"HOW IMMIGRATION AFFECTS HOUSING PRICES: EVIDENCE FROM EUROPEAN COUNTRIES"

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ABSTRACT

DOES IMMIGRATION CONTRIBUTE TO THE CONTINUOUS RISE OF HOUSE PRICES IN EUROPE? MY FINDINGS REVEAL A PERSISTENT POSITIVE CORRELATION BETWEEN HOUSE PRICES AND IMMIGRATION INFLOWS FROM 2011 TO 2021. I HAVE USED A MODEL INITIALLY DEVELOPED BY ALBERT SAIZ IN 2007, WHICH USES AN INSTRUMENTAL VARIABLE APPROACH TO ADDRESS ENDOGENEITY. I HAVE CONCLUDED THAT AN INCREASE IN IMMIGRATION INFLOW EQUAL TO 1% OF THE TOTAL POPULATION LEADS TO A 1.58% RISE IN HOUSE PRICES ALIGNING WITH SAIZ'S FINDINGS. MY STUDY AIMS TO ENHANCE THE UNDERSTANDING OF THE RELATIONSHIP BETWEEN IMMIGRATION AND HOUSING PRICES ADDING TO THE EXISTING LITERATURE ON THIS TOPIC WITHIN EUROPE AS A WHOLE. IT EXTENDS THE SCOPE OF THE INVESTIGATION TO AN INTERNATIONAL CONTEXT IN CONTRAST WITH MOST OF THE EXISTING LITERATURE THAT EXAMINES THIS RELATIONSHIP ON A NATIONAL LEVEL.

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1.INTRODUCTION

Europe experienced large increases in both immigration inflows and house prices in recent years. House prices rose by 50 % from 2010 to 2022 and Immigration population from 48 million in 1990 to 87 million in 2020. Housing is becoming unaffordable for the average European citizen; immigration inflows are also rising and European countries struggle to control them.

Despite this bilateral increase, data show variations in the interaction of house prices and Immigration inflows in different regions. Western, Eastern and Northern Europe's immigration rises align with increases of house prices. In contrast, Southern Europe doesn't show a similar correlation, possibly influenced by their persistent high unemployment rates, these regions show a decline in house prices which does not follow the increases in immigration. This is analyzed further in Descriptive Statistics section 3.4

Research on immigration mainly documents the impact of immigration on the labor market. In this paper I look at another perspective, the relationship of Immigration and House Prices. I use annual panel data of 29 countries as a sample of Europe (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden). The dependent variable is the House Price Index and the main independent variable is Immigration inflow. I implement the shift – share IV estimation approach of Saiz (2007) based on the immigration population of 2004 to address the endogeneity issue due to reverse causality. With the use of control variables to account for socio-economic, demand and supply side determinants of house prices, I find that immigration inflow equal to 1% of previous period's population results in a 1.58% increase of housing prices.

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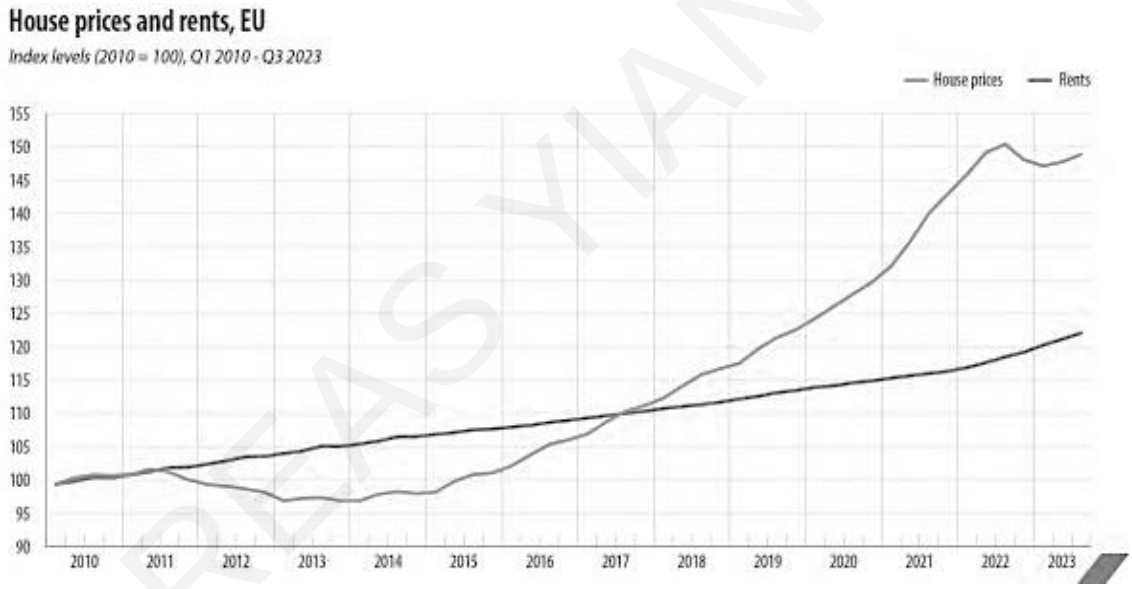
Existing literature shows that the impact of immigration on the housing market is mixed, and it varies in each country depending on culture and state of the economy. Saiz (2007) looks at the effect on both rent and house prices in metropolitan areas in the US observing a positive correlation. Other studies as Akbari and Aydede (2012), found that an increase in immigration results has a modest or no impact in Canada using census data. Sá (2015) found a negative correlation between immigration and house prices in the UK, showing that a 1% increase in the immigrant population led to a 1.7% decrease in local house prices across 170 authorities in England and Wales.

