

Table 1. List of studies on the dwelling that use quantitative methods

Authors	Country	Objective	Results
Yao (2002)	China	examine the price discrimination phenomenon in Shanghai	implicit land prices existed in the market but weakened over time as market reform progressed.
Hidano y Yamamura (2004)	Japan	Land Price changes	industrial investment activities and lending behavior by the banks accounted for a major impact on land value changes,
Lewis (2007)	Jakarta	analyzed urban residential land price	the effect of distance on residential land prices was negatively significant, though the level of significance reduced over time
Haughwout et al. (2008)	New York	analyses actual transaction land prices	land prices had a significant negative correlation with distance to the Central Business District
Zheng and Kahn (2008)	Beijing	Land Price changes	the classic urban monocentric model's predictions were largely upheld in Beijing
Li (2009)	Beijing	Land Price changes	Land prices in Beijing are influenced by common market indicators such as GDP growth and investment,
Glaeser and Gyourko (2018)	US	understand the distribution of home prices	the effects of price regulation influence the mobility of workers
Tu, de Haan and Boelhouwer (2018)	Duch	analysis long-run house prices under a regulatory environment	a long-run relationship for house prices under strict regulations
Fan, Yang and Yavas (2019)	China	study real estate prices in five major Chinese cities	macroeconomic variables, have strong explanatory power in determining long-term price trends

Sources: own elaboration

Table 2. Laws and decrees on private housing in Spain

Law / Royal Decree	Objective
Property	
Law 1975 replaces 1956	The reform affected the land regime, redefining land classes and making determinations evolve towards the concept of soil qualification. The previous urban reserve land is unfolded into programmed urban land (that which must be urbanized immediately) and unprogrammed urban land (which is reserved for future development through Urban Action Programs).
Law 8/1990 replaces 1976	Reform of the urban and land regime. Greater regulation to control speculation. Intervention in the land market. Conditions of property value (actual or potential), rustic (initial value). It is associated with the use.
RD 1997/98 to 1996	Modification of the mortgage regulation on general conditions of contracting. Eliminates the distinction between programmed and non-programmed land for development, being now all of it for development. It also simplifies procedures by shortening deadlines.
Law 2007 replaces law 6/1998	Law of land regime, applicable to each Autonomous Community, in matters of planning, urbanism and housing on public patrimonies of land. It does not classify land in an urban way, considering two basic situations of the same rural and urbanized (art.12), depending on the current objective characteristics of it.
Rent	
RD 1980	Public aid was regulated in successive state housing plans, 1981-1983 regulated in Royal Decree 2455/1980.
RD 1985	Liberalization of the sector, fixing by the parties the amount of rent and the suppression of the forced extension. Possibility of extending without safe guarding the renewal price.
Law 1994	Duration of the contract minimum 1 year and automatically extendable to 5. Initial rental agreement between the parties and after 1 year according to IPC.
Law 2000 replaces LEC 1881	Simplification of procedures in case of renter and lessor litigation
Law 19/2009 replaces Laws 29/1994 and LEC. Law 1/2000	Extension of the cases in which the obligatory extension of the contract is not applicable. The landlord may occupy the dwelling for first-degree relatives. Streamlining and improving eviction processes, safeguarding the rights and guarantees that protect the tenant in good faith.
Law 4/2013 replaces law 29/1994	Reinforce the freedom of covenants and give priority to the will of the parties. Reduction of the obligatory extension from 5 to 3 years, in order to make the market more dynamic and more flexible. Recovery of the property by the lessor, in order to sell it in certain cases. The tenant can cancel the rental contract at any time after 6 months.

Sources: own elaboration

Table 3. ITSA of home ownership

<i>Y= Index of property variable</i>	Parameters Label	Coefficient	Newey-Std.	Sig.
Constant	k	4.070	0.091	**
Trend	t	-0.016	0.003	**
Dummy Law 1990	_x1990	0.878	0.146	**
Interaction#1	_x_t1990	0.005	0.002	**
Dummy Law 1997	_x1997	-0.356	0.121	**
Interaction#2	_x_t1997	0.015	0.001	**
Dummy Law 2007	_x2007	-0.054	0.035	
Interaction#3	_x_t2007	-0.024	0.003	**
Dummy Eco. Crisis	_xEco.Crisis	-0.347	0.074	**
Interaction#4	_x_tEco.crisis	0.002	0.003	
F(Pvalor)		243.8(0.000)		
Number of obs.		509		
a) Postintervention linear trend. Law 1990				
Treated: $_b[t] + b[_x_t1990]$				
Lineat trend treated	Ltt#1	-0.010	0.001	**
b) Postintervention linear trend. Law 1997				
Treated: $_b[t] + b[_x_t1990] + b[_x_t1997]$				
Lineat trend treated	Ltt#2	0.005	0.0006	**
c) Postintervention linear trend. Law 2007				
Treated: $_b[t] + b[_x_t1990] + b[_x_t2007]$				
Lineat trend treated	Ltt#3	-0.018	0.003	**
d) Postintervention linear trend. Eco. Crisis				
Treated: $_b[t] + b[_x_t1990] + b[_x_tEco.crisis]$				
Lineat trend treated	Ltt#4	-0.001	0.003	**

