THE ROLE OF CONSUMER CONFIDENCE IN THE PROPERTY MARKET: ONE STEP FURTHER IN THE COINTEGRATED HOUSE PRICE SERIES MODEL

Luis Lample
University of San Jorge (Spain)

Luis Ferruz
University of Zaragoza (Spain)

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Abstract

Is confidence important in the recovery of a general economy or a specific sector? This study aims to analyse the contribution of the consumer confidence index and its main components to the house price forecasting model. Based on the cointegrated series model by Ferruz and Lample (2016), the addition of consumer sentiment variables maintains long-run equilibrium through the Johansen test. Furthermore, the subsequent ECM has proven the contribution of information on the variable and the improved predictive quality of the short-run model. The significant nature of the variables confirms their validity in this study of Spain.

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Introduction

In reviewing the literature on this topic, the housing market’s behaviour could be explained by many authors who focused their research on the housing bubble and the factors that influenced its formation.

To find the key variables that affect housing prices is the main purpose of our research in order to build afterwards a prediction model for an economic interpretation.

This model will answer the question that every economic player has: When will the maximum prices from before the crisis return?

A year before it happened, Shiller (2006) asked in his analysis about the possibility of the housing bubble to burst and the kind of correction -a harsh or a gradual one- that could be done in order to return prices to their previous state. He was more inclined towards a slow recovery process.

In this study, two key factors that have unquestionably affected housing prices have been confirmed: the progressive growth of banks through indebting families with mortgages and the continued decrease in the types of interest associated with such purchases.

The first key factor is related to different studies performed by authors such as Delgado et al (2007). His research reveals how, in addition to major banks, the expansion of Savings Banks, Credit Unions and smaller banks has considerably increased the amount of guaranteed loans and has enabled the extending of loans to small-scale borrowers.

A first analysis shows a considerable increase of the growth rate in the construction sector between 1990 and 2014. Furthermore, the rate of new granted mortgages grew at an even higher rate during the same period. Our first key variable comes from the difference of these two series, thereby quantifying the excess of mortgages granted (Figure 1). It has been proved how the progressive and accelerated growth of the mortgages provision has affected housing demand and, therefore, the formation of the housing bubble (Figure 2). The employed methodology will help to reveal whether or not this relationship is genuine and exists a long-term validity.

Figure 1
Other authors, such as Hofmann (2004), Gerlach and Peng (2005) Oikarinen (2009), McDonald (2011) and Zhang et al (2015) use different methodologies to analyse the relationship between a number of variables, including housing prices and debt in several countries.
The methodology applied in the cointegration analysis for the variables in this study has been used by other authors, including Martinez-Pagés and Maza (2003), who analyse the cointegration relationship between housing prices and real estate stock in Spain. Martinez-Carrascal and del Rio (2004) also study the long-term equilibrium model between family consumption and debt. Similarly, Gimeno and Martinez-Carrascal (2010) show the links between mortgage debt and, in this case, long-term housing prices in Spain. Along these same lines, Çelik and Özerkek (2011) perform panel data analysis with the cointegration test to show the long-run equilibrium between consumer confidence and other economic and financial variables in different European Union countries. Finally, Berisha et al (2015) use the Johansen and Engle-Granger tests and the consequent short-term model through ECM, used by Pesaran et al (2000), to determine the cointegration of family debt and income inequality in the United States.

As previously explained, the main objective of the line of research that this article has followed involves finding the key variables affecting house prices. The model designed by Ferruz and Lample (2016) proves how the excess number of mortgage loans granted and the theoretical effort without deductions are series of cointegrated house price variables. Using the ECM, this analysis has confirmed the gradual recovery of equilibrium prices, Shiller (2006).

In the search for variables that are able to provide further information for the model, we have found consumer confidence to be a possible candidate. Analysis of consumer confidence and its use in predicting economic activity has been the subject of many different studies. This study aims to find whether confidence in the economy truly helps in the recovery of house prices.

