The Unemployment Rate and Household Formation in Spain

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Abstract

Household formation does not follow a similar pattern in all European countries since it depends mainly on specific structural factors, such as the socioeconomic conditions to access property and the legal and institutional frameworks that control the housing market in each country. For this reason, this paper studies the effects of a negative shock in household formation in Spain and its duration during the 1995–2017 period. We use a vector autoregressive (VAR) model with different endogenous and exogenous variables that, according to the literature, may have an impact on household formation. The results show that the negative impact on household formation is not immediate but takes about a year to generate results. Also, the rise in unemployment due to the economic crisis explains almost a third of household formation variance, which is strengthened by the impact of housing prices. Finally, there is no virtual development in household formation before a change in housing stock in the short term. This result means that public policies aimed to strengthen housing and, particularly, the emancipation of young people must improve opportunities and labor market conditions to allow young people access to the real estate market.

Keywords

Economic crisis; household formation; Spain; unemployment rate; VAR

Introduction

Household formation does not follow a similar pattern in all European countries, and there are significant differences among these nations. These differences vary widely and depend mainly on specific structural factors, especially the socioeconomic conditions that exist to access property and the legal and institutional frameworks that control the housing market in each country. These factors are coupled with general sociological elements and individual psychological behaviors (Guerrero, 2003).

An analysis of the factors that influence the creation of new households is of singular importance both from a demographic and sociological perspective since the creation of new families, whatever their type, is necessary for social development. Moreover, a delay in creating new households also implies a delay in making other vital decisions, such as deciding whether to marry or have children (Billari & Liefbroer, 2010). These factors may vary depending on the type of society, the time period, and certain structural factors such as socioeconomic variables or economic independence (Anxo et al., 2010). For this reason, different studies (Bosch Meda, 2017; Breen & Buchmann, 2002; Buchmann & Kriesi, 2011; Iacovou, 2002, 2004) have analyzed the main characteristics of household formation in European countries based on the welfare-system distinction developed by Esping-Andersen (1990) and including the late classification extension made by Leibfried (1992) and Kornai (1992). One of the most common conclusions drawn from these studies is that the southern European countries, framed within the so-called Mediterranean or rudimentary model, are those where the delay between young people leaving the parental home and forming a new place is longer.

The reasons that explain this delay are diverse. The model is characterized by individual strategies that prioritize achieving a degree of economic stability before leaving the parental home (Emmanuel, 2013), by low levels of public spending on active employment policies and high rates of youth unemployment, by the significant role the family plays in providing support to access housing (Anxo et al., 2010), by the vigorous promotion of property as the primary tenure system of political authorities (Allen et al., 2004) within the framework of a housing stock characterized by a low proportion of social housing and renting, and by a high proportion of secondary housing (Bosch Meda, 2017).

We should highlight the difficult financial situation that most European countries found themselves in after the 2008 financial crisis, especially if we consider that the economic literature agrees that economic conditions, both on a general and individual level, shape household formation patterns. Thus, an economic recession may cause a delay in this process (Lee & Painter, 2013).

To determine the effect the economic crisis had on the rhythm of household formation in Mediterranean countries, the case of Spain has been chosen. Spain experienced one of the largest housing bubble bursts in terms of prices and the amount of housing stock in Europe in the 21st century. Moreover, to maintain the intense activities of the construction industry, Spain needed a higher household indebtedness rate than other European countries, which worsened the economic consequences after the beginning of the crisis in 2008 (Naredo, 2010).

An analysis of the Spanish case allowed us to study how household formation was affected by improved economic conditions when the housing provision expanded and the

consequences of worsening economic conditions once the crisis occurred. To analyze this issue, we applied a vector autoregressive (VAR) model similar to that used by Choi and Painter (2015) in the case of the United States. The objective was to analyze, by impulse-response functions and variance decomposition, the temporal impact of an increase in household formation and how long it lasts. This model also allowed us to estimate the contribution of each endogenous variable that influences the variation of new households in the short and the long term.

The following section explains the recent evolution in household formation in Spain between 1995 to 2017 and its variables. The third section reviews the relevant academic literature for Europe and the United States and its results, while the fourth section describes the data used and the estimation method. In the fifth section, we present the main results and the conclusions of this research.

Household formation and economic conditions in Spain (1995–2017)

As previously mentioned, the processes of emancipation and home formation are generally conditioned by achieving an initial state of economic independence. Consequently, all those factors that influence the conditions that make economic independence possible directly impact the emancipation and household formation processes. Accordingly, and to the extent that participation in the labor market constitutes the main way to attain economic independence, an analysis of the link between the labor market and household formation is crucial to understanding the dynamics of this phenomenon. However, since the labor market is affected by general macroeconomic conditions, these conditions, in turn, influence the process of emancipation and household formation. Although this process is a personal decision with profound social and demographic implications, it is undeniable that socioeconomic conditions and their patterns of evolution influence this decision. In this regard, the economic literature that analyses this issue highlighted the importance of two essential variables in the behavior patterns of the formation of new households.

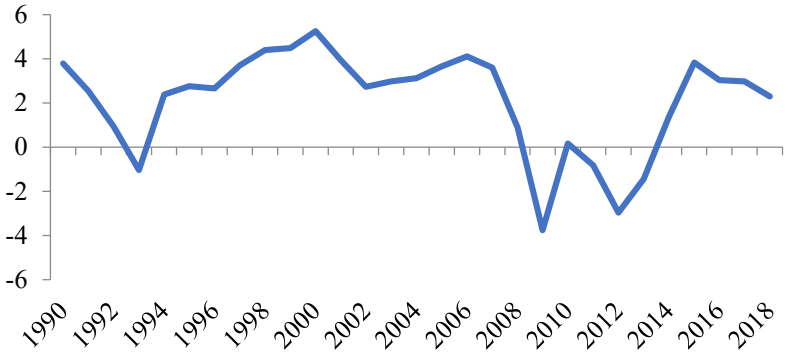
In the first place, there are the labor market conditions. According to Becker et al. (2010), young people who find it challenging to get into the labor market or whose jobs are precarious and poorly paid will struggle to emancipate themselves and create a new home. In this respect, Martínez-Granado and Ruiz-Castillo (2002) analyzed the negative effects of unemployment on household formation in Spain, albeit using a different methodology from the one used in this article.

