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Did the 2012 Spanish law reform to protect mortgage debtors modify banks' lending behavior?

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Royal Decree-Law 6/2012 introduced a new Code of Good Practice for Spanish banks and financial institutions with the aim of protecting low-income debtors. In this study, we examine the impact of this legal reform on the lending behavior of banks. We analyze quarterly data spanning from 2005 to 2020(Q1) across the 17 Spanish NUTS II regions. Our analysis employs panel data models incorporating regional, year, and quarter fixed effects, as well as linear and quadratic region-specific time trends. We also include other relevant control variables at the regional level, such as house prices, inflation rates, and unemployment rates. Our findings indicate that the Code had a significant and negative effect on the number of new mortgage loans, the average interest rate, and the average ratio between monthly mortgage payments and wage costs.

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Introduction

The global financial crisis of 2007–2009 had profound economic and social ramifications in Spain, coinciding with the onset of the Great Recession and the housing market collapse. Prior to the Great Recession, the unemployment rate stood at 8% (as reported by INE, *Instituto Nacional de Estadística*), but it skyrocketed to over 25% in both 2012 and 2013. The housing bubble's collapse was equally dramatic, with prices plummeting continuously for six consecutive years from 2008 onwards (Martín et al. 2019). According to Parreño Castellano et al. (2019, p. 2), “between 1996 and 2007 6.5 million new residences were built in Spain (Romero et al. 2012), while average prices grew by 135%.” Consequently, household debt in the form of mortgage loans surged from 66.1 to 167.9% of GDP. The abrupt bursting of the housing bubble led to an inability to repay a portion of the 319 billion euros in mortgage loans, triggering an unprecedented wave of foreclosures and evictions in the country (Parreño Castellano et al. 2019).¹In just 2 years, from 2008 to 2010, the number of judicial foreclosures doubled, reaching its zenith in 2015 at four times the 2008 figure (González-Val, 2021).

The resulting social tensions exerted substantial pressure on political forces, as various social movements and associations advocated for specific measures. These included allowing debtors to transfer their property to the bank as payment for their debts (commonly known as *dación en pago*), urging the government to establish a system of social rent for low-income debtors, and calling for a moratorium on all evictions.²Consequently, the government and parliament responded by implementing a series of new regulations aimed at reforming the banking sector and creating mechanisms to safeguard low-income mortgage debtors facing the threat of eviction.

However, according to González-Val (2021), the most pivotal among these measures designed to protect low-income mortgage debtors was the Royal Decree-Law 6/2012. This decree introduced an effective tool for averting foreclosures: a new Code of Good Practice for banks and financial institutions.³

Under this new regulatory framework, low-income debtors who meet specific criteria can only be evicted with difficulty and, in the case of default, the bank is obligated to provide the debtor with options, including a debt restructuring plan. As a last resort, debtors can even transfer the property to the bank as an alternative to undergoing foreclosure proceedings. Essentially, the beneficiaries of the protections outlined in Royal Decree-Law 6/2012 are individuals who have mortgaged their primary residence and find themselves in a situation where the monthly mortgage payments represent more than 50% of the total net income received by all members of the household. However, it is important to note that various other economic and familial prerequisites must also be met.

The primary objective of the Code is to streamline the repayment process for mortgage loans among low-income individuals it targets. In cases where full repayment is not feasible, its secondary goal is to minimize the occurrence of foreclosures. This approach enables mortgage debtors to remain in their homes, even if the property is ultimately transferred to the bank to satisfy the mortgage debt. The Code outlines a sequential procedure consisting of three distinct steps for restructuring mortgage debt (for more comprehensive information, refer to González-Val (2021, 2022a)).

First, if the borrower's financial challenges are deemed temporary, certain fundamental terms in the loan agreement, namely the repayment period and/or interest rate, can be adjusted. The bank is authorized to provide the debtor with a five-year grace period for repaying the principal, an extension of the repayment period for a maximum of 40 years from the loan's origination date, and/or a reduction in the interest rate applicable during the

grace period. Additionally, the bank is granted the option to consolidate debts owed to it.

Second, if implementing the measures mentioned above is deemed unfeasible, the mortgagor retains the option to request a debt reduction, commonly referred to as a *'quita'*. However, in this scenario, the bank is not obligated to accept this request.

Finally, if the restructuring plan and additional measures are not feasible, in the third step the mortgagor may seek to settle the debt by offering the residence itself as payment, and the lender is obliged to accept the transfer of the mortgaged property. Furthermore, the debtor is granted the right to remain in the residence as a tenant for two years, paying an annual rent below market value, equivalent to 3% of the total debt amount at the time of the property transfer. This arrangement helps prevent foreclosure, allowing the debtor to relinquish the property while satisfying the mortgage debt.

Participation in this Code is voluntary; nevertheless, within a brief period, the majority of Spanish banks chose to align with the Code due to concerns about their reputation during a period marked by diminished trust in financial institutions (Carbó-Valverde et al. 2013). Once an institution committed to adhering to the Code, it became mandatory for them to provide borrowers experiencing challenges in repaying their mortgage debt with the opportunity to avail themselves of the measures outlined in the Code.

The Code came into effect on March 11, 2012.⁴ Biannual reports issued by the Commission responsible for monitoring the Code of Good Practice offer statistical insights into its effectiveness. From 2012 to mid-2022, financial entities received a total of 136,876 applications, of which only 63,439 (46%) were accepted and processed. Among the accepted applications, 55,099 (87%) were successfully resolved through modifications to the loan agreement, while in twenty cases (0%), the bank approved a reduction in the debt, and the bank took possession of the property securing the mortgage loan as payment for the loan 8320 (13%) times. It is worth noting that financial institutions rejected over half of the applications they received, with the most common reasons for rejection being insufficient documentation in the application and the mortgage debtor's failure to meet the income threshold.

Some authors have contended that the Code might introduce a new set of incentives, altering banks' lending practices and potentially yielding undesirable outcomes. Lacruz Mantecón (2014) suggested that this heightened protection of debtors could lead to a decrease in mortgage credit availability, particularly affecting the very groups the law aims to safeguard, such as individuals at risk of economic exclusion. Similarly, González-Val (2021) observed that the adverse effects of the 2012 law reform on the mortgage loan market persisted for many years. The argument here is that even though banks aligned with the Code, they sought ways to mitigate its potential costs. Since the Code clearly delineates the characteristics of the targeted debtors, banks might adjust their lending behavior to exclude such mortgage debtors, thereby pre-empting future applications.