Figure 3 shows the evolution of the consumer confidence index in Spain. In an initial descriptive analysis, it can be seen how certain economic, political or social events have been able to affect consumer sentiment.
The data series runs from the first quarter of 1995 to the last of 2015. Initially, the graph shows a stage of economic recovery from a financial crisis that began in 1992 and caused high inflation. Progressive growth in confidence can be seen during this period, accompanied by the meeting of requirements to enter the European Union in 1998. This is followed by a minor slowdown with the increase in inflation rates from 1998 to the year 2000. From then on, there was a sudden change in trend following the dotcom crash in the year 2000. Different events, such as the terrorist attacks on 11th September 2001, the Iraq war in 2003 and the terrorist attacks in Madrid on 11th March 2004, did nothing to help recover confidence. Only the monetary policies on minimal interest rates seemed able to cushion its fall. However, it could not maintain these levels and experienced its greatest drop following the start of the subprime mortgage crisis of 2007 and the subsequent international impact on the real economy. In Spain, the financial and property crisis had a notable effect on the economy, especially unemployment. The latest drop in confidence seems to have been due to the lack of market confidence reflected by the increase in the risk premium on public debt. Lastly, as of late 2012, optimism has improved to reach positive levels that had not been seen since the end of 1999.

In reviewing the literature, Tsuchiya (2014) proves consumer sentiment to be a useful predictor of durable goods consumption and price indexes. The author uses directional analysis with the estimation of thresholds in extreme-value applications.

Along the same lines, Dees and Soares (2013) assess the link between consumer confidence and consumption expenditures for the United States and the Euro area. More specifically, they prove increased predictive power in the event of major changes in
confidence indices. The results are obtained based on out-of-sample analysis with non-linear models.

Kilic and Cankaya (2016) use a factor-augmented vector autoregressive (FAVAR) approach to study the effects of consumer confidence on US economic activity. The results show that consumption expenditure and housing market variables are strongly correlated with this index.

The methodology applied in the cointegration analysis of study variables has been used by other authors, such as Gimeno and Martinez-Carrascal (2010), who show the linkages between mortgage debt and long-run house prices in Spain.

Finally, the results obtained confirm the existence of cointegration with the addition of the consumer confidence variable to the model and house prices in Spain for the period analysed. Subsequently, the ECM in the short-run model has proven its improved quality, along with significance in variables with different lags.

This paper is structured as follows: Section II provides the data series and methodology used; Section III explains the results obtained and, finally, the conclusions are presented in Section IV.

Data Series and Methodology

Firstly, the cointegrated series model by Ferruz and Lample (2016) between house prices and the explanatory variables that forms it, the theoretical purchase effort with deductions and the excess of mortgages granted, has been used as a basis. Subsequently, the consumer confidence index variable has been added and it was confirmed that the model maintained the existence of cointegration. All variables have been expressed in quarterly terms and the period was between the first quarter of 1995 and the last of 2014.

The general model\(^1\) is expressed as follows:

\[
\Delta X_t = \prod X_{t-1} + \sum_{j=1}^{q-1} \Gamma \Delta X_{t-j} + \varepsilon_t
\]

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\(^1\) Data published by Bank of Spain and Ministry of Development. EM is own elaboration from data of Bank of Spain and Ministry of Development.

The variables have been deseasonalised using TSW (Tramo Seats methodology). The housing price variable has been deflated by using the CPI.

The rate of correlation between the variables, which might cause multicollinearity problems, has been analysed.

Ramsey’s reset test was used to verify that the functional form is adequate.
Where $X_t$ is a vector including House Price per m$^2$ (HP), Excess of Mortgages granted (EM), Theoretical Purchase Effort without deductions (TE) and Consumer Confidence Index (CCI).

The Johansen test has been performed to prove the existence of cointegration based on the range of the corresponding matrix. The null hypothesis means that there is no cointegration and the alternative hypothesis expresses the existence of at least one cointegration vector. As a result, the range of the matrix is one. In the following test, the search for cointegrating vectors that the range gives the matrix is increased. Following this reasoning, a possible maximum number of vectors is reached, which is the same as the number of explanatory variables.

The test has been performed with the constant unrestricted. The variables are introduced up to four lags for the quarterly frequency of the series. This test uses the maximum likelihood method for the estimation.