In the second place, the literature also highlights the importance of the real estate market structure on residential emancipation since this process requires a home that is on the market to buy or rent to be finished. In this sense, an increase in the housing supply, together with an easing of lending standards to access a mortgage, or public policies that facilitate access to rental accommodation for young people, will positively impact the conditions of emancipation.

All these factors were severely affected during the last great financial crisis. In fact, at the end of 2007, the subprime mortgage crisis in the United States significantly impacted international monetary systems with disastrous effects on the European economy. It was the start of a prolonged economic crisis. After over ten years of a positive GDP growth rate in Spain, the 2008 financial crisis ended this trend abruptly. The trend was reversed, and negative rates

appeared for the first time in years, which continued until the start of the 2012 recovery, as shown in Figure 1.

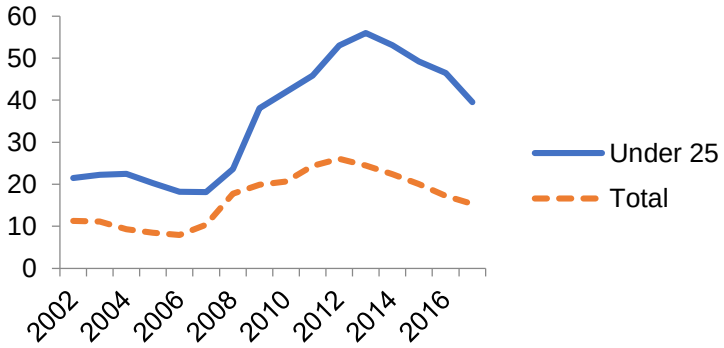
Figure 1: Annual Growth Rate GDP in Spain (1990–2018)



Note: Organization for Economic Co-operation and Development (2020)

One of the variables most affected by the economic crisis was employment. The post-2008 economic slowdown led to a sharp increase in total and youth unemployment rates, both peaking in 2013 (26.06% & 55.97%, respectively), as shown in Figure 2. In 2014, as Barroso (2017) pointed out, there was a cycle change, and the unemployment rate dropped, although there has been a significant deterioration in working conditions, despite the rise in employment.

Figure 2: Total and Under 25 Unemployment Rates in Spain (2002–2018)

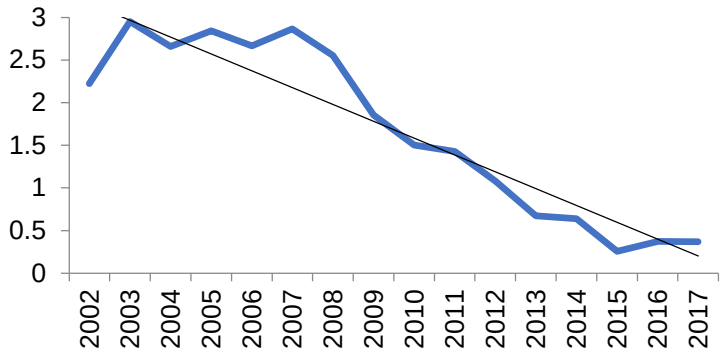


Note: National Statistics Institute (2021)

This study focuses particularly on the evolution of the unemployment rate among young workers since this demographic group has the greatest potential for the creation of new households, and it is, in fact, one of the groups that were the hardest hit in Spain due to the lack of jobs as a result of the crisis. As can be seen in Figure 2, the differential growth in the unemployment rate among young workers compared to the unemployment rate for workers of all age groups from 2008 clearly shows the greater vulnerability of this age group concerning the changing trend, with predictable consequences on the prospects of setting up their own family home. Indeed, as Lee and Painter (2013) mentioned this increase in the unemployment rate among young workers meant that they did not become part of the labor market and therefore had no expectations of household formation.

In short, the rise in unemployment in the whole workforce and among young people suggests that there has been a slowdown in household formation in recent years due to economic shortcuts. This is because a household's consumption decisions, especially those related to housing access, are strongly influenced by family incomes. Hence, unemployment or job insecurity may have a negative impact on emancipation and decisions regarding household formation (Barceló & Villanueva, 2018; Becker et al., 2010). As shown in Figure 3, the growth rate for new households in Spain during the first few years of the 21st century reached its highest peak in the last 20 years, around 3%. Still, after the crisis, it dropped sharply and progressively, coinciding with lower GDP growth rates and a steady increase in unemployment.

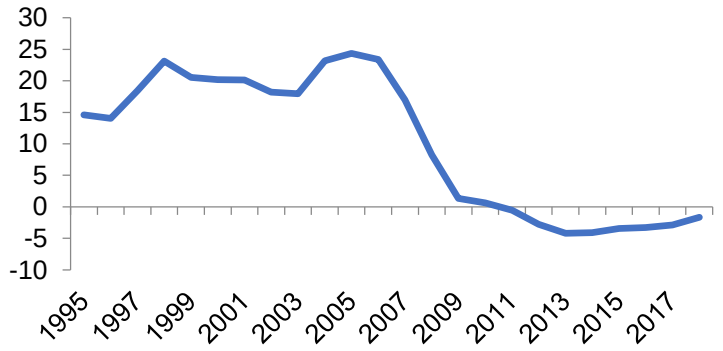
Figure 3: Household Growth Rate (2002–2017)



Note: National Statistics Institute (2021)

Furthermore, the literature indicates that the economic conditions influence the access to finance to create new households (Lee & Painter, 2013). This influence is highly significant since there is a tendency among the population to opt for homeownership over renting to form an independent household. The crisis saw a reduction in mortgage offers and the imposition of higher requirements and tighter conditions to secure a loan since the Spanish banking system presents liquidity problems (Ahn & Sánchez-Marcos, 2017). This was toughening up with regard to accessing credit is a crucial and distinguishing factor in the countries of the southern European region, where, as in the case of Spain, access to the housing market is often through homeownership, which in turn depends on obtaining a mortgage (Poggio, 2008).

