local, 2014). However, a turnaround followed. In 2016, Swedish asylum laws went from being the most generous in EU to the minimum EU level (Migrationsverket, 2019a).

Sweden has also experienced a soar in housing prices since the turn of the millenium (Svensk Mäklarstatistik). According to a global real estate bubble index conducted by the Swiss financial service company UBS, Stockholm faces a considerable risk of a housing bubble, second only to Toronto in terms of risk (UBS, 2017). Although both immigration and the housing market are two widely debated topics in Sweden currently, they are rarely discussed jointly. Many researchers have studied the impact of immigration on wages (Borjas, 2003; Ottoviani & Peri, 2012), and there is a vast strand of literature attempting to explain rising housing prices (Glaeser et al., 2005; Himmelberg et al., 2005; Goodhart et al., 2008).

The rapid increase in housing prices and immigrations levels urges for a deeper understanding of the relation between these two imperative phenomena.

It is a particularly interesting and important area of research since it addresses appearances that will continue to play a key role in many people's lives. The Swedish population surpassed ten million in 2017, of which 18 percent was born in a foreign country. According to Statistics Sweden (SCB), the same numbers will be almost 13 million in 2060, of which 22 percent is predicted to be born in a foreign country (SCB, 2017a). Since research in this field in Sweden is still in its early stages, it is of great relevance to ask the fundamental question: can housing prices be explained by immigration, and if so, to what extent. More precise, in this paper we aim to study the effect of immigration on housing prices in Swedish counties 2000-2015.

The paper is organized in the following way. The remainder of the first section defines a few recurring and potentially vague terms that are important for the study. Section 2 frames a more detailed background regarding immigration and housing developments in Sweden, as well as a brief literature review. Section 3 presents the methodology, where we declare our empirical model and instrumental variable strategy. In Section 4, we describe and motivate the databases and variables included in the analysis. Descriptive statistics are also included here. Section 5 presents the results. Section 6 and 7 are conclusion and discussion, respectively.

1.1 Definitions

1.1.1 Tenant-owned apartment

According to the Swedish National Board of Housing, Building and Planning (Boverket), tenant-ownership implies that you are a member of a housing association. The association owns the real estate and every member has their own apartment. Thus, you do not literally own your apartment. However, a tenant-owned apartment can be bought and sold on the housing market as long as the buyer is approved by the association (Boverket, 2015). Furthermore, SCB uses Swedish property data when compiling statistics on form of residence. Therefore, tenant-owned apartments include sublessees as long as it is their registered address (SCB, 2017b).

1.1.2 Immigration

The data on immigration in this paper is based on the definitions by SCB (n.d.). They define the Swedish population as individuals who are registered at the Swedish authorities and intend to stay in Sweden for minimum a year, regardless of citizenship. Foreign-born persons is defined as the part of the Swedish population who is born in a foreign country. However, there are three notes worth mentioning regarding the SCB definitions. Firstly, asylum seekers are not included in the population due to the fact that they are not registered. Secondly, children of asylum seekers who are born in a foreign country are registered as natives if their parents get residence permit. Thirdly, the term foreign background is commonly used in Swedish labour research and differs from the term foreign-born. They should not be regarded as interchangeable. To summarize, immigration in this thesis refers to the change in individuals born in a foreign country across years, excluding asylum seekers and children of former asylum seekers.

2. Background

2.1 The Swedish Housing Market

Apart from the immigration debate which has been a dominant discussion for politicians for some time, the development in housing prices have been a vivid discussion and concern for financial institutes and the central bank of Sweden alike. From year 2000 to 2015 the average square meter price of tenant-owned apartments has risen from 8314 kr to 34 655 kr as Figure 1 illustrates, with a similar development in one- or two-dwelling buildings (Svensk Mäklarstatistik).

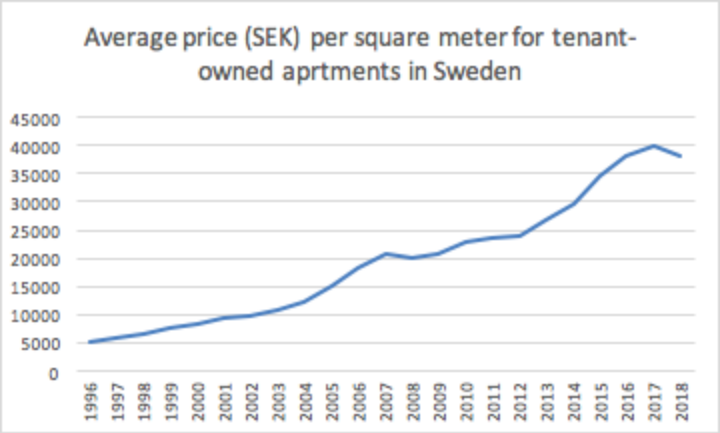

Figure 1: (Source: Svensk Mäklarstatistik)

Simultaneously, household debt has been rising faster than household disposable income for a long time, almost doubled in the last twenty years (Sveriges Riksbank, 2018). The country has in the same time experienced a progressive lowering of the interest rate, which reached a historical low of -0,5% in the spring of 2016, contributing to the price development and fear of a housing bubble (Sveriges Riksbank, 2011). The so-called Swedish November Revolution in 1985, an extensive deregulation of the Swedish credit market where the Swedish Central Bank no longer could hinder the banks from lending credit (Sveriges Riksbank, n.d.), was followed by a crash in housing prices between 1990-1994 (Sveriges Riksbank, n.d.). In 1991, the state-provided tax deduction in interest expenditures was reduced from 50% to 30% (Creutzer, 2007).

