PAPER

Title: Did Unilateral Divorce raise house prices in Europe?

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Subject area: 12. Territorial planning, urban planning and housing

Abstract: In this paper, we analyse the impact of divorce law reforms on house prices for a sample of ten European countries between 1960 and 2008, taking advantage of the real house price index developed by Knoll et al. (2017). The period of reforms began in 1970, and differences in the timing of entry into force of unilateral divorce laws across countries provide a quasi-experimental setting. We estimate the static and dynamic effect of divorce law reforms, finding a positive and significant effect of these reforms on real house prices, mainly concentrated in years 3 to 6 after the reforms, even after controlling for a set of country-specific variables, as well as country-specific linear and quadratic time trends. The dynamic effect of unilateral divorce law reforms accounts in those years for 22% of the average interannual increment in the real house price index.

Keywords: Divorce laws, real house prices, Europe

JEL codes: D10, J12, R21.

1. Introduction

Divorce is an issue with strong social implications. The literature studying the effects of divorce on the socio-economic outcomes of women and children is wide. The possibility of divorce may increase female labour force participation (Michael, 1985; Johnson and Skinner 1986; Peters, 1986; Parkman, 1992), but it can also affect the economic status of women and children (Jarvis and Jenkins, 1999; Bedard and Deschênes, 2005). At the same time, divorce may also have long-term negative effects on children (Seltzer, 1994; Amato, 2000; Gruber, 2004; Moschion and van Ours 2019).

Since the 1960s there has been an important increase in European divorce rates, defined as the number of annual divorces per 1,000 inhabitants. The timing of this change coincided with the wave of divorce law reforms passed in many European countries, allowing divorce under mutual consent and other ‘‘no-fault’’ grounds or even unilaterally. This liberalization in the divorce law changed divorce incentives by making divorce easier. González and Viitanen (2009) examine the impact of no-fault and unilateral reforms that occurred from the 1970s, finding a transitory response to unilateral reforms that lasted between 5 and 8 years after the reform, as well as a permanent effect of no-fault reforms on divorce rates. Based on their analysis, the reforms account for an increase of about 0.6 divorces per 1,000 inhabitants, from 1950 to 2003.

It was expected that divorce liberalization could have an effect on the number of divorces; what the literature usually discusses is whether that effect is transitory (Wolfers, 2006) or permanent (Friedberg, 1998; González and Viitanen, 2009). Nevertheless, what was not expected is that divorce law reforms had an effect on many other outcomes, closely related (or not) to marriage. That is, the change in individuals’ behaviour induced by the new legal regime spread to many other aspects inside and outside marriage.

Some works explore the effect of unilateral divorce laws on other variables different from divorces. Most of them consider the United States (US) case because differences in the timing of entry into force of unilateral divorce laws across US states

provide a quasi-experimental setting. Stevenson (2007) finds that the adoption of unilateral divorce—regardless of the prevailing property-division laws—reduces investment in all types of marriage-specific capital considered (spouse's education, children and household specialization) except home ownership; results for home ownership depend on the underlying property division laws. Stevenson (2008) concludes that unilateral divorce led to an increase in both married and unmarried female labour force participation.

Still for the US, several papers also find a significant effect of divorce law reforms on crime, inside and outside home. Regarding domestic violence, Stevenson and Wolfers (2006) find that states that passed unilateral divorce laws saw a large decline in both male- and female-initiated domestic violence; domestic violence rates fall by about one-third. For the overall crime rates, Cáceres-Delpiano and Giolito (2012) estimate that unilateral divorce caused an increase in violent crime rates of approximately 9% during the period 1965–1996. Finally, Ciacci (2019) concludes that unilateral divorce reduced prostitution.

For Europe, Bellido and Marcén (2014) study the effect of unilateral divorce law reforms on fertility. Their results suggest that divorce liberalization had a negative and permanent effect on fertility, decreasing the total fertility rate by about 0.2.

In this paper, we examine the possible effect of unilateral divorce law reforms on house prices in a sample of ten European countries. In related literature, some papers have studied the role of house-price changes in determining divorce rates. 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. Also for the US, Klein (2017) concludes that a one standard deviation increase in the house price shock decreased the risk of divorce in the following year by about 13–18%. 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.

Our approach here is different. We do not test the inverse relationship (the effect of divorce on house prices); we study whether the divorce law reforms had any effect on house prices. We argue that, no matter whether the effect on divorce rates was transitory (Wolfers, 2006) or permanent (Friedberg, 1998; González and Viitanen, 2009), in any case the short term effect of the divorce law reform would be a sizeable increase in divorces and, therefore, an unexpected increase in housing demand caused by the raise in the number of people living separately. González and Viitanen (2009) report an important increase in divorce rates after the reforms; they explain that almost all European countries experienced less than 1.5 divorces per 1000 people in 1960, and many had divorce rates below 0.5, but by 2002, after the reforms, most European countries had divorce rates around 2 per 1000 people or higher. Nevertheless, a priori the effect of this increasing demand on house prices could be quite limited for several reasons.