Figure 4: Growth Rate of Mortgage Loans in Spain (1995–2018)

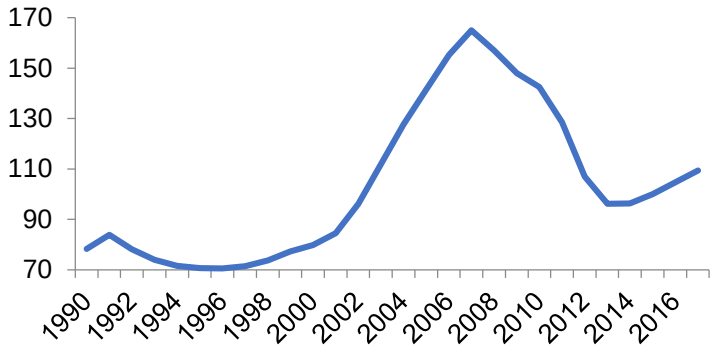


Note: Bank of Spain (2021)

As shown in Figure 4, there was significant growth in the number of mortgages approved in Spain until 1999, when the Euro was introduced, and figures began to stabilize at these high levels. The main reason for this growth lies in the fact that there was a considerable increase in house purchases due to low-interest rates, together with large numbers of immigrants moving to Spain. However, since the origin of the crisis was financial, this had an immediate impact on mortgages, so from 2011, the growth rate quickly dropped to negative figures. This situation went hand in hand with a common feature in most European periphery countries: huge over-indebtedness among households. Thus, between 1996 and 2006, Spanish households saw how their indebtedness levels went from 25% of GDP to more than 90% in 2006 (Carballo-Cruz, 2011).

Lastly, we should consider the evolution in house prices among the Mediterranean model countries when we analyze the process of new household formation since this process often takes place through purchasing property rather than renting (Ahn & Sánchez-Marcos, 2017; Giannelli & Monfardini, 2003).

Figure 5: Real House Prices Index (2015 = 100)



Note: Organization for Economic Co-operation and Development (2020)

In this regard, Spain saw annual explosive growth rates in house prices from 1999 to 2008. However, when the housing bubble burst in 2008, this tendency abruptly changed direction, and prices began to fall. It was not until 2014, when the Spanish economy started recovering, that prices in the housing market became more stable and began once more to increase, although this time in a less precarious way. Several factors affect new household formation, although little economic literature discusses this issue (Lee & Painter, 2013). Moreover, there are even fewer studies examining the impact the deterioration of economic conditions has on the formation of new households. Consequently, we will review the existing academic literature to ascertain the current understanding and subsequently present an empirical analysis of the Spanish case in the final sections.

Literature review

The approaches used in studies on household formation and the literature differ between Europe and the United States. In Europe, for example, the studies focus on the differences among countries and welfare systems (Aassve et al., 2002; Iacovou, 2010). In contrast, as Wiemers (2014) pointed out, U.S.-focused research emphasized economic factors as the main determinants in explaining the formation of new households. In both cases, research on how

adverse economic conditions affect household decision-making after a financial shock is much scarcer (Choi & Painter, 2015). Kaplan (2009, 2010) analyzed the adjustments young Americans made to their living conditions after the labor market crisis and demonstrated that labor market disruptions are an explanatory factor underlying the return of young people to the parental home after a first emancipation attempt. A recent study by Cooper and Luengo-Prado (2018) concluded that demographic factors, house prices, and the economic cycle explained 70% of the household formation rate among young Americans.

Another critical study undertaken in the United States by Wiemers (2014) showed that job losses during recessions increased by three the probability of house-sharing to reduce expenses. This was also investigated by Mykyta and Macartney (2011) in the United States. They concluded that during recessions, the percentage of the house-sharing population is above 6% compared to the usual 2% on average. Furthermore, Lee and Painter (2013) found that a 2% increase in the unemployment rate decreased the creation of new housing by 1%. Subsequent work by Choi and Painter (2015) showed that it takes ten quarters for the rate of household growth in the United States to return to its original value. Similarly, Paciorek (2016) also concluded that household formation increases as the United States labor market recovers.

In the European context, Aassve et al. (2013) analyzed the economic difficulties of young adults in 24 countries and determined that the rate of young adults living with parents has increased. In contrast, it should be noted that in Ireland, the household formation rate increased in the post-crisis years due to the fall in rental prices (Byrne et al., 2018).

As for literature on household formation, in the case of Spain, this focuses on the delay in leaving the parental home among young people (Echaves García, 2017; Guerrero, 2003; Martínez-Granado & Ruíz-Castillo, 2002; Moreno Mínguez, 2016, 2017). However, there is little bibliography about the effect of the last economic recession on household formation in Spain.

Módenes et al. (2013) and Módenes and López-Colás (2014) studied the formation of young people's households following the reconfiguration of the Spanish residential system after the financial crisis. Furthermore, through a labor market analysis, Ahn and Sánchez-Marcos (2017) investigated the household formation of people under 40 during the last Spanish economic boom and subsequent crisis. They concluded that during the 2009–2013 period, the residential independence of Spaniards under 40 increased by 2%, beyond all expectations.