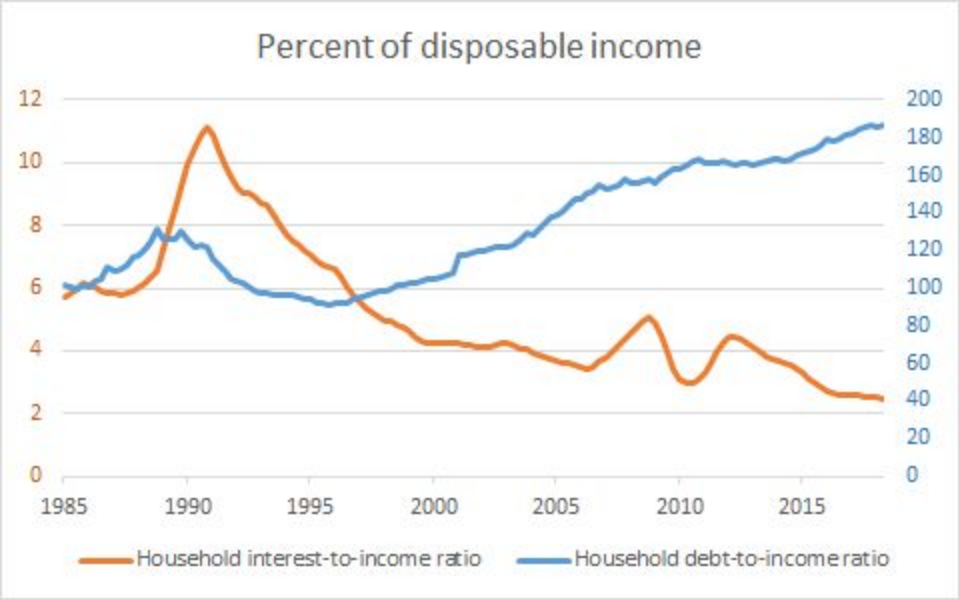

Figure 2: (Sources: SCB and Sveriges Riksbank)

In order to get control of the prevalent large household debt, regulatory actions have been taken in 2016 and 2018. The Swedish Financial Supervisory Authority (FI) have introduced a mortgage cap, raised the risk weights on mortgages, and applied an amortization requirement in 2016. This requirement was extended in 2018, attempting to further strengthen the resilience of households (Finansinspektionen, 2018a). The first law introduced forced amortization for credit takers who failed to fulfill certain criterias regarding the debt-to-equity ratio, and restrictions in how often an ownership residence may be valuated in order to affect this ratio and thereby the terms of the interest and amortization. The second law further forced amortization upon individuals or households who failed to fulfill a criteria for income-to-debt ratio. In both cases the rate of amortization was increased by a percentage of the debt taken, effectively meaning that a household could be obliged to pay a maximum of 3% in yearly amortization alone, if neither one of the above mentioned criterias were met (Finansinspektionen, 2018b). Furthermore, the state-provided deduction of interest expenditures is once again debated amongst the established political parties, with six out of eight parties supporting the progressive and in some cases partial removal of the deduction (Carlström, 2018).

Åkesson (2018) expressed concerns that the recent development, including credit expansion and financial regulations, reminisce the late 1980s that preceded the house crash in the early 1990s. And as noted by Sveriges Riksbank (2011), real estate-related crises are generally preceded by periods of increasing house prices and increasing household debt-to-income ratio.

Some important notes about the composition of the Swedish housing market have to be made as well. About a third of the Swedish population live in rented apartments (SCB, 2018). The much debated Swedish system for rent setting was introduced in 1968 and is quite unique. The "utility value system" entails that rents should be determined by the apartment's quality and according to comparable apartments when taking local amenities in to consideration, and is set by Hyresnämnden (Boverket, 2014). This means that rents are neither fully determined by the state, nor by market forces alone. The main purpose is to prevent unreasonable rents and to protect the tenant's security of tenure (Boverket, 2014).

In later years a severe housing shortage has been reported in 243 out of 290 Swedish municipalities, with students and immigrants being particularly affected (Hyresgästföreningen, 2018). In order to receive a first-hand contract in a rental apartment one must register at the local broker of rental apartments to enter a housing queue. Waiting times for apartments in Gothenburg and Stockholm are on average 3-7 and 8-12 years respectively, with extreme cases being above 20 years for Stockholm (Boplats, n.d; Bostadsförmedlingen, n.d.).

2.2. Immigration

Sweden has a long history of immigration. However, it was not until the 1930s that Sweden became an immigration country rather than an emigration country. Except for a few years in the 1970s, immigration has been larger the emigration annually since then (Migrationsverket, 2019a). A substantial part of historical immigration to Sweden have been motivated by major political changes in the world, such as the Hungarian uprising, the Chilean coup d'etat, the Iranian Islamic revolution, the Polish military coup, or the Eritrean War of Liberation (Schierup & Ålund, 1991).

After 1945, however, the inflows were constituted of labour immigration from Scandinavia, Italy, Greece, Yugoslavia, Turkey and other countries (Migrationsverket, 2019a). As Knocke (2000) points out, this was due to an initiative from the Social-Democratic government in 1946, in agreement with the employers' association (SAF) and the Confederation of Trade Unions (LO), as a way to handle the country's prevalent labour shortfall. Ekberg (1999) claims that there is strong evidence that the native Swedish population experienced additional incomes via public sector as a result of immigration during the postwar period up to about 1980. In 1972, after a combination of economic crisis, rising unemployment and increasing resistance from Swedish trade unions, a regulated immigration policy was implemented with reference to a strained labour market (Knocke, 2000; Schierup & Ålund, 1991). As a result, immigration decreased significantly.

Immigration in the 1980s was to a large extent marked by asylum seekers. In 1985, the Swedish Immigration Board (nowadays the Swedish Migration Agency) took over the responsibility from the labour market authorities (Migrationsverket, 2019a). Asylum seekers from Iran, Iraq, Lebanon, Syria, Turkey and Eritrea increased in many Western Europe countries, and in the late 1980s asylum seekers from Somalia, Kosovo and former Eastern Bloc countries increased in numbers. According to Rosenberg (1995), the word refugee became almost synonymous with immigration during this period. Knocke (2000) states that ethnic minorities were depicted and perceived as a resource at this point in time due to labour shortage and a growing economy. However, Schierup and Ålund (1991) claims that the positive attitude towards migration reversed as the labour market deteriorated, now describing immigration in negative terms.

The breakdown of Yugoslavia in the 1990s forced many people from the Balkan states to find new homes. More than 100 000 people, mainly Bosnians, did so in Sweden (Migrationsverket, 2019a). In 1995, Sweden joined the European Union, and in 2001 Sweden entered the Schengen Agreement which opened the borders between the member states. Consequently, labour immigration increased significantly. (Migrationsverket, 2019a). The last decade, the number of

non-EU born immigrants has increased as well. The war in Syria that broke out in 2011, and later the refugee crisis in 2015, have had a major impact on the inflows to Sweden. At the end of the year, 162,877 persons had applied for asylum, whereof 51,338 from Syria (Migrationsverket, 2019a). In late 2015 and early 2016, Sweden introduced temporary border controls and temporary identity checks aiming to limit asylum immigration. In July 2016, a new temporary law was introduced to restrict the possibilities for asylum seekers to receive a permanent residence permit in Sweden. The law remains valid until July 2019 (Migrationsverket, 2019a).