(**), (*) statistically significant at 1% and 5% respectively.

Sources: own elaboration

Table 4. ITSA with Newey-West standards errors and intervention in dwelling rent

<i>Y= Index of rent</i> variable	Parameters Label	Coefficient	Newey-West Std. Err.	Sig.
Constant	k	3.698	0.064	**
Trend	t	0.003	0.003	
Decree Law 1980	_x1980	0.255	0.127	*
Interaction#1	_x_t1980	-0.029	0.004	**
Decree Law 1985	_x1985	0.046	0.111	
Interaction#2	_x_t1985	0.032	0.002	**
Dummy Law 1994	_x1994	-0.530	0.104	**
Interaction#3	_x_t1994	-0.015	0.002	**
Dummy Law 2000	_x2000	-0.077	0.084	
Interaction#4	_x_t2000	0.010	0.002	**
Dummy Law 2009	_x2009	-0.082	0.016	**
Interaction#5	_x_t2009	0.003	0.001	*
Dummy Law 2013	_x2013	-0.442	0.111	**
Interaction#6	_x_t2013	-0.036	0.003	**
Dummy Eco. Crisis	_xEco.Crisis	-1.244	0.217	**
Interaction#4	_x_tEco.crisis	0.056	0.005	**
F(Pvalor)		545.6(0.000)		
Number of obs.		509.000		
a) Postintervention linear trend. Decree Law 1980				
Treated: $_b[t] + b[_x_t1980]$				
Lineat trend treated	Ltt#1	-0.026	0.002	**
b) Postintervention linear trend. Decree Law 1985				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985]$				
Lineat trend treated	Ltt#2	0.006	0.0007	**
c) Postintervention linear trend. Law 1994				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985] + _b[_x_t1994]$				
Lineat trend treated	Ltt#3	-0.009	0.002	**
d) Postintervention linear trend. Law 2000				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985] + _b[_x_t1994] + _b[_x_t2000]$				
Lineat trend treated	Ltt#4	-0.001	0.0003	**
e) Postintervention linear trend. Law Eco crisis				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985] + _b[_x_t1994] + _b[_x_t2000] +$ $+ _b[_x_tEco\ crisis]$				
Lineat trend treated	Ltt#5	0.004	0.001	**
f) Postintervention linear trend. Law 2009				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985] + _b[_x_t1994] + _b[_x_t2000] +$ $+ _b[_x_tEco\ crisis] + b[_x_t2009]$				
Lineat trend treated	Ltt#5	-0.031	0.003	**
g) Postintervention linear trend. 2013				
Treated: $_b[t] + b[_x_t1980] + _b[_x_t1985] + _b[_x_t1994] + _b[_x_t2000] +$ $+ _b[_x_tEco.crisis] + b[_x_t2009] + _b[_x_t2013] +$				
Lineat trend treated	Ltt#5	0.024	0.004	**

Sources: own elaboration

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Table 5. Granger causality Wald tests

Equation	Excluded	chi2	Pvalue
IPP	IRP	8.701	0.013
IPP	ALL	8.701	0.013
IRP	IPP	5.041	0.08
IRP	ALL	5.041	0.08