Graph 1.1



Source: Eurostat

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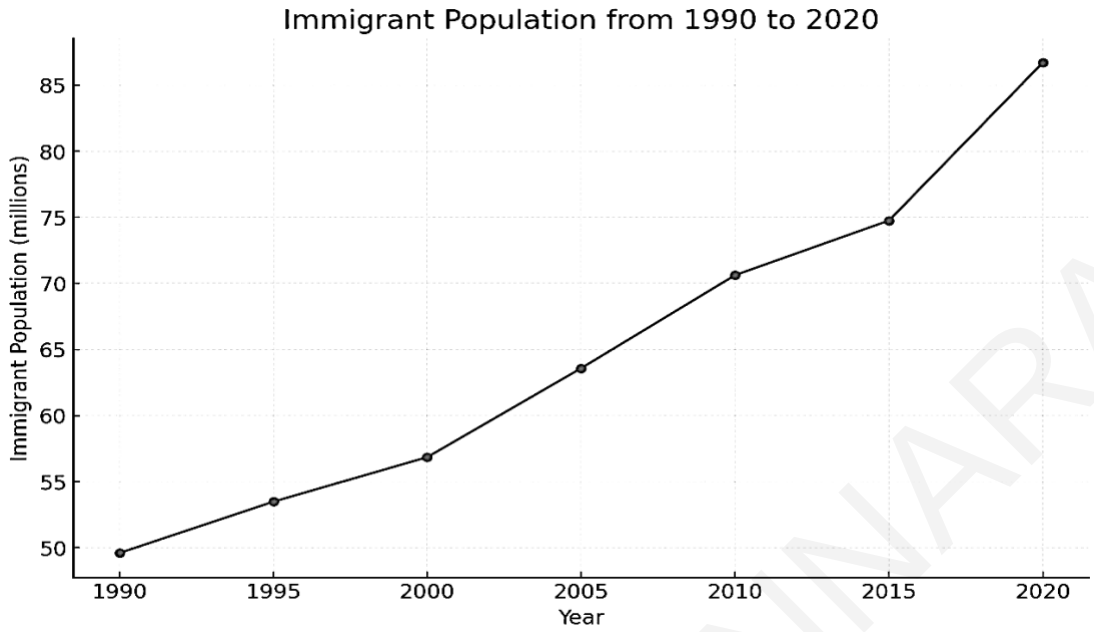
Graph 1.2



Source: United Nations

Graph 1.1 illustrates a rise of 50 % during the last decade. The Housing market experienced considerable increases in House prices that surpassed the rent price increase which increased at a more stable rate. This implies a housing market where the supply of houses is not keeping up with demand. In addition, Graph 1.2 shows the increase in immigrant population in Europe. During 2011 to 2021 immigrant population increased by 15 million.

What caused the rise of immigration inflows in Europe?

During the decade of 2011 to 2021 Europe was marked by a series of events that had a significant impact on immigration inflows. The Arab Spring anti-government protests in 2011 initiated a wave of migration from North Africa to Europe (Sergio Carrera, Leonhard den Hertog and Joanna Parkin, 2012). Moreover, the Syrian Civil War, which began in 2011, led to a massive displacement of 6.6 million people many of whom sought asylum also in European countries. European Union statistics from 2021 show that 2.3 million

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immigrants entered the EU from third countries, highlighting the continued trend of significant migration flows into Europe (Eurostat, 2021). Considering recent events of the wars between Russia with Ukraine and Israel with Palestinians, understanding this relationship would be a strong tool in deciding on future public policies regarding migration and housing.

How can Immigration affect House Prices?

Demand side: Increase in demand as new immigrants need places to live. This is added to the existing demand for housing from the natives leading to higher prices. (Sanchis-Guarner, 2017)

Supply side: Considering that Housing Supply tends to be inelastic in the short – run, this increase leads to higher prices. However, in the long run the market will respond to this increase as higher prices will encourage suppliers in the market, offsetting the increases. In addition, wealthy new immigrants or past immigrants that accomplished to get a more stable employment may build houses on their own increasing the supply. (Cochrane & Poot, 2020)

Indirect Effects: Immigrants can fill shortages in the labor market or even bring innovative ideas opening new businesses contributing to economic growth. This means higher salaries within the country for both immigrants and native population. Higher salaries lead to higher demand for housing. In addition, immigrants can get funds into the country investing in the housing market. (Gonzalez & Ortega, 2009)

The rest of the article is organised as follows. Section 2, presents existing literature findings and the methodology used. Section 3 outlines the model, explains the data used and my Methodology. Empirical results are discussed in Section 4 and Section 5 concludes.

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2. LITERATURE REVIEW

2.1 EMPIRICAL FINDINGS

Most studies about immigration focus on the relationship with the labor market. However, research on house prices and immigration has become more important the recent years despite the fact that studies have not yet reached a clear conclusion. Some show positive, negative or even no impact of immigration to house prices. Below I summarize the findings.

Saiz (2003) was a pioneer on this topic using the Difference in Difference technique. Similar to how Card (1990) analyzed the impact in the labor market, Saiz examined the 1980 movement of Cubans in Miami which, according to his findings, resulted to a 9% increase in rental prices in Miami compared to the other group that was observed. The Difference in Difference method compares the changes of prices over time in Miami affected by the immigration to a different region which is assumed that is not affected. By looking at how both groups changed from before to after the Mariel boatlift event, Saiz (2003) managed to isolate the impact in House and rent prices caused by immigration. Another important finding is that as rental prices went up, house prices moved in the opposite direction confirming the complexity of this relationship. However, this technique has its downsides, firstly, it is difficult to decide which region to be the control group that will be unaffected from immigration inflows and secondly, this method can only be used to address specific events at a specific time making it difficult to draw conclusions on a broader aspect.