First, it is true that after divorce at least one of the separated ex-partners will have to move out of the joint home, but as Mikolai and Kulu (2018) explain these individuals are likely to experience ‘downward’ moves on the housing ladder; they are likely to move out of single-family homes, from owner occupation to rented housing (Feijten, 2005), and often move to shared housing or to their parents’ home at least temporarily (Feijten and van Ham, 2007). Dewilde (2008) finds that divorce significantly raises the odds of experiencing a tenure change for homeowners in many European countries, with factors such as the institutional arrangements mitigating the income consequences of divorce, the constraints/opportunities specific to the housing market and the extent of family support having limited effects. Lersch and Vidal (2014) also conclude that separation is negatively associated with homeownership, and although ownership rates increase again after repartnering, these rates do not reach the level of ownership rates among people in their first marriage. Overall, this literature indicates that only a fraction of divorced people come back to the housing market and

most of them do so after a period of temporary solutions. Therefore, from this view we would expect a limited (if any) effect of divorce law reforms on house prices that, moreover, may be lagged.

Second, in some European countries an important proportion of people are renters rather than owners even before getting divorced, and therefore after divorced they move but still remain renters in their new dwelling. This factor could also mitigate the influence of divorce law reforms on house prices. In general, we might expect that the higher the proportion of renters in a country, the lower the impact of unilateral divorce law reforms on house prices. Dewilde (2008) provides some statistics on the percentage of households in owner occupation for a sample of European countries in 2001 (the last year in our sample is 2008), and the share of owners is greater than 66% in most of the countries. [1] Cross-country data for rents for a long time period are hardly available, so we exclude renters from our analysis.

Against this background, we find a positive and significant effect of divorce law reforms on real house prices in a sample of ten European countries during the second half of the twentieth century. However, in accordance with the literature mentioned above, our results show that there is a lag of two years in the effect of these reforms on house prices, which is temporary and mainly concentrated in years 3 to 6 after the reforms.

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 regression results, and Section 4 concludes.

2. Data

Real house prices are taken from Knoll et al. (2017). This data set is part of the Jordà-Schularick-Taylor macrohistory database (Jordà et al., 2017). Knoll et al. (2017) provide annual house prices for 14 advanced economies since 1870; we exclude non-European countries (Australia, Canada, Japan and the US) to obtain a sample of 10

[1] According to Dewilde (2008), if we focus on the countries in our sample, the percentage of households in owner occupation in 2001 was 74.1% in Belgium, 66.9% in Denmark, 68.8% in Finland, 63.1 in France, 44.4% in Germany and 71.8% in the United Kingdom. Data for the Netherlands, Norway, Sweden and Switzerland is not available from that source.

European countries: Belgium, Denmark, Finland, France, Germany, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. To our knowledge, cross-country data for rents for a long time period are not available, so we exclusively focus on house prices.

Knoll et al. (2017) includes an extensive data Appendix that specifies the sources consulted, discussing the construction of the individual country indices in detail. Some series rely on appraisals, others on list or transaction prices. They normally chose data for the price of existing houses instead of new ones. In addition, they collected long-run indices for the price of residential land, the price of agricultural land, and construction costs to proxy for replacement costs. The house price index covers the broadest possible geographical extent and, whenever possible, keeps the type of house considered constant over time, giving a fairly consistent measure of real house prices between and within countries. Table 2 shows the average value of the real house price index by country in the period considered. The index is equal to 100 in 1990 (4.6 in log scale).

Table 1. Data on the year of divorce law reforms

Country	Year divorce allowed	No-fault Unilateral
Belgium	Pre-1950	1975
Denmark	Pre-1950	1970
Finland	Pre-1950	1988
France	Pre-1950	1976
Germany	Pre-1950	1977
The Netherlands	Pre-1950	1971
Norway	Pre-1950	1993
Sweden	Pre-1950	1974
Switzerland	Pre-1950	2000
United Kingdom	Pre-1950	1971

Source: González and Viitanen (2009) and Bellido and Marcén (2014). The first column indicates the year in which divorce was first allowed in each country included in our analysis, and the second column shows the year of the first no-fault unilateral reform in divorce laws in those countries since 1940.

Although Knoll et al. (2017) provide house prices data since 1870, here we focus on the second half of the twentieth century. Actually divorce was allowed before 1950 in all the countries in the sample (see Table 1), but we want to avoid issues related to the Second World War (WWII) and the post-war period (including some missing data

during the war years).[2] The last year we consider is 2008, just before the start of the last global financial crisis, which affected housing markets in many countries. Therefore, our period of analysis is from 1960 to 2008.[3]

Table 2. Average values by country, 1960-2008 (49 observations by country)