Sources: own elaboration

Journal of Economic Studies

Figure 1a Evolution of housing prices in property

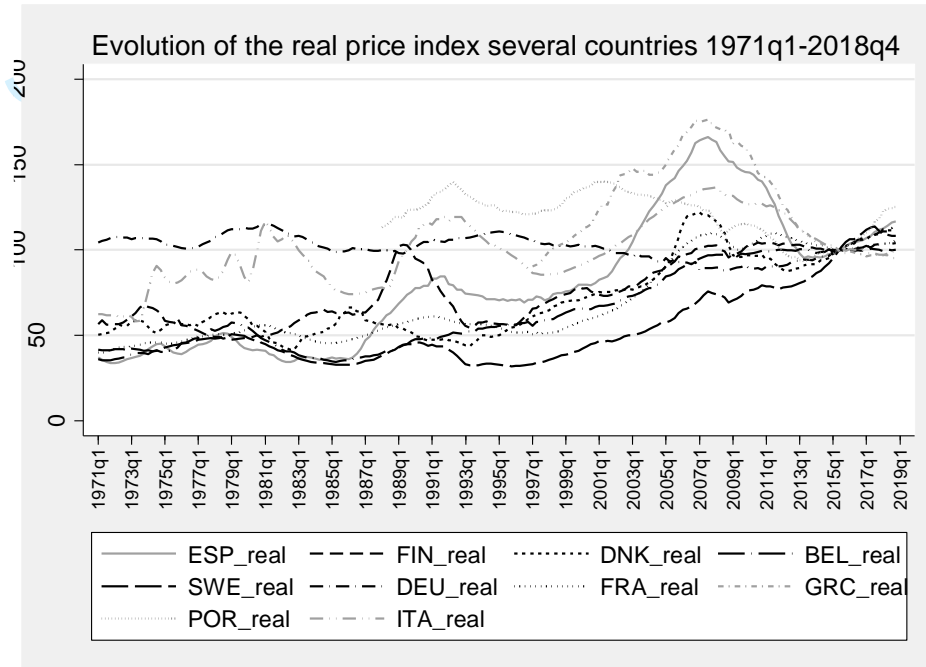
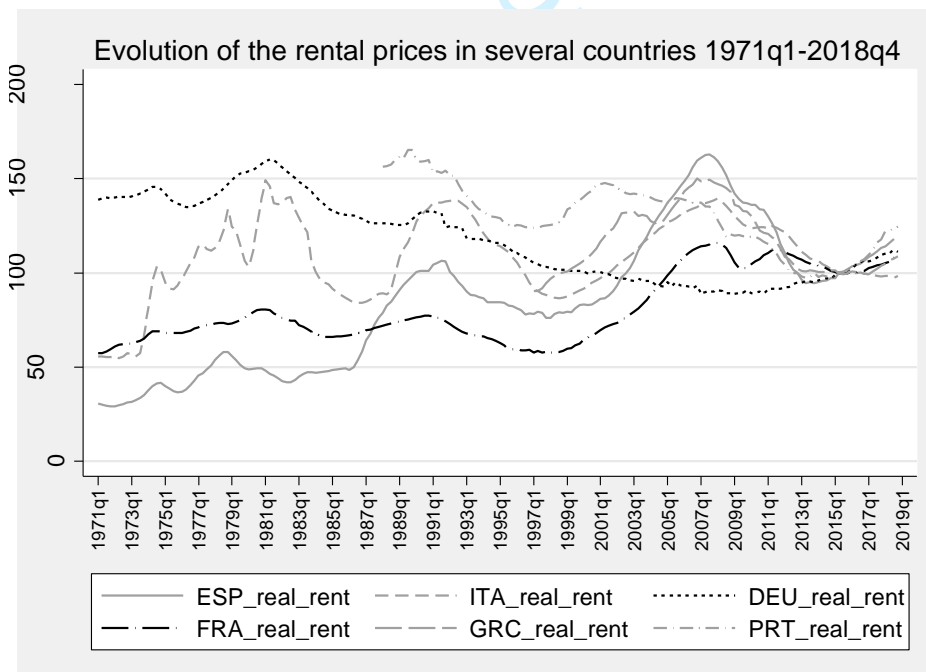
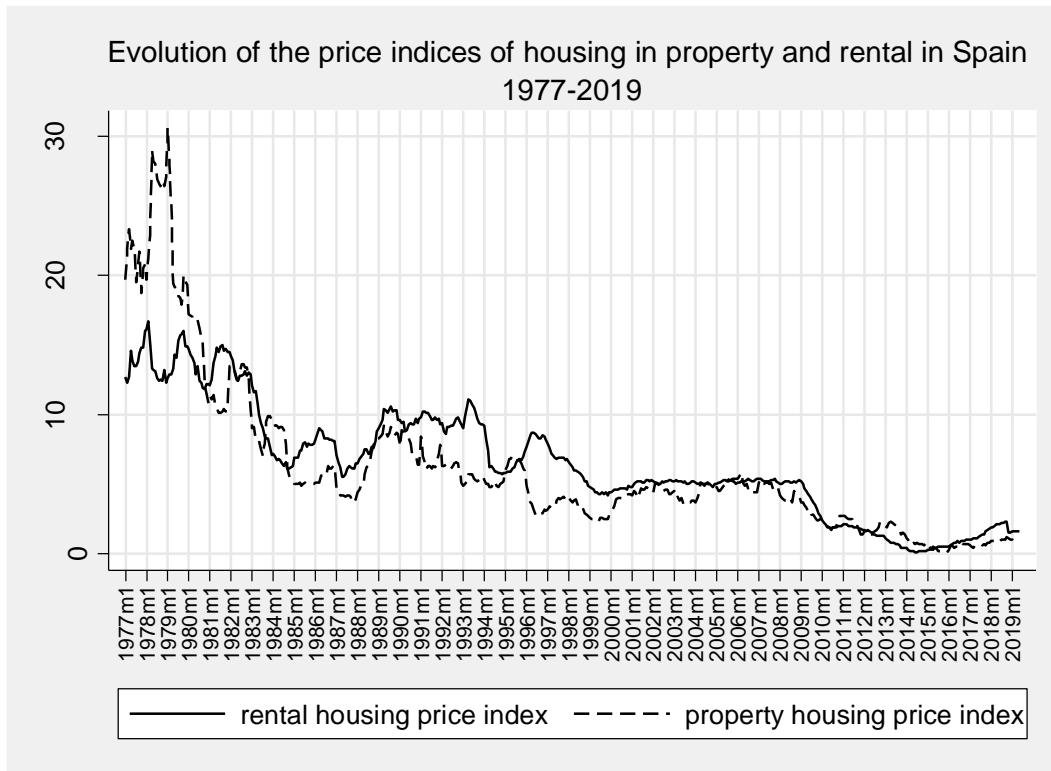


