PAPER

Title: House prices and divorce in Spain

Authors and e-mails: Rafael González-Val (rafaelg@unizar.es), Miriam Marcén (mmarcen@unizar.es)

Department: Análisis Económico

University: Universidad de Zaragoza

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Abstract:

In this paper, we examine the link between regional house prices and divorce in Spain. We consider data from 50 Spanish provinces (NUTS III regions) and from local courts in 211 cities with population greater than 25,000 inhabitants. The regional data cover the 1998-2016 period, while the local sample includes information from 2005 to 2016. The divorce rate is defined as the annual absolute number of divorces per thousand inhabitants in each region or city. We use data on Spain, since the Spanish housing market experienced strong rise in house prices until 2006, when the housing bubble ended and prices dramatically decreased. By using different econometric techniques (panel data model with fixed effects and a dynamic panel model estimated by the GMM estimator (Arellano and Bond, 1991)), our results reveal that there is a significant positive relationship between housing prices and the divorce rate at the regional and local level.

Keywords: Divorce, house prices, geography.

JEL codes: J12, R21.

1. Introduction

Gary Becker established decades ago the foundations of the economics of the family with a new theoretical framework based on an economic approach to the family with individuals' maximizing behavior and equilibrium. Since then, many empirical and theoretical studies have analysed the influence of many economic determinants on marital stability, such us unemployment, labor supply, price stability or consumption. However, literature examining the effect of house-price changes on marital stability is scarce.

In this paper, we analyse the Spanish case. From 1999 to 2005 the Spanish housing market was characterised by an extraordinary boom, which increases house prices (euros per m^2) by 117%. This housing bubble had a crucial role on the impact of the international financial crisis beginning in 2008 in the Spanish economy. After 2008, during the Great Recession, house prices dramatically decreased.[1] Have such great variations in the house prices any effect on divorce decisions?

From a theoretical point of view, the relationship between house prices and divorce is ambiguous. Becker et al. (1977) extend the basic Becker framework to marital instability and divorce, positing that couples choose to separate when the expected utility from divorcing and possibly remarrying is greater than the expected utility from remaining married. Thus, unanticipated changes in income, wealth (including housing wealth), health, or other factors can alter the expected utility in both the married and divorced state and as a result affect probabilities of marital dissolution.

Farnham et al. (2011) argue that house-price changes could affect marital stability through a variety of mechanisms which may differ for renters and owners. When house prices rise, equity gains experienced by owners facilitate making down payments on separate homes, and so could increase divorce probabilities. At the same time increases in house prices mean that both owners and renters experience higher costs of living separately, which could reduce divorce probabilities. House-price gains

[1] In February 2009, it was confirmed that Spain had officially entered recession and the economy contracted 3.7% in 2009 and again in 2010 by 0.1%. By 2013, Spanish unemployment rate reached 26%, twice the euro-zone average.

may reduce financial stress–and therefore divorce probabilities–for owners; gains should have the opposite effect on renters

Only a few papers have empirically studied the role of house-price changes in determining divorce rates (Rainer and Smith, 2010; Farnham et al., 2011; Farzanegan and Gholipour, 2016), and most of them favour the use of micro-data. Farnham et al. (2011) find a positive significant effect of changes in house prices on divorce risk, especially for homeowners versus renters, using individual-level CPS data aggregated by metropolitan statistical area from 1991 to 2010 in the US. For the UK, Rainer and Smith (2010) find that positive and negative house price shocks have asymmetric effects on the probability of partnership dissolution by using individual household data from the British Household Panel Survey and county level house price data: Negative house price shocks significantly increase the risk of partnership dissolution, whereas positive house price shocks do not have a significant effect in general. Finally, using aggregated regional data from 30 Iranian provinces from 2002 to 2010, Farzanegan and Gholipour (2016) find a positive significant effect of housing prices on divorce rates.

In our main empirical analysis, we use Spanish data on divorce rates, measured at the region (NUTS III regions) and city-level (cities with population greater than 25,000 inhabitants). The regional data cover the 1998-2016 period, while the local sample includes information from 2005 to 2016, in both cases covering the end of the housing bubble and the aftermath period. Using both spatial units we obtain a clear positive relationship between house prices and the divorce rate.

The remainder of the paper is organized as follows. Section 2 presents the data used. In Section 3, we describe the methodology and the main results. Section 4 concludes.

2. Data

We consider two different spatial units: 50 Spanish provinces (NUTS III regions) and 211 cities (i.e., municipalities) with population greater than 25,000 inhabitants.[2] In both cases the divorce rate is defined as the annual absolute number of divorces per thousand

[2] Ceuta and Melilla, located on the African coast, are excluded from the analysis in the two data sets.