Figure 1 presents some descriptive evidence illustrating the non-parametric evolution of average financial terms in mortgage loan agreements before and after the law reform, with calculations based on regional values. This analysis encompasses the average mortgage loan amount, monthly payments, interest rates, and the ratio between the mortgage monthly payment and the average wage cost. The vertical line in the chart marks the date of the law reform in 2012(Q1). Beginning in 2008, coinciding with the onset of the Great Recession, all four variables experienced a significant decline. Notably, prior to 2008, the ratio was notably high, with monthly payments averaging over 50% of the average wage cost.

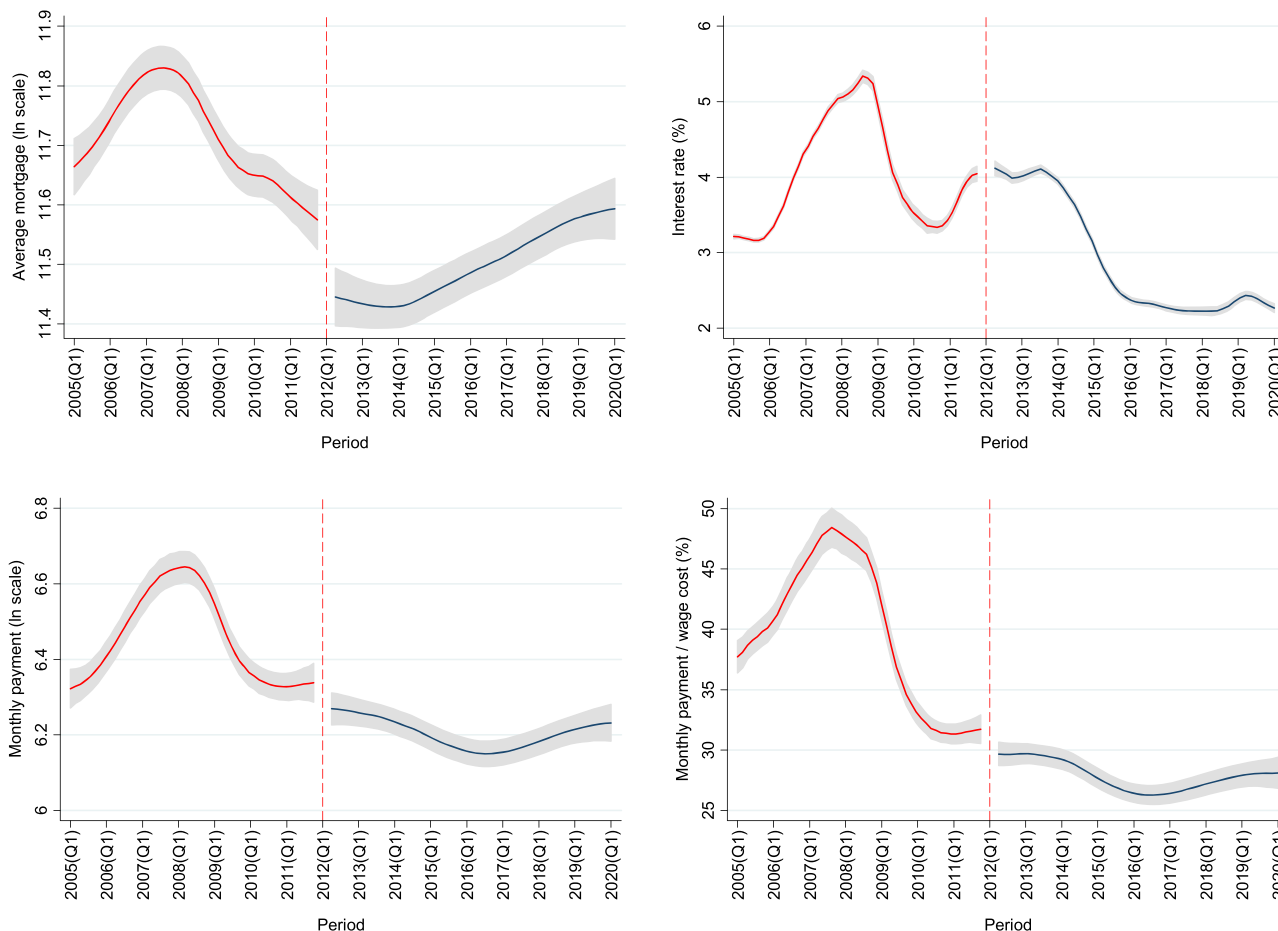


Fig. 1 Average financial terms in the mortgage loan agreements before and after the law reform. Notes: Unconditional non-parametric estimates of the evolution of these variables over time: interest rate, loan amount, monthly payment, and monthly payment/wage cost. Computed from regional data (NUTS II regions), quarterly data from 2005 to 2020(Q1). The gray area is the 95% confidence interval. The vertical line indicates the date of the law reform (2012(Q1)). Data source: Statistics from the Spanish Land Registries (*Registro de la propiedad*).

From 2012(Q1) onward, all the series appeared to exhibit similar trends, showing a slight decrease in value following the reform, except for the interest rate. In fact, the interest rate displayed an upward trajectory starting in 2011, but two years after the reform, it began a pronounced descent. In sum, these observations suggest a potential effect of the law reform, although this evidence is purely descriptive. This paper’s objective is to empirically investigate whether the enactment of Royal Decree-Law 6/2012 (along with the accompanying Code of Good Practice) influenced banks’ lending behavior, utilizing aggregate regional-level data for analysis.

We employ panel data models incorporating quarterly regional data. One potential limitation to our analysis is that the law reform had a simultaneous impact on all regions in Spain, leaving us without a control group. Nonetheless, we account for this by incorporating regional, year, and quarter fixed effects, linear and quadratic region-specific time trends, and other pertinent control variables at the regional level. Our empirical approach also accommodates the possibility of a dynamic effect stemming from the law reform.

The rest of the paper is structured as follows: Data provides an overview of the data utilized, while Methodology and Results outlines the methodology and presents the key findings. Finally, Conclusions offers our concluding remarks.