In 2007 Saiz used another technique to examine this relationship. He addressed the endogeneity issue, due to reversal causality, by implementing an Instrument variable for Immigration. The IV shift-share approach basically re-allocates the

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immigrants based on past trends to eliminate the endogenous part of immigration to rent prices. He assumes that immigrants tend to settle in areas that there is an existing community of immigrants from the same cultural background and that past immigration inflows have no correlation with current house prices. His findings show that a 1 % increase in Immigration relative to each city's population is linked with a 1 % increase in average rent and 2.4 % increase in house prices. This method is used in this study.

Mussaa, Nwaogub, Pozoc (2017) used a Spatial Durbin Model to examine spatial dependence between USA regions. The Spatial Durbin Model (SDM) analyzes how data in different regions affect each other. It considers not only local variables but also the impact of similar variables in nearby regions. The findings show that the effects in house prices due to immigration can affect nearby areas confirming spatial dependence. This means that the impact of immigration on the housing market in a region can influence the prices and immigration to other regions close to the affected one. For example, if a country offers high wages and good living conditions, this may influence neighboring countries which share the same geographical and economical characteristics (especially if they offer lower living costs) by attracting new immigrants. In addition, they have also examined the general impact for the period of 2002 – 2012 using the IV model of Saiz (2007) and concluded that 1% rise in immigration inflow results in a 0.8% rise in house prices and 1.6% in rental prices. (Mussa et al., 2017).

A close approach to Saiz (2007) was also used by Gonzalez and Ortega (2009) estimating the effect using panel data from 50 provinces in Spain for the decade of 1998 to 2008. An average Spanish province had immigrant inflows equal to 17% of its working-age population. Their findings show a 3.2 % increase in house prices due to a 1 % increase in immigration relative to population. Also,

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they estimate that during this decade, immigration is responsible for 30 % of the total house prices increase and for 37% of the total construction of new housing units during the period.

Kalantaryan (2013) studied the impact using panel data from the provinces in Italy using panel data from 1997 to 2007 using the Difference and System Generalized Method of Moments. This method accounts for potential biases due to unobservable variables and endogeneity. Difference GMM focuses on first differences to remove unobserved effects using lagged immigration values as instruments. Kalantaryan's findings show a positive impact of immigration on housing prices. What is interesting is that Kalantaryan also showed a non - linear diminishing impact influenced by the impact of immigration in the labor market.

Larkin et al. (2019) concludes that Immigration generally increases house prices. They used a weighted average approach using panel data from 14 developed countries across the world. The weighted average method gives different weight to each country's data based on criteria rather than treating all countries' data equally. In addition, they show that the natives' attitude towards immigrants diminishes this effect as in more conservative countries, the increase in house prices is more limited.

Cochrane and Pot (2020) used panel data from eight countries (Canada, France, Italy, New Zealand, Spain, Switzerland, United Kingdom and United States). They found that on average, a 1% increase in immigration raises prices by 0.5% to 1%.

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On contrast, literature also includes articles that their findings show no effect or even a negative impact.

Akbari and Aydede (2012) observed that this effect can be very small or even zero. The study is focused on Canada using census panel data from 2006 to 2013 allowing them to capture long term effects where the supply curve of house supple is more elastic. Their findings show a small impact on house prices which is mainly because of immigrants arriving in Canada a decade ago. They refer to this as the 'timing effect'. Immigrants that decide to resettle in a foreign country, need a couple of years before deciding or being able to buy a house. In the short run, they would choose to rent until they get a stable employment or save money that will allow them to buy a house. Akbari and Aydede (2012) conclude that a 1% increase in immigration leads to a small 0.10% change in housing prices on average. This implies that other factors beyond immigration may have more significant effects on housing prices in Canada and also that the impact of immigration on the housing market is minor in the long run.

Saiz and Watcher (2011) showed a negative relationship of immigrants and house price changes within metropolitan areas using census data from the USA for the period 1990 to 2010. Employing first difference and instrumental variable (IV) models, they show a statistically significant negative relationship between immigration and house prices. The authors state that this is a consequence of the natives moving to different locations because of the immigrants. Natives in many countries might prefer to live in areas with people of the same or similar cultural background and may decide to relocate. It is also important to note that natives who tend to move are often high earning ones as it is easier for them to relocate. As a result, there's a drop in demand for houses

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from the reallocation of these higher earners, which leads to a decrease in house prices.

Sá (2015) also reports a negative relationship between immigration and house prices for the UK. Using panel data of immigration and house prices for 170 local authorities in England and Wales, Sá finds that an increase in immigrant population equal to 1% of the local population reduces house prices by 1.7%.Similar to the study of Saiz and Watcher (2011), this is attributed to the natives mobility to relocate (especially high earning natives). It's worth pointing out that this negative relationship is driven mainly by regions where the percentage of immigrants with low education is high.

3.DATA EMPIRICAL METHODOLOGY

3.1 THE MODEL

In Section 3, I explain the model and summarize the data that I use in the empirical part. For detailed definitions of the variables and statistical tests used, please refer to the Data Appendices section 6.