Asylum seekers can either choose to arrange their own accommodation (EBO) or accept temporary accommodation provided by the Swedish Migration Agency (ABO), while their application for asylum are evaluated (Migrationsverket, 2019b).

2.3 Literature Review

The effect of immigration on housing prices is theoretically ambiguous. Intuitively, immigrant inflows would increase the demand for housing and thereby the price. However, this might not be the case in reality. Housing supply conditions and changes in local population must also be considered (Sanchis-Guarner, 2017). As Saiz (2007) points out, immigrant inflows may lead to native outflows from the same area due to competition in the local labor market. Saiz (2007) further claims that immigrants and natives may differ in their motives for settlement choice. While immigrants tend to cluster in certain areas where their ethnic group is more concentrated, natives may be more sensitive to housing prices.

Most studies in the field show a positive relationship between immigration and housing prices. Saiz (2007) investigates American cities between 1983-1997 and finds that an immigration inflow of 1% of the initial metropolitan area population corresponds to an equally large increase in rents and housing prices. Ottoviano and Peri (2007) analyzes the effect of skill-differentiated immigration on both wages and the housing market across U.S states in the period 1990-2005, reporting positive effects on housing values regardless of educational level.

The majority of the research on the topic have been developed in the U.S. However, some analyses have been conducted in Europe as well. For Switzerland, Degen and Fischer (2009) report increasing prices of single family homes by roughly 2,7% due to an immigration inflow equal to 1% of an area's population. Gonzales and Ortega (2013) estimate the effects of immigration on both prices and quantities in regional housing markets in Spain during the period 1998-2008. They find that approximately one third of the housing boom, both in terms of prices and new construction, can be explained by immigration. As Kerr and Kerr (2011) proclaim, "this would suggest enormous effects of immigration on the economy through a very understudied channel" (Kerr & Kerr, 2011, p.22). Contrarily, Sá (2014) finds a negative effect of immigration on house prices in the UK due to native outflows.

Müller (2018) is the first to study the Swedish housing market in relation to immigration. She finds a positive correlation between immigration and prices for one- or two-dwelling buildings on municipality level. However, due to data limitations, her instrumental variable strategy does not produce any significant results. Müller concludes that "...the proposed IV strategy can easily adapted to [sic] when access to a richer data set is available" (2018, p.29).

This study contributes to the existing literature by widening the understanding of the relationship between immigration and housing prices in Sweden, a very understudied market in this aspect. Moreover, by conducting the analysis on county level we have access to a rich data set in the creation of our instrument.

3. Methodology

3.1 The Regression Model

We propose the following empirical model:

$$\Delta ln(P_{i,t}) = \alpha + \beta_1(\frac{\Delta FB_{i,t}}{Pop_{i,t-1}}) + \beta_2 \cdot GRP_{i,t-2} + \beta_3 \cdot PopDensity_{i,t-2} + \beta_4 \cdot EducationRate_{i,t-2} + \beta_5 \cdot CrimeRate_{i,t-2} + \beta_6 \cdot UnemploymentRate_{i,t-2} + \gamma_t + \delta_i + \varepsilon_{i,t} \quad (1)$$

where,

$\Delta ln(P_{i,t})$ is the change in log of square meter price of tenant-owned apartments in county *i* between years *t-1* and *t*. α denotes the constant. Our main explanatory variable, $\frac{\Delta FB_{i,t}}{Pop_{i,t-1}}$, depicts the change in number of foreign-born persons relative to the total population in a given county in the previous year. The coefficient β_1 in front of our main explanatory variable can be interpreted as the change in tenant-owned apartment prices expressed in percent, corresponding to an increase in foreign-born population with 1% in relation to the initial population in the specific county. The control variables included in the model consist of the gross regional product (per capita, TSEK), population density, education rate, crime rate and unemployment rate. For education rate and crime rate, number of post-high school diploma and declared crimes are divided by the initial total population in a given county.

The model includes two dummy variables, γ_t for fixed year effects that capture economic trends such as inflation and population growth, and δ_i for county fixed effects that capture local trends in housing prices. Following Müller (2018), the model is specified with one time lag due to measurements being done in the end of the year. We also run regressions with a second lag to avoid correlation between county specific trends captured in controls and immigration levels.

3.2 Instrumental Variable

There are some recurring endogeneity issues in this area of research. An explanatory variable is said to be endogenous if it is correlated with the error term (Wooldridge, 2010). In applied econometrics, endogeneity usually occurs in three possible scenarios: omitted variables, measurement error or reverse causality. The distinctions between the different sources of

endogeneity are not always clear (Wooldridge, 2010). Our equation may suffer from two of them. Firstly, there is a possibility that omitted variables could affect both immigration inflows and housing prices in the same direction. As Saiz (2007) points out, immigrants could choose to settle in a certain area because of expectations of future economic growth, a factor in itself driving housing prices. This would lead to an overestimation of the impact of immigration, thereby producing upward biased estimates of β_1. Secondly, there is a potential existence of reverse causality between housing prices and immigration. It is possible that immigrants take housing prices into consideration when deciding where to settle, which may cause biased estimates. One can imagine either upward or downward bias depending on immigrants' reason for settlement. Choosing to live in an area with low housing prices in order to spend less money for housing would cause downward bias. On the other hand, choosing to live in an area with expensive housing price due to better job opportunities and economic prosperity would create upward bias.

Jaeger et al. (2018) describe this selection problem as extremely difficult to solve. To overcome the issues of endogeneity, different types of "shift-share" instruments have been widely used in previous immigration literature (Card, 2001; Sá, 2014; Müller, 2018). The most common approach is to focus on spatial correlation and past settlement (Jaeger et al., 2018). This strategy builds on observations that immigrants tend to settle into areas with already high share of immigrants, as noticed by Bartel (1989). The instrument was further developed by Card (2001), who estimated yearly inflows based on historical immigration population from each country of origin in combination with current inflow at the national level. The majority of research in the field of immigration and housing prices, for instance Saiz (2007), Ottoviani and Peri (2007) and Gonzalez and Ortega (2013) utilizes a version of this instrument.

We follow Gonzales and Ortega (2013) and Müller (2018):

$$Z_{i,t} = \sum_{c} \left(\frac{FBc,i,t_0}{FBc,t_0}\right) \cdot FB_{c,\,t} \qquad (2)$$

where,

FB_{c,i,t_0} is the initial number of foreign-born persons in a specific county *i* from a specific country of origin *c* in 1984. This is divided by the total number of foreign-born persons from country *c* in Sweden in 1984. The result within the bracket is then multiplied by the number of foreign-born persons from a specific country of origin *c* for each of the years 2000-2015. Summing over all countries of origin for each of years *t*, we end up with predictions of number of foreign-born per county, and thereby yearly inflows. Our main explanatory variable is then substituted with our instrumental variable.

