Factors Affecting Housing Prices: International Evidence

Christos S. Savva*

Department of Commerce, Finance and Shipping, Cyprus University of Technology

Abstract

This paper investigates how changes in key macroeconomic variables influence the growth in house prices, using a panel data methodology for a sample of 24 countries. The main findings suggest that population; economic growth, stock returns and inflation are key factors for the increase in the housing price index. Moreover, as expected, construction cost is associated with the housing prices. In contrast, interest and unemployment rates adversely affect housing prices.

Keywords: Empirical Modeling; Property Prices; Housing Markets; Panel-Data Analysis

1. Introduction

The housing sector in most countries is the main driver of economic growth and constitutes a popular topic of study. From the public sector's perspective, the weakening of this sector has severe implications for future economic expansion because it constitutes a big part of government revenue (through taxes on house ownership and stamp duties imposed on transaction in real estate market). From the households' perspective, it constitutes the biggest part of their wealth influencing consumer spending, saving decisions, and the tide of residential construction jobs.

Figure 1 shows the home ownership rate in selected European countries and highlights the importance of the real estate sector. More specifically, it shows the homeownership rate (defined as the share of owner-occupied dwellings of all homes). In 2016, the homeownership rate in Norway amounted to 82.7 percent. The homeownership rate in the presented European countries extended from 42.5 percent in Switzerland to as much as 96 percent in Romania. More developed European countries, such as France or Germany, tended to have a lower homeownership rate compared to the frontier countries, such as Lithuania or Slovakia. The share of house owners among the population of all 28 European countries has remained relatively stable over the past few years, amounting to approximately 69 percent.

In many countries around the globe (see for instance the cases of the US, UK, Spain, Ireland, Japan among others) housing markets experienced large cyclical variations in prices and volumes, with these cycles being characterized by a surge in prices followed by a fall or crash (Nneji et al., 2013). Hence, in combination with the importance of housing market mentioned above, it is important to identify which macroeconomic variables and how they are linked to house price dynamics. It

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* Address: Department of Commerce, Finance and Shipping, Cyprus University of Technology, P.O. Box 50329, 3603 Limassol, Cyprus. +357 25 002349 E-mail: christos.savva@cut.ac.cy

is also of great importance to examine these linkages under an econometric framework that takes into account as many countries as possible.

In the first step, a selection of the most important macroeconomic variables should be identified. In the extant literature, the majority of studies identify interest rates as the most important explanatory variable for various countries (Abraham and Hendershott, 1992; for the US, Iacoviello and Minetti, 2003; for European countries including the UK, Himmelberg et al., 2005; Adams and Füss, 2010; Holly and Jones, 1997; McQuinn and O'Reilly, 2008; Bouchouicha and Ftiti, 2012; among others). Mayer and Somerville (2000) suggested construction cost as a possible factor that affect house prices while Brunnermeier and Julliard (2008) conclude that inflation plays important role. Beltratti and Morana (2009) suggest global macroeconomic shocks, Adams and Füss (2010) provide evidence that variables linked to economic activity (such as industrial production and the level of unemployment) influence house price.[1] Finally, Pashardes and Savva (2009) suggest that population and financial performance (stock returns) are good candidates to explain the fluctuations in housing market.

Nevertheless, the majority of above studies deal with a single country or region; hence they do not depict the true picture of the relationship between macroeconomic factors and house prices growth for a larger number of countries.[2] Therefore, they may lead incomplete picture regarding the effects of real economy on housing market.

The purpose of this study is to investigate how changes in key macroeconomic variables could influence house prices growth, using a panel data methodology for a sample of 24 countries. Therefore, the contribution of this paper is twofold: From a methodological perspective it applies a dynamic panel estimation approach while from data coverage it performs the analysis on the majority of the European countries.