The model I have used for my regression is:

$$log\Delta HPI = a + \beta \frac{immigration\ inflow\ kt}{population\ kt-1} + \theta \frac{population\ kt}{population\ kt-1} + \gamma\, Dkt + \delta\, Skt + + \lambda\, Soc\ kt + \zeta\, YearD + \varepsilon\, kt$$

Where log ΔHPI is the dependent variable which is a log transformed value of the annual change of the house price index in country i at time t. The main independent variable is the annual immigration inflow for each country at time t divided by total population at t-1. The interpretation of the coefficient is that if b

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= 1, it means that for a 1% increase in immigrants relative to population results to 1 % increase in the House Price Index.

"D" represents variables that drive the demand side of house prices, specifically GDP per capita, Building Permits and unemployment rate. "S" stands for variables that influence the supply in the housing market. An important limitation of my study is that no variable can be found for all the countries reflecting housing supply as the only one available is Building Permits, which my findings show that it is an indicator of demand (positive coefficient). "Soc" stands for socioeconomic variables that reflect the living conditions in country k at time t measured by: overcrowding rate, house overburden cost, the percentage of people with tertiary education, and crime rate per 1000 individuals. Population variable captures the growth of each country's population.

"Year D" stands for year dummy variables that capture time specific events such as policy changes, recessions as well as external events like Covid-19 pandemic which are unobserved in the data. This approach enhances the model's explanatory power, handles autocorrelation and also reduces omitted variable bias providing a clearer understanding of how immigration inflows correlate with the housing market dynamics in European countries, ensuring that the analysis accurately reflects the impact of immigration on house prices, independent of these trends. (Kalantaryan, 2013)

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3.2 REVERSE CAUSALITY

The most important consideration in this model is to address endogeneity as:

Housing prices (as captured by the HPI) attract immigrants who are seeking more prosperous areas with better economic opportunities represented by stronger housing markets. On the other hand, increased immigration could drive up demand for housing, thus affecting the HPI leading to higher prices. Accounting for this both way influence is critical for understanding the causal relationship and for achieving consistent and unbiased coefficients (Saiz, 2007). To address this issue, I have used the immigrant population of each country in 2004 to create an IV estimator. The new variable was tested to satisfy two criteria:

1. Covariance of immigrants and the new IV estimator not 0 to ensure the relationship between the two variables. After running the regression, the F-statistic is 26 exceeding 10 showing a strong relationship.

2. Covariance with error term = 0. This is difficult to test but following Saiz (2007) and existing literature I assume the variable is valid.

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3.3 CONSTRUCTING THE IV ESTIMATOR: SHIFT – SHARE APPROACH IV

The method to predict the immigration inflow to avoid endogeneity as showed by Nartel (1989), is to use historical immigration patterns of to predict current inflows to different countries. This is based on the assumption that the initial distribution of immigrants across countries (in this case, 2004) is not related on housing prices of the 29 countries for the period of 2011 – 2021 and also based on the assumption that immigrants tend to move in areas that already immigrants are established as explained in Section 2. (Saiz, 2007)

***Share of country k*, 2004**: This is the share of country k in 2004 calculated as:

Share= immigrants in country k, 2004 / Sum of immigrants in the 29 countries in 2004

Immigrants k, t = Share of country k, 2004 · Sum of Immigrant inflows at time t

Immigrants *k,t*: This represents the predicted number of new immigrants arriving in country *k* in a specific year *t*. It's what we're trying to estimate using this equation. Basically, is a reallocation of immigrants based on historical patterns.

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2 STAGE REGRESSION FOR ENDOGENEITY (2SLS)

First Phase Equation:

$$IV\ Estimated\ Immigration = \alpha + \beta\ IV\ Immigrants\ k,t + \gamma\ Control\ Variables$$

Second Phase Equation:

$$Log\ HPI = \delta + b\ IV\ Estimated\ Immigration + b2\ Control\ Variables + et$$

The first phase is the estimation of the exogenous part of immigration variable and the second phase is the estimation of the model using the fitted values that address endogeneity.

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3.4 DESCRIPTIVE STATISTICS

In this section I provide the statistics and the transformations of the data. All the data used are downloaded from the Eurostat database and the World Bank. More information can be found in the Appendices.

Table 3.1

Variable	***Obs.***	***Mean***	***Std. dev.***	***Min***	***Max***
Year	319	2015.5	3.457023	2010	2021
Tertiary education	319	27.85086	7.544685	11.9	45.2
Building Permits (1000s)	319	56.4181	90.39316	2.3	488.4
Overcrowding rate	319	17.90598	14.4309	1.4	51.6
Crime per 1000 citizens	319	1.330086	1.122901	.28	6.33
Population	319	8115637	21201077	317630	83166711
Immigration inflow	319	119875.6	183978.8	2639	1571047
Unemployment rate	319	8.503448	4.673568	2	27.5
House Overburden cost	319	9.101437	6.40151	1.1	45.5
HPI	319	117.2227	30.64298	71.52	246.54
ΔHPI	319	4.729552	7.182827	-17.08	31.9
Inflation Rate	319	1.602192	1.480506	-2.097	6.0914

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TRANSFORMED VARIABLES

Table 3.2

LogΔHPI	*Log transformed annual change of House Price Index*
Immigration Inflow / Pop t-1	Immigration inflow in country k divided by the population of country k at t-1
IV Immigration inflow Estimator / Pop t-1	Estimated Immigration inflow using the shift share approach on data from 2004 divided by the population of country k at time t-1
ΔTertiary education	Percentage difference of people with tertiary education in each country
Building Permits (thousands)/Population t-1	Number of new building permits in thousands divided by population at t-1
Crime per 1000 citizens	Number of homocides and burglaries per 1000 citizens in each country
Δ Population / Population t-1	Percentage change of population in country k
Unemployment Rate	People unemployed in each country
Δ Log GDP per capita	Annual % change in GDP per capita
Inflation Rate	Inflation Rate in each country
Year Dummies	To control for all unobserved time-invariant characteristics, ensuring that the estimated coefficients reflect the impact of the independent variables free from these unobserved confounders. Eg Covid-19
House overburden Cost	The housing cost overburden rate is the percentage of the population living in households where the total housing costs ('net' of housing allowances) represent more than 40 % of disposable income ('net' of housing allowances). Housing costs refer to the monthly expenses associated with the right to live in a dwelling.