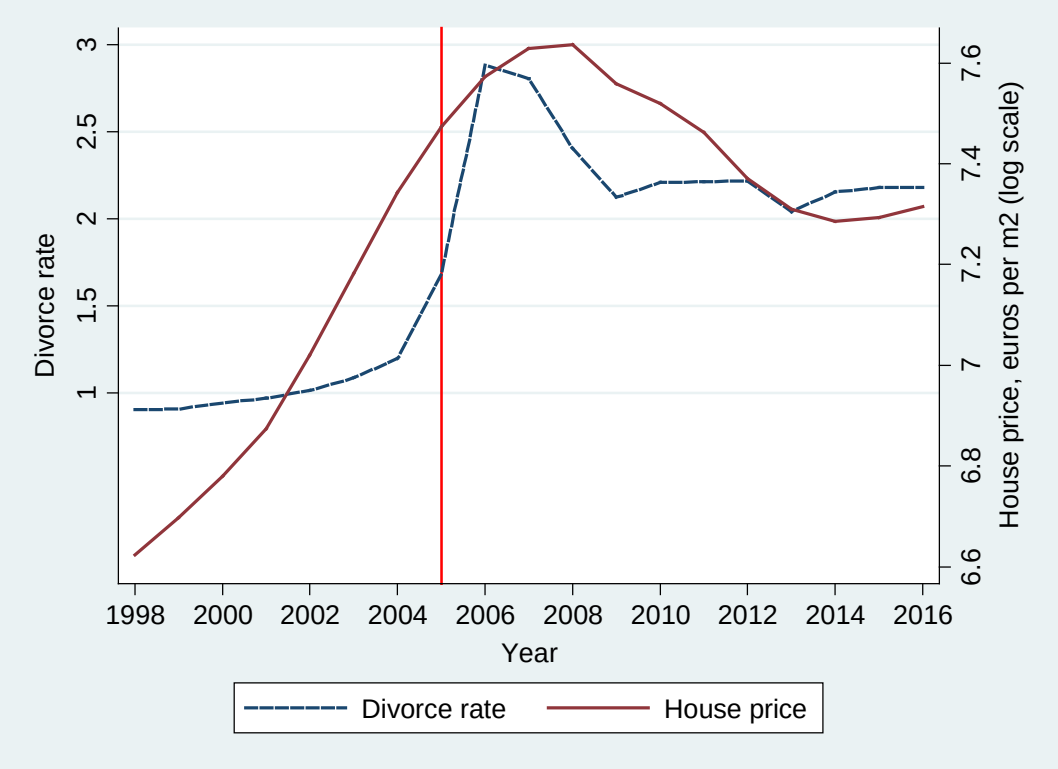
inhabitants in each region or city. The available divorce data on divorce covers the period 1998 to 2016 (*Instituto Nacional de Estadística*, INE, and *Consejo General del Poder Judicial*, CGPJ). This 'crude' divorce rate is the standard measure of the level of, and changes in, divorce.[3] At the city level, divorce data come from city courts; we collect information from 1,633 city courts in these 211 cities, which represent 78% of total courts and 86% of total divorces in the country.

House prices are new house prices measured in euros per m^2 (*Ministerio de Fomento, Gobierno de España*). Regional house prices are available for all the period considered (1998-2016), but local prices are only available since 2005, which restricts our sample in that case to the 2005-2016 period. Note that we do not include rents in our analysis. The reason is that Spaniards show strong preferences for property ownership against renting. As Blanco et al. (2016) point out, "in Spain, property ownership is widely viewed as superior to renting almost as a social status". As a result, the rental market in Spain is far less developed than in other European countries. According to the last Spanish population census in 2011, owner occupancy rates are (on average) around 78.9%, while the rental share is around 13.5%. Dewilde (2008) provide some statistics on the housing market for 12 European countries; her calculations based on national micro-data from the European Community Household Panel in the period 1995–2001 reveal that the percentage of households in owner occupation in Spain is the highest (84.9%) in her sample of countries. Only Greece shows a similar figure, while other European countries are far below: Portugal (66.7%), France (63.1%), Germany (44.4%) or the United Kingdom (71.8%). Thus, given that the proportion of renters is much lower than that of owners in Spain, and the lack of official data on housing rents, in this study we exclusively focus on owners.

[3] These rates may be affected by the marital status structure of the populations to which they relate. Divorce rates may be low, either because marriage rates are low, or because marriages are less likely to end in divorce. Some authors use an alternative definition of divorce rates, measured as the annual number of divorces per 1,000 of the married population. However, this analysis would have been less reliable due to the scarcity of data on the total number of marriages, which is only available at the regional level when each census is collected, normally every 10 years. In the case of cities, this information is not available. For that reason, we favour the use of the crude divorce rate.

Figure 1 shows the evolution of the crude divorce rate at the national level.

Figure 1. Divorce and House prices in Spain, 1998–2016



Notes: Data sources: *Instituto Nacional de Estadística* (INE) and *Ministerio de Fomento*. The vertical red line indicates the 'express divorce' law reform approved in 2005.