Data

We analyze quarterly data from the 17 Spanish Autonomous Communities (NUTS II regions) spanning the periods before and

after the Great Recession, encompassing the impacts of the economic crisis and the global financial crisis of 2008. Our dataset concludes just prior to the onset of the COVID-19 pandemic.⁵ The choice of regional data is critical due to the unique spatial considerations in Spain. While major financial institutions like Banco Santander and BBVA have a national presence with offices across the country, Spain had a distinct category of regional financial entities known as ‘*cajas de ahorros*’ (savings banks). These savings banks exhibited different behavior compared to traditional banks. Notably, they were marked by poor management, significant exposure to risk through real estate loans, and excessive private loans, rendering them highly vulnerable to the financial crisis. Consequently, these institutions effectively ceased to exist in the aftermath of the crisis, either through mergers, acquisitions, or their transformation into conventional banks. The majority of these entities disappeared from the market between 2010 and 2012, resulting in a reduction in the number of financial entities operating within the market.

The aggregate data utilized in this study are sourced from two public data repositories: land registrars and notaries. Both professions are subject to regulation by the General Directorate for Registries and Notaries, which operates under the purview of the Ministry of Justice. These professionals are organized within associations, as detailed by Femenia-Ribera et al. (2021). On a national level, land registrars are coordinated by the Spanish Land and Trade Registrars Association, comprising 1058 members who are restricted to practising within specific geographical territories.

Notaries, on the other hand, are affiliated with various regional organizations overseen by the General Council of Notaries (*Consejo General del Notariado*, CGN).

In Spain, the registration of real estate sales in the Land Registry is not obligatory, although it is strongly recommended due to its ability to confer third-party efficacy (declaratory effect) upon property rights. However, in the context of mortgage loans, this dataset is both comprehensive and reliable. This is primarily because notary intervention is compulsory for gaining access to the Land Registry (González-Val, 2021). Consequently, a notary must be present to witness the sale deeds, transforming the private sales contract into a public deed that can subsequently be recorded in the official property register. Furthermore, registration becomes mandatory when a mortgage loan is used to finance the property acquisition, as stipulated in Article 145 of the Mortgage Law. Importantly, mortgage registration holds a constitutive effect, effectively bringing the registered right into existence (Gómez Gállego, 2010).

The quarterly bulletins sourced from the land registries furnish us with aggregate information at the regional level, spanning from 2005(Q1) to 2020(Q1). This data encompasses the total count of registered real estate sales and various average mortgage loan parameters, including interest rates, monthly mortgage payments, and the proportion these payments represent in relation to wage cost⁶. The wage cost figures are derived from labor statistics provided by the Spanish National Institute of Statistics (INE). Additionally, the data pertaining to the number of new mortgage loans is extracted from the statistics CGN. It is important to note that our analysis exclusively considers mortgage loans associated with housing acquisition. Please be aware that data on these loans are only available from 2007 onwards, resulting in a slightly smaller sample size for this variable.

Our empirical models incorporate a set of additional control variables that may exert influence on mortgage loans. This same set of controls has been employed by González-Val (2021, 2022b) in the examination of judicial foreclosures and housing markets in Spain. Consequently, our presentation closely aligns with the data description outlined by González-Val (2021, 2022b). These controls encompass house prices, the unemployment rate, and the inflation rate.

House prices refer to the prices of new houses (i.e., recently constructed properties) measured in euros per square meter, sourced from the Spanish Government's *Ministerio de Fomento*. This variable enables the identification of shifts in the supply and demand dynamics within the housing market.

We utilize the unemployment rate as a control to account for regional fluctuations in the business cycle, and inflation is related to the cost of living. Data on unemployment are obtained from the Spanish Labor Force Survey. It is worth noting that Spain has experienced significant and persistent variations in unemployment rates at both the national and regional levels over time (Jimeno and Bentolila, 1998). In terms of inflation, Spain has consistently reported higher inflation rates compared to other European Union (EU) countries. In fact, Lopez and Papell (2012) analyzed inflation rate behavior across several EU nations in recent decades. Until 2008, Spain held one of the highest inflation rates among EU countries. Subsequently, Spain was severely affected by the 2008 crisis, leading to a moderate decrease in its inflation rate post-crisis. Our measure of the inflation rate corresponds to the rate of change in the consumer price index.

Lastly, to account for the regional size factor, we incorporate population data at the regional level to compute a relative measure of the number of mortgage loans. These population figures are accessible at the regional level for two specific dates each year, corresponding to the first and third quarters. To complete the

dataset for the remaining two quarters, we employ linear interpolation techniques to estimate the missing values.

Table 1 provides an overview of the regional average values for all these variables by year, spanning the entire period under consideration. If we turn our attention to the years surrounding 2008, a range of different dynamics becomes evident. This period marks the onset of the Great Recession and the global financial crisis. During this time, unemployment experienced an upward trajectory, while house prices, real estate sales, inflation, interest rates, absolute and relative (in relation to wage costs) monthly mortgage payments, as well as the quantity (both absolute and relative) and value of mortgage loans, all registered declines from that pivotal date. However, these metrics have displayed signs of recovery in the subsequent periods.

It is worth noting that the number of real estate sales and new mortgage loans do not align perfectly; this discrepancy arises from the fact that not all property acquisitions are financed through mortgage loans. This divergence explains why the gap between real estate sales and mortgage loans widened in the initial years of the economic crisis.⁷

Methodology and Results

The primary hypothesis we intend to investigate pertains to whether the 2012 law reform in the Spanish mortgage market, aimed at safeguarding mortgage debtors lacking resources, had a substantial impact on the lending practices of banks. In order to capture the evolving effects of this legislative reform, we employ the following econometric model:

$$Y_{it} = \alpha + \rho Y_{it-1} + \beta_1 \cdot \ln(HP_{it}) + \beta_2 \cdot UNEMP_{it} + \beta_3 \cdot INF_{it} + \sum_{k \geq 1} \beta_k \cdot d_k \text{ Years since law reform, } it + \theta_i + \delta_t + T_{it} + u_{it} \quad (1)$$

where Y_{it} is the dependent variable in region i at time t . We estimate several models using different dependent variables related to the average characteristics of mortgage loans. Y_{it-1} is the first lag of the dependent variable; we consider a dynamic specification because the variables considered show strong persistence over time. HP_{it} , $UNEMP_{it}$, and INF_{it} represent the house prices, unemployment, and inflation rates in region i at year t , respectively.⁸

Table 2 displays the pairwise correlations among all variables utilized in our empirical analysis, encompassing the various outcome variables and control factors. In general, the seven outcome variables, which pertain to the average characteristics of mortgage loans, exhibit statistically significant positive correlations, with the interest rate demonstrating the weakest correlation with the other variables. In relation to the control variables, the correlation between the inflation rate and house prices fails to reach statistical significance at the conventional 5% level. Nevertheless, both variables display a noteworthy and positive correlation with all outcome variables associated with the average terms of loan agreements and the housing market. Conversely, the correlation between the unemployment rate and the various outcome variables is consistently negative across all cases, though it fails to reach statistical significance in the context of the interest rate and real estate sales.