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3.4 DATA VARIATION

It’s important to note that the tendency of immigration inflows and House Prices vary across European. In Western; Eastern and Northern Europe, there is a consistent positive movement where increased immigration is associated with rising house prices. In the dataset, Germany has a large increase in immigration inflows from 489,000 in 2011 to 874,000 in 2021, and HPI from 103.5 to 184.6 in the same period. Similarly, Sweden experienced significant rises in HPI during years of high immigration inflows. The same interaction exists in Eastern Europe. For instance, Hungary's HPI rose from 96.57 in 2011 to 222.12 in 2021 alongside increases in immigration inflows from 25519 to 80471 by 2021. In contrast, Southern Europe shows more variation in the movement of the two variables. The relationship of immigration and house prices in Spain Italy and Greece is not constant, rises of immigrant inflows often are accompanied with a reduction in house prices. Italy's immigration inflows increased but the HPI dropped from 101.4 in 2011 to 87.2 in 2021. Spain shows a negative relationship from 2011 to 2016 with HPI dropping to 77% from 92% in 2011 despite rising immigration inflows. These variations might imply that the positive or negative effect might be influenced by the overall economic conditions in countries as Spain, Greece and Italy show high unemployment rates averaging to 16.54% for the period of 2011 to 2021 which could be the explanation for this negative impact. Bad economic conditions outrun the impact of immigration. Graphs and tables are included in Data Appendices.

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4.RESULTS

This study analyzes the effects of Immigration on House Prices by examining a dataset consisting of 319 observations grouped across 29 countries as a sample for Europe. I have used both pooled Ordinary Least Squares (pooled OLS) and Instrumental Variables (IV) models to examine this relationship. The findings indicate that an increase in immigration inflows, equivalent to 1% of the population from the previous year, results in a statistically significant rise in HPI by 1.58%, underlining a strong positive relationship between immigration and house prices across all models.

Table 4.1

Dependent Variable	*Log Δ House Price Index*			
Independent Variables	Pooled OLS	IV	Pooled OLS	IV
Immigration Inflow / Pop t-1	**1.266*** **	**1.823*** **	**0.7032*** **	**1.585*** **
ΔTertiary education	-0.000337	-0.0004559	-0.0001523	0.002533
Building Permits (thousands)/Population t-1	0.000399***	0.000396***	0.000133	0.000168*
Crime per 1000 (homocide)	-0.00264	-0.00241	-0.00173	-0.00083
Population t / population t-1	-0.71306**	1.14183*	-0.30791	1.2347**
Unemployment Rate	-0.00328***	-0.00319**	-0.00306***	-0.00356***
Δ Log GDP per capita	0.01067**	0.00671*	0.00452	0.00586**
Inflation Rate	0.00174*	0.0024346**	0.00260	0.00730***
Year Dummies	NO	NO	YES	YES
R - Squared value	0.22	0.1986	0.5581	0.5474

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Wald chi2	73.59	58.31	339.91	263.32
Prob > chi2	0.0000	0.0000	0.0000	0.0000

Notes: Δ denotes First difference. Explanatory variables are on the left side and dependent variable is Log House Price Index. In the IV estimators, 2SLS method is used as explained in section 3. Year Dummies denote the inclusion of dummy variables for each year in the regression analysis, accounting for time-specific effects on housing prices. Statistical tests are in the Data Appendices.

*Statistical significance at 10%
**Statistical significance at 5%
***Statistical significance at 1%

As we can see in table 4.1, the regression analysis of the relationship between immigration and house prices resulted in a substantial and consistent positive influence of immigration inflows on the House Price Index of the 29 European countries in the sample. Specifically, for every 1% increase in the immigration inflow relative to population at t-1, the HPI increases by 1.58% which is statistically significant at 1% level. This positive correlation persists in all models supporting this strong positive relationship between the rise of immigrants inflows and the increase of house prices.

It is interesting to mention the relationship of building permits with house prices. Although one can expect to be negative representing supply for housing where the relationship with house prices is inverse, the coefficient here is positive and statistically significant at 10 %. This positive correlation indicates that a rise in Building Permits is an indicator of growing demand, influencing house prices upwards.

The state of the economy in a country also influences the housing market. The unemployment rate with coefficient -0.00357, shows a negative impact across all models, with statistical significance ranging from 1% to 5%. This negative correlation points to the constraints that higher unemployment levels have on the housing market due to a reduction of housing demand as economic conditions worsen within countries. The inflation rate, with coefficient

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0.0073051, is significantly positive in all models, suggesting that as general prices rise, house prices follow this pattern. A potential explanation is that people turn to real estate as an inflation hedge to protect their wealth. (Rubens et al., 1989) Also, population growth increases house prices by 1.24% for 1% increase with statistical significance at 5%.

Year Dummies are used to control for all unobserved time-invariant characteristics, ensuring that the estimated coefficients reflect the impact of the independent variables free from unobserved factors leading to more reliable coefficients. This inclusion improves the models' explanatory power as indicated by R-squared values of 0.5581 and 0.5474 for the pooled OLS and IV models.