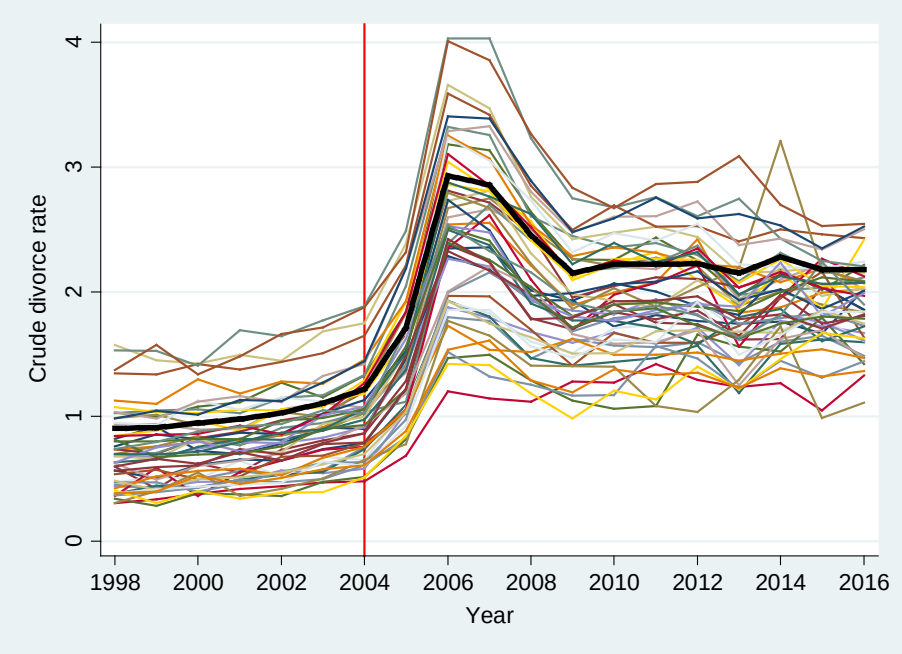
The average divorce rate slightly increases from 1998 to 2004. The sharp rise in this rate observed after that until 2006 coincides with the introduction of the so-called 'express divorce law' in 2005. This reform eliminated the legal separation period requirements to obtain a divorce, introducing unilateral divorce in Spain. Under this new regime, divorce can be granted at the request of either spouse if both spouses have been married for at least 3 months.[4] From 2006, the divorce rate decreases and has been maintained stable around 2.1 divorces per thousand individuals since 2008, until the end of our sample in 2016. The average house price is also plotted. Its evolution illustrates the recent Spanish housing boom. As Blanco et al. (2016) explain, from the middle of

[4] As we explain below, we take into account this divorce law reform in the empirical analysis including time fixed effects.

the 1990s to 2007 the housing market was characterised by an extraordinary boom, which multiplied house price by a factor of more than three. In particular, between 1995 and 2007 the annual rate of increase of house prices was on average 9.7%, with a maximum over 17% in 2003 and 2004. After 2008, during the Great Recession, house prices dramatically decreased. It is worth pointing out that both variables seem to behave similarly in most of the years, although between 2007 and 2009 divorce rates started to decline while house prices maintained their level. This would suggest a positive relationship between house prices and divorce.

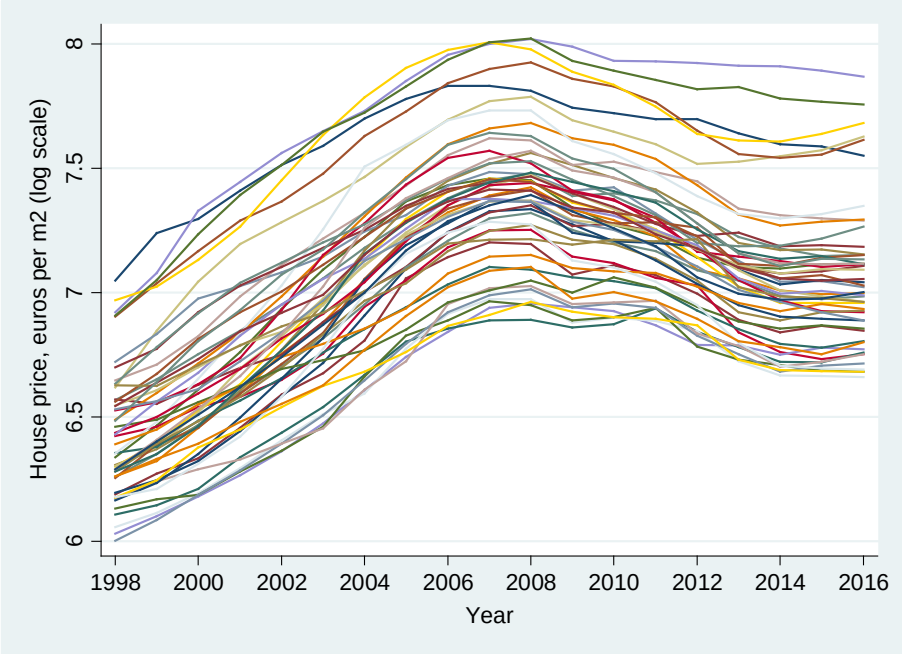
The spatial scale is an important issue. Figure 2 plots divorce rates over time by region and significant differences across regions can be observed. This regional variation increases even more when we consider house prices, as Figure 3 shows. Blanco et al. (2016) study the existence of convergence clusters among Spanish regions, on the basis of house price trends from 1995 to 2007, concluding that some degree of segmentation in the Spanish housing market exists. For instance, their results confirm that the housing boom was much more pronounced in coastal provinces, mainly in the Mediterranean coast. These considerable differences point to the necessity of a regional analysis of the impact of house prices on divorce. Moreover, using data at the national level could be problematic, since NUTS II regions in Spain have different divorce and marriage laws. For instance, there are important differences in the property regimes and in the child custody laws; thus, as suggested by Wolfers (2006) and González-Val and Marcén (2012), dissimilarities in those legal frameworks may influence divorce decisions. If divorce is less costly in one region than in another, variations in the house prices may have different effects in those regions.