Figure 1b Evolution of housing prices in rent



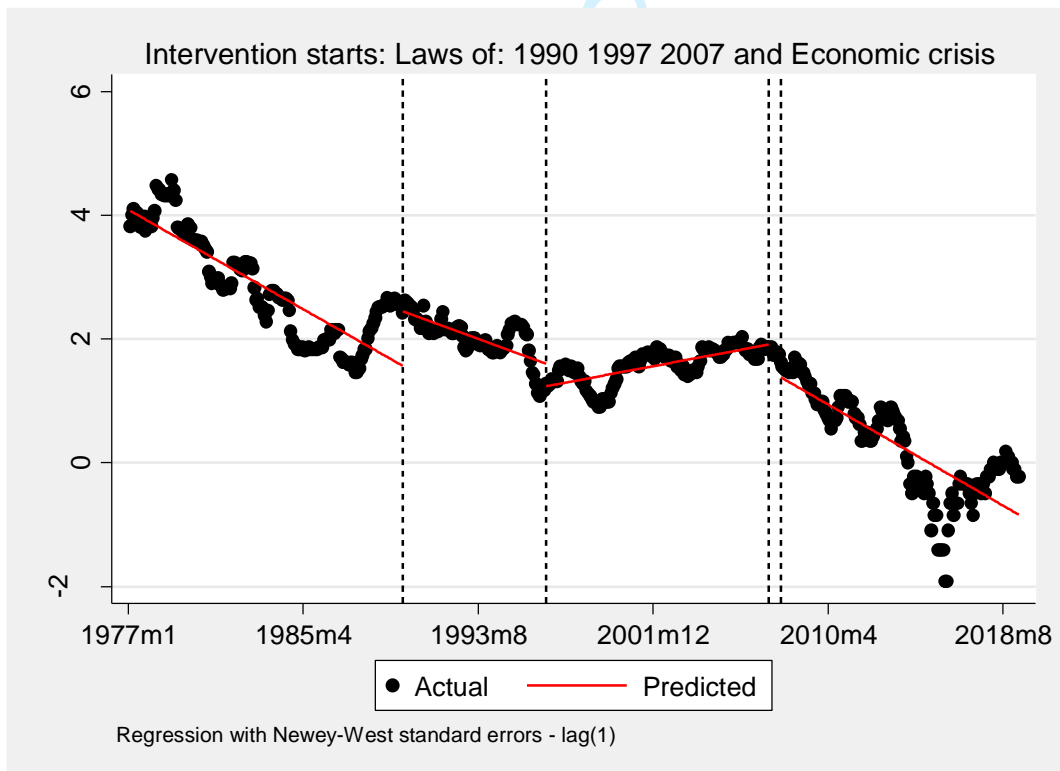
Fuente: Eurostat and own elaboration

Figure 2. Evolution of private housing prices in Spain



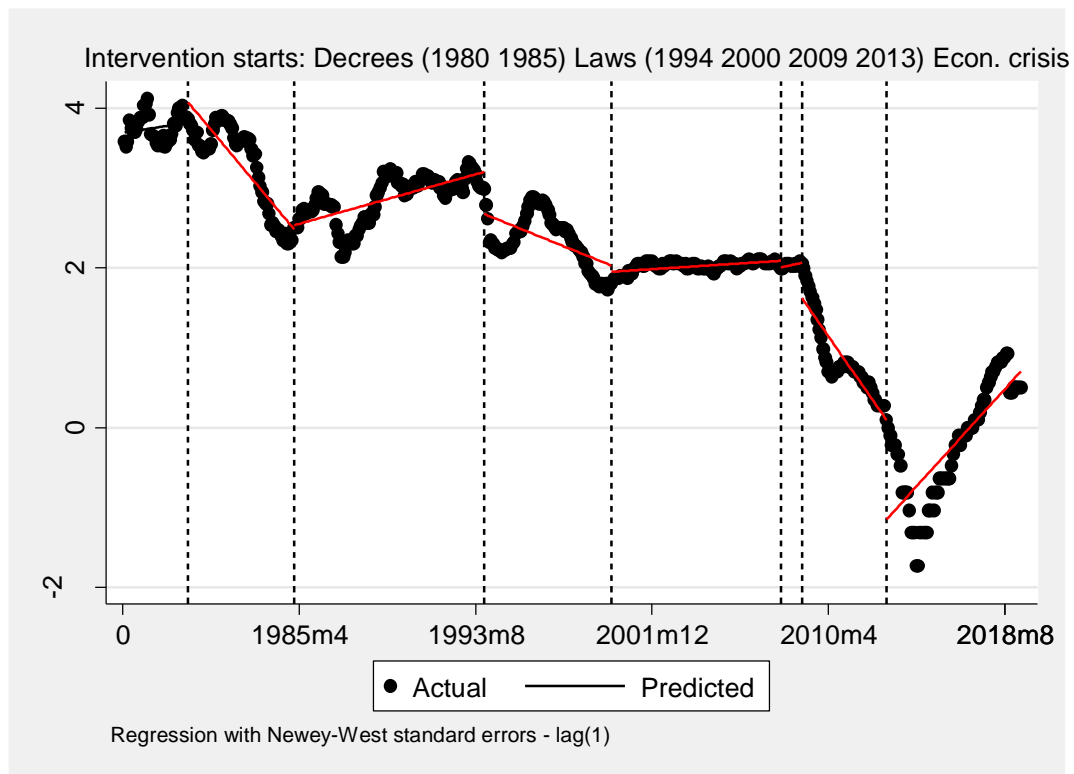
Sources: INE and own elaboration

Figure 3. ITSA with Newey-West standards errors and intervention in dwelling property



Sources: own elaboration

Figure 4. ITSA with Newey-West standards errors and intervention in rent property



Sources: own elaboration

Analysis of the effects of (de)regulation on housing prices in Spain 1977-2019.

Abstract

Purpose:

This paper analyzes the regulatory effects on homeownership and rental prices in Spain in the period 1977m1 to 2019m5, taking into account the economic crisis. It also studies the causal relationship between the prices of private housing (owned and rented).

Design/methodology/approach:

Interrupted Time Series analysis has been used to analyse the legislative impact on the construction sector. Also, the Box-Cox transformation has been used to carry out the above analysis. Finally, Granger's test has made it possible to determine the causal relationship between the price series.

Finding:

The results obtained in this work show the partial positive effects of legislative instrumentalisation, which in general result in decreasing trends in prices in both types of housing use. Likewise, the causal relationship between the prices of housing owned and rented means that the latter do not provide any incentive with respect to the former.

Originality/value: The results obtained in this work could be relevant, both from the point of view of future housing policies, and of the agents involved in them and society in general. In addition, this work could contribute to fill the existing gap in this field in Spain, given the scarce literature that raises the objective, using quantitative methodologies.

Keywords: Housing prices, interrupted time series, regulation.