Country	Real House Price index	Real GDP per capita	Consumer price index	Population density	FLFP	Unemployment rate
Belgium	106.45	68.40	78.82	325.27	30.99	7.31
Denmark	125.06	73.45	73.24	118.43	43.66	5.22
Finland	72.52	63.71	70.40	14.35	44.76	6.10
France	88.96	70.20	72.30	102.54	34.31	6.36
Germany	94.66	72.11	87.19	246.11	36.28	5.19
The Netherlands	128.54	68.46	85.41	366.45	27.78	5.28
Norway	110.46	61.91	72.28	12.80	38.15	2.76
Sweden	92.55	69.44	72.22	20.47	44.59	4.02
Switzerland	75.25	80.78	83.09	160.97	40.79	1.42
United Kingdom	77.11	66.00	74.47	235.67	35.82	5.62

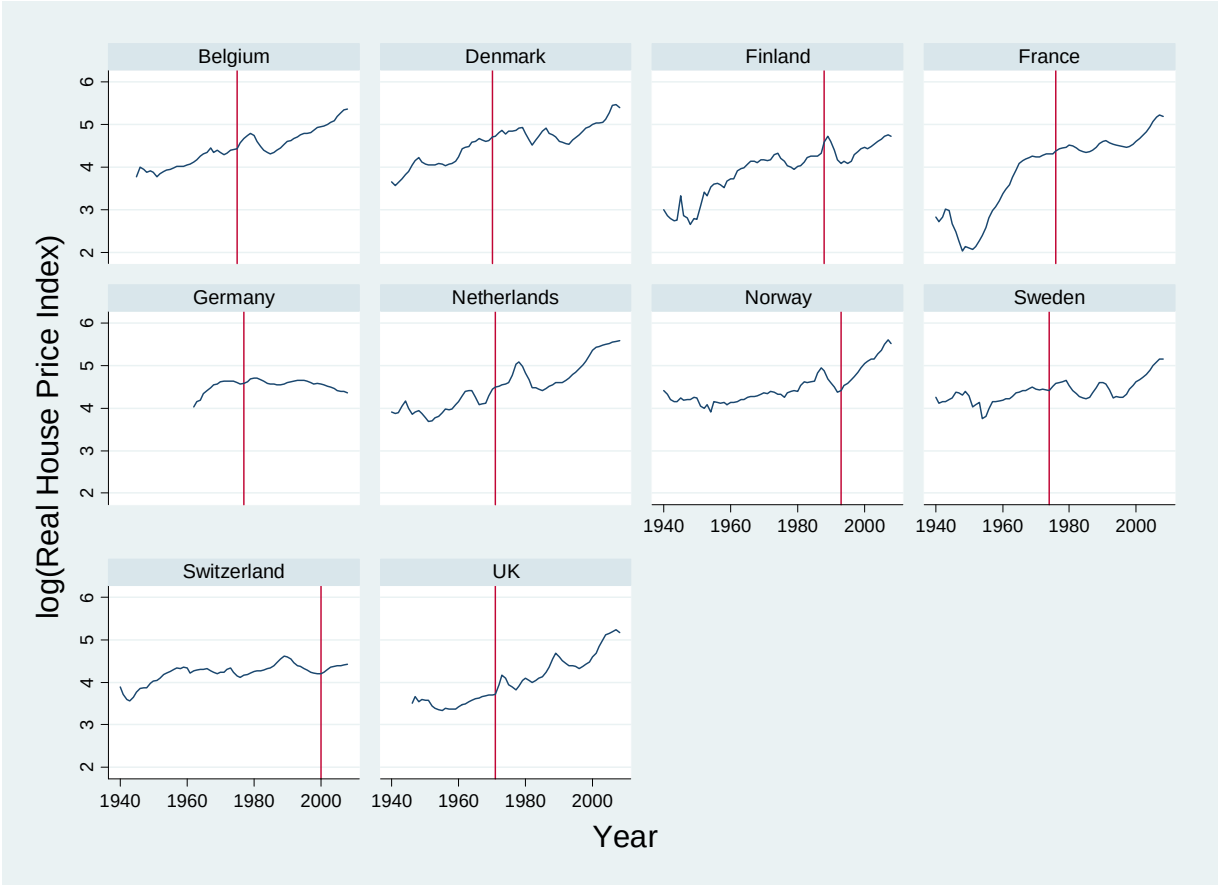
Sources: Real House Price index and Consumer price index from Knoll et al. (2017) and Jordà et al. (2017). Population density is defined as the number of inhabitants per km^2; the population and area used to compute the population density come from Knoll et al. (2017) and Jordà et al. (2017). Real GDP per capita data come from Barro/Ursua until 2005, World Bank after (2005=100). Female labour force participation is defined as the Female Civilian Labour Force over number of women, in percentage; the unemployment rate is defined as the percentage of the civilian labour force; data come from the OECD statistics.