Figure 2. Divorce rate by region, 1998–2016



Notes: Data source: *Instituto Nacional de Estadística* (INE). The vertical red line indicates the 'express divorce' law reform approved in 2005.

Figure 3. House prices by region, 1998–2016



Notes: Data source: *Ministerio de Fomento*.

Table 1 shows the average divorce rate and house price by region and city over the period considered. These values highlight the differences between both samples. Although the temporal evolution of divorce rates is similar in both spatial units, levels are clearly higher at the local level. As we explain above, local divorce data come from city courts; all the large cities have a city court (more than one in most of the cases), but in Spain most of the municipalities are small or medium-sized, so courts in large cities assume divorce petitions from individuals living in surrounding municipalities around the large core city. This means that the total number of divorces by city may be overestimated, and the same applies to local divorce rates, calculated using the resident population of the city. Regarding house prices, the regional data consist of huge geographical areas, including both rural and urban areas, so the average house price measure is an average of all the cities within the region. Thus, if we focus on the house prices in large cities, they tend to be higher than regional prices during the market's boom (2005-2007), but after the crash they fall below the regional average, reflecting better the actual evolution of the housing market. Therefore, regional divorce rates are more precise than local data, but local house prices are more accurate than regional average values.

Table 1. Average divorce rate and house price

	Regional data		Local data	
Year	Divorce rate	House price	Divorce rate	House price
1998	0.73	637.15	1.54	
1999	0.74	697.38	1.53	
2000	0.77	782.21	1.62	
2001	0.79	877.42	1.60	
2002	0.84	984.78	1.72	
2003	0.91	1,108.66	1.83	
2004	1.01	1,271.78	2.02	
2005	1.44	1,439.82	2.83	1,726.77
2006	2.50	1,598.26	5.22	1,923.35
2007	2.44	1,690.56	5.02	2,072.66
2008	2.10	1,705.13	4.56	2,066.35
2009	1.88	1,581.79	4.14	1,853.03
2010	1.94	1,538.93	4.27	1,744.55
2011	1.95	1,468.96	4.31	1,610.30
2012	1.99	1,361.19	4.45	1,469.71
2013	1.82	1,260.83	4.48	1,294.81
2014	1.96	1,213.63	4.65	1,189.69
2015	1.91	1,216.32	4.62	1,169.37
2016	1.90	1,220.50	4.33	1,167.75

Notes: House prices in euros per m^2.

For illustrative purposes, Figures 4 and 5 show the bivariate relationship between divorce rate and house prices at the regional and local level, respectively. In both cases we can observe a clear positive relationship: The higher the house price, the higher the divorce rate in both cases. Nevertheless, these are just the unconditional bivariate correlations; in Section 3 we properly estimate the effect of house prices controlling for other time varying economic variables and regional (or local) and time fixed effects. In the case of local data, as mentioned above, some divorce rates may be overestimated if courts handle divorce petitions from nearby small cities. Thus, Figure 5 displays some extreme high values of divorce rates; most of them correspond to some Catalan cities: El Vendrell, Gavá, Granollers, Martorell or Sant Feliu de Llobregat.