$\sum_{k \geq 1} \beta_k \cdot d_k \text{ Years since law reform, } it$ is a set of time dummies to capture the dynamic effect of the policy reform. As explained in the introduction, among the different rules introduced during the period considered, the most important was the Royal Decree-Law 6/2012; thus, we set the law reform date at March 11, 2012 (2012(Q1)), when this rule entered into force. The dummies d_k equal to "1" when the law reform has been effective in year t for k periods and "0" otherwise. We include dummy variables for the

Table 1 Regional average values by year.

Year	House price (euros per m ²)	Unemployment rate	Inflation rate	Sales	Mortgage Loans	Loans per 1000 inhabitants	Interest rate	Loan amount	Monthly payment	Monthly payment/wage cost
2005	1606.26	8.88	3.28	13,775.35			3.18	11,9431.13	574.62	38.90
2006	1776.53	8.13	3.49	13,472.10			3.66	13,4005.44	653.68	42.80
2007	1876.33	7.71	2.73	11,595.85	8867.96	3.33	4.68	14,1664.33	759.86	47.82
2008	1889.62	10.39	4.13	8256.18	5266.28	2.07	5.23	13,4950.48	783.48	46.69
2009	1744.89	16.45	-0.42	6222.26	4128.46	1.63	4.23	11,8079.63	643.50	37.35
2010	1691.01	18.38	1.75	6557.13	4497.07	1.72	3.40	11,6385.41	572.22	31.81
2011	1600.06	20.05	3.23	5444.18	2690.60	1.05	3.81	11,0030.10	573.03	31.59
2012	1477.36	23.45	2.42	4863.97	2312.57	0.87	4.09	9,9120.47	548.91	30.05
2013	1390.79	24.72	1.43	4840.38	1610.03	0.60	4.06	9,3721.35	533.86	29.71
2014	1351.41	23.00	-0.22	4690.12	2262.71	0.82	3.69	9,4940.09	519.96	28.75
2015	1360.70	20.65	-0.59	5213.79	2815.76	1.03	2.72	9,9271.09	490.84	27.06
2016	1375.61	18.27	-0.23	5937.40	3351.91	1.20	2.33	10,0597.59	474.50	25.99
2017	1397.12	16.10	1.91	6826.81	3798.62	1.34	2.24	10,4960.40	486.76	26.67
2018	1428.93	14.32	1.64	7598.24	4304.16	1.50	2.23	10,9710.98	506.18	27.53
2019	1467.35	13.35	0.68	7409.93	4499.09	1.55	2.41	11,1789.20	525.30	28.15
2020(Q1)	1466.84	14.18	0.61	7491.59	3930.65	1.33	2.23	11,3780.06	523.92	27.75

Data sources: Statistics from the Spanish Land Registries (*Registro de la propiedad*), General Council of the Judiciary (*Consejo General del Poder Judicial*), Spanish Government (*Ministerio de Fomento*), and Spanish National Institute of Statistics (INE).

first two years of the new legal regime and for years 3 and 4, 5 and 6, and 7 and 8 (until Q1 in 2020).⁹ The β_k coefficients are intended to capture the entire dynamic response of the dependent variable to the new legal regime, while the region-specific time trends identify pre-existing trends. The estimates of these coefficients allow us to determine the average effect of the law reform by year and to test whether this effect declines (a negative coefficient) or grows (a positive coefficient) over time.

Finally, region and time (year and quarter) fixed effects are included, represented by θ_i and δ_t , respectively. T_{it} is a matrix of time variables, incorporating region-specific linear time trends ($\sum_{i=1}^{n-1} Region_i \cdot Time_t$) and quadratic region-specific time trends ($\sum_{i=1}^{n-1} Region_i \cdot Time_t^2$), thus allowing us to control for unobserved regional characteristics that vary over time. u_{it} is the error term.

Time-fixed effects and linear as well as quadratic time trends serve to account for additional unobservable factors that influence the mortgage market. One of the most significant factors among these is the Basel III agreement and its implementation in Europe through the Capital Requirements Regulation (CRR) and Directive (CRD), aimed at bolstering the resilience of the banking sector within the EU. The CRD IV package came into effect on July 17, 2013, marking the commencement of its implementation. CRD IV and the CRR were enforced as of January 1, 2014, with certain provisions phased in until 2019. Consequently, this timing is in proximity to, albeit after, the approval of Spain's Royal Decree-Law 6/2012. It is important to note that the adaptation to this new regulatory framework within the EU transpired gradually, following multiple European Directives, spanning several years (with full implementation in Spain concluding in early 2022).¹⁰

Various other temporal events also exerted influence on certain aspects related to the Spanish mortgage system. Apart from Royal Decree-Law 6/2012, other legislations were enacted to safeguard mortgage debtors, as outlined in González-Val (2021). For example, Royal Decree-Law 27/2012 and Law 1/2013 introduced a moratorium on evictions for low-income debtors.

The model described in Equation (1) possesses a dynamic nature as the law reform may have prompted gradual changes in the lending practices of banks. These changes occurred as banks

and financial institutions progressively adhered to and adapted to the new Code of Good Practice. This empirical approach bears a resemblance to the one advocated by Wolfers (2006) for analyzing the impact of unilateral divorce law reforms in U.S. states. Notably, the only distinction between our approach and Wolfers' methodology lies in the fact that, in our case, the law reform simultaneously affected all regions due to its national scope. Consequently, there is no variability in the timing of treatment.¹¹

In the relevant literature, this same methodology has been employed to investigate legal reforms that affected all entities concurrently. Marcén (2016) explored the impact of the Bosman ruling on the presence of native football (soccer) players in their respective home leagues, while González-Val (2021) estimated the effects of the 2012 law reform designed to protect mortgage debtors on judicial foreclosures in Spain.

We estimate Equation (1) using Ordinary Least Squares (OLS) with robust standard errors. All models incorporate all control variables. Initially, our focus is on assessing the impact of the 2012 law reform on the volume of credit. Table 3 presents the estimates of this impact on the number of mortgage loans in absolute (Column 1) and relative terms (Column 2), utilizing data obtained from notaries' statistics. It is important to note that this dataset regarding loans is available only from 2007 onwards, resulting in a slightly reduced sample size compared to the rest of the estimations. (See Column 3 in Tables 3 and 4 for the sample period, which begins in 2005 based on the Land Registry's statistics.)