Figure 1 shows the temporal evolution of the real house price index by country (in logs) since 1940. The series begin during the WWII. Overall, real house prices remain stable until the end of the 1970s (with the exceptions of Finland and France, whose house prices significantly grow since the beginning of the period), followed by a rapid sustained growth in most of the countries. The vertical red lines indicate the dates when the No-fault Unilateral divorce was introduced in each country, as shown in Table

[2] Even in the 1960–2008 period there are two missing data for Germany, in 1960 and 1961.
[3] Results hold if we consider wider periods, from 1940 to 2008 or even the whole twentieth century (1900–2008), see Tables A1 to A4 in the Appendix. Nevertheless, data for unemployment rates and the FLFP prior to 1960 are not available, so in Tables A2 and A4 the country-specific controls are per capita real GDP, population density and CPI.

1. The timing of the main reforms in no-fault and unilateral divorce laws for our sample of European countries was firstly summarized by González and Viitanen (2009).

Figure 1. Real House Price Index by country, 1940-2008



Notes: Data source: Knoll et al. (2017). The vertical red lines indicate the dates when the No-fault Unilateral divorce was introduced in each country (see Table 1).

A quick glance reveals that in some countries house prices clearly grew after the divorce law reform (Norway, the Netherlands and the UK), while in others (such as Finland) house prices decreased; however, in most of the countries there is no clear visual relationship between the timing of the unilateral divorce law reforms and the evolution of house prices.

We also use data from some country variables that can have an influence on national real house prices: per capita real Gross Domestic Product (GDP), population density, a consumer price index (CPI), the unemployment rate and the female labour

force participation (FLFP). The per capita real GDP represents the average income, and the CPI is a measure of the cost of living. Both variables are related to the standard of living; usually the higher the average income or level of prices, the higher the house prices. The CPI is also equal to 100 in 1990. Population density measures the country's degree of urban concentration. The unemployment rate proxies the national business cycle, and the FLFP reflects differences across countries in economic growth, social norms, education levels, fertility rates, and access to childcare and other supportive services (Verick, 2018). Table 2 shows the average values by country for all these variables, revealing important differences across countries.

3. Methodology and results

Our empirical strategy takes advantage of the European cross-country differences in the timing of divorce law liberalization, in order to identify the effects of these reforms on national house prices. As in Bellido and Marcén (2014), the reforms, known as no-fault unilateral divorce reforms, consist of any change in divorce laws that liberalizes divorce and of those changes that introduce unilateral divorce either implicitly (at least after a required separation period) or explicitly (divorce can be granted at the request of either spouse).

The timing of the main reforms in no-fault and unilateral divorce laws is shown in Table 1. The period of reforms began in 1970, when Denmark implemented a divorce law reform that allowed unilateral divorce after a period of separation. After 1970, in the 1970s and 1980s five countries (Belgium, France, Germany, The Netherlands and the UK) permitted divorce when a couple had lived apart for a specified period of time, allowing unilateral divorce after separation; Norway allowed this regime in the 1990s, and Switzerland in 2000. Only Finland and Sweden recognized unilateral divorce, the right to divorce at the request of either spouse. As Bellido and Marcén (2014), we categorize all these legal changes as no-fault unilateral divorce, because all reduce the value of marriage, regardless of the regime, and because the empirical literature does not distinguish between these types of reform, as in the case of US divorce law reforms.

González-Val and Marcén (2012a, 2012b) found that the date of the no-fault unilateral reforms coincides with the timing of structural breaks located in the divorce

rates series of European countries and of the US. These authors explain that those policy shocks had a permanent impact on the divorce rate, suggesting that the reforms of divorce laws permanently reduce the value of marriage relative to divorce. González and Viitanen (2009) also examined the effect of divorce laws for a panel of European countries, finding a significant and permanent effect of the introduction of no-fault unilateral divorce on divorce rates by about 0.6 (the average divorce rate was 2 in 2002).

Therefore, the literature confirms that these shocks involve an increase in divorces after the law reforms. Our argument is that, although the total population of the country is not affected by the reforms, this increase in the number of people living separately cause a shift to the right in the housing demand curve. At the very first moment, this demand shift generates an increase in the house prices, thus increasing builders' profits too. However, the standard microeconomic theory indicates that this extraordinary profitability induces the entry of new builders in the market, causing a shift to right of the housing supply curve too. In the end, we may expect an increase in the number of houses sold, but the effect on house prices is ambiguous, depending on which shift is stronger. The key question is how long it would take the housing market to adjust to the new market equilibrium.[4]

A priori, we would expect that the adjustment takes several periods. As Bardhan et al. (2011) point out, housing supply reacts slowly to rising prices and unmet demand. It is not only that the physical building activity takes time; cumbersome and slow administrative procedures are also involved. Therefore, our empirical strategy distinguishes between static of dynamic effects of the divorce law reforms. Initially, to capture the effect of divorce law reforms, we estimate the following expression:

$$\log(Real\ House\ Price_{ct}) = \alpha_c + \beta NoFault_{ct} + X_{ct} + \varphi_t + u_{ct}, \qquad (1)$$

where $NoFault_{ct}$ is a dummy variable that takes a value of "1" when country *c* has a no-fault unilateral divorce law regime in year *t*, and "0" otherwise. Holding constant the rest of explanatory variables, the parameter β is interpreted as the average level shift in

[4] Note that our argument regarding the relationship between divorce law reforms and house prices holds no matter the shock in divorce rates is temporary or permanent. The only difference would be the time needed in the transition to the new housing market equilibrium.

the real house prices after the law reform. From a theoretical point of view, as mentioned above, the sign of this parameter is not clear, since the final effect on house prices depends on whether the shift in housing demand or supply is more intense.