For an instrumental variable strategy to be valid, two conditions must be fulfilled. Firstly, instrument relevance must be established. That is, the instrumental variable needs to be correlated with the endogenous regressor (Wooldridge, 2010). Secondly, the exclusion restriction must be valid. This means that there can be no direct effect of the instrumental variable on the outcome (Wooldridge, 2010). More specifically, the immigrant's decision to move to Sweden in 1984 can not affect housing prices in our study period. This is not testable, but is plausible to assume in our case. The substantial time gap between our initial year 1984 and our period of interest 2000-2015 decreases the risk that the instrument is correlated with housing prices (Müller, 2018). As previously stated, immigration to Sweden has been largely made up by different waves such as the ethnic cleansing in the Balkans in the 1990s and the ongoing Syrian war (Migrationsverket, 2019a). Due to the different nature of these immigration waves, it is reasonable to assume that they are somewhat independent of each other.

4. Data and Descriptive Statistics

4.1. Databases

Our data is mainly gathered from Statistics Sweden (SCB), the Swedish National Council for Crime Prevention (BRÅ) and Svensk Mäklarstatistik. We use a panel data set of yearly observations for the years 2000-2015 on all of Sweden's 21 counties. The geographical division

and number of counties have changed over time, most recently in the years 1997-1998. Kristianstad county and Malmöhus county merged into Skåne county. Göteborg & Bohuslän, Skaraborg, and Älvsborg county merged into a new county named Västra Götaland county, with exception of the municipalities of Mullsjö and Habo which are now part of Jönköping county. This is important when looking at our initial year for our instrument. To be able to make comparisons over time, we have accounted for this by adding the municipalities' population to Jönköping county in 1984 and subtracting the same municipalities from Skaraborg in the same year. Lastly, Kopparberg county is now named Dalarna county.

Our choice of the years 2000-2015 is primarily motivated by data availability. Due to the recent changes in financial regulations and immigration policies, as described earlier in this paper, it would be interesting to study the period 2000-2018. However, data limitations constrain us from this. Some of the variables we use were first obtained and examined from the turn of the millenium, whereas the county police district division seized to exist in 2015 and was replaced by a single authority, divided into seven regions (BRÅ, 2019). This issue is avoided by using one lag. The dependent variable is provided by Svensk Mäklarstatistik and is defined as the purchase price per square meter in a tenant-owned apartment in a given county.

4.2. Variable Motivation

The dependent variable includes all buildings for permanent residence, excluding small houses with one- or two-dwelling, as well as secondary or seasonal smaller houses. The motivation behind using tenant-owned apartments instead of one- or two-dwelling buildings is twofold. Firstly, according to Forslund and Åslund (2016), the foreign-born population is in comparison to natives in a worse situation regarding the labour market. They have in general higher rates of unemployment, lower participation in the labour force, lower salaries, less stable employments, and work to a higher extent with jobs below their level of education. SCB (2016) reports that single-dwelling buildings and apartments in Sweden are on average 122 square meters and 60 square meters respectively. Considering this, it is reasonable to assume that a single-dwelling building have a higher starting price and is therefore a more excluding form of residence.

Although natives prefer tenant-owned apartments to almost the same extent as the foreign-born population, the same does not hold when considering one- or two-dwelling buildings. Natives prefer this type of accomodation to a significantly higher degree than the foreign-born population, as illustrated in Figure 3. Furthermore, Bråmå et al. (2006) studied the relationship between form of residence and ethnic background for Stockholm and Uppsala, and found that the propensity to live in one- or two-dwelling buildings is more than 80 percent higher for people with Swedish background compared to people with background from countries in Western Asia or Northern Africa.

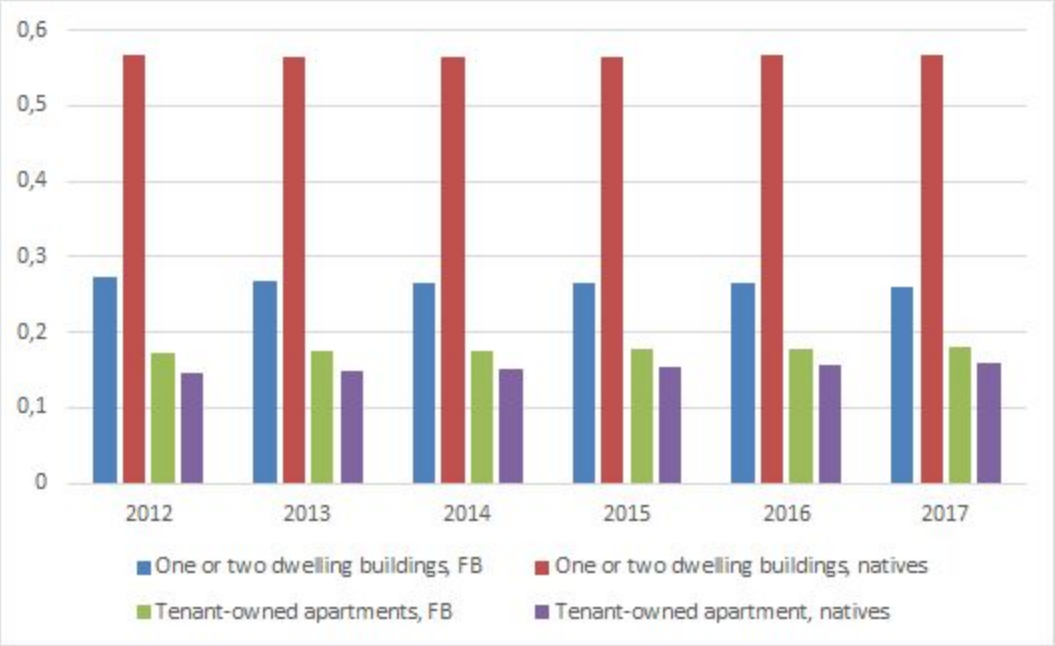

Figure 3: Form of residence, foreign-born persons and natives (Source: SCB).