The results are consistent across both measures of the number of mortgage loans (log-number of mortgage loans and the ratio of mortgage loans per 1000 inhabitants). Our analysis reveals that the impact of the law reform on regional mortgage loans is negative and statistically significant from the time of the reform's approval up to eight years following it. It is worth noting that during the first 2 years, while the effect is negative, it does not attain statistical significance. Furthermore, our findings indicate not only the persistence of this negative effect but also an increase in its magnitude over time, as indicated by the estimated coefficients for the time dummies.

This finding corroborates the results obtained by González-Val (2021) using data from Spanish regions at the NUTS III level,

Table 2 Pairwise correlations.

	Mortgage Loans	Loans per 1000 inhabitants	Sales	Interest rate	Loan amount	Monthly payment	Monthly payment/wage cost	Unemployment rate	Inflation rate	House price (euros per m ²)
Mortgage Loans	1.000									
Loans per 1000 inhabitants	0.415***	1.000								
Sales	0.943***	0.227***	1.000							
Interest rate	0.089***	0.245***	0.089***	1.000						
Loan amount	0.503***	0.540***	0.394***	0.160***	1.000					
Monthly payment	0.453***	0.514***	0.363***	0.468***	0.928***	1.000				
Monthly payment/wage cost	0.409***	0.623***	0.388***	0.621***	0.736***	0.850***	1.000			
Unemployment rate	-0.124***	-0.635***	-0.059*	-0.012	-0.626***	-0.515***	-0.519***	1.000		
Inflation rate	0.133***	0.299***	0.210***	0.385***	0.319***	0.358***	0.485***	0.473***	1.000	
House price (euros per m ²)	0.411***	0.411***	0.315***	0.240***	0.875***	0.884***	0.645***	-0.280***	0.049*	1.000

Notes: Pairwise correlations. All variables are on a logarithmic scale except loans per 1000 inhabitants, interest rate, monthly payment/wage cost, unemployment rate and inflation rate. Significant at the *10%, **5%, and ***1% levels.

affirming that the law reform had a significant impact on reducing access to the credit market. Similarly, the outcomes presented in Column 3 demonstrate a substantial decrease in real estate sales, primarily due to the increased difficulty in securing funding for property acquisitions after the law reform. Notably, the pairwise correlation between mortgage loans and real estate sales, as indicated in Table 1, stands at 0.943.

It is essential to emphasize that while both real estate sales and loans granted by financial institutions naturally decreased in number during the global financial crisis and the Great Recession for various reasons¹², our analysis takes into account this negative pre-trend. We accomplish this by incorporating time-fixed effects and region-specific linear and quadratic time trends. Consequently, our time dummies, designed to exclusively isolate the effect of the 2012 law reform, reveal an additional adverse impact on the already declining mortgage loans market attributed to the policy reform approved in 2012.¹³

Regarding the control variables, it is worth noting that only the coefficient associated with the unemployment rate exhibits statistical significance across all cases. The negative sign of this coefficient suggests that as the unemployment rate rises, there is a corresponding decrease in the number of real estate sales. Lastly, the lagged dependent variable consistently displays significance and a positive coefficient in all three models, which lends support to the dynamic model being employed.

Subsequently, we delve into whether this reduction in mortgage loans was widespread or if it primarily affected a specific group of borrowers. To investigate this, we re-evaluate model (1) by examining the average values of key components of any mortgage loan agreement, including the interest rate, loan amount, monthly payment, and the proportion of the monthly payment relative to the average wage cost. The results of this analysis are presented in Table 4. In this instance, the coefficients of the control variables exhibit the expected signs and are statistically significant in most cases. Specifically, both unemployment and inflation rates exert a negative influence, while house prices have a positive impact. Additionally, the lagged dependent variable maintains its significance and positive coefficient across all models once again.

The law reform did not yield a significant impact on the average loan amount and monthly payment, both of which are assessed on a logarithmic scale (as shown in Columns 2 and 3). Our collection of time dummies does not exhibit statistical significance in most instances, with the sole exception being the coefficient corresponding to years 7 and 8 following the law reform. However, it is important to exercise caution when interpreting the latter-time dummies. This caution arises from the fact that, as we move further away from the reform date and consider that none of the preceding time dummies hold statistical significance, these dummies may be influenced by other factors.

Nevertheless, we observe a consistent and significant impact of the law reform on both the interest rate and the ratio between the monthly payment and the average wage cost. In Column 1, it is evident that the law reform substantially reduced the average interest rate. Furthermore, the time dummies reveal that this effect increased progressively over time. In other words, as the Code of Good Practice remained in force for a longer duration, the average interest rate on new mortgage loans continued to decline.

The underlying cause of this decrease can be attributed to a substantial shift in the types of interest rates stipulated in mortgage loan contracts, specifically between fixed and variable rates. Typically, the Euribor serves as the benchmark for calculating variable interest rates, often expressed as a positive differential over the Euribor rate, with annual adjustments. During the period under consideration, fixed interest rates were selected for only 2.57% of new mortgage loans in the first quarter of 2005.

Table 3 Effect of the 2012 law reform on mortgage loans and real estate sales.

Dependent variable:	ln(loans) (1)	Loans per 1000 inhabitants (1)	ln(sales) (3)
First 2 years	-0.030 (0.035)	-0.105* (0.063)	-0.111 (0.071)
Years 3-4	-0.162*** (0.044)	-0.384*** (0.100)	-0.225*** (0.064)
Years 5-6	-0.178*** (0.053)	-0.451*** (0.138)	-0.175*** (0.060)
Years 7-8	-0.267*** (0.058)	-0.658*** (0.105)	-0.233*** (0.061)
ln(loans) _{t-1}	0.411*** (0.054)		
Loans per 1000 inhabitants _{t-1}		0.506*** (0.050)	
ln(sales) _{t-1}			0.260** (0.105)
Unemployment rate	-0.008*** (0.002)	-0.014*** (0.004)	-0.021*** (0.004)
Inflation rate	-0.005 (0.012)	0.006 (0.020)	0.040** (0.020)
ln(House price in euros per m ²)	-0.148 (0.172)	-0.142 (0.271)	-0.617** (0.278)
Regional fixed effects	Y	Y	Y
Year & Quarter fixed effects	Y	Y	Y
Year × Quarter fixed effects	Y	Y	Y
Region × Time	Y	Y	Y
Region × Time ²	Y	Y	Y
Observations	884	884	1020

Notes: Dependent variables: ln(loans) (Column 1), loans per 1000 inhabitants (Column 2), and ln(sales) (Column 3). Quarterly data from 2007 to 2020(Q1) in Columns 1 and 2, and from 2005 to 2020(Q1) in Column 3. All models include a constant. Robust standard errors. Significant at the *10%, **5%, and ***1% levels.