JEL:C22-E30

Introduction

Authors such as (Maldonado and del Olmo 2017) mention the existence of different models of housing policy in Europe. The southern countries compared to the rest, are more linked to the existence of a considerable number of secondary dwellings, empty dwellings and a significant shortage of social housing for rent. The so-called Culture of ownership, of Spanish society as a paradigm, where the owner invests and saves in the face of uncertainty (Echaves, 2017). In this sense, the tax deduction for acquisition has been one of the main instruments of housing policy and with a larger budget Maldonado and del Olmo (2017). In this sense, Pareja and Sánchez-Martínez (2012) mention that the housing system in Spain is significantly different from other European countries. The main political and economic differences are reflected in: i) imbalances in housing ownership versus renting (and therefore possibilities of reducing public spending by governments), ii) very little public housing and a real estate sector associated with the country's economic growth.

Figures 1 a and b show different evolutions of housing prices in property (figure 1a) and in rent (figure 1b). In both graphs, it can be seen how the evolution of prices has been more intense in the countries of the south for almost two decades.

Figure 1a and b, here

The degree of association and participation of the housing sector in economic development in southern European countries, despite the greater presence of the market vis-à-vis the State, compared with other European countries, as a mechanism of interaction, especially in Spain, could distort State intervention in housing and the objectives it sets itself, given the different ideologies resulting from the alternation of political parties. The instrumentalisation of policies, in legislative and regulatory terms, could have adverse consequences. The objective of this paper is to analyze the regulation influence on the prices of housing owned and rented in Spain in the period 1977m1 to 2019m5. The causal relationship between the prices of private housing (owned and rented) will also be studied. The results obtained in this work could be relevant, both from the point of view of future housing policies, and of the agents involved in them and society in general. In addition, this work could contribute to fill the existing gap in this field in Spain, given the scarce literature that raises the objective, using quantitative methodologies.

The work is organized as follows. In the second section we review the literature and the legislative environment and the variables used. The third section shows the methodology. In the fourth section the results are present. Finally, section 5 shows the main conclusions

Review of literature and the legislative environment and the variables used.

In the Spanish context, the studies of González-Perez (2007, 2010), Pareja and Sánchez-Martínez (2012) or (Maldonado and del Olmo 2017) offer an interesting development of housing policy in Spain, from a descriptive point of view. Table 1 contains some of the works that deal with the analysis of housing in the international sphere. The use of housing prices (and land), as can be seen, has been previously studied by the literature (Tu, de Haan and Boelhouwer, 2018). Likewise, housing in China and its regions or cities has received significant attention, as opposed to other environments.

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Table 1, here

As previously mentioned, the housing sector in Spain is related to a high proportion of secondary and vacant dwellings and associated with ownership. Authors such as Maldonado and del Olmo (2017: 25) indicate that, within the measures or instruments of intervention in the market, on the part of the State is the regulation (laws and decrees), which will address this work. Following these authors, other instruments are related to: the production of land for development, spatial delimitation of special intervention areas (for example rehabilitation), provision of mortgage loans and regulation of the means of financing housing, appropriate fiscal policy, taxes and allowances (property or rental housing), promotion of public and private housing of new housing and action plans of the State (three-year plans) allocated to budgets.

In relation to the regulatory processes carried out in Spain. Table 2 contains three laws (1975, 1990 and 2007) and a decree (1997/98) associated with owned housing. Their objectives are centered on the regulation of land prices or the control of speculation. In the case of rented housing, four laws (1994, 2000, 2009 and 2013) and two decrees (1980 and 1985) are shown, with objectives related to the promotion of the use of rent, as opposed to property.

Table 2, here

The association of the evolution of private housing prices in Spain are shown in figure 2. They are revealed with the different regulations relating to housing in a descriptive manner. It seems to indicate that, in general, and with some caution, these have had an alternating impact. Some examples of this would be attempts to improve the escalation of housing prices; through measures of percentage variations in the cession of land or, without charges in town councils that did not have the expected result. This is demonstrated by the increase in prices, since the late 1980s or since 1998, for almost a decade. However, the new 2007 law, related to the regulation of public land patrimony, could have had a positive impact, given the downward trend in prices.

In this sense, it is important to consider the effects that the economic crisis may have had in this same period. In relation to the effects on the prices of rented housing, for example, the "Boyer" Decree 1985 or the urban leasing law of 1994, which attempts to liberalize rents, do not seem to be reflected in decreasing trends in prices.