Another recent study by Barceló and Villanueva (2018) examined how job insecurity influenced household formation in Spain between 2002–2014. They concluded that the 1% increase in permanent employment contracts improves household formation opportunities by 1.2%, confirming an important relationship between job security and the creation of new households. However, none of the previous studies, excluding Choi and Painter's (2015) American case, explained whether unemployment has lasting effects on the formation of new households over time.

This paper aims to advance research on this subject and, to this end, analyze the dynamic relationship between unemployment and the formation of new households after an economic recession in Spain, a Mediterranean model country.

Methodology and data

The temporal period could not be extended further back in time since some of the series of the temporal variables used in this analysis do not go beyond 1995, so this will be the initial year as it is the first with known data for all variables.

Although the main interest of this research is focused on determining the impact the unemployment rate has on household formation (represented by the variation in the number of households in one year with respect to the previous one) and for how long this impact lasts, other variables have also been added to this model since, according to the literature, they may have potentially relevant effects on the evolution of housing numbers. Thus, following Choi and Painter (2015), together with the unemployment rate and the variation in the number of households (which may represent both household formation or its reduction), we incorporated the development of housing prices, the number of housing starts, population, income for households, and mortgage interest rates.

These variables were divided into four endogenous and three exogenous variables to identify those factors that influence the fluctuations in the number of long-term households. Our four endogenous variables are the change in the number of households, the unemployment rate, housing prices, and the number of new houses built yearly, thus increasing the total housing supply. Our three exogenous variables are the changes in the population, the mortgage market interest rate, and the average household income. The choice was made to assume that while exogenous variables are likely to affect household decisions, the formation of new households is less likely to impact these variables.

Furthermore, the order of the endogenous variables within the VAR may affect the result; therefore, a theoretical justification was needed that gives meaning to how the variables are organized. The variables were arranged to allow for the impact of economic conditions on new demands for housing to be reflected in the VAR and, from there, to analyze how the demand for new housing and the number of housing starts can influence housing prices. Thus, the order of the variables chosen are as follows: unemployment, changes in the number of households, changes in the number of housing starts and housing prices.

The main problem concerning time series data is their availability and publication frequencies. Table 1 shows data sources and their publication frequency. Monthly and annual series have been converted to quarterly data using the European Commission's Jdemetra+ program following the Chow-Lin method (Jdemetra+ software is the program recommended by the European Commission for seasonal and calendar adjustments).

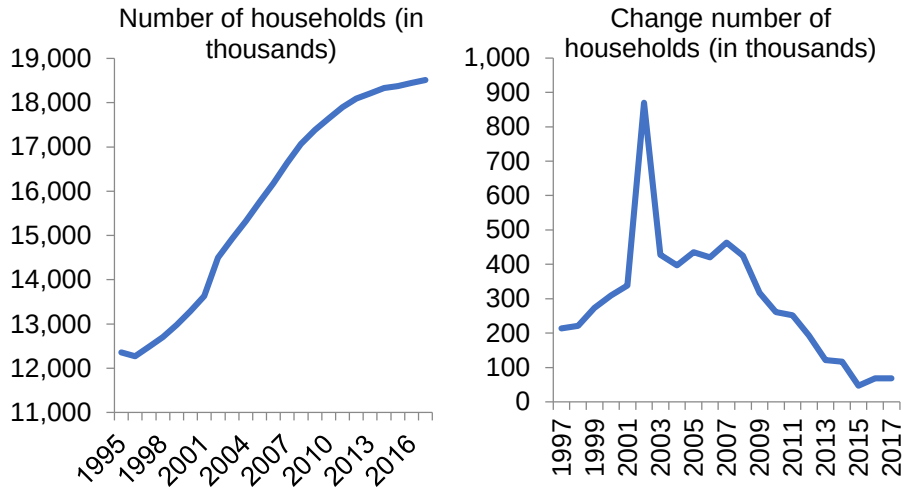
Table 1: Source and Time Periodicity of the Series (1995–2017)

Data	Publication date	Source
Number of households	Annual	National Statistics Institute (2021)
Real housing price	Quarterly	Organization for Economic Co-operation and Development (2020)
Unemployment rate	Quarterly	National Statistics Institute (2021)
Population	Biannual	National Statistics Institute (2021)
Income for households	Annual	Eurostat (2020)
Mortgage interest rate	Quarterly	Bank of Spain (2021)

Data	Publication date	Source
Long-term interest rate	Monthly	Organization for Economic Co-operation and Development (2020)
Housing starts	Annual	Ministry of Public Works and Transport (2020)

Figure 6 shows the evolution of the number of households in absolute terms (left side) and the change in the number of households throughout the period in question (right side). As can be seen, the rhythm of growth, which was exponential during the economic boom due to the housing bubble, was brought brusquely to a halt when the bubble burst, and although it was still on the uptrend, it was increasing a lot slower than before. The trend during the crisis years was for a progressive reduction in the number of new households set up yearly. While the net balance was never negative, there was a steep drop between 2008 and 2014, settling to new lows and starting a slow recovery.