Table 4 Effect of the 2012 law reform on the average financial terms in the mortgage loan agreements.

Dependent variable:	Interest rate (1)	ln(loan amount) (2)	ln(monthly payment) (3)	Monthly payment/wage cost (4)
First 2 years	-0.312*** (0.056)	-0.020 (0.029)	0.020 (0.026)	-1.071 (0.963)
Years 3-4	-0.757*** (0.080)	-0.011 (0.027)	0.003 (0.027)	-3.434*** (0.871)
Years 5-6	-1.033*** (0.113)	0.038 (0.028)	-0.031 (0.028)	-4.304*** (0.904)
Years 7-8	-1.303*** (0.132)	0.078*** (0.029)	-0.057** (0.028)	-4.586*** (0.948)
Interest rate _{t-1}	0.559*** (0.038)			
ln(loan amount) _{t-1}		0.218*** (0.039)		
ln(monthly payment) _{t-1}			0.247*** (0.039)	
Monthly payment/wage cost _{t-1}				0.259*** (0.044)
Unemployment rate	0.002 (0.003)	-0.005*** (0.002)	-0.004** (0.001)	-0.149*** (0.055)
Inflation rate	-0.053*** (0.020)	-0.002 (0.008)	-0.016** (0.008)	-0.744** (0.296)
ln(House price in euros per m ²)	0.912*** (0.197)	0.254** (0.104)	0.413*** (0.096)	14.917*** (3.499)
Regional fixed effects	Y	Y	Y	Y
Year & Quarter fixed effects	Y	Y	Y	Y
Year × Quarter fixed effects	Y	Y	Y	Y
Region × Time	Y	Y	Y	Y
Region × Time ²	Y	Y	Y	Y
Observations	1020	1020	1020	1020

Notes: Dependent variables: Interest rate (Column 1), ln(loan amount) (Column 2), ln(monthly payment) (Column 3) and monthly payment/wage cost (Column 4). Quarterly data from 2005 to 2020(Q1). All models include a constant. Robust standard errors. Significant at the *10%, **5%, and ***1% levels.

However, this percentage surged to 53.43% in the final period, which was the first quarter of 2020.

From the perspective of borrowers, the prevalence of contracts with variable interest rates diminished due to the inclusion of multiple clauses that ultimately reduced the variability of the interest rate. For example, ‘floor clauses’ hindered any decrease in the interest rate, even when Euribor reached historically low (negative) values.¹⁴ Notably, one of the rules of the Code mandated the immediate suspension of interest rate floor clauses in all cases when restructuring mortgage debt.

Nevertheless, when viewed from the lenders’ standpoint, within the context of a diminishing demand for mortgage loans, the decrease in the interest rate can be attributed to heightened competition among banks. Financial institutions vied for “desirable” borrowers – those less likely to default and, consequently, less likely to rely on the provisions outlined in the Code. This aligns with the credit creation theory, where banks aim to

safeguard themselves against credit risk (Tobin, 1963). Managing the risks associated with extending further loans is a pivotal factor influencing bank lending behavior, and the Code introduced additional costs for risky lending, apart from the inherent risk of borrower default.¹⁵

Certainly, the notable historical decline of Euribor since 2011, reaching negative values in 2016, undeniably influenced interest rates. However, it is important to note that the time-fixed effects and time trends should account for this influence. The time dummies, which are integrated into the analysis, serve to encapsulate the distinctive impact of the law reform. They unveil an additional adverse effect on interest rates, specifically a competitive effect stemming from the Code. This competitive effect, resulting from the implementation of the Code, was advantageous to all borrowers, not limited to those with low incomes.

In terms of the ratio between the monthly payment and the average wage cost, Column 4 reveals a significant and negative

impact of the law reform. Interestingly, this negative effect grew more pronounced over time, although it was not immediate. Indeed, in the first two years following the law reform, we do not discern a statistically significant effect. The interpretation of these findings suggests that, on average, the proportion represented by the monthly payment relative to the wage cost dwindled progressively following the enactment of the Code. It is vital to underscore that while banks managed to reduce the risk of default¹⁶, this strategy also resulted in the exclusion of low-income borrowers, specifically those who might have otherwise benefited from the Code's provisions.

This ratio measures the average financial burden of the mortgage. However, we must exercise caution when linking it to the Code for two primary reasons. Firstly, in Column 3, we cannot identify a significant impact on the monthly payment, so the ratio could only decrease if the wage cost increased over time. Official statistics reveal that, although the temporal evolution of wage costs varied across sectors, the average value slightly increased during the period under consideration.

Secondly, the economic indicator considered in Royal Decree-Law 6/2012 is net household income (for mortgage payments to qualify under the Code, they must exceed 50% of the net income received by all household members). This indicator differs from our monthly payment-to-wage cost ratio. While they may align for one-person households or households with a single breadwinner, discrepancies may arise for households with multiple breadwinners or those without employed members. Consequently, our estimates may underestimate the actual changes in lending behavior and should be considered a conservative lower bound.

Furthermore, our methodology does not permit us to assert a causal relationship, as other factors may also account for the decrease in the ratio. What we observe is a consistent reduction in the average ratio between the monthly payment and individual wage cost following the enactment of the law reform. Nevertheless, it is important to acknowledge that additional factors may contribute to this decline. For instance, Ford and Rowlingson (1996) noted that during the 1990s recession, institutional exclusion was coupled with self-exclusion by low-income debtors.

However, what is evident is that financial institutions grapple with the challenge of reducing doubtful debtors and mortgage delinquency. According to statistics from the Bank of Spain, the percentage of doubtful loans in residential lending saw a dramatic increase after the 2008 financial crisis. It surged from an average value of 0.46% over the previous decade (1998–2008) to a peak of 5.96% in 2013, which was immediately after the law reform was implemented. Subsequently, this percentage progressively declined, reaching 3.13% in 2020. When considering this decrease in the percentage of doubtful loans alongside the reduction in mortgage loans granted (as indicated in Table 3), it becomes apparent that banks curtailed loans to borrowers with a higher likelihood of default. These borrowers often belong to low-income households (Quercia et al. 2012).