The vector X includes a set of country-specific variables: per capita real GDP, population density, CPI, the unemployment rate and the FLFP. Country fixed effects (α_c) and year fixed effects (φ_t) are included, in addition to linear and quadratic country-specific time trends, to control for evolving unobserved country attributes. u_{ct} is the standard error term. [5,6]

The estimate of the parameter β in Eq. (1) informs us about the average change in real house prices after the divorce law reforms controlling for fixed and time-specific shocks. However, as explained above, it is conceivable that the impact of divorce law liberalization has very different short-run and long-run effects depending on the temporal transition to the new equilibrium in the housing market, which may induce gradual change in house prices. To tackle this issue, we also estimate the dynamic response of house prices to divorce law reforms as in Wolfers (2006):

$$\log(Real\ House\ Price_{ct}) = \alpha_c + \sum_s \beta_s NoFault_{cts} + X_{ct} + \varphi_t + u_{ct}. \quad (2)$$

This model differs from the one previously discussed in that we introduce dummies to capture the dynamic effect of the shock. Thus, the variable $NoFault_{cts}$ now is a set of dummies equal to "1" when country *c* has implemented a no-fault unilateral divorce law regime in year *t* for *s* periods, and "0" otherwise. These dummy variables are supposed to capture the entire dynamic response of house prices to the new legal regime, while the country-specific time trends identify preexisting trends. A negative sign of the β parameter indicates that house prices in country *c* have fallen after *s* periods since the change in divorce law. The interpretation of a positive sign would be just the opposite. Again, we also add country fixed effects, year fixed effects, in

[5] As we only have ten countries in our sample, we do not use cluster-robust standard errors. According to the literature, an insufficient number of clusters (approximately less than 50) can lead to biased standard errors (Cameron et al., 2008; Esarey and Menger, 2018), even if the model is consistent and there are many observations in each cluster.

[6] Our main results show the unweighted panel fixed-effects estimates. Results using population-weighted least squares (shown in the Appendix) are similar.

addition to the country-specific controls, and linear and quadratic country-specific time trends, as in Eq. (1).

Table 3 reports the estimates for Eq. (1). As can be seen in the first column, which includes country and year fixed effects, a change in divorce law is associated with a raise in real house prices, but this effect is only significant at the 10%. The significance of this effect totally vanishes after adding country-specific linear time trends in Column (3). Nevertheless, when we add country-specific linear and quadratic time trends (Column 5), the coefficient turns to significant at the 5% level, with an estimated coefficient very close to that in Column 1.

To examine the impact of the liberalization of divorce laws, we also use an alternative strategy proposed by Wolfers (2006), which allows us to analyse the dynamic response of real house prices to the implementation of divorce law reforms. This dynamic empirical strategy informs us about the transition to the new equilibrium in the housing market, via adjustment in house prices. Table 3 also shows regressions for Eq. (2) in Columns (2), (4) and (6). In Column (2), including only country and year fixed effects, no significant effect can be found, as only the coefficient for 15 or more years after the reform is significant. In Columns (4) and (6), including country-specific linear and quadratic time trends, a similar pattern arises for the dynamic response of house prices. The first two years after the divorce law reform there is no significant effect in any case, but then we obtain a positive and significant effect for years 3 to 6 after the reform. For later years the effect turns to non-significant, or even negative and significant for 13 and 14 years after the reform. Furthermore, the estimated coefficients shown in Columns (4) and (6) are quite similar.

Therefore, there is a lag of two years in the effect of divorce law reforms on real house prices, consistent with the sociological literature indicating that most people do not immediately come back to the housing market after getting divorced; the fraction of people that finally return to ownership do so after a period of temporary solutions (see the survey by Wagner and Mulder, 2015). The positive effect of divorce law reforms on house prices is limited to years 3 to 6 after the reform, vanishing for later periods. Thus, this points to a temporary effect of the unilateral divorce law reforms on house prices.