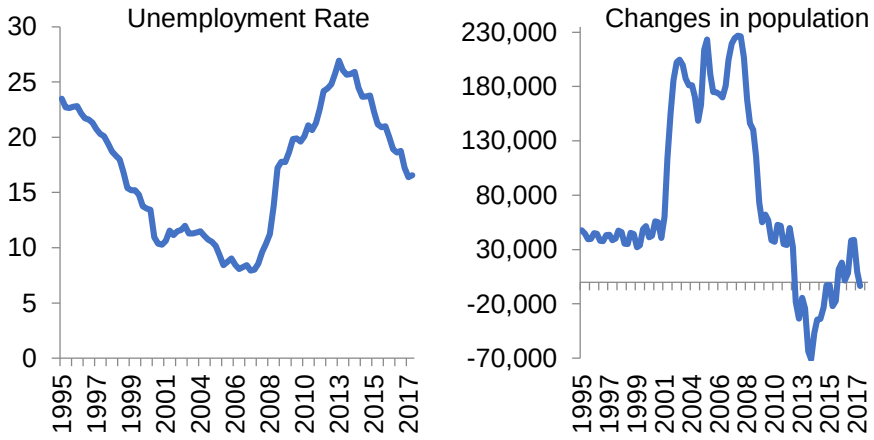
Figure 6: Formation of New Households

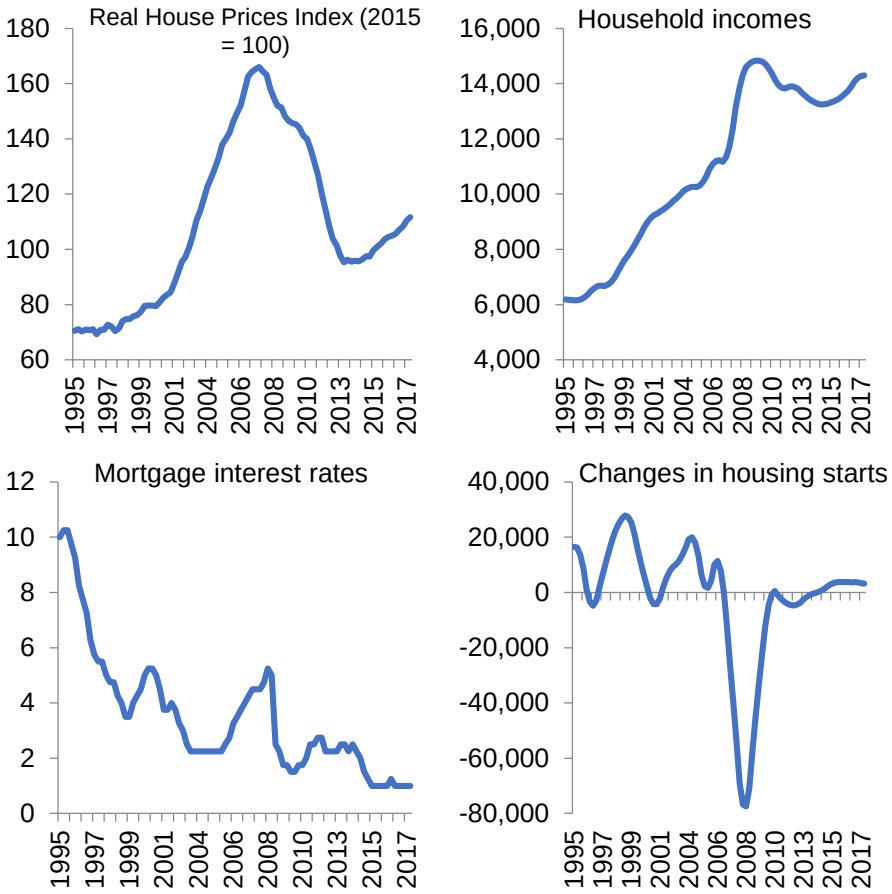


Note: National Statistics Institute (2021)

Figure 7 shows the evolution of the remaining variables used in the model.

Figure 7: Changes in the Variables Analyzed (1995–2017)





Note: See Table 1

As can be seen, the evolution of the unemployment rate followed a marked pattern linked to the evolution of GDP and the construction of new housing. Hence, the unemployment rate of around 24% in 1995 dropped to all-time lows in 2005 and 2006 and, from there, due to the crisis and the collapse of the residential construction sector, returned to over 25%. Unemployment continued to rise until 2013, when it started to slow, although it was still far from constituting a situation that could be considered sustainable for the Spanish economy.

The evolution of the unemployment rate was followed by the average income trend, which saw a significant increase as unemployment dropped and reached its highest point in 2007. There was a slight drop, and although it recovered in terms of growth, it did so to a lesser extent than before the crisis. Despite the increasing number of new houses being built, house prices continued to rise during the housing boom. However, in 2007 these dropped to the same levels as those at the beginning of the century. This process was partially driven by lower mortgage rates, which fell from around 10% in 1995 to 2% before the bubble burst. In addition, as an explanatory factor, we considered population evolution because, from the end of the 1990s, there was a constant upturn resulting from an increase in immigration, pushing up demand and impacting prices. Nevertheless, after the beginning of the crisis, population figures experienced a slowdown, and from 2012 there was a drop in the net basis of these numbers, coinciding with the worst years of the crisis due to the growth in emigration.

The Vector Autoregressive model

To analyze the relationship between household formation and the rest of the endogenous variables, a vector autoregressive (VAR) model was estimated. Vector autoregressive models have a well-defined structure that allows the identification of relationships in a time series of endogenously related variables. In a VAR model, each variable is expressed as a linear function of its past values and variables (endogenous and exogenous), with a stochastic error term.

We used the following specification of the VAR model

$$Y_{it} = \alpha + \Phi_i \sum_{1}^{n} Y_{it-1} + \beta_{it} X_{it} + \varepsilon_{it}$$

Where Y is the vector representing the four endogenous variables and X is the vector of exogenous variables and dummy variables used to correct for normality in the initial model.

To estimate the VAR, we used the unit root test to analyze the stationarity of the time series. For this purpose, we used the extended Dickey-Fuller test. The results are shown in Table 2.