Conclusions

To safeguard mortgage debtors, the 2012 legal reform introduced a new Code of Good Practice for banks and financial institutions. Following this legal revision, low-income debtors who meet specific criteria can rarely face eviction. In the event of default, the bank is compelled to offer the debtor a debt restructuring plan. In a final recourse, the debtor can transfer the property to the bank as an alternative to the lender foreclosing on it. This allows the debtor to remain in the property as a tenant, paying reduced rent and avoiding eviction even after foreclosure. Previous studies have demonstrated that the Code substantially reduced

foreclosure rates, although this effect was found to be temporary (González-Val, 2021). Additionally, it contributed to a decrease in litigation rates (Gómez et al. 2021).

While most banks swiftly adopted the Code, we contend that they adjusted their lending practices to mitigate the likelihood of the Code's application. Although they could not prevent existing mortgage debtors who met the legal criteria from utilizing the Code to restructure their mortgage debt or transfer their property as payment, they could steer clear of extending loans to such borrowers to avert future applications. In essence, the heightened protection of debtors resulted in a contraction of mortgage credit, particularly for the demographic groups that the law aims to safeguard (Lacruz Mantecón, 2014).

Our empirical findings substantiate this assertion. We conducted an empirical analysis to assess the impacts of this legal reform, utilizing quarterly data from 17 Spanish Autonomous Communities (NUTS II regions) spanning from 2005 to 2020 (Q1). Our approach employs panel data models featuring fixed effects for regions, years, and quarters, as well as linear and quadratic time trends specific to each region. We also incorporate relevant control variables at the regional level, such as house prices, inflation, and unemployment rates. Although the time frame considered encompasses the global financial crisis, the Great Recession, and the significant decrease in the Euribor rates since 2011, the pre-existing trends are expected to be accounted for by the time-fixed effects and time trends in our model. Consequently, our empirical methodology aims to estimate the specific impact of the 2012 law reform.

We have identified three significant effects resulting from the law reform. Firstly, our findings indicate that the reform had a substantial impact on reducing the number (both in absolute and relative terms) of new mortgage loans. In simpler terms, the Code restricted access to the credit market, and this reduction in available funding had repercussions on the housing market, leading to a decrease in real estate sales.

Secondly, the reduction in new mortgages was not uniform or arbitrary; it particularly affected the specific group of borrowers that the law aimed to protect. To qualify for the benefits of the Code, mortgage payments needed to exceed 50% of the combined net income of all household members. Although individual data regarding mortgagors' household incomes is unavailable, the average ratio between monthly payments and individual wage costs significantly declined after the law reform. This suggests that low-income borrowers were gradually excluded as banks increasingly favored lending to more financially stable borrowers.

Lastly, the average interest rates experienced a significant decline following the law reform. We attribute this to a competition effect, specifically, financial institutions competing for 'good' borrowers—those less likely to require the provisions outlined in the Code. This competition led to lower interest rates. While the decrease in interest rates had positive implications for all borrowers, it was predominantly middle and high-income borrowers who benefited. However, it is worth noting that the potential role of reduced interest rates in mitigating risks associated with fringe low-income groups might have prompted financial institutions to reconsider their lending profiles.

These findings highlight a dual aspect of the effectiveness of the Code. On the one hand, mortgage debtors meeting the legal criteria can employ the Code to circumvent foreclosure, providing them with a valuable safeguard. However, on the other hand, the law reform had adverse consequences for low-income borrowers in the long term, diminishing their ability to access the credit market.

As a result, our results raise concerns about the economic and social repercussions of the Code. They prompt questions about whether it remains the optimal tool to address the current sharp

surge in interest rates and monthly mortgage payments, circumstances that are pushing many mortgagors into dire straits.

Data availability

Data used in this study are publicly available to download from the webpages of the *Instituto Nacional de Estadística* (<https://www.ine.es>), the *Consejo General del Notariado* (<https://www.notariado.org/liferay/web/cien/estadisticas-principales/inicio>), the *Registro de la propiedad* (<https://www.registradores.org/actualidad/portal-estadistico-registral/boletin-estadistico-registral>) and the Spanish Government (*Ministerio de Transportes, Movilidad y Agenda Urbana*, <https://www.mitma.gob.es/the-spanish-real-estate/precio-de-la-vivienda>, and *Ministerio de Asuntos Económicos y Transformación Digital*, <https://portal.mineco.gob.es>).

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Notes

- 1 The collapse of the property market also severely impacted the banking sector, because the proportion of mortgage loans was oversized during the housing boom. Mortgage lending to households appeared to be of lesser concern than lending to builders and property developers, to which savings banks were heavily exposed (Goddard et al., 2009).
- 2 In February 2013, the Association of those Affected by Mortgages (*Plataforma de Afectados por la Hipoteca*) registered in the Spanish Parliament a popular legislative initiative with over 1,402,854 signatures in support thereof.
- 3 A Royal Decree-Law is a legal rule with the force of a law approved by the government under very specific circumstances: There must be a situation of extraordinary necessity that requires certain measures that must be implemented urgently (and cannot be carried out by the normal parliamentary process, which may be slow). A Royal Decree-Law is temporary and must be ratified, rejected or converted into law by parliament within 30 days of its publication. The Royal Decree-Law 6/2012 was ratified by parliament on March 29, 2012.
- 4 The Code has been modified by Law 1/2013, Law 25/2015, Royal Decree-Law 5/2017, and Law 5/2019 in some minor aspects, such as extending the protection to guarantors or changing some of the requirements to define debtors at risk of exclusion.
- 5 The Spanish government declared a nationwide lockdown on March 14, 2020.
- 6 Disaggregated data by financial entity are not available, so we cannot study heterogeneity in lending behavior across banks.
- 7 Although the global financial crisis had a strong effect on all the variables considered, the data between prior and post-financial crisis are comparable because all the variables are stationary. To check this issue, the Pesaran's CADF (2007) test for unit roots in heterogeneous panels with cross-sectional dependence was run. The null hypothesis assumes that all series are non-stationary, and Pesaran's CADF is consistent under the alternative that only a fraction of the series is stationary. The results of the test show that the null hypothesis is clearly rejected for all the variables. These results are available from the author upon request.
- 8 Results hold if the lag of the dependent variable and the set of control variables are not included in the model.
- 9 We can include the set of time dummies along with year and quarter time fixed effects because the timing of the law reform did not coincide with the change in calendar year (the law reform became effective after the beginning of 2012, and we have quarterly data).
- 10 EU legislation adopting Basel III standards includes: EU Directive 2013/36/EU (CRD IV), EU Regulation 575/2013 (CRR), Commission Delegated Regulation (EU) 2015/61 with regard to liquidity coverage requirement for Credit Institutions, and Regulation (EU) 2019/876 (CRR2). Moreover, some issues related to Basel III have not been yet transposed in EU legislation: the finalizing post-crisis reforms (December 2017) and the minimum capital requirements for market risk (January 2016, revised January 2019).
- 11 We do not have a control group within Spain because all units were affected by the law reform simultaneously. Moreover, it is not easy to find a control group considering regions from other European countries either because many countries passed similar law reforms (Domurath et al., 2014). For instance, in Portugal in case of default of a debtor in a harsh economic situation under Law No. 58/2012 the credit institution is obligated to present a plan for restructuring the mortgage loan and offer