Once the existence of cointegration, a non-spurious long-run equilibrium relationship, was confirmed, the short-run equilibrium model was built using the error correction mechanism (ECM), Pesaran et al (2000). Based on the correction residual, the contribution of the confidence variable to returning in advance to the situation of equilibrium has been confirmed. Specifically, based on a high coefficient of the correction residual, which means correcting more each period. Furthermore, the $R^2$ result shows the quality of the model prediction.

**Estimation Results**

Firstly, the Johansen test has indicated the existence of up to two cointegration vectors, as the null hypothesis is rejected. The matrix range at the corresponding significance levels was greater than three. Null hypothesis was rejected in following tests and, therefore, the existence of up to two long-run equilibrium vectors is accepted. It must be noted that in both the trace test and the maximum eigenvalue test, the highest significance level suggests the existence of cointegration.

Table 1 shows the results of the Johansen test for the period analysed:

**Table 1. Cointegration test**

| Johansen test | Number of equations = 4 |
The matrix of the long-run model is represented in Table 2, which shows the correlation between the variables. The correlation is positive between house prices and the number of mortgages granted and negative with the theoretical effort that families must make to purchase a home\(^2\). It is also negative with the confidence index, given that the series remains at negative values for almost all of the period analysed. The consumer confidence index is built on the questions posed on the individual economic situation of homes and the general economic situation of the country, as well as family expectations regarding unemployment and savings. The methodology used for the assessment is a simple arithmetic method of positive or negative balances\(^3\) obtained from the scores of the answers.

Table 2. Long-term matrix

\[(\alpha * \beta)\]

<table>
<thead>
<tr>
<th>Range</th>
<th>Eigenvalues</th>
<th>Trace Statistic</th>
<th>p-value</th>
<th>Log-likelihood</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.36724</td>
<td>62,963</td>
<td>[0.0008]</td>
<td>34,325</td>
<td>[0.0041]</td>
</tr>
<tr>
<td>1</td>
<td>0.18038</td>
<td>28,638</td>
<td>[0.0684]</td>
<td>14,919</td>
<td>[0.3070]</td>
</tr>
<tr>
<td>2</td>
<td>0.11417</td>
<td>13,719</td>
<td>[0.0904]</td>
<td>9,0925</td>
<td>[0.2850]</td>
</tr>
<tr>
<td>3</td>
<td>0.059824</td>
<td>4,6266</td>
<td>[0.0315]</td>
<td>4,6266</td>
<td>[0.0315]</td>
</tr>
</tbody>
</table>

Note: p-values are given in brackets denote rejection of the hypothesis at 10%, 5% and 1% levelsSource: Own elaboration.

\(^2\) The Bank of Spain develops this indicator based on the quotient between the cost during the first year of a fixed-rate mortgage, those currently being used, with a term of 15 years and which allow 80% of the price of an average home to be financed, and the average annual salary. An average home is considered to be a property of 93.75 m\(^2\) built space (approximately 75 m\(^2\) of usable floor space).

\(^3\) The balances are corrected for seasonality.
Finally, the short-run equilibrium model has been calculated in Table 3 using the error correction mechanism (ECM). VECM\(^4\) is estimated by using the method of maximum likelihood.