Lastly, the Wald chi-square statistics, with value 339.91, and their associated p-values at 0.0000, underscore the overall significance of the models. These figures confirm that the relationships identified between immigration, economic factors and HPI are not due to random variation but are statistically important.

The findings align closely with previous research by Saiz (2007) and Gonzalez and Ortega (2009), which concludes to a positive effect of immigration on housing prices. The most significant factors in terms of significance and impact influencing house prices in European countries are immigration inflows and changes in population. This highlights a general demand-driven housing market in Europe and suggests that as the number of immigrant inflows increases, there is a corresponding rise in demand for housing which drives up prices as increased demand puts pressure on existing inelastic housing supply. This effect is more pronounced in areas with lower unemployment rates in contrast with the evidence from Spain and Italy and Greece were high unemployment resulted to a reduction in house prices eliminating the impact of immigration.

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5.CONCLUSION

In the recent years, the relationship between house prices and immigrants draws a lot of attention. It's important for governments to fully understand its implications so that they can introduce effective policies. This paper shows that there is an economic impact of immigration in European countries. Immigration pushes up the demand for housing of the destination countries. The result is the general impact for all the 29 countries and is not focused on a specific event or country. It agrees with the idea that immigrants do not displace native population from the countries they settle and are an addition in the demand for housing.

Additionally, my findings highlight the importance of other socio-economic indicators. Unemployment rate, inflation and population growth are determinants of house prices. The statistical significance of these results is clear, suggesting that these factors are key drivers in determining the value of houses within Europe.

Summarizing the results, immigration is found to have a statistically significant positive effect on house prices in Europe. Using panel data from 29 countries for the decade of 2011 to 2021 and constructing an Instrumental Variable using the shift – share approach of Saiz (2007), I conclude that a 1 per cent increase in immigration inflow equal to 1% of population at t-1 affects positively House Prices by 1. 58 % and this relationship persists with the use of control variables and year dummies. This finding is interesting as opposite to negative findings who explain this offset due to native's reallocation. On country level this effect does not apply. Natives ability or desire to reallocate to a new country is very limited thus the 'Migration in Native out' effect does not hold.

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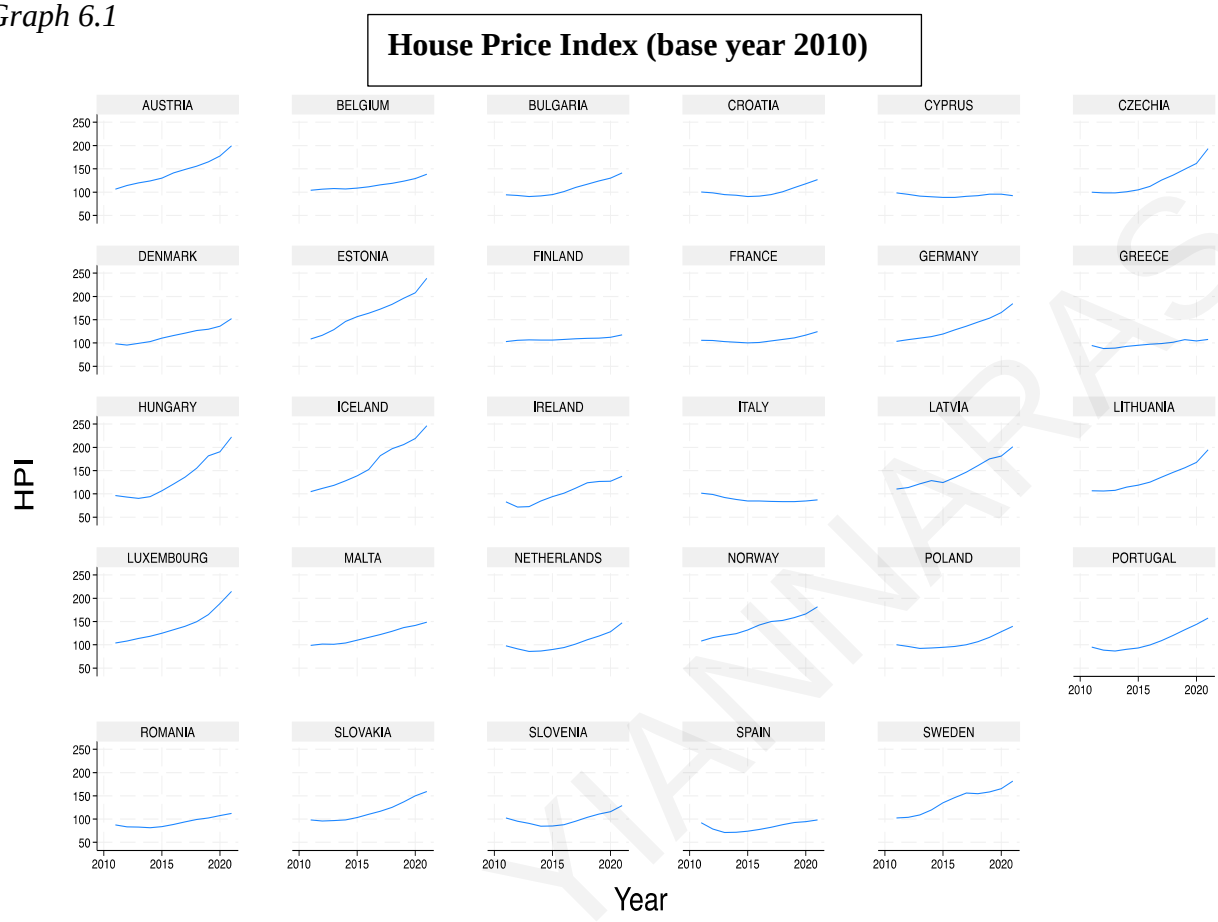
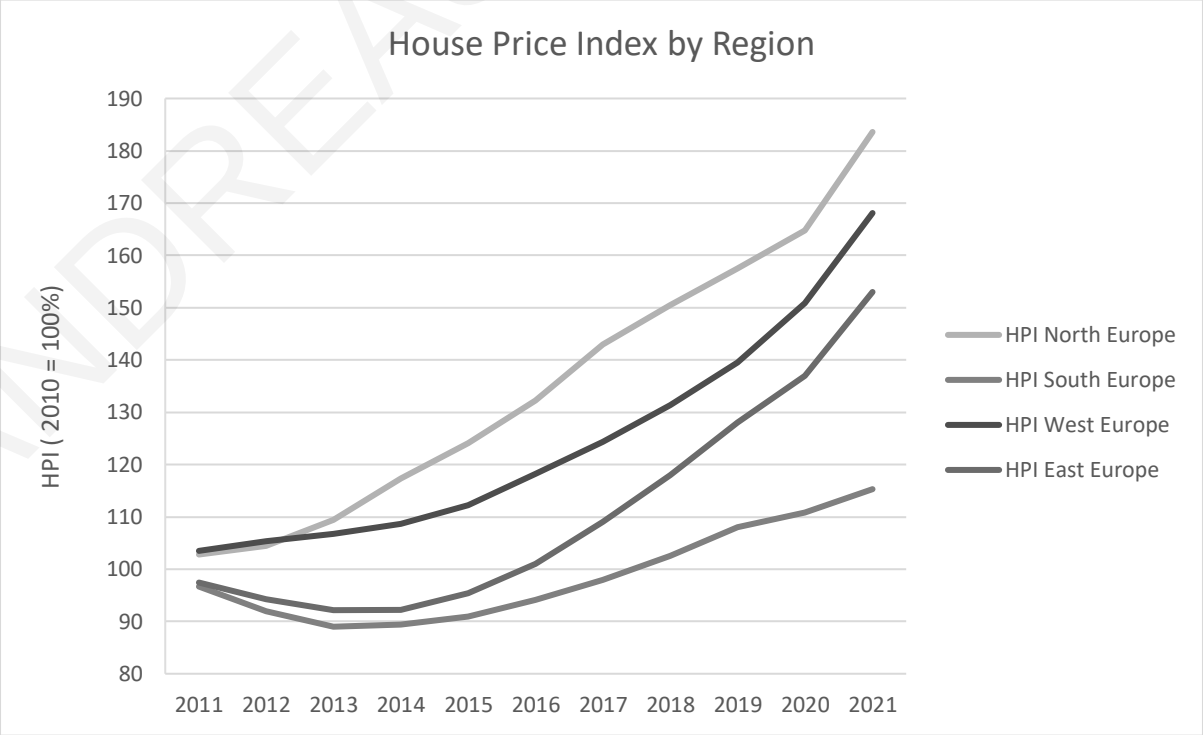
6.APPENDICES