Figure 4. Divorce and regional house prices, 1998–2016

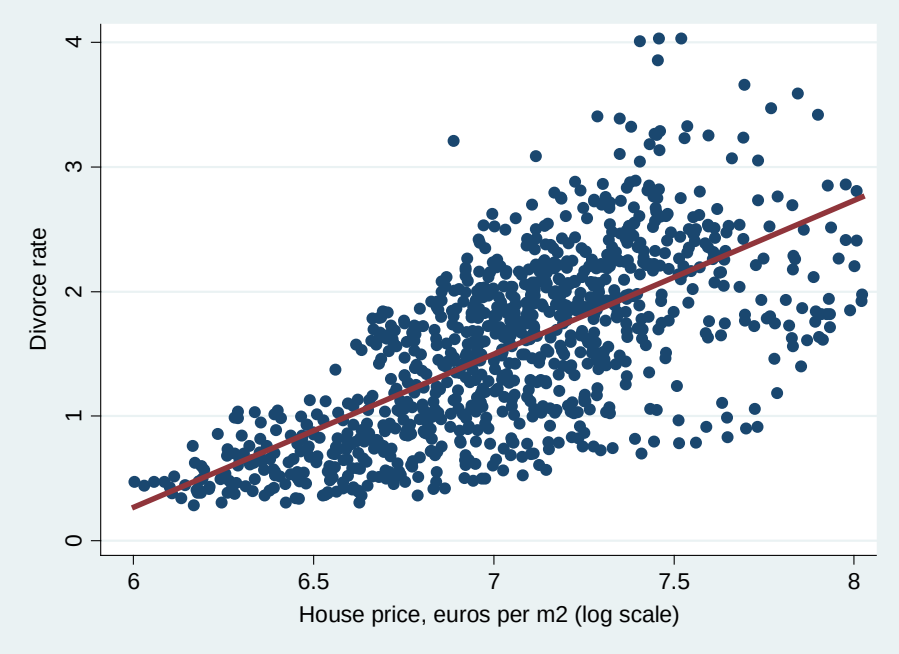
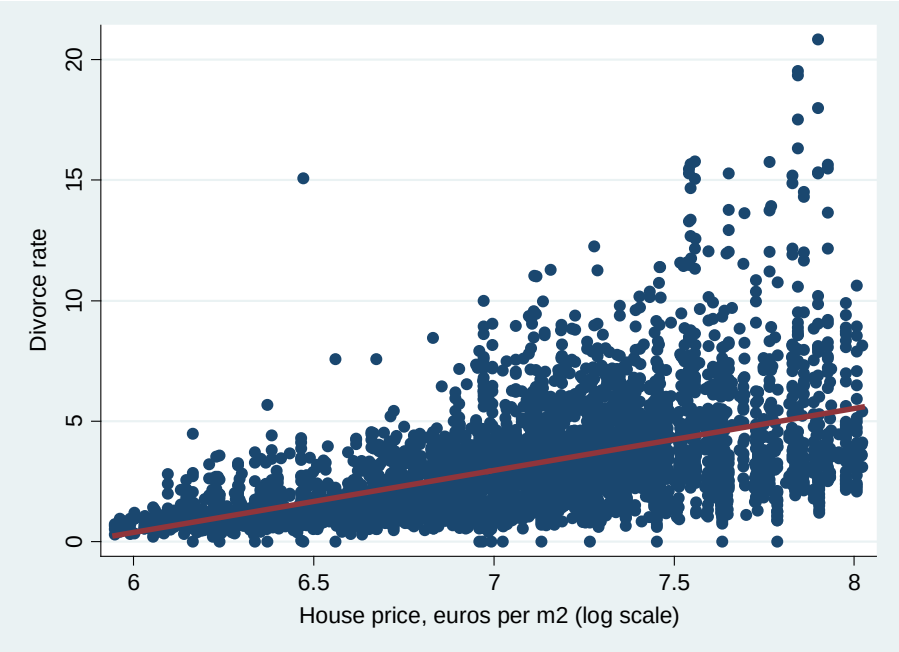


Figure 5. Divorce and local house prices, 2005–2016



3. Methodology and Results

We apply the same model that Farzanegan and Gholipour (2016). First, we estimate the following equation:

$$DIVR_{it} = \alpha + \beta_1 \cdot \ln(HP_{it}) + \beta_2 \cdot UNEMP_{it} + \beta_3 \cdot INF_{it} + \beta_4 \cdot EDU_{it} + \beta_5 \cdot WEA_{it} + v_i + \Omega_t + u_{it} \quad (1)$$

where $DIVR_{it}$ is the divorce rate in region (or city) *i* at time *t*. The main explicative variable is $\ln(HP_{it})$, the logarithm of the house price. Then, the sign of the β_1 coefficient captures the positive or negative response of divorce rates to changes in house prices. The rest of explanatory variables are similar to those used by Farzanegan and Gholipour (2016). After a review of the empirical literature, they select several macroeconomic variables with a robust influence on divorce. These variables are the unemployment and inflation rates, and the percentage of female population with some college.[5]

Both unemployment and inflation are related to the standard of living. Although the effect of unemployment is a priori undetermined as there are different mechanisms involved (the psycho-social stress perspective and the cost of divorce perspective; Amato and Beattie, 2011), González-Val and Marcén, (2018) find a negative effect of unemployment on divorce rates in Spain, especially after the divorce law reform in 2005. Unemployment data come from the Spanish Labour Force Survey. Regarding inflation, Spain reports consistently higher inflation rates than the rest of European Union (EU) countries. Lopez and Papell (2012) study the behaviour of inflation rates among several EU countries during the last decades: Until 2008, Spain was one of the Euro countries reporting the highest inflation rates, then Spain was one of the countries most affected by the 2008 crisis and, finally, after the crisis Spain's inflation observes a moderate decrease. Our measure of the inflation rate is the rate of change in the

[5] Actually, Farzanegan and Gholipour (2016) use the total expenditures in higher education in public and private education institutions. However, we believe that the percentage of female population with some college is a better indicator of the educational attainment of women than expenditure.