Table 3. Vector error correction model

<table>
<thead>
<tr>
<th>VECM</th>
<th>∆Housing Price</th>
<th>Lags: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>96:01 - 14:03</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>17,0733</td>
<td>0,00025***</td>
</tr>
<tr>
<td>∆ HP t-1</td>
<td>0,118553</td>
<td>0,21436</td>
</tr>
<tr>
<td>∆ HP t-2</td>
<td>-0,0278547</td>
<td>0,76782</td>
</tr>
<tr>
<td>∆ HP t-3</td>
<td>0,116932</td>
<td>0,21663</td>
</tr>
<tr>
<td>∆ HP t-4</td>
<td>0,805510</td>
<td>0,00001***</td>
</tr>
<tr>
<td>∆ TE t-1</td>
<td>1,65673</td>
<td>0,11334</td>
</tr>
<tr>
<td>∆ TE t-2</td>
<td>0,494651</td>
<td>0,65352</td>
</tr>
<tr>
<td>∆ TE t-3</td>
<td>-1,26226</td>
<td>0,25127</td>
</tr>
<tr>
<td>∆ TE t-4</td>
<td>-0,120648</td>
<td>0,90599</td>
</tr>
<tr>
<td>∆ EM t-1</td>
<td>0,000233730</td>
<td>0,00183***</td>
</tr>
<tr>
<td>∆ EM t-2</td>
<td>0,000236222</td>
<td>0,00211***</td>
</tr>
<tr>
<td>∆ EM t-3</td>
<td>0,000178633</td>
<td>0,01500**</td>
</tr>
<tr>
<td>∆ EM t-4</td>
<td>0,000190818</td>
<td>0,00124***</td>
</tr>
<tr>
<td>∆ CCI t-1</td>
<td>-0,239214</td>
<td>0,62517</td>
</tr>
<tr>
<td>∆ CCI t-2</td>
<td>0,182863</td>
<td>0,71167</td>
</tr>
<tr>
<td>∆ CCI t-3</td>
<td>-0,0272961</td>
<td>0,95413</td>
</tr>
<tr>
<td>∆ CCI t-4</td>
<td>-1,20507</td>
<td>0,01488**</td>
</tr>
<tr>
<td>EC1</td>
<td>-0,0269518</td>
<td>0,00020***</td>
</tr>
<tr>
<td></td>
<td>Adjusted R²</td>
<td>0,795891</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** denote significance at 10, 5 and 1% levels, respectively.
Source: Produced by the authors.

The resulting model includes the explanatory variables and the endogenous variable up to four lags. The explanatory variable Consumer Confidence Index with four lags has resulted in high levels of significance. Although certain variables were not significant at levels of 1%, 5% and 10%, they have been included in the model due to their relevant contribution towards the economic interpretation. The adjusted determination coefficient R² has shown an explanatory capacity of the prediction of 79,58%. As a result, with the

\(^4\) The Breusch-Godfrey test was used to analyse whether or not there were any problems with autocorrelation, the ARCH test was used to analyse heteroscedasticity and the Jarque-Bera test was used to analyse normality. Ramsey’s reset test was used to verify that the functional form is adequate.
addition of the confidence variable, prediction quality has improved by almost 2.4% taking into account the estimation variance.

Continuing with the results of the analysis, the variable EC1 represents the error correction term with one lag, which is significant at levels of 1%. The coefficient of this variable indicates the speed of adjustment or correction quantity for each period. Therefore, quarterly correction has improved from 1.55% to 2.69%, returning beforehand to the level of equilibrium. In other words, the results indicate a minimum of nine years and a quarter to return to the maximum house price levels of 2006.

The values obtained individually using the components that form the confidence coefficient have been similar, the index as a whole being the variable that has performed the best.

**Conclusions**

Economic, political and social events affect consumer confidence and, therefore, consumer behaviour. Reactions to certain events may affect the general economy and a specific market. In this study, the information provided by the consumer confidence index in economic prediction models has been analysed for the property market in particular. The results of the Johansen test have confirmed the existence of up to three cointegration vectors in the long-run equilibrium model. Therefore, with the addition of the consumer confidence variable, the Ferruz and Lample (2016) model that explains house prices continues to maintain a non-spurious long-run correlation of equilibrium. What is more, a more precise short-run prediction model has been established using the error correction mechanism, reaching a value of up to 79% in the estimation of adjusted \( R^2 \).

The results obtained based on the error correction coefficient indicate a return to the situation of equilibrium in nine years and a quarter, accelerating the adjustment speed thanks to information provided by confidence. It seems that consumer sentiment helps reanimate the property market in particular, perhaps encouraged by economic improvement data. However, we continue to consider a gradual return to the maximum house prices of 2006, coinciding with Shiller (2006).

Finally, we maintain the idea of implementing the model with a higher number of lags. The significance of explanatory variables with more lags indicates that the speed of the transfer of information in the property market could be slower.
References