Graph 6.1



Source: Eurostat

Graph 6.2



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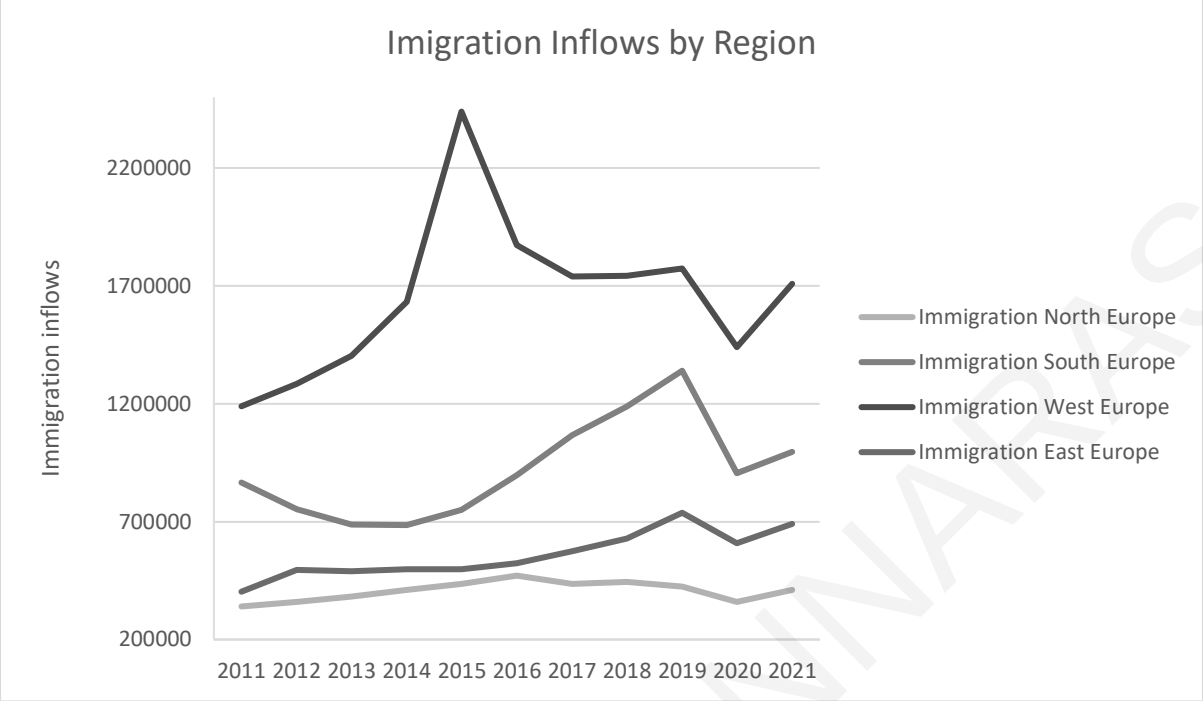
Graph 6.3