Table 2: Unit Root Test for Individual Series

	Unemployment	**House Prices**	**Δ Housing**	**Δ Households**
ADF-GLS (levels)	-2.684***	-2.371	-2.310	-1.196
ADF-GLS (1st dif.)	-2.329	-2.863***	-5.299*	-3.386**

*Note: ADF-GLS is the increased Dickey-Fuller test statistic with GLS DETRENDING; *, **, *** indicate significance at 1%, 5%, and 10%, respectively; Author's estimation*

Only the unemployment rate is stationary on levels; the rest of the variables (price levels, variance in new household formation, and housing starts) are stationary on first differences at 10%, 1%, and 5%, respectively. According to Choi and Painter (2015), the unemployment rate has not been differentiated using the stationary model since we are interested in the relationships between the variables, even if there is no possibility of getting the estimate of a vector error correction (VEC) (Sims et al., 1990). This way, these variables' wealth of information was better preserved without distinguishing the variables.

Finally, after sorting the endogenous variables according to the criterion stated above, we chose the optimal number of lags for endogenous variables.

Table 3: Selection Criteria for the Order of the VAR

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SIC**	**HQC**
0	-2,367.079	NA	5.15E+19	56.739	57.202	56.926
1	-1,957.592	740.974	4.41E+15	47.371	48.297	47.743
2	-1,804.366	262.674	1.69E+14	44.103	45.492	44.662
3	-1,753.976	81.583	7.53E+13	43.285	45.137*	44.029

Lag	LogL	LR	FPE	AIC	SIC	HQC
4	-1,741.245	19.398	8.29E+13	43.362	45.678	44.293
5	-1,717.592	33.790	7.11E+13	43.180	45.958	44.297
6	-1,683.109	45.978	4.77E+13	42.740	45.981	44.043
7	-1,627.801	68.476*	1.98e+13*	41.804*	45.508	43.293*

*Note: * indicates delay order selected by the criterion; LR = Likelihood Ratio, FPE = Final Prediction Error; AIC = Akaike Information Criterion; SIC = Schwarz Information Criterion; HQC = Hannan-Quinn Information Criterion; Author's estimation*

Table 3 presents the optimal lag length for the endogenous variables according to the used criteria. This lag length ranges from order 3 of the information criterion by Schwarz to the lag length of 7 chosen by the Akaike and Hannan-Quinn criteria. The optimal lag lengths of the endogenous variables were determined by order 7.

Formation of new households in Spain: Main results

Table 4 shows the main results of the VAR constructed from the selected endogenous and exogenous variables. As noted above, the model includes four endogenous variables (the change in the number of households, the unemployment rate, and the change in the number of housing starts) and three exogenous variables (the change in the population, the mortgage market interest rate and the average household income).

Table 4: VAR for Endogenous Variables

	Unemployment	Dif. Households	Dhouse starts	Real prices
Unem. (-1)	0.712* (0.139)	-5,087.856* (1,005.40)	-485.436 (394.089)	-0.481 (0.358)
Unem. (-2)	-0.197 (0.188)	2,781.117** (1,358.82)	-261.394 (532.617)	0.672 (0.484)
Unem. (-3)	0.138 (0.176)	-1,033.008 (1,278.50)	718.350 (501.137)	0.004 (0.456)
Unem. (-4)	0.384** (0.164)	-2,970.548* (1,186.21)	44.331 (464.960)	0.095 (0.423)
Unem. (-5)	-0.281 (0.181)	7,295.874* (1,309.69)	53.522 (513.362)	0.435 (0.467)
Unem. (-6)	-0.130 (0.209)	-4,958.748* (1,513.81)	475.652 (593.369)	-0.744 (0.540)
Unem. (-7)	0.446* (0.147)	3,319.500* (1,069.19)	-481.732 (419.092)	-0.010 (0.381)
Dif. Households (-1)	1.01E-05 (1.5E-05)	2.224* (0.107)	-0.004 (0.042)	1.02E-04* (3.8E-05)
Dif. Households (-2)	-2.59E-05 (3.0E-05)	-2.012* (0.215)	0.038 (0.084)	-1.77E-04** (7.7E-05)
Dif. Households (-3)	3.07E-05 (2.9E-05)	0.839* (0.209)	-0.047 (0.082)	3.84E-05 (7.5E-05)
Dif. Households (-4)	-9.76E-06 (2.4E-05)	-0.762* (0.173)	-0.028 (0.067)	6.45E-05 (6.2E-05)
Dif. Households (-5)	1.67E-06 (2.6E-05)	1.615* (0.185)	0.088 (0.072)	7.73E-05 (6.6E-05)
Dif. Households (-6)	-1.04E-05 (2.5E-05)	-1.573* (0.184)	-0.048 (0.072)	-1.66E-04* (6.6E-05)
Dif. Households (-7)	1.66E-05 (1.2E-05)	0.637* (0.089)	0.002 (0.035)	6.73E-05** (3.2E-05)
Dhouses starts (-1)	2.90E-05 (4.7E-05)	0.248 (0.336)	2.233* (0.132)	2.11E-04*** (1.2E-04)
Dhouses starts (-2)	-1.19E-05 (1.1E-04)	-0.571 (0.787)	-1.686* (0.308)	-2.22E-04 (-2.8E-04)
Dhouses starts (-3)	-5.19E-05 (1.2E-04)	0.681 (0.888)	0.327 (0.348)	1.91E-04 (3.2E-04)
Dhouses starts (-4)	-5.32E-05 (1.2E-04)	-0.494 (0.858)	-0.157 (0.336)	-4.24E-04 (3.1E-04)