The main findings suggest that population; economic growth, stock returns and inflation are key factors for the increase in the housing price index. Moreover, construction cost is associated with the housing prices while in contrast to the above, lending (interest) and unemployment rates adversely affect housing prices.
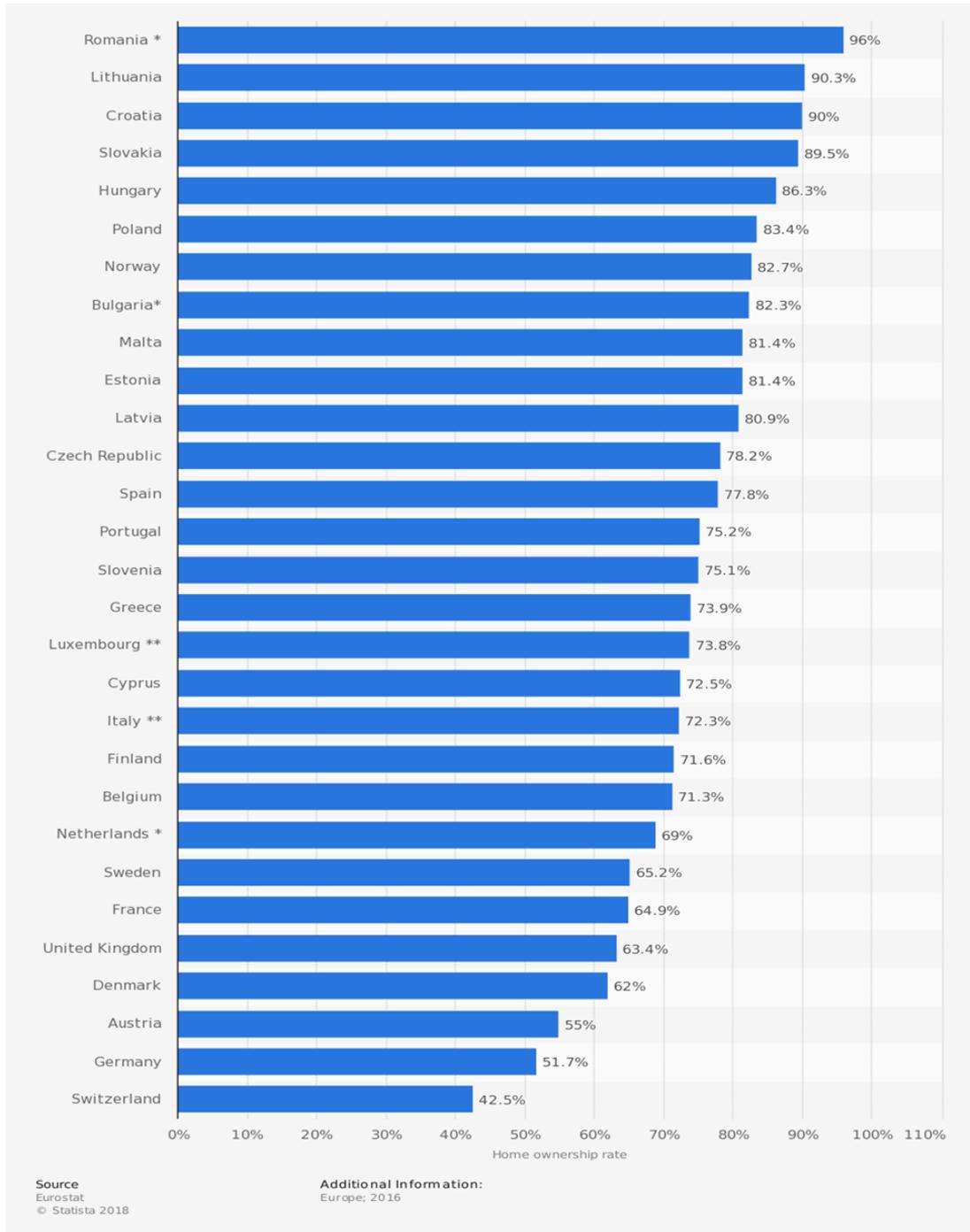
The rest of the paper is organised as follows: Section 2 describes the data while Section 3 discusses the methodology. Section 4 presents the results and Section 5 indicates the policy implications of the main findings and concludes.

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[1]See also the work of Englund and Ioannides (1997), Tsatsaronis and Zhu (2004) and Glindro et al. (2011) for similar suggestions.

[2]Exceptions include the work of Hibers et al. (2008) and Olesen (2013) who examine a larger number of countries.