Table 3. Baseline regression: Static and dynamic effects of divorce law reforms

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.066*		0.048		0.064**	
	(0.039)		(0.030)		(0.026)	
First 2 years		-0.034		0.031		0.014
		(0.059)		(0.031)		(0.030)
Years 3-4		0.050		0.109***		0.099***
		(0.061)		(0.035)		(0.037)
Years 5-6		0.053		0.107**		0.104**
		(0.074)		(0.043)		(0.041)
Years 7-8		0.072		0.096		0.094
		(0.086)		(0.065)		(0.066)
Years 9-10		0.082		0.053		0.055
		(0.059)		(0.058)		(0.061)
Years 11-12		-0.037		-0.091*		-0.077
		(0.049)		(0.051)		(0.050)
Years 13-14		-0.057		-0.135**		-0.111**
		(0.053)		(0.059)		(0.052)
Years 15 Onwards		0.140***		-0.038		0.026
		(0.043)		(0.062)		(0.047)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.739	0.750	0.869	0.876	0.901	0.908
Observations	488	488	488	488	488	488

Note: Sample period: 1960-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table 4 reports the estimates adding country-specific controls: per capita real GDP, population density, CPI, the unemployment rate and the FLFP. All variables are in logarithmic scale, except the unemployment rate and the FLFP. We add these variables to check whether our findings are driven by omitted economic and demographic variables. The impact of these variables correlated with the outcome of interest, if omitted, would be captured by the coefficients measuring the effect of divorce law reforms in Table 3.

The first difference with estimates reported in Table 3 is that, when we add country-specific controls, the static effect of divorce law reforms is positive and significant in all cases (Columns (1), (3) and (5) in Table 4), although the magnitude of the coefficients clearly decreases as we add country-specific linear and quadratic time trends. The magnitude and duration of the dynamic effect also decreases when adding country-specific linear and quadratic time trends. In Column (2), all the coefficients but the one corresponding to the first two tears after the divorce law reform are positive and significant at the 5% level. However, when we add country-specific linear time trends in Column (4) the duration of the effect is reduced to years 3 to 10 after the reform.

Finally, in the specification including country-specific linear and quadratic time trends, shown in Column (6), we obtain again a positive and significant effect only for years 3 to 6 after the reform. Furthermore, the estimated coefficients shown in Columns (5) and (6) in Tables 3 and 4 are pretty similar, indicating that our first set of results is robust to the inclusion of country-specific controls. If we focus on the dynamic coefficients in Column (6) in Table 4 (our preferred specification, including country-specific controls and country-specific linear and quadratic time trends), the magnitude of the effect is 0.093 in years 3 to 4 after the reform, and 0.126 in years 5 to 6. As the dependent variable is in logarithmic scale, these coefficients imply in both periods a raise of 1.1 points of the real house price index in absolute value. The average interannual increment in the real house price index for our sample of countries in the period 1960–2008 is 2.5; therefore, although the dynamic effect of unilateral divorce law reforms is only significant during four years (years 3 to 6 after the reforms), in those years that effect accounts for 22% of the average interannual increment in the real house price index.

Regarding the country-specific variables, both the real GDP per capita and the CPI show a positive (when significant) coefficient, confirming that a high average income and/or level of prices mean higher house prices. The coefficient picking up the effect of population density is always positive and significant, indicating that house prices are higher in those countries with less available space by person. The effect of the unemployment rate is negative and significant in all cases; as expected, high unemployment rates (which imply economic crisis) are associated with lower house

prices. Finally, the coefficient of the FLFP is negative, but turns to not significant when country-specific linear and quadratic time trends are added.

Table 4. Static and dynamic effects of divorce law reforms: Country-specific controls

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.238***		0.111***		0.064**	
	(0.034)		(0.027)		(0.027)	
First 2 years		0.068*		0.048*		0.010
		(0.039)		(0.027)		(0.027)
Years 3-4		0.172***		0.136***		0.093***
		(0.039)		(0.031)		(0.034)
Years 5-6		0.231***		0.171***		0.126***
		(0.057)		(0.039)		(0.040)
Years 7-8		0.252***		0.158***		0.102
		(0.072)		(0.057)		(0.062)
Years 9-10		0.298***		0.164***		0.098*
		(0.052)		(0.048)		(0.055)
Years 11-12		0.264***		0.080		0.012
		(0.048)		(0.051)		(0.051)
Years 13-14		0.246***		0.029		-0.043
		(0.054)		(0.056)		(0.053)
Years 15 Onwards		0.325***		0.074		0.018
		(0.039)		(0.048)		(0.048)
Log (Real GDP per capita)	1.081***	1.078***	1.142***	1.057***	1.384***	1.358***
	(0.117)	(0.113)	(0.198)	(0.204)	(0.290)	(0.287)
Log (CPI)	0.286***	0.289***	-0.094	-0.127	-0.142	-0.193
	(0.053)	(0.052)	(0.102)	(0.100)	(0.125)	(0.123)
Log (Population density)	0.725***	0.890***	0.779***	0.786***	0.389*	0.414**
	(0.233)	(0.266)	(0.209)	(0.204)	(0.203)	(0.200)
Unemployment rate	-0.045***	-0.047***	-0.027***	-0.026***	-0.017***	-0.015**
	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)
FLFP	-0.005*	-0.006**	-0.011***	-0.010***	-0.002	-0.001
	(0.003)	(0.003)	(0.004)	(0.003)	(0.006)	(0.006)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.846	0.856	0.904	0.907	0.919	0.923
Observations	488	488	488	488	488	488

Note: Sample period: 1960-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

To reinforce the consistency of our results, we run several robustness checks. First, our results are similar if we consider wider periods of time: 1900–2008 (Tables A1 and A2 in the Appendix) and 1940–2008 (Tables A3 and A4). Second, our results hold if estimate by using population-weighted least squares (Tables A5 and A6). In all cases, the magnitude and duration of the effect of divorce law reforms on house prices is similar to those reported in the main results.