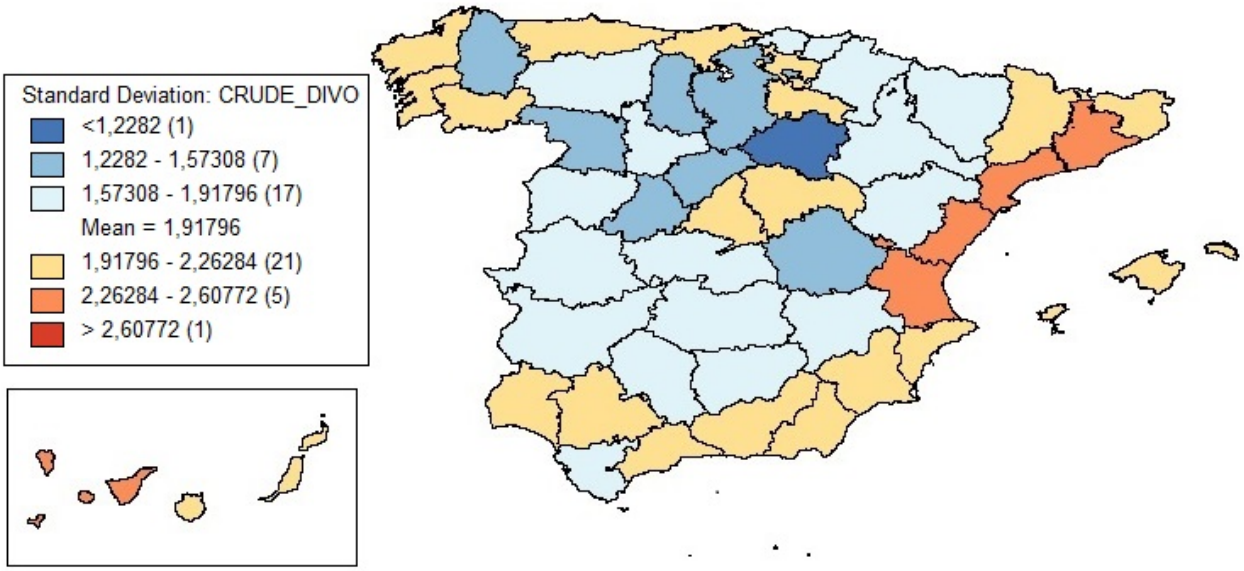
consumer prices index.

Several studies corroborate the effect of the educational attainment of women on divorce, although this effect can be positive or negative. In contrast to the United States, where the education of both spouses is negatively associated with divorce, the sign of the relationship between education and divorce varies across European societies (Amato and James, 2010). For Spain, Härkönen and Dronkers (2006) and Bernardi and Martínez-Pastor (2010) conclude that women with higher education had a higher risk of divorce. In related research, Gutiérrez-Domènech (2008), also finds that highly educated married women delay the first birth and family formation. Thus, we include the percentage of female population 16 years and over with some college or higher degree.

Finally, we also add a set of weather controls by region ($\boldsymbol{WEA_{it}}$). Previous research by González-Val and Marcén (2018) find a significant geographical pattern of divorce rates in Spain because the regions with high divorce rates are mainly located on the coast (including the two archipelagos). The map in Figure 6 shows the spatial distribution of divorce rates in 2016, the last year in our sample, confirming a clear spatial pattern in divorce rates across the regions. The maps for other periods are similar. González-Val and Marcén (2018) offer some explanations for this spatial pattern: Weather conditions can be responsible, to some extent, for the possible social interactions and the potential divorce decisions of couples because weather conditions may impact both mood and prosocial behaviour (Connolly, 2013). They argue that the better the weather conditions, the greater the possibility of meeting more potential partners for divorcees to match with, because individuals spend more time outside and the number of social interactions increases. Moreover, the better the weather conditions in a region, the more likely is that region to receive tourists, and so, to increase the housing demand from foreigners. As mentioned above, Blanco et al. (2016) find that the housing boom was much more pronounced in coastal provinces, mainly in the Mediterranean coast. Therefore, region (or city) spatial location may have an effect in both divorce rates and house prices, our endogenous and main explicative variables, respectively. Thus, if controls for weather conditions are not added, results can be

biased. Taking this into account, we add to the specification the following weather controls: the annual average precipitation, the annual number of cloudless days, the annual average temperature, the annual number of days with temperatures greater than 25ºC, and the annual number of days with temperatures below 0ºC, all measured at the regional level (data come from the INE).

Figure 6. Divorce rate by region, 2016



The model also includes regional (or local) fixed-effects (v_i) to control for unobserved characteristics that can vary at the regional or local level, and year fixed-effects (Ω_t). The time fixed effects aim to capture year-specific determinants of divorce rates. In particular, one of these time-variant characteristics is divorce law; as mentioned above, there was a divorce law reform approved in 2005 (the 'express divorce law') that made divorce easier. u_{it} is the error term.

We estimate model (1) by OLS, with robust standard errors clustered by region. Although we include fixed-effects and time fixed-effects to control for possible unobserved characteristics at the regional (or city) level and year-specific shocks, some potential issues still remain. These are, basically, the possible persistency in the trend of the dependent variable (divorce rates), related with dynamic issues of the variable, and

endogeneity concerns and reverse causality. To solve both potential issues, Farzanegan and Gholipour (2016) recommend adding one lag of the divorce rate in the right hand side of the model and estimating by using the GMM estimator. Thus, model (1) turns into a dynamic panel model:

$$DIVR_{it} = \alpha + \beta_1 \cdot \ln(HP_{it}) + \beta_2 \cdot UNEMP_{it} + \beta_3 \cdot INF_{it} + \beta_4 \cdot EDU_{it} + \beta_5 \cdot WEA_{it} + \beta_5 \cdot DIVR_{it-1} + v_i + \Omega_t + u_{it} \quad (2)$$

As Farzanegan and Gholipour (2016), we use the difference GMM estimator by Arellano and Bond (1991). By using a first differencing transformation, individual specific unobserved effects are eliminated and the effect of possible time trend in our main variables of interest is also controlled. After first-differencing model (2), the equation is estimated via GMM. The independent variables are instrumented with lagged values of the dependent and independent variables.