Secondly, foreign-born people tend to settle in metropolitan areas to a larger extent than natives (Svenska Dagbladet, 2002; SCB, 2008; Migrationsinfo, 2016). As depicted in Figure 4, only 16 percent of the foreign-born population lives outside Sweden's three largest metropolitan city areas. This is interesting for various reasons. In Stockholm, Gothenburg and Malmö, apartments make up for 90, 80, and 82 percent of total housing respectively, of which 54, 36 and 48 percent are tenant-owned (SCB, 2016). And as explained by Figure 5, although rental apartments remain

the most common type of housing for foreign-born immigrants in Stockholm, the trend is downward sloping. The opposite is true for tenant-owned apartments.

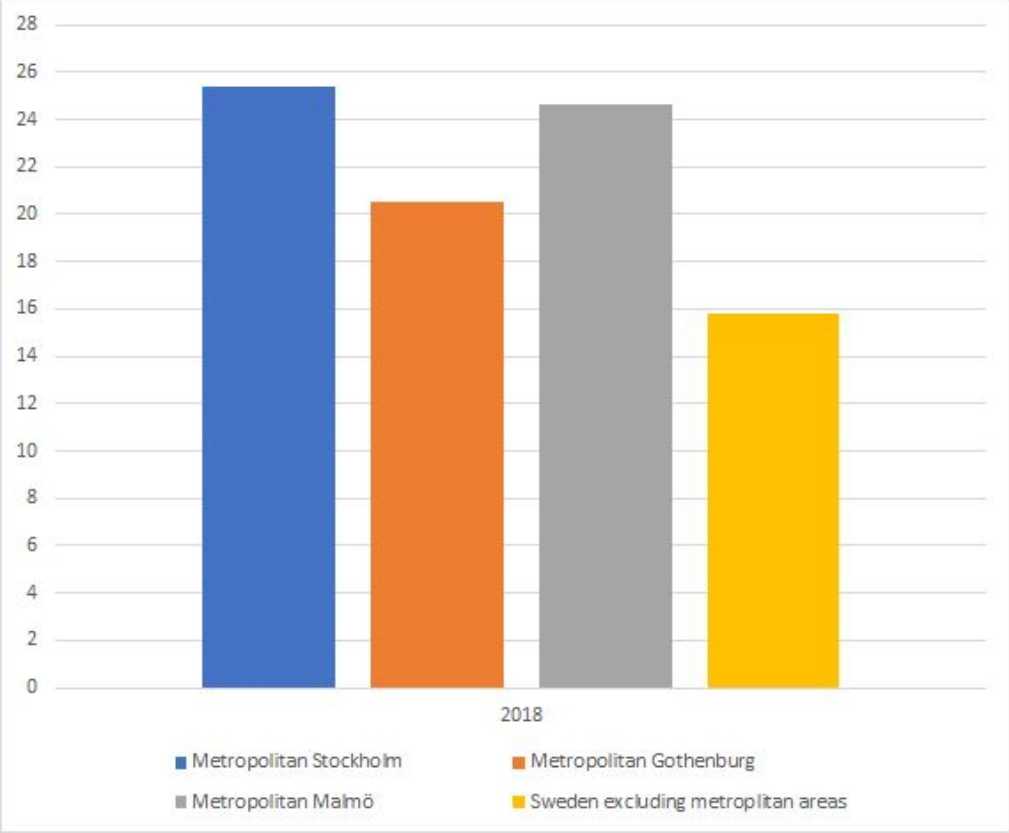

Figure 4: Percentage of foreign-born population per region, 2018 (Source: SCB)

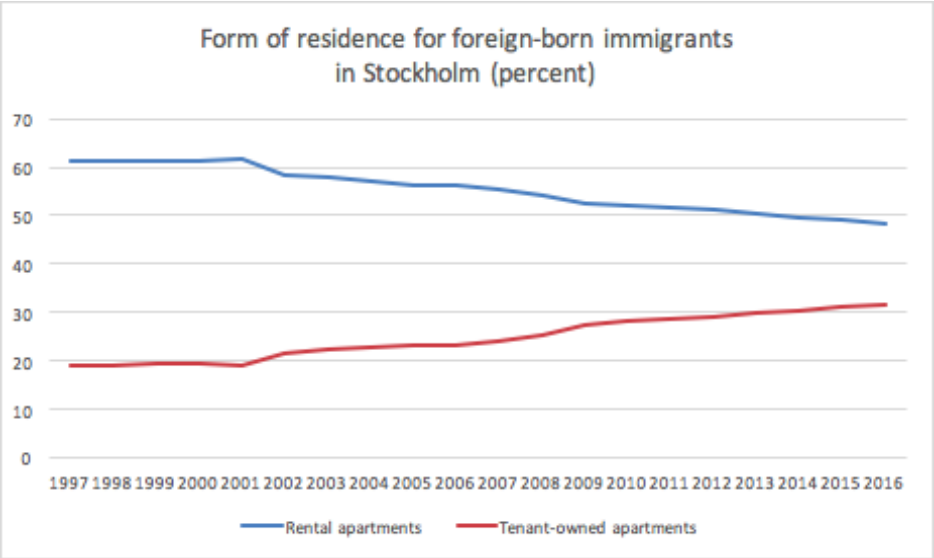

Figure 5: (Source: SCB)

Our main explanatory variable, immigration, is defined as the change in number of foreign-born persons. As Müller (2018) points out, this is the most accurate definition. Using inflow as a measure would risk to cause a bias due to returning migrants, while using changes in the number of foreign nationals would carry the statistical issue of citizenship attainment. Our definition do not suffer from these issues.

The choices of control variables are mainly motivated by previous literature. Jud et al. (1996) considers income and unemployment important factors affecting housing prices. Instead of income we use gross regional product (GRP) which is a monetary measure used as an indicator for prosperity in a county and is gathered from SCB. Unemployment is defined as an individual who at the week of observation has not worked for a full hour, nor is absent due to granted temporary leave (SCB, n.d.). Following Sanchis-Guarner (2017) we have included all crimes which we believe may affect the decision to settle in the area where the crime was committed. The following crimes are included: violent crimes, unlawful threat, sexual crimes, theft, robbery, vandalization, general hazard, violence and/or threat against public servant, and narcotics related crimes. The education variable includes all individuals with post-high school diploma in accordance with Glaeser and Shapiro (2001). All of the mentioned variables are divided by the

total population of the observed county. Finally, we have included population density as a control variable as we expect the population concentration to large cities may affect housing prices. This variable is constructed by dividing the total population in a specific county by the total square kilometer in the county.