The information used in this study comes from the National Statistics Institute (INE). The database created covers the period 1977m1-2019m1. The analysis period is defined by full access to the data. This extensive period of analysis allows us to capture an important part of the regulatory processes that have taken place in private housing in Spain, as is reflected in the initial part of this section. The variables used relative to the private housing price series are the monthly price indices of dwellings owned (hereinafter, PPI) and rented (hereinafter, IRP). The variables are expressed in real terms (deflated by the consumer price index).

Research Methodology

Interrupted time series regression

In this work, the methodology of analysis of interrupted time series is applied. For this purpose, the work of Linden and Arbor (2015), related to Stata software, is closely followed. Likewise, the work of Linden and Adams (2011) and Bernal, Cummins and Gasparri (2017) have provided important support for the use of the afore mentioned methodology.

According to Linden and Arbor (2015: 481) the interrupted time series analysis command (ITSA) is used, which has previously been used in different fields of literature, among which are public policy (Mueller 2004) or regulatory actions (Briesacher et al. 2013). The model to estimate would be:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \dots + \beta_n X_m T_m + \varepsilon_t \quad [1]$$

Y_t is the dependent variable measured at each point of time equally spaced t . T_t is the time control from the beginning of the study, X_t, \dots, X_m are dummies variables that represent the intervention, for example; law, royal decree or economic crisis (periods of preintervention 0, in another case 1), and $X_t T_t + \dots + X_m T_m$ would be the terms of interaction. β_0 represents the intercept or starting level of the outcome variable. β_1 is the slope or trajectory of the Y_t variable until the introduction of the intervention. β_2 represents the change in the level of the Y_t that occurs in the period immediately following the introduction of the intervention (compared with the counterfactual). β_3 represents the difference between preintervention and postintervention slopes of the Y_t . Thus, we look for significant p-values in β_2 to indicate an immediate law or decree law effect, or in β_3 to indicate a treatment effect over time (Linden and Adams 2011).

Box-Cox

The type of distribution of the two price indices will be studied. If these indices are not normal, the Box-Cox transformation will be applied. This transformation is one of the most used (for more details see Collins 1991). Li (2009), among others, is used within the field of housing analysis. Following (Box and Cox, 1964):

$$Y(\lambda) = (Y^\lambda - 1) / \lambda, \quad \lambda \neq 0 \ln Y, \quad \lambda = 0$$

Where Y is the dependent variable and λ is the transformation parameters. For $\lambda=0$, the natural log of the data is taken instead of using the above formula. $\lambda=1$, the transformation is not necessary.

Causality

The Granger test will be used to study the causal relationship between property prices and rental prices. Authors such as Altuzarra and Esteban (2011) have used this same methodology to determine the relationship between land prices and housing in Spain. As these authors mention, Granger's test proposal has been widely accepted as a methodological process. Granger's causality test is applied in two steps. In step #1, it is to determine the existence of cointegration in time and its order, between the two-price

series. In step #2, the residues of these series are integrated in order and therefore are stationary.

Results

The Shapiro-Wilk tests of the IPP (Statistical=0.959; Pvalue=0.000) and IRP (0.946; Pvalue=0.000) variables indicate non-normality and therefore the absence of all the assumptions inherent to this distribution. The Box Cox transformation proposes a value of λ of 0.215 and 0.612 for the indices of housing owned and rented respectively.

Tables 3 and 4 show the results obtained after applying the ITSA for the two price indices. In the two ITSA models analyzed the Cumby-Huizinga test for autocorrelation (Breusch-Godfrey), indicating uncorrelated error term that has been confirmed by the Breusch-Godfrey LM test of two lags (space saving results omitted and available on request).

Table 3, here

Table 4, here

In relation to the ITSA for homeownership housing, table 3 and graph 3 show the following results. With the 1990 Law, homeownership prices react with a decreasing trend in the years (months) prior to 1990 ($k = -0.016$). In the first year of intervention of the 1990 law, there is an increase in prices ($_x1990 = 0.878$), followed by a growing trend towards a monthly price ratio (relative to the pre-intervention trend) of 0.005. The first year of intervention of the 1990 law, there is an increase in prices ($_x1990 = 0.878$), followed by an increasing trend towards a monthly price ratio (relative to the pre-intervention trend) of 0.005. The first year of intervention of the 1990 law, there is an increase in prices ($_x1990 = 0.878$), followed by an increasing trend towards a monthly price ratio (relative to the pre-intervention trend) of 0.005. In relation to the effects after the 1990 Law, section a) at the end of table 3 indicates a decreasing trend of 0.010. The interpretation of all the coefficients up to the second intervention is the same as the previous one. In other words, the first intervention period is compared with the period prior to the intervention. However, the additional coefficients for the second intervention period corresponding to the 1997 law ($_x1997$ and $_x_t1997$) are now compared with those of the (first) previous intervention period, and so on. As shown in section b), c) and d) in the final part of table 3, and verified in visual inspection, prices increase from 1997 and have a decreasing trend of 0.018 and 0.001 with the 2007 law and the economic crisis respectively.