3.1. Regional results

Table 2 reports the estimates for Equation (1) for the regional data. As can be seen in the first column, which does not include any control, the estimated coefficient capturing the effect of the regional house prices is positive and significant, which is in line with Figure 4. In columns (2) and (3), we include weather controls and regional and year fixed effects. We also add the set of controls for macroeconomic indicators. After the inclusion of all these controls, the coefficients picking up the effect of house prices remain positive and significant, albeit the magnitude of the coefficient decreases. The impact of the unemployment is not statistically significant, while the inflation rate has a negative and significant coefficient and female education has a positive and significant effect on divorce.

Table 2. Regional divorce rate models, 1998-2016

	(1)	(2)	(3)
ln(House price)	1.232***	1.185***	0.413***
	(0.125)	(0.084)	(0.131)
Unemployment rate		0.011**	0.001
		(0.004)	(0.003)
Inflation rate		-0.059***	-0.062***
		(0.012)	(0.020)
% female population with some college		0.005	0.007**
		(0.006)	(0.003)
Weather controls	N	Y	Y
Regional fixed effects	N	N	Y
Year fixed effects	N	N	Y
R^2	0.465	0.609	0.952
Observations	950	950	950

Notes: Dependent variable: Crude divorce rate. All the models include a constant. Robust standard errors clustered by region. Significant at the *10%, **5%, ***1% level. Weather controls: Annual average precipitation, annual number of cloudless days, annual average temperature, annual number of days with temperatures greater than 25ºC, annual number of days with temperature lower than 0ºC, measured at the province level.

We also estimate the dynamic model (2) by using the difference GMM estimator. Results are shown in Table 3. This time, we only show the results of the estimation including all the controls. We obtain a positive and significant coefficient for past divorce rate, supporting persistence and a dynamic behaviour of the variable. The effect of house prices remains positive and significant, and the estimated coefficient is not very different from that of the OLS fixed-effects model (last column in Table 2). Regarding the rest of controls, now the unemployment rate has a negative and significant effect on divorce, consistent with González-Val and Marcén (2018)'s findings, and the coefficient of the inflation rate remains negative and significant. Finally, the female education variable turns to not significant.

Table 3. Regional divorce rate models, Difference GMM

	(1)
Divorce rate t-1	0.561***
	(0.043)
ln(House price)	0.333***
	(0.102)
Unemployment rate	-0.005**
	(0.002)
Inflation rate	-0.079***
	(0.023)
% female population with some college	0.002
	(0.003)
Weather controls	Y
Year fixed effects	Y
AR(2), p-value	0.434
Hansen test, p-value	0.999
Regions	50
Observations	850

Notes: Dependent variable: Crude divorce rate. Difference GMM method is used to remove the cross-section fixed effect, and controlling for possible trend in data. As instruments we use lags 2-3 of all the explanatory variables, and of the dependent variable. Robust standard errors. Significant at the *10%, **5%, ***1% level. Weather controls: Annual average precipitation, annual number of cloudless days, annual average temperature, annual number of days with temperatures greater than 25ºC, annual number of days with temperature lower than 0ºC, measured at the province level.

Farzanegan and Gholipour (2016), following Arellano and Bond (1991), remark the importance of passing some tests to validate the use of the GMM method. In particular, the second order (AR (2)) test for serial correlation in the first-differenced residuals proposed by Arellano and Bond (1991) and the Hansen test for the validity of the instruments used. Table 3 reports the results for both tests; results of the Hansen test validate our instruments and serial correlation is not found.

3.2. Local results

Similarly to the analysis of the divorce rate at the regional level, now we use divorce and house prices at the local level. As mentioned above, house prices at the city level are more accurate than those averages at the region level but divorce figures may be overestimated in some cities (especially in the largest ones). Moreover, local house

prices are only available since 2005, so we carry out the analysis using a shorter period, from 2005 to 2016. Also, macroeconomic indicators are not defined at the city level, so we use the regional values of the unemployment and inflation rates, the female education variable and weather controls. OLS results are reported in Table 4. We consider three different samples of cities: all cities with population greater than 25,000 inhabitants (211 cities), the same sample of large cities but excluding the two greatest cities in the country (209 cities), Madrid and Barcelona, and a third sample excluding all capital cities of any region (161 cities). We consider these subsamples in order to avoid the possible overestimated divorce figures in the largest cities.

Table 4. Local divorce rate models, 2005-2016

	All cities		Excluding Barcelona and Madrid		Excluding capital cities	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Local house price)	0.459	0.347*	0.563*	0.365*	0.843**	0.629**
	(0.320)	(0.210)	(0.326)	(0.212)	(0.393)	(0.242)
Regional unemployment rate		0.021***		0.021***		0.026***
		(0.007)		(0.007)		(0.009)
Regional inflation rate		-0.097*		-0.101*		-0.085
		(0.057)		(0.058)		(0.075)
Regional % female population with some college		0.014*		0.015*		0.014
		(0.007)		(0.007)		(0.011)
Regional weather controls	N	Y	N	Y	N	Y
City fixed effects	N	Y	N	Y	N	Y
Year fixed effects	N	Y	N	Y	N	Y
R^2	0.006	0.485	0.009	0.486	0.018	0.496
Observations	2,532	2,532	2,508	2,508	1,932	1,932

Notes: Dependent variable: Crude divorce rate. All the models include a constant. Robust standard errors clustered by city. Significant at the *10%, **5%, ***1% level. Weather controls: Annual average precipitation, annual number of cloudless days, annual average temperature, annual number of days with temperatures greater than 25ºC, annual number of days with temperature lower than 0ºC, measured at the province level.