	Unemployment	Dif. Households	Dhouse starts	Real prices
Dhouses starts (-5)	1.68E-4 (1.2E-04)	-0.299 (0.849)	0.614** (0.333)	4.813-04 (3E-04)
Dhouses starts (-6)	-1.23E-04 (9.9E-05)	0.704 (0.715)	-0.632** (0.280)	-3.61E-04 (2.6E-04)
Dhouses starts (-7)	1.40E-05 (4.1E-05)	-0.431 (0.294)	0.234** (0.115)	1.96E-04*** (1.1E-04)
Real prices (-1)	-0.003 (0.048)	153.221 (350.541)	-215.963 (137.402)	1.191* (0.125)
Real prices (-2)	-0.122*** (0.073)	-400.912 (528.16)	26.903 (207.024)	-0.008 (0.188)
Real prices (-3)	0.005 (0.071)	-551.516 (515.462)	152.511 (202.046)	0.088 (0.184)
Real prices (-4)	0.0129 (0.071)	-68.588 (516.660)	-23.328440 (202.516)	0.078 (0.184)
Real prices (-5)	-0.020 (0.069)	-180.359 (501.139)	-230.982 (196.432)	-0.272 (0.178)
Real prices (-6)	0.129*** (0.071)	-426.977 (518.907)	429.795** (203.397)	-0.241 (0.185)
Real prices (-7)	0.003 (0.053)	1,439.114* (387.370)	-174.808 (151.838)	0.145 (0.138)
C	-3.737** (1.749)	11,816.71 (12,644.3)	7,691.908 (4,956.21)	-2.712 (4.511)
Income	6.50E-06 (1.1E-04)	-0.106 (0.774)	-0.321 (0.303)	4.01E-04 (2.8E-04)
Mortg. Rate	0.005 (0.124)	143.302 (902.951)	-818.866** (353.931)	0.203 (0.322)
Dpopulation change	1.23E-05* (4.7E-06)	0.084* (0.033)	0.016 (0.013)	-2.59E-06 (1.2E-05)
R-squared	0.995	0.996	0.997	0.998
Adj. R-squared	0.993	0.994	0.996	0.998
Number of obs.	85	85	85	85

*Note: *, **, *** indicate significance at 1%, 5% and 10%, respectively; Author's estimation*

As mentioned, 7 lag lengths were added for each of the endogenous variables based on the optimal lag length suggested by Akaike's information criterion (Table 3). The choice of these 7 lag lengths made it possible to delete the residual autocorrelation in every equation. It also strengthened the VAR stability allowing every root to remain inside the unit circle. Thus, the condition of stability was satisfied by giving robustness to impulse-response functions and the analysis of variance. Likewise, the model did not present heteroscedasticity problems.

Therefore, the estimated VAR coefficients did not have a relevant economic meaning and could not be interpreted. Furthermore, the collinearity between the explanatory variables made it difficult to interpret the *t* statistics. Notwithstanding, Table 4 shows the resulting coefficient estimates for the different equations for each endogenous variable. For this paper, the most relevant equation is related to household change.

With all the safeguards mentioned, it must be said that the change in the number of households was influenced considerably by the unemployment rate and, obviously, by the trend in home ownership which followed that of the previous quarters. These results should be considered with due caution, as the variables may be negative or positive depending on the quarter of reference, showing that there is no clear pattern and therefore, as we have already seen, it is impossible to confirm the validity of the said relationship, or that it is not merely spurious. On the other hand, contrary to what one might expect, income does not influence household formation, which seems counterintuitive; house prices only influence from the seventh month; nonetheless, what impacts the population change, in this case, in the right direction.

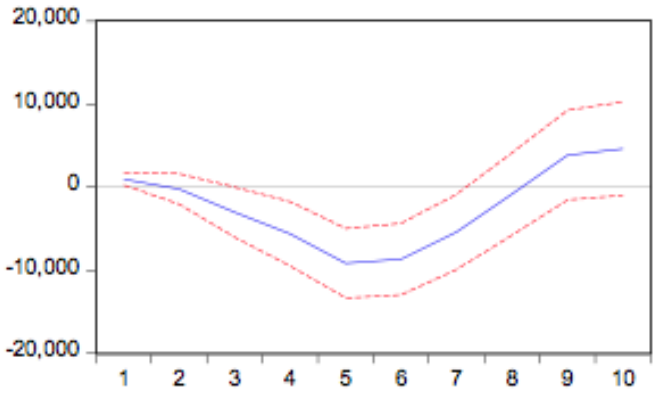
In any case, and given that, as mentioned above, the meaning and significance of the estimated VAR coefficients are up to a certain point irrelevant, we will now analyze the impulse-response functions and then analyze the breakdown of the variance, which is where we can reach conclusions concerning new houses set up in Spain during the period in question.

Impulse-response functions

From the impulse-response function analysis derived from the VAR model, the speed of the impact a negative economic shock has on changes in household formation can be determined. This is one of the fundamental applications of VAR models and the one that is relevant to this paper's purposes.

Firstly, we estimated the impact of an increase similar to a standard deviation on the unemployment rate on household formation in the long term (Figure 8).

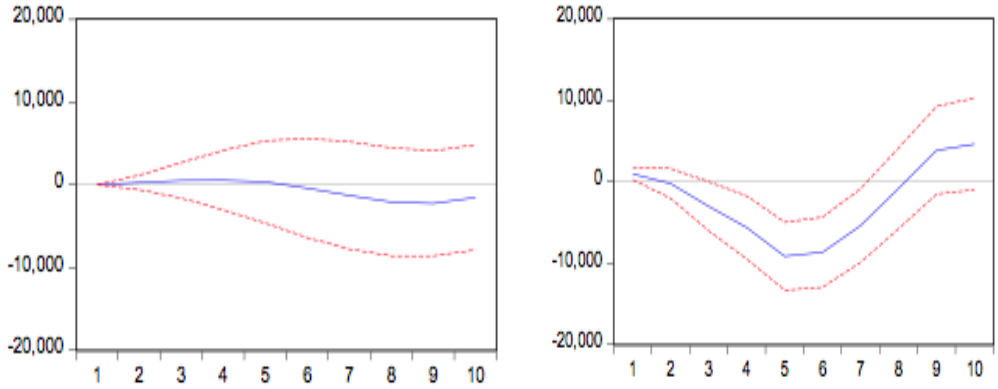
Figure 8: Impulse-Response Function of Household Changes After a Shock by a Standard Deviation on the Unemployment Rate