4.3 Descriptive Statistics

Descriptive statistics for the variables of interest in our analysis are displayed in Table 1. Immigration is defined as the change in the number of foreign-born persons in a county divided by the initial total population in the same county. The mean value of immigration is 0,4% with a standard deviation of half the size, 0,2%. The considerable variation is not surprising considering immigrants' concentration to metropolitan areas. The minimum value of -0,1% is the single one decrease in immigration during the studied period, and occurred in Blekinge county in 2012. As a matter of fact, the maximum value of 1,3% is ascribed to Blekinge county as well, in 2015. For our dependent variable, the change in log price per square meter for tenant-owned apartments, the standard deviation in relation the the mean value is even larger. Other variables that are summarized are used as controls in our regressions. We also include our instrument, Z, for comparison purposes.

Variable	Mean	Std.Dev.	Min	Max
Δ Log Price	.121	.107	-.177	.772
Immigration	.004	.002	-.001	.013
Crime rate	.088	.017	.056	.138
Education rate	.193	.043	.083	.317
Population density	44.476	61.842	2.556	331.552
GRP per capita, TSEK	289.5	62.528	180	553
Unemployment rate	.068	.018	.024	.11
Z	.117	.059	.011	.304
Number of observations	4263			

Table 1: Descriptive statistics (2000-2015)

Figure 7, 8 and 9 in Appendix show the evolution of average price per square meter, logged average price per square meter, and change in the logged average price per square meter for Swedish counties in the period from 2000 to 2015.

4.4 Instrumental Variable

4.4.1 IV – Data

The initial year for our instrumental variable is 1984, which preferably should be as far back in time as possible to avoid earlier described endogeneity problem (Müller 2018). In comparison to previous papers on the subject, our initial year is strong in that aspect. Our instrument contains the following foreign countries of origin: Denmark, Iceland, Norway, Finland, Estonia, Greece, Italy, Yugoslavia, Poland, Great Britain, Germany, USA, Argentina, Chile, Uruguay, India, Iran, Turkey and The Soviet Union. Furthermore, due to data limitations, we include regions in the IV

with the exclusion of the mentioned countries to receive more precise results. The regions included are: Europe, Africa, Asia, North America, South America and Oceania.

Table 5 in appendix displays the composition of the foreign-born population in Sweden in 1984. This represents the initial "networks" from each of the countries and regions. This is of course important to keep in mind when drawing conclusions from our IV results. What the instrument picks up in 2000-2015 depends on the reported immigration to Sweden in 1984. Since data on the number of foreign-born persons is not available for all the world's countries in 1984, we can not distinguish between networks on a strictly national level. In order to keep the IV as accurate as possible despite this drawback, we have included regions separately. For example, for South America, SCB only provides country-specific data for Uruguay, Argentina and Chile. The rest of the countries from the continent are included in "South America excl.".

4.4.2 IV – First Stage

Table 2 demonstrates the first-stage regressions. The main explanatory variable from equation (1) is now the dependent variable. The main explanatory variable is our instrument. In the first three regressions, the coefficient of the instrument is positive and in the last two regressions the coefficient is negative. The instrument is significant on the 1% level in the regression without controls and the regression with one year- lagged controls without county fixed effects. The instrument is significant on the 5% level in the regression with two lags without county fixed effects. However, Andrews et al. (2018) proclaim that instruments can be described as weak when their correlation with the endogenous regressors, conditional on any controls, is close to zero. Although the F-statistics are above 20 for all five specifications, the low coefficients and varying signs indicate a weak instrument. The correlation between the instrument and the endogenous regressor is very small, in two cases even slightly negative. We include both one and two lags for comparison purposes.

Dependent variable: Immigration (t-1)					
	(1)	(2)	(3)	(4)	(5)
	(t-1)	(t-1)	(t-2)	(t-1)	(t-2)
IV	0.006***	0.009	0.010	-0.007***	-0.006**
	(0.002)	(0.011)	(0.012)	(0.002)	(0.002)
Unemployment rate		0.010		-0.009	
		(0.010)		(0.008)	
Crime rate		-0.003		0.024**	
		(0.018)		(0.011)	
Education rate		-0.068***		-0.000	
		(0.022)		(0.003)	
GRP		0.000		-0.000	
		(0.000)		(0.000)	
Population density		0.000		0.000***	
		(0.000)		(0.000)	
Unemployment rate			0.031***		-0.000
			(0.010)		(0.009)
Crime rate			0.003		0.021*
			(0.019)		(0.012)
Education rate			-0.050**		-0.000
			(0.024)		(0.003)
GRP			0.000		-0.000
			(0.000)		(0.000)
Population density			-0.000		0.000***
			(0.000)		(0.000)
_cons	0.001***	0.005*	0.003	0.001	0.001
	(0.000)	(0.002)	(0.003)	(0.001)	(0.001)
Obs.	315	315	294	315	294
R-squared	0.506	0.774	0.769	0.614	0.594
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	No

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table 2: First stage regressions

Figure 6 illustrates the factual development of the foreign-born population in Sweden from 1984 to 2015. Noticeably, during this period the largest increases are from Asia and Europe (excluding the Nordics), while immigration from the Nordics has decreased. Immigration from North America, South America, Africa, Oceania and the Soviet Union started from significantly lower levels, but especially immigration from Africa has experienced a sharp increase since the turn of the millenium.