FIGURE 1

Homeownership rate in selected European countries in 2016

Country	Home ownership rate
Romania *	96%
Lithuania	90.3%
Croatia	90%
Slovakia	89.5%
Hungary	86.3%
Poland	83.4%
Norway	82.7%
Bulgaria*	82.3%
Malta	81.4%
Estonia	81.4%
Latvia	80.9%
Czech Republic	78.2%
Spain	77.8%
Portugal	75.2%
Slovenia	75.1%
Greece	73.9%
Luxembourg **	73.8%
Cyprus	72.5%
Italy **	72.3%
Finland	71.6%
Belgium	71.3%
Netherlands *	69%
Sweden	65.2%
France	64.9%
United Kingdom	63.4%
Denmark	62%
Austria	55%
Germany	51.7%
Switzerland	42.5%

Home ownership rate

2. The Data

Based on the related literature we use quarterly data for the following series (balanced panel data set): For house market price index we use the index constructed by Eurostat. Further, we employ for each country in the dataset; Lending Rate, Gross Domestic Product, Unemployment rate, Stock market Index, Construction Cost Index, Population and Inflation Rate. All series were transformed to render stationarity. Specifically, as a dependent variable we use the percentage change of house price index (ΔHP), while for independent variables we employ change in Lending Rate (ΔLR), percentage change of GDP, which basically proxies for economic growth (GROWTH), percentage change of Stock Price Index, i.e. stock returns (SR), and percentage change of Construction Cost Index (CONSTR). Unemployment Rate (UNEMP) is expressed in rates while inflation (INFL) is the percentage change of the consumer price index. Finally, population growth (POPUL) is expressed as the percentage change of the population.[3,4]

The data spans from 2001Q1-2015Q4 and covers 24 countries, namely: Germany, Spain, Italy, Lithuania, Ireland, France, Luxemburg, Hungary, Cyprus, Austria, the Netherlands, Finland, Portugal, Bulgaria, Slovenia, Sweden, Malta, Belgium, Estonia, Romania, Denmark, UK, Czech Republic and Slovenia. The choice of the countries was based on data availability.

3. Methodology

3.1. Empirical Specification

Our main objective is to examine the short-run determinants of the change in housing prices in various economies. The estimation strategy, in terms of the choice of potential determinants is driven by the existing literature, as outlined in the introduction. We wish to draw attention, however, to the short-run determinants given the limited empirical work on this front. Given our main interest, the regression specification is:

$$\Delta HP_{it} = \beta_0 + \beta_1 \Delta LR_{it} + \beta_2 GROWTH_{it} + \beta_3 CONSTR_{it} + \beta_4 UNEMPL_{it} + \beta_5 SR_{it} + \qquad (1)$$
$$\beta_6 POPUL_{it} + \beta_7 INFL_{it} + \varepsilon_{it}$$

The panel estimations we use consider a variety of techniques. We first estimate equation (1) with pooled OLS with robust standard errors adjusted for heteroskedasticity and serial correlation. We next consider the random effects estimator and control for unobserved country-specific effects using the fixed effects estimator.[5] In both cases we report robust standard errors adjusted for arbitrary serial correlation and heteroskedasticity. An additional way to correct for serial

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[3]Another important variable for this analysis is the bank credit. Unfortunately, due to lack of data for most of the countries in our sample we are not able to include it in the analysis.

[4]Transforming the variables in annual changes (of quarterly frequency) instead of quarterly changes yield results that are qualitatively the same.

[5]The fixed-effects model controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics. The rationale behind random effects model is that, unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model.

correlation in the errors is to assume that the errors follow an AR(1) process. We therefore estimate parametric models with the fixed and random effects GLS estimators that allow for AR(1) structure of the error term. For robustness, we also estimate the models with FGLS with panel heteroskedasticity and panel specific autocorrelation with AR(1) disturbances.