Note: Author's estimation

As can be seen, the impact of a negative shock in the unemployment rate on housing formation in Spain lasts for two years with a concrete profile in two different stages. In the first five quarters, the rise in the unemployment rate negatively affects housing formation, which rises to reach its maximum point, stabilizes, and from then on recovers until the eighth quarter. There is, therefore, strong evidence concerning the short-term impact of worsening economic conditions (expressed as an increase in the unemployment rate) and the continuation of these effects in time until they return to previous levels. This result aligns with the empirical evidence found for other Western economies, as mentioned above. Furthermore, Figure 9 shows the impact of the change in the number of housing units under construction (left graph) and the evolution in housing prices (right graph) on housing formation.

Figure 9: Impulse-Response Function of Household Changes After a Shock by a Standard Deviation on the Creation of New Housing Starts (left) and After a Shock on the Standard Deviation on Housing Prices (right).



Note: Author's estimation

There was practically no change in the number of new households set up in relation to the change in housing stock in these cases. On this basis, we can infer that an increase in housing stock does not affect household formation; in other words, there is no restriction derived from the lack of housing stock for new household formation. This was a vital result if analyzed when considering the effect of house prices. In this case, there was an effect on household formation that derives from the increase in house prices, which, although not evident in the short term, shows a remarkable impact from the fourth quarter, resulting in a reduction in the number of new households which continues until the tenth quarter. Consequently, based on an analysis of the impulse-response functions, we can conclude that the most significant effect of time on household formation derives from the economic situation, expressed as a shock in the unemployment rate. Likewise, the evolution of the housing market also influences it, but this is not due to the supply of available housing, which seems sufficient, but due to its price.

Variance decomposition

The variance decomposition of the endogenous variables in light of the impacts on each variable measures its relative importance in the overall VAR dynamic. In this regard, the variance decomposition analysis allows us to obtain more empirical evidence related to the variables that impact the creation of new households.

Table 5: Variance Decomposition for Changes in Number of Households

Period	S.E.	Unemployment	Dif. households	Dhouse starts	Real prices
1	3,424.331	7.988	92.011	0.000	0.000
2	8,001.193	1.546	98.285	0.120	0.048
3	12,734.15	6.223	93.530	0.220	0.024
4	16,726.09	14.938	84.759	0.239	0.062
5	19,758.16	32.244	67.249	0.202	0.303
10	24,510.16	44.487	48.892	2.390	4.229
20	29,392.40	43.714	36.615	9.811	9.858
30	32,053.37	39.166	34.979	16.150	9.704

Note: Author's estimation

Table 5 shows the variance decomposition for changes in household numbers. As can be seen, the most relevant result is that in the short term, the lagged values of this variable explain its evolution in time, indicating that it presents certain persistence. However, this continuation seems to be progressively diluted over time and leads to a greater weight of the unemployment rate from the first year after the shock; from that moment on, this rate explains one-third of the variation in household formation, and its influence continues growing over time while persistence decreases. Meanwhile, in terms of new housing offers and prices, the variance in the housing market has a marginal impact, with the effect being greater on prices rather than on new offers, as was proved by impulse-response functions.

In any case, if the long-term evolution of variables was considered together with the effect that these have on household formation, we can see that housing construction. Thus, the housing stock expansion had a minor impact on household formation (although it keeps growing continuously in time) and on housing prices. In this way, in the last period under review, both prices and housing stock can explain around 25% of the variability of household formation in the long term in Spain.

Discussion

The socioeconomic implications of these results are evident since they reveal the impact of the increase in the unemployment rate on the formation of new households to the extent that they exceed the very elements of persistence that this phenomenon presents as time passes. In addition, the housing price is another factor that significantly influences the formation of new households: the higher the price, the more difficulties young people face in gaining independence (Aparicio-Fenoll & Oppedisano, 2015). In short, this means that public policies aimed at strengthening household formation and, particularly, the emancipation of young people must improve opportunities and conditions for young people concerning the labor market to allow them access to the real estate market (Ahn & Sánchez-Marcos, 2017).

Conclusion

The Spanish case is one of the situations in which the effects of the economic crisis were worsened by their contribution to the bursting of the real estate bubble, which the country experienced at the beginning of the 21st century. In this regard, this research tries to analyze the impact that a worsening in the economic situation of the country and the consequent increase in the unemployment rate have on household formation. This paper aims to deepen our understanding of how an employment shock can impact the population's living conditions, notably young people.

A vector autoregressive (VAR) model has been used to determine how an economic shock might impact household formation and how long this effect can last. The main findings obtained are as follows: Firstly, the main outcome is that, in the short term, the lagged values on household formation explain its development over time, indicating that this variable presents a certain continuation. However, this persistence is gradually interrupted over time, giving way to a greater weight of the unemployment rate from the first year after the shock; from then on, this rate explains how almost a third of the variation of new household formation and its strength keep growing over time, while persistence decreases. Secondly, the impact of a negative shock in the unemployment rate on housing formation in Spain lasts for

two years with a concrete profile in two different stages. In the first five quarters, the effect of the rise in the unemployment rate negatively affects housing formation, which rises to reach its maximum point, stabilizes, and from then on recovers until the eighth quarter. And thirdly, the development of household formation before a change in housing stock is virtually non-existent in the short term; as regards housing prices, it can be affirmed that these impact the creation of new households, and although prices cannot be appreciated in the short term, from the fourth quarter they begin to emerge, causing a drop in new household formation.

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