Figure 3, here

In relation to the ITSA for rental housing, table 4 and graph 4 show the results. Through the decree law 1980, the prices of rented housing show an increasing trend in the years (months) prior to 1980 ($k = 0.003$), although it is not statistically significant. In the first year of intervention of the 1980 decree law, there is an increase in prices ($_x1990 = 0.878$), followed by a growing trend towards a monthly price ratio (relative to the pre-intervention trend) of 0.255. In relation to the effects after the decree Law of 1980, section a) at the end of table 4 indicates a decreasing trend of 0.026. As already mentioned, the interpretation of all the coefficients up to the second intervention is the same as the previous one. In other words, the first intervention period is compared with the period

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3 before the intervention. However, the additional coefficients for the second intervention
4 period corresponding to the 1985 decree law ($_x_{1985}$ and $_x_{t1985}$) are now compared
5 with those of the (first) previous intervention period, and so on. As shown in section b),
6 c), d), e), f) and g) in the final part of table 4 and verified in visual inspection, prices have
7 increasing trends of 0.006 from 1985, decreasing with 0.009 and 0.001, from 1994 and
8 2000 respectively, increase again with the crisis with 0.004, and finely decrease and grow
9 from 2009, and 2013 respectively.
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12 Figure 4, here

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14 In summary, the regulatory effects through decrees and laws have had a partial effect,
15 which is balanced in greater proportion with decreasing trends in the reduction of prices
16 in both types of housing use.

17 Finally, table 5 shows the results of the causality analysis through Granger's test.

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19 The first row of the table 5 shows that IRP cause IPP as p-value is ($0.013 < 0.05$). The
20 direction of causality is therefore from IRP to IPP. The second row, p-value for IPP is
21 greater than 0.05 ($0.080 < 0.10$ at 10% level of significance). This implies that IPP does
22 not Granger-cause IRP at 5%.
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25 Table 5, here
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29 Conclusions

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31 This paper analyzes the regulatory effects of the State on the prices of owned and rented
32 housing in Spain in the period 1977m1 to 2019m5, taking into account the economic
33 crisis. It also studies the causal relationship between the prices of private housing (owned
34 and rented). The results obtained in this work show the partial positive effects of
35 legislative instrumentalisation, which in general result in decreasing trends in prices in
36 both types of housing use. Likewise, the causal relationship between the prices of
37 housing, owned and rented, means that the latter do not provide any incentive with respect
38 to the former.
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41 The effective influence of the 1990 and 2007 homeownership laws are framed within
42 efforts to control speculation and the implications of regulation on land prices
43 respectively. In this sense, the recommendations based on these results could be directed
44 towards greater coherence and caution in public but also private actions in the promotion
45 of new housing, without leaving aside actions on rehabilitation. It is important to consider
46 here the scarce and perhaps unequal provision of social housing, a subject that could be
47 an interesting field of future analysis.
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50 The 1980 decree and the 1994, 2000 and 2009 laws have influenced declining trends in
51 rental prices. Regulatory efforts aimed at greater control of public aid and relations of
52 agents involved in the rental process, in terms of contractual deadlines, commitments and
53 simplification of procedures seem to have had some impact. However, the situation of
54 rental prices vis-à-vis property and above all, the non-existent effects of these in
55 comparison with the acquisition of housing, suggest drastic changes in the rental housing
56 policy that balances this option. It is a complex issue that could perhaps find possibilities
57 through fiscal means. These links with the idea of affordable public rents, with a greater
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3 importance in social investment taking into account the possible returns of the capital
4 gains, that have possibly been generated by the policies of urban reorganizations.
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6 The Mediterranean countries, and Spain in particular, maintain price behaviour that is
7 different from the rest. Public policies and market behaviour are therefore also different.
8 Therefore, given the current economic and social context, the need to find solutions to a
9 problem, such as housing, becomes one of the main priorities of all actors. In this sense,
10 according to Madden and Marcuse (2016:211) the real right to housing requires a
11 fundamental change in the political and economic structures of contemporary society.
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