Furthermore, we consider models using fixed and random effects that also account for time effects. Finally, a dynamic specification using Arellano and Bond (1991) technique (that includes the lag value of the dependent variable) is also employed. The advantage of the dynamic panel model is cited to fact that is able to model the dynamic nature and features that vast majority of economic relationships have (i.e, dynamic panel models contain dependent variable with one or more lags in according with its characteristics and capture the long-run impact).[6]

3.2. Expected signs of the variables of interest

As stated in introduction a number of variables were identified as possible candidates that affect housing prices. In the next paragraphs, based on economic/finance theory we report the expected sign of the effect of these variables on housing prices.[7]

Starting with the lending rate we expect a negative impact. The economic literature suggests that an increase in the mortgage rate reduces the affordability of housing assets. This fact compels some potential buyers to abandon the market. As a result, this decline in demand for housing curbs housing prices.

GDP growth which generally accounts for the prosperity of households is expected to have a positive effect on housing prices. More specifically, any increase in households' ability to consume more makes it more affordable to purchase a home. Therefore, increases demand for housing and induces an increase in housing prices appreciation since the supply of housing is fixed in the short run.

As for the unemployment, we expect rising unemployment to reduce the demand for housing. Increase in unemployment reduces disposable income and the purchasing power of the household. Consequently, it reduces the ability of the household to buy a house.[8]   House prices are expected to negatively correlate to equity prices, mainly because of the existence of substitution effects. When stock returns are high, investors (i.e. people who buy and sell houses to make profit) are moving from housing market to stock market when the latter is more profitable, and vice versa.

Moving to the case of population growth, the effects are expected to be positive. For instance, an increase in population fuels demand for housing since more people have to share the existing number of housing properties.

Finally, construction cost and inflation are expected to positively correlate to housing prices since higher cost in materials/labour leads to higher prices.

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[6] For the readers who are interested for more details regarding the panel-data techniques employed in this research we refer to Badi Baltagi's book entitled "Econometric Analysis of Panel Data".

[7] This part heavily draws on the work of Arestis and Gonzalez (2013).

[8] Indirect effects or unemployment also have effects on housing market. For instance, in the presence of unemployment, households freeze any plan for investments and banks are reluctant to issue new mortgages causing a decline in demand for housing, which reduces housing prices appreciation. Finally, because of the unemployment some home owners have to sell their properties in order to cover their needs.

The previous discussion can be summarized in equation below:

$$\Delta HP = F(\Delta LR, \text{ GROWTH, CONSTR, UNEMP, SR, POPUL, INFL})$$
$$- \quad + \quad + \quad - \quad - \quad + \quad +$$

4. Empirical Findings

We begin our investigation by estimating equation (1) for the short-run determinants of the change in housing prices with OLS, FE, RE, and Dynamic specification using the set of control variables described above.[9] The results are presented in Table 1 and all six columns verify the expected signs in accord with economic theory (except from the case of stock returns).

More specifically, population growth positively affects housing prices changes. This effect may be attributed to two components that influence population growth. The first one is the natural population growth (i.e. higher birth-rates in combination with lower mortality rates, which takes place slowly over longer periods of time) and the increase of immigration, which occurs quickly and unexpectedly. The difference between the two components is the degree of predictability of each of the components. The former follows an expected course while the latter is sudden and market-driven.[10]

Unemployment rate is negatively correlated with housing prices changes. Countries with high unemployment rates have lower demand for properties, therefore housing prices drop. Furthermore, some anecdotal evidence suggest that house prices do not bottom in real terms until the unemployment rate has peaked. GDP growth is highly significant and has the expected positive sign in all regressions (except from the cases where time-effects are imposed in the regressions), indicating that changes in income are strongly positively related to changes in house prices. House prices in the countries in our sample, by contrast to what expected are positively correlated with equity prices, indicating possible wealth effects. A possible explanation is that people investing in stock markets become richer and reinvest some of their profits in housing market, increasing in that manner the demand for properties.

As indicated in previous section, construction cost and inflation rate are expected to positively correlate to housing prices, since higher cost in materials/labour leads to higher prices. Indeed, the empirical findings support the positive effects of the two variables on housing prices. Lending rate coefficients in all cases have the expected negative sign and are highly significant, indicating that lowering of lending rates is associated with rising in house prices. Finally, column 6 of the table presents the results of the dynamic panel data specification which includes the lag value of the dependent variable. The coefficient of this variable is highly significant and relatively big in magnitude suggesting that there are some persistence effects in housing market. For instance

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[9]Hausman test suggests that Fixed effects (FE) is at least as consistent as Random Effects (RE).
[10]The size of impact of each component remains an open question for further research.

when prices are high during one quarter tend to remain high in subsequent quarters and vice versa.