Columns (1), (3) and (5) show the simple bivariate correlation between house price and divorce rate not including any control; the estimated coefficient capturing the

effect of the local house price is positive but not significant in column (1), when using all the sample of cities. However, as we filter the sample of cities excluding the two largest (column 3) and capital cities (column 5) the coefficient increases and turns to significant, confirming the positive relationship observed in Figure 5. When we include all the set of controls, columns (2), (4) and (6) in Table 4, the local house price coefficient remains positive and significant (at the 10% in columns (2) and (4), and at the 5% in column (6)), although the magnitude of the effect decreases.

The difference GMM estimations are shown in Table 5. Again, only the results of the estimation including all the controls are reported, and the three models pass the AR(2) and Hansen tests. The coefficient for past divorce rates is positive and significant, supporting the dynamic model. The effect of house prices remains positive and significant in all cases (at the 10% in columns (1) and (2), and at the 5% in column (3)). The interesting point is that this local effect of house prices on divorce is twice (columns (1) and (2)) or three times (column (3)) that obtained with regional data in Table 3, indicating that in large cities, where the ups and downs of house prices are sharper than when considering the regional average, the relationship between house price and divorce is much stronger.

Regarding the set of regional macroeconomic indicators, both the OLS and difference GMM estimations lead to similar conclusions. As in the case of regional data, the coefficient of the inflation rate is negative and significant, and female education is not significant. Compared to regional results in Tables 2 and 3, the only difference is the positive and significant effect of the regional unemployment rate on divorce at the local level. Thus, this would suggest that, at the regional level, the unemployment rate is negatively associated with the divorce rate (see Table 3), pointing to a pro-cyclical evolution of divorce; however the response of the divorce rate at the city level is the opposite, obtaining a positive effect of unemployment on divorce rates (see Table 4 and 5) and, thus, a counter-cyclical response of divorce. González-Val and Marcén (2018) already find evidence in Spain of different responses of divorce to unemployment changes; according to their results, divorce rates in coastal regions are pro-cyclical, while in inland regions divorces react to unemployment in a counter-cyclical way. Here,

we obtain evidence of different within-region patterns; it looks that the behaviour of individuals living in large cities is different from that of people of the rest of the region.

Table 5. Local divorce rate models, Difference GMM

	All cities	Excluding Barcelona and Madrid	Excluding capital cities
	(1)	(2)	(3)
Local divorce rate t-1	0.313***	0.312***	0.311***
	(0.033)	(0.033)	(0.033)
ln(Local house price)	0.698*	0.706*	1.003**
	(0.364)	(0.361)	(0.395)
Regional unemployment rate	0.013*	0.013*	0.021**
	(0.007)	(0.007)	(0.008)
Regional inflation rate	-0.124**	-0.129**	-0.083
	(0.060)	(0.061)	(0.070)
Regional % female population with some college	0.002	0.002	0.001
	(0.009)	(0.009)	(0.012)
Regional weather controls	Y	Y	Y
Year fixed effects	Y	Y	Y
AR(2), p-value	0.631	0.615	0.695
Hansen test, p-value	0.700	0.728	0.995
Cities	211	209	161
Observations	2,321	2,299	1,771

Notes: Dependent variable: Crude divorce rate. Difference GMM method is used to remove the cross-section fixed effect, and controlling for possible trend in data. As instruments we use lags 2-3 of all the explanatory variables, and of the dependent variable. Robust standard errors. Significant at the *10%, **5%, ***1% level. Weather controls: Annual average precipitation, annual number of cloudless days, annual average temperature, annual number of days with temperatures greater than 25ºC, annual number of days with temperature lower than 0ºC, measured at the province level.

4. Conclusions

This paper examines the relationship between variations in house prices and divorce rates. We use data from 50 Spanish provinces (NUTS III regions) and from local courts in 211 cities with population greater than 25,000 inhabitants. The regional data cover

the 1998-2016 period, while the local sample includes information from 2005 to 2016. From the middle of the 1990s to 2007 the Spanish housing market was characterised by an extraordinary boom, followed by a dramatic fall in prices. Thus, we consider that it provides an appropriate framework to explore how those changes impact divorce decisions.

Our results show that there is a significant positive relationship between housing prices and the divorce rate at the regional and local level, by using different econometric techniques (panel data model with fixed effects and a dynamic panel model estimated by the GMM estimator). Furthermore, this positive effect is greater in cities than in regions, indicating that in large cities, where the ups and downs of house prices are sharper than when considering the regional average, the link between house price and divorce is much stronger. Large cities also show higher shares of young and educated people, which may also increase divorce rates. Thus, we might expect that, if episodes of fast rising house prices are repeated again in Spain, divorces figures will boost, especially in cities.

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