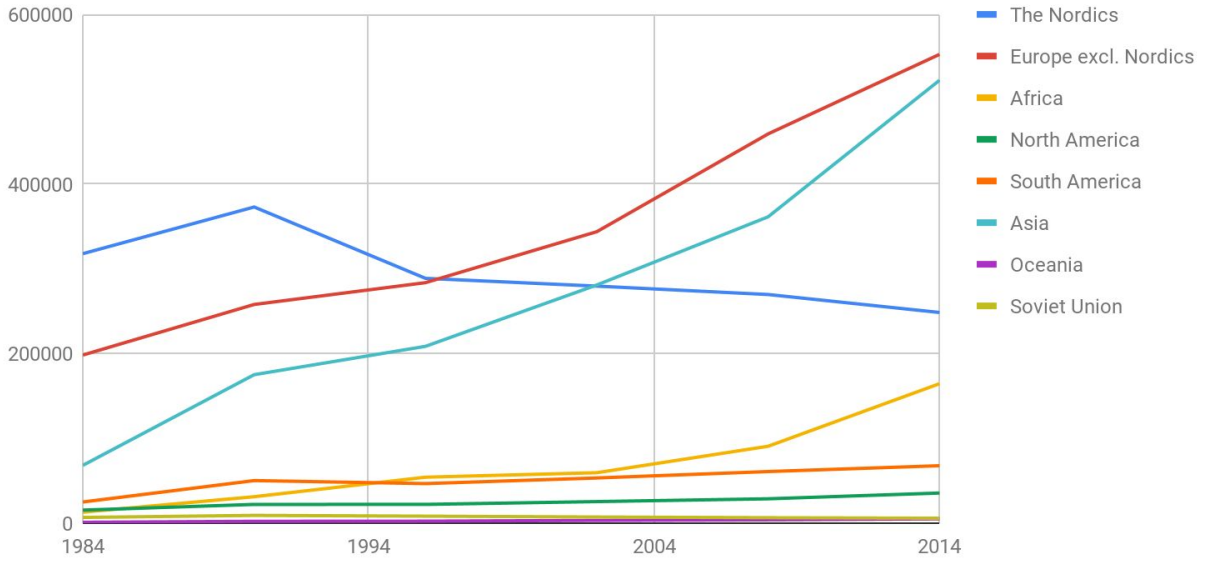

Figure 6: Number of foreign-born persons in Sweden by region of origin, measured in six years intervals (1984-2014)

5. Results

Table 3 reports the results from the Ordinary Least Square (OLS) regressions. The dependent variable is the change in the log of square meter price for tenant-owned apartments and the main explanatory variable is the change in the foreign-born population relative to the total population. The first column displays the simplest form of regression, containing only year fixed effects. Year dummies capture the influence of aggregate trends such as inflation, economic growth and population growth. In column two and three county fixed effects as well as the control variables are added with one and two lags respectively for comparison purposes. Column four and five follow the same logic but without county fixed effects.

Dependent variable: Delta Log Price (t)					
	(1)	(2)	(3)	(4)	(5)
	(t)	(t-1)	(t-2)	(t-1)	(t-2)
Immigration	-1.234	3.682	3.824	2.409	2.813
	(2.833)	(3.855)	(3.934)	(2.968)	(2.961)
Unemployment rate		-1.031*		-0.596	
		(0.614)		(0.401)	
Crime rate		0.012		0.133	
		(1.126)		(0.498)	
Education rate		-1.624		0.046	
		(1.397)		(0.150)	
GRP		0.001**		0.000	
		(0.000)		(0.000)	
Population density		0.000		-0.000	
		(0.001)		(0.000)	
Unemployment rate			0.126		0.019
			(0.639)		(0.408)
Crime rate			-0.987		-0.033
			(1.200)		(0.511)
Education rate			-1.957		0.038
			(1.523)		(0.154)
GRP			0.001**		0.000
			(0.000)		(0.000)
Population density			0.000		-0.000
			(0.002)		(0.000)
_cons	0.217***	0.013	0.021	0.101	0.103
Obs.	336	315	294	315	294
	(0.021)	(0.151)	(0.167)	(0.070)	(0.072)
R-squared	0.324	0.422	0.431	0.356	0.375
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	No

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table 3: OLS regressions

As Table 3 illustrates, neither of the coefficients of the main explanatory variable are significant. This may be caused by the relatively small number of observations and high standard errors. The magnitude of the coefficients of the main explanatory variable is 2,41 and 2,81 when controls are included but without county fixed effects. When county fixed effects are included, the magnitude varies from 3,69 to 3,82. This indicates that county fixed effects are an important determinant of the magnitude of the coefficient. We also find that the sign of the coefficient turns from negative to positive when the controls are added.

For our control variables, the signs varies depending on what specification we use. For unemployment, the coefficient is negative in the one-year lagged regressions while turning positive when one more lag is added. The opposite is true for our crime variable. Education rate has the expected sign only when county fixed effects are excluded. GRP has positive coefficients over all specifications and is significant on the 5% level when county fixed effects are added. However, the significance disappears when county fixed effects are excluded.

Table 4 displays the results from our IV regressions. Unfortunately, despite a settlement pattern built on 25 different networks our instrument turns out to be weak. Andrews et al. (2018) state that IV estimators are generally unreliable, potentially badly biased, when this is the case. The coefficients for the instrumental variable are insignificant and vary substantially in magnitude, with very high standard errors. However, the construction of the instrument is time consuming and requires a detailed set of data, and time limitation has restricted us from pursuing a different instrument. Consequently, we include the results from our IV, with both one and two lags, for comparison purposes.

Dependent variable: Delta Log Price (t)					
	(1) (t-1)	(2) (t-1)	(3) (t-2)	(4) (t-1)	(5) (t-2)
Z	-15.527	9.785	0.574	11.676	2.461
	(13.267)	(18.440)	(19.337)	(17.575)	(18.595)
Unemployment rate		-0.706*		-0.589	
		(0.412)		(0.394)	
Crime rate		-0.137		0.066	
		(0.519)		(0.505)	
Education rate		-0.054		0.059	
		(0.196)		(0.150)	
GRP		0.000		0.000	
		(0.000)		(0.000)	
Population density		-0.000		-0.000	
		(0.000)		(0.000)	
Unemployment rate			-0.084		0.022
			(0.415)		(0.417)
Crime rate			-0.257		-0.031
			(0.529)		(0.503)
Education rate			-0.083		0.038
			(0.191)		(0.149)
GRP			0.000		0.000
			(0.000)		(0.000)
Population density			-0.000		-0.000
			(0.000)		(0.000)
_cons	0.271***	0.135	0.142	0.073	0.078
	(0.100)	(0.197)	(0.192)	(0.163)	(0.163)
Obs.	315	315	294	315	294
R-squared	0.268	0.345	0.377	0.334	0.375
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	No

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table 4: IV regressions

6. Conclusion

We estimate the relation between immigration and housing prices in Swedish counties during the period 2000-2015. The OLS regressions show that an increase in immigration of 1% relative to the total population in a county is associated with an increase in housing prices between 2,41-3,82%. However, none of our OLS results from the fixed-effects model are significant.

Hence, we can not conclude whether immigration have had an impact on housing prices in Swedish counties or not. Furthermore, the effects can not be interpreted as causal, since immigrants' settlement decision may depend on housing prices.

Due to the risk of endogeneity bias in our main explanatory variable, we adopt a "shift-share" instrumental variable strategy. This is a common way to handle endogeneity concerns in this field of study (Saiz, 2007; Ottoviani & Peri, 2007; Gonzalez & Ortega, 2013). The shift-share instrument is based on the observation that immigrants tend to settle into locations with already high share of immigrants (Bartel, 1989). When constructing our instrument, we have access to a rich set of data over the foreign-born population in Sweden in 1984, sorted by country of origin. Considering the large time gap between 1984 and our study period, and the heterogeneous nature of historical immigration to Sweden, we assume that the exclusion restriction is valid. Unfortunately, our instrument turns out to be weak when testing for relevance. Consequently, our IV regressions yield unreliable results.