5. Discussion and Conclusions

This study (by employing a panel data methodology) investigates how changes in key macroeconomic variables (such as lending rate, growth, construction cost, unemployment, stock returns, population and inflation) influence housing prices growth, using a sample of 24 countries over the period that spans from the first quarter of 2005 to the fourth quarter of 2015.

The main contribution of this study compared to the existing literature is the relatively large sample employed (24 European countries) and the various panel data techniques employed to answer the research questions and illustrate/verify the main findings.

The main findings suggest that population; economic growth, stock returns and inflation are key factors for the increase in the housing price index. Moreover, construction cost is positively associated with the housing prices. In contrast, with the above, interest and unemployment rates adversely affect housing prices.

Hence, if the policy makers want their policies to have effect on housing market they should seek for the following:

- Increase the growth rate of the economy which will lead to an increase in household income and consumption.

- Proceed with innovations in mortgage markets starting with the reduction of lending rates.

- Introduce policies that reduce unemployment.

- Generally, improve macro economic conditions (create stable economic climate of low inflation and positive economic growth).

More specifically, the main findings suggest a strong link between inflation and lending rates with the housing prices. This link suggests that long periods of elevated inflation followed by a sharp deceleration of price growth may breed misalignments between house prices and the determinants of real estate values. Situations like this might call for greater caution on the part of monetary authorities. Therefore, prudent policies may guarantee the stability of house prices.

Finally, a note of caution should be taken in interpreting the findings of this study. While the aim of the paper is to include as many countries as possible in the analysis, each country has its own specificities and house prices in different countries are affected by various other factors (for instance foreign investment in the real estate market can have a significant impact on house prices in countries like Cyprus, Spain, Malta, UK, while it may not be important for Finland, Sweden, Denmark, etc.). Therefore, an alternative methodology such as Multi-country VAR model (Canova and Ciccareli, 2009) or grouping the countries under examination (Tsatsaronis and Zhu, 2004) can be employed to examine similar research question. We leave this issue open for future research.

TABLE 1
Change in housing prices – estimation results

Variable	OLS	FE	RE	FE-time effects	RE-time effects	Dynamic Panel
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	9.090	8.345	8.826	53.312	53.099	-0.347
	(10.618)	(10.546)	(12.864)	(55.210)	(56.048)	(0.775)
Population	0.029***	0.025***	0.028***	0.014**	0.016**	0.022***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Unemployment	-0.030***	-0.032***	-0.031***	-0.030***	-0.029***	-0.028***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Growth	0.015***	0.015***	0.015***	-0.004	-0.003	0.012**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Stock Returns	0.030***	0.029***	0.029***	0.016***	0.016***	0.027***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)
Construction Cost	0.546**	0.599**	0.566**	0.488**	0.449**	0.358
	(0.294)	(0.294)	(0.293)	(0.289)	(0.288)	(0.307)
Inflation Rate	0.118***	0.121***	0.119***	0.109***	0.106***	0.103***
	(0.026)	(0.026)	(0.026)	(0.031)	(0.031)	(0.026)
Lending Rate	-0.183***	-0.182***	-0.183***	-0.098***	-0.099***	-0.106***
	(0.026)	(0.025)	(0.025)	(0.033)	(0.033)	(0.043)
Lag Dependent	-	-	-	-	-	0.358***
						(0.080)
Countries/Observations	24/1032	24/1032	24/1032	24/1032	24/1032	24/984
R-square	0.228	0.272	0.272	0.366	0.366	

Notes: Dependent variable is the log change in housing prices index. Robust standard errors adjusted for heteroskedasticity and serial correlation for the OLS, FE, and RE estimators are reported in parentheses. ***and ** denote 1% and 5% level of significance, respectively. Country and time dummies are not reported.

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