- additional measures, such as credit consolidation, if necessary, and the Greek Law 4161/2013 introduced the 'facilitation scheme for performing borrowers', which can only be applied to debts arising from housing or 'repair' loans that have a mortgage lien to the primary residence of the debtor.
- 12 International financing for Spanish banks became scarce between 2010 and 2015, severely curtailing available funds for new mortgages. At the same time, Spanish and European regulators (e.g., the European Mortgage Directive of February 2014) sent clear signals to banks as to the importance of ex ante screening of mortgage applicants and the importance of avoiding over-indebtedness of consumers in the mortgage setting.
- 13 Another factor that could have had influence on real estate sales was the end of fiscal benefits in the personal income tax for home acquisition in December 2012.
- 14 Decisions by the Spanish Supreme Court (in May 2013) were deeming all interest rate floor-clauses as unfair, something that-coupled with a decision by the Court of Justice of the European Union in 2016, Gutiérrez Naranjo case) gave rise to hundreds of thousands of court cases seeking restitution from banks of the excess paid. The European Court of Justice ruled on December 21, 2016, that the typical 'floor clauses' included in mortgage loans in Spain were null and void. Previously, Royal Decree-Law 1/2015 had established that floor clauses in mortgage contracts for mortgage debtors without resources could no longer be applied.
- 15 Competition could rise even in a period of disappearance of saving banks, mergers, and certain foreign banks leaving the Spanish markets. Fuentes and Sastre (1998) found that banks consolidation in Spain in the nineties did not weaken the competition level in the sector.
- 16 One of the causes of the Spanish housing boom was high-risk lending by some financial institutions.

References

- Carbó-Valverde S, Maqui-López E, Rodríguez-Fernández F (2013) Trust in Banks: Evidence from the Spanish Financial Crisis. Paper presented at the 26th Australasian Finance and Banking Conference 2013. Available at SSRN: <https://ssrn.com/abstract=2310273>
- Domurath I, Comparato G, Micklitz H-W (2014) The Over-Indebtedness of European Consumers – A View from Six Countries. European University Institute working paper, Law 2014/10
- Femenia-Ribera C, Mora-Navarro G, Martínez-Llario JC (2021) Advances in the coordination between the cadastre and land registry. Land 10(1):81
- Fuentes I, Sastre T (1998) Implications of restructuring in the banking industry: the case of Spain. BIS Conference Papers 7:98–120
- Ford J, Rowlingson K (1996) Low-income households and credit: exclusion, preference, and inclusion. Environment and Planning A: Economy and Space 28(8):1345–1360
- Goddard J, Molyneux P, Wilson JOS (2009) The financial crisis in Europe: evolution, policy responses and lessons for the future. Journal of Financial Regulation and Compliance 17(4):362–380
- Gómez F, Segura A, Spruk R (2021) Litigation and the Mortgage Market: Evidence from Spain. Paper presented at the 18th Annual Conference of the German Law and Economics Association
- Gómez Gállego J (2010) Spanish property registration law. Available at the European Land Registry Association's webpage: <https://www.elra.eu/spanish-property-registration-law/>
- González-Val R (2021) The effects of the 2012 Spanish law reform to protect mortgage debtors. Housing Policy Debate 31(2):239–253
- González-Val R (2022a) A time series analysis of judicial foreclosures in Spain. Journal of Risk and Financial Management 15(10):472
- González-Val R (2022b) House prices and marriage in Spain. Sustainability 14(5):2848
- Jimeno JF, Bentolila S (1998) Regional unemployment persistence (Spain, 1976–1994). Labour Economics 5:25–51
- Lacruz Mantecón ML (2014) La dación en pago. In: Alonso Pérez MT (ed) *Vivienda y crisis económica*. Thomson Reuters Aranzadi. Navarra, Spain
- Lopez C, Papell DH (2012) Convergence of Euro area inflation rates. Journal of International Money and Finance 31:1440–1458
- Marcén M (2016) The Bosman ruling and the presence of native football players in their home league: The Spanish Case. European Journal of Law and Economics 42(2):209–235
- Martín A, Moral-Benito E, Schmitz T (2019) The financial transmission of housing bubbles: Evidence from Spain. European Central Bank (ECB) Working Paper Series No 2245/February 2019
- Parreño Castellano JM, Domínguez Mujica J, Armengol Martín MT, Boldú Hernández J, Pérez García T (2019) Real estate dispossession and evictions in Spain: A theoretical geographical approach. Boletín de la Asociación de Geógrafos Españoles 80(2602):1–25
- Pesaran MH (2007) A simple panel unit root test in the presence of cross-section dependence. Journal of Applied Econometrics 22:265–312
- Quercia RG, Pennington-Cross A, Yue Tian C (2012) Mortgage default and prepayment risks among moderate- and low-income households. Real Estate Economics 40:S159–S198

- Romero J, Jiménez F, Villoria M (2012) (Un) sustainable territories: causes of the speculative bubble in Spain (1996–2010) and its territorial, environmental, and sociopolitical consequences. *Environment and Planning C: Government and Policy* 30:467–486
- Tobin J (1963) Commercial banks as Creators of ‘money’. Cowles Foundation for Research in Economics, Yale University. New Haven, CT, USA
- Wolfers J (2006) Did unilateral divorce laws raise divorce rates? A reconciliation and new results. *American Economic Review* 96(5):1802–1820

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Author contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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The author declares no competing interests.

Ethical approval

This article does not contain any studies with human participants performed by the author.

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