7. Discussion

We have not found any significant causal relationship between immigration and housing prices in Swedish counties during the years 2000-2015. There are several factors to consider when analysing the results. Firstly, the Swedish system for rent setting prevents prices to move freely in response to changes in supply and demand. Thus, it is difficult to measure the total impact on housing prices of immigration, particularly since rental apartments are the most common form of residence for immigrants in Sweden.

Secondly, a big challenge is to overcome the potential endogeneity bias in the immigration variable. In comparison to the previous study on immigration and housing prices in Sweden (Müller, 2018), we have access to more detailed data on countries of origin when creating our instrumental variable. However, although we have been able to distinguish between 25

“networks”, the instrument is weak. Possible solutions for future researchers would be to try different base years alternatively to use another version of the shift-share instrument.

A few possibly rewarding extensions to our paper would be to to study a geographically smaller unit, to target a specific housing market, or to compare two cities with substantial differences in immigration levels. Another interesting idea would be to observe the rents set by subletters of tenant-owned apartments as these are determined by market forces to a much higher degree than rental apartments, and are primarily based on the market value of the tenant-owned apartment (Hyresnämnden, n.d.).

The link between housing prices and immigration is still a relatively understudied field in Sweden. It is surprising considering how frequently and intensely immigration and housing prices are debated in the country. Despite our inconclusive results, further research is essential to reach an immersed understanding of the relation between these two phenomena. That will be important for enhanced policy making.

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9. Appendix

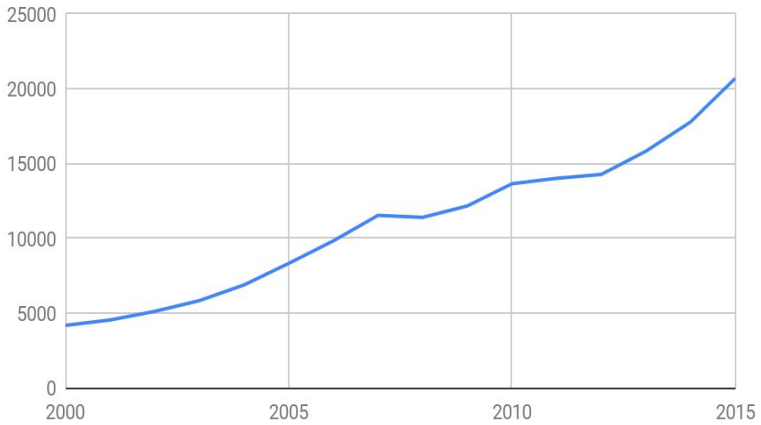

Figure 7: Average price per square meter for tenant-owned apartments in Swedish counties, SEK (2000-2015)

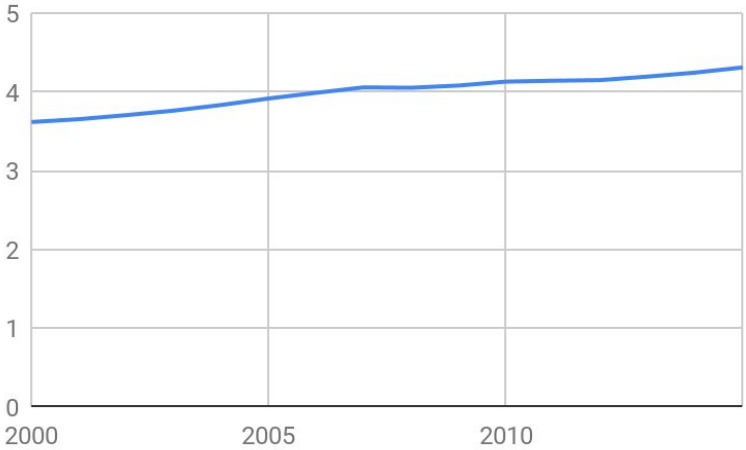

Figure 8: Log average price per square meter for tenant-owned apartments in Swedish counties (2000-2015)

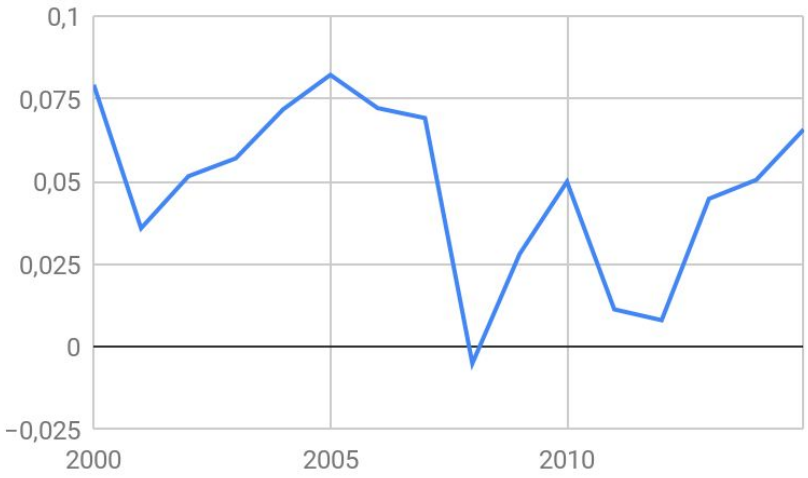

Figure 9: Delta log average price per square meter for tenant-owned apartments in Swedish counties (2000-2015)

World	The Nordics	Rest of Europe*	North America	South America
645'557	317'857	198'289	15'391	24'970
Asia	Denmark	Finland	Iceland	Norway
61'430	41'394	230'741	2'976	42'746
Rest of Europe excl.**	Estonia	Greece	Italy	Yugoslavia
52'227	13'912	13'919	5'863	37'952
Poland	Great Britain	Germany	Africa	Canada and Mexico
27'413	9'354	37'649	12'960	4'863
USA	South America excl.**	Argentina	Chile	Uruguay
10'528	9'518	2'026	11'128	2'298
Asia excl.**	India	Iran	Turkey	Oceania
30'457	6'614	5'967	18'392	1'062
Soviet	Unknown			
6'771	70			

* Excluding the Nordic countries.

** Excluding the countries accounted for separately.

Table 5: Foreign-born population in Sweden 1984 sorted by country/region of origin