MAIN VARIABLES EXPLAINED

Table 6.1

The House Price Index (HPI)	HPI looks at how much homes are sold for in the market. It doesn't consider residencies that aren't sold in the usual way, like houses people build themselves for own use, homes sold super cheap to people already living in them, or homes sold within families. The HPI keeps track of all homes bought, no matter how they're paid for, like with cash or a home loan. Data collection is carried out by the national statistic institutes of each country. Data sources for prices include, among other, administrative data sources, bank (mortgage) data, construction companies, and real estate agents. Weights are usually compiled from administrative data sources, national accounts data, Household Budget Survey data, Construction Statistics. This index checks the price changes of homes bought by people for any reason. This means even if someone buys a home not to live in it but to rent it out, it's still counted.

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	The HPI includes every time a new or already existing home is bought, even when one person sells their home to another person. The value is measured using as base year 2010 with value 100 for all countries the panel data showing relevant increases or decreases.
Immigration Inflow	It is the number of people entering a country from another member state or a third country. One limitation that we have in the data is that illegal migration which also affects house prices is not accounted for. The Eurostat service provides data on illegal immigrant but these estimates are not detailed by country but to the whole of the European Union. As consequence, the data used account only for legal migrants and if the number of illegal immigrants is highly correlated with the number of legal immigrant inflows questions the validity of the findings. However, as Saiz (2007) states, the number of illegal Immigrants may be offset by the number of foreigners that left the country in that year offsetting the effect. Therefore, I assume that Legal and illegal immigration are not perfectly correlated and the offset explained above to support the findings.

Source: Eurostat

Table 6.2

Variable	Source
Tertiary Education	Eurostat
Building Permits (1000s)	Eurostat
Overcrowding rate	Eurostat
Crime per 1000 citizens	Eurostat
Population	Eurostat
Immigration inflow	Eurostat
Unemployment rate	Eurostat
House Overburden cost	Eurostat
ΔHPI	Eurostat
Inflation Rate	World Bank
Immigration Population in 2004	World Bank

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Table 6.3

Immigration inflows and House Price Index by region

Region	Year	Immigration inflow	HPI	Region	Year	Immigration inflow	HPI
Northern Europe	2011	340111	102.8	Southern Europe	2011	865382	96.7
	2012	360723	104.5		2012	753363	91.9
	2013	382775	109.4		2013	687772	89
	2014	411214	117.29		2014	685280	89.4
	2015	435743	124.1		2015	748653	91
	2016	470977	132.3		2016	896803	94.1
	2017	436731	143		2017	1067440	97.9
	2018	443153	150.5		2018	1188553	102.5
	2019	423678	157.5		2019	1339953	108
	2020	359833	164.8		2020	906571	110.8
	2021	411230	183.6		2021	997212	115.3
Region	**Year**	**Immigration inflow**	**HPI**	**Region**	**Year**	**Immigration inflow**	**HPI**
Western Europe	2011	1189231	103.5	Eastern Europe	2011	402804	97.5
	2012	1285684	105.3		2012	496354	94.2
	2013	1403935	106.7		2013	491017	92.16
	2014	1632351	108.6		2014	499244	92.2
	2015	2438892	112.2		2015	498234	95.4
	2016	1872892	118.2		2016	522993	101
	2017	1739259	124.4		2017	573851	109
	2018	1743487	131.3		2018	626804	118
	2019	1773459	139.5		2019	737530	128
	2020	1438825	150.9		2020	608362	137
	2021	1708459	168.1		2021	690319	153

Note:
Northern Europe: Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden
Southern Europe: Cyprus, Greece, Italy, Malta, Portugal, Spain
Western Europe: Austria, Belgium, France, Germany, Luxembourg, Netherlands
Eastern Europe: Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia
HPI is the average between countries in each region for each year

STATISTICAL TESTS

The Levin, Lin & Chu was used to test for stationarity and **Variance Inflation Factor (VIF)** for multicollinearity. Results are shown below and were performed after the transformations of the data following existing literature:

Table 6.3

	p-value	VIF (UNCENTERED)
LogHPI	0	
Immigration Inflow / Pop t-1	0	4.16
IV Estimator / Pop t-1	0	1.48

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ΔTertiary education	0	1.90
Building Permits (thousands)/Population t-1	0	1.22
Crime per 1000 (homocide)	0.0000	1.22
Population t – population t-1 / population t-1	0.0002	2.84
Unemployment Rate	0	1.62
Δ Log GDP per capita	0.045	2.76
Inflation Rate	0	3.85

Breusch Pagan test for heteroskedasticity of the Error term

H0: homoskedasticity.

H1: heteroskedasticity.

Results:

- Test Statistic: Chi-squared = 136.52
- p-value: 0.0000

Conclusion: p-value is 0, reject null hypothesis at all significance levels. There is significant variation in the panel data. To account for this, I have used robust standard errors in all my models.

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Hausman test

Hypotheses:

- $H0$: The random effects model is appropriate
- $H1$: The fixed effects model is appropriate

Results:

- *Chi-square statistic: 0.06*
- *P-value: 0.9996*

Conclusion: p-value is very high (0.9996), fail to reject null hypothesis. Random effects model is selected**.**

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