Third, we run placebo regressions. One possible concern with our results is that our static and dynamic models may be capturing any other factor influencing house prices at the same time. That is, that the effects found are not actually the effect of the law reforms, and could be explained by any other reason. The key in the models specified in Eqs. (1) and (2) is the cross-sectional variation in the timing of the law reforms across countries; in the static model (Eq. 1) these dates determine the aftermath of the law reforms and in the dynamic model (Eq. 2) these dates are used to define the time dummies measuring the number of elapsed years since the change in the law. Therefore, we might expect that if we are truly capturing the dynamic effect of the law reforms, if we run the same regression using random dates we should not obtain any significant coefficient, because there would be no effect of any event to capture.

We draw random law reform dates for all the countries from a discrete uniform distribution on the interval 1970 to 1990, that is, the time period when most of the divorce law reforms took place (see Table 1). Then, we define static $NoFault_{ct}$ dummy variable and the set of time dummies to measure the dynamic effect of the law reform using this random dates, and re-estimate the models. We repeat this exercise 2,000 times, which gives us a large number of different estimates of the coefficients for different random dates.[7] Finally, from these 2,000 replications we obtain the bootstrapped average and standard deviations of all the coefficients. These bootstrapped coefficients are shown in Table 5, and should be compared with those obtained in Table 4 using the actual law reforms dates.

[7] The empirical distribution of the 2,000 estimated coefficients in the placebo regressions is shown in Figure A1 in the Appendix.

Table 5. Static and dynamic effects of divorce law reforms: Bootstrapped coefficients from placebo regressions

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	-0.001		-0.001		-0.002	
	(0.031)		(0.028)		(0.031)	
First 2 years		0.001		-0.001		-0.002
		(0.040)		(0.036)		(0.038)
Years 3-4		-0.001		-0.002		-0.004
		(0.042)		(0.039)		(0.043)
Years 5-6		-0.001		-0.002		-0.005
		(0.046)		(0.042)		(0.048)
Years 7-8		0.000		-0.001		-0.005
		(0.050)		(0.046)		(0.054)
Years 9-10		0.001		-0.001		-0.006
		(0.052)		(0.048)		(0.058)
Years 11-12		0.001		-0.001		-0.007
		(0.055)		(0.050)		(0.063)
Years 13-14		0.002		0.000		-0.007
		(0.059)		(0.053)		(0.068)
Years 15 Onwards		0.003		0.000		-0.009
		(0.066)		(0.057)		(0.078)
Log (Real GDP per capita)	1.053***	1.055***	1.216***	1.214***	1.390***	1.324***
	(0.129)	(0.130)	(0.211)	(0.214)	(0.292)	(0.290)
Log (CPI)	0.200***	0.208***	-0.100	-0.125	-0.139	-0.150
	(0.055)	(0.056)	(0.107)	(0.109)	(0.124)	(0.123)
Log (Population density)	0.773***	0.777***	0.820***	0.805***	0.362*	0.360*
	(0.248)	(0.253)	(0.201)	(0.203)	(0.198)	(0.197)
Unemployment rate	-0.033***	-0.033***	-0.022***	-0.021***	-0.017***	-0.018***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)
FLFP	-0.004	-0.004	-0.011***	-0.010***	-0.002	-0.002
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)	(0.006)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes

Note: Sample period: 1960-2008. Dependent variable: log(Real House Price Index). All models include a constant. Bootstrapped coefficients and standard errors from 2,000 placebo regressions using random law reform dates. Statistical significance at ***1%, **5%, *10% level.

These results show that now the coefficients of neither the static $NoFault_{ct}$ dummy variable nor the dynamic time dummies are significant in any case, while the coefficients for the rest of controls are identical to those reported in Table 4. Therefore, random dates lead to no static or dynamic effect on house prices. That is, the law reforms effects estimated in Table 4 are robust, because they can only be found for the particular set of historical divorce law reforms dates; any other random combination of dates leads to no effect on house prices. This way we confirm that our estimates in Table 4 are truly capturing the effects of the law reforms on house prices.

4. Conclusion

Prior research has found that unilateral divorce laws change individuals' behaviour in many aspects inside and outside marriage. In this paper, we analyse the impact of divorce law reforms on real house prices for a sample of ten European countries. We argue that the increase in divorces following the wave of divorce law reforms in Europe increased the number of people living separately, causing a shift to the right in the housing demand curve. Long term series of cross-country house prices are hard to find, but here we use the real house price index from Knoll et al. (2017), which is part of the Jordà-Schularick-Taylor macrohistory database (Jordà et al., 2017). This new data set allows us to investigate the effect of divorce law reforms on European real house prices during the second half of the twentieth century.

A priori this effect could be quite limited for several reasons; the literature indicates that only a fraction of divorced people return to the housing market and most of them do so after a period of temporary solutions, and renters are excluded from our analysis. Nevertheless, we find a positive and significant effect of these reforms on real house prices, mainly concentrated in years 3 to 6 after the reforms, even after controlling for a set of country-specific variables, as well as country-specific linear and quadratic time trends. Therefore, although we can conclude that the effect was short-lived, vanishing 6 years after the divorce law reform, we estimate that the dynamic effect of unilateral divorce law reforms accounts in those years for 22% of the average interannual increment in the real house price index. Placebo regressions and several

robustness checks carried out considering wider time periods and using a population-weighted least squares estimator validate our results.

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Appendix:

Table A1. Static and dynamic effects of divorce law reforms, 1900-2008

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.298***		0.150***		0.045	
	(0.038)		(0.049)		(0.043)	
First 2 years		0.106		0.058		0.068
		(0.089)		(0.076)		(0.068)
Years 3-4		0.203**		0.147*		0.145**
		(0.091)		(0.076)		(0.058)
Years 5-6		0.220**		0.155*		0.139**
		(0.102)		(0.089)		(0.064)
Years 7-8		0.274***		0.186*		0.114
		(0.102)		(0.097)		(0.076)
Years 9-10		0.315***		0.200***		0.039
		(0.076)		(0.072)		(0.071)
Years 11-12		0.203***		0.077		-0.125*
		(0.075)		(0.067)		(0.067)
Years 13-14		0.190**		0.054		-0.190***
		(0.086)		(0.071)		(0.071)
Years 15 Onwards		0.394***		0.224***		-0.174**
		(0.045)		(0.059)		(0.079)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.750	0.753	0.801	0.802	0.840	0.843
Observations	1,042	1,042	1,042	1,042	1,042	1,042

Note: Sample period: 1900-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table A2. Static and dynamic effects of divorce law reforms: Country-specific controls, 1900-2008

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.390***		0.044		0.055	
	(0.037)		(0.037)		(0.034)	
First 2 years		0.170**		-0.004		0.057
		(0.080)		(0.055)		(0.049)
Years 3-4		0.272***		0.073		0.135***
		(0.084)		(0.058)		(0.046)
Years 5-6		0.299***		0.086		0.143***
		(0.091)		(0.066)		(0.046)
Years 7-8		0.348***		0.074		0.105*
		(0.087)		(0.074)		(0.058)
Years 9-10		0.396***		0.090		0.057
		(0.068)		(0.056)		(0.058)
Years 11-12		0.299***		-0.010		-0.075
		(0.072)		(0.053)		(0.057)
Years 13-14		0.281***		-0.063		-0.145**
		(0.084)		(0.057)		(0.061)
Years 15 Onwards		0.506***		0.054		-0.092
		(0.045)		(0.047)		(0.063)
Log (Real GDP per capita)	0.504***	0.505***	1.479***	1.470***	1.083***	1.041***
	(0.087)	(0.086)	(0.172)	(0.174)	(0.184)	(0.185)
Log (CPI)	-0.002	-0.002	0.008	0.008	0.004	0.004
	(0.005)	(0.005)	(0.006)	(0.006)	(0.013)	(0.013)
Log (Population density)	0.628***	0.699***	1.178***	1.186***	1.450***	1.453***
	(0.138)	(0.135)	(0.194)	(0.196)	(0.357)	(0.354)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.767	0.772	0.847	0.848	0.865	0.867
Observations	1,042	1,042	1,042	1,042	1,042	1,042

Note: Sample period: 1900-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table A3. Static and dynamic effects of divorce law reforms, 1940-2008

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.224***		0.003		0.077***	
	(0.042)		(0.040)		(0.028)	
First 2 years		0.058		-0.004		0.046
		(0.084)		(0.057)		(0.036)
Years 3-4		0.151*		0.070		0.133***
		(0.085)		(0.050)		(0.038)
Years 5-6		0.164		0.062		0.139***
		(0.100)		(0.059)		(0.041)
Years 7-8		0.210**		0.048		0.131**
		(0.106)		(0.077)		(0.063)
Years 9-10		0.246***		0.003		0.088
		(0.074)		(0.068)		(0.057)
Years 11-12		0.132*		-0.143**		-0.047
		(0.069)		(0.061)		(0.047)
Years 13-14		0.117		-0.190***		-0.084*
		(0.076)		(0.066)		(0.049)
Years 15 Onwards		0.319***		-0.098		0.034
		(0.046)		(0.070)		(0.046)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.765	0.770	0.872	0.875	0.922	0.925
Observations	657	657	657	657	657	657

Note: Sample period: 1940-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table A4. Static and dynamic effects of divorce law reforms: Country-specific controls, 1940-2008

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.277***		0.020		0.084***	
	(0.036)		(0.034)		(0.027)	
First 2 years		0.097*		-0.004		0.038
		(0.057)		(0.048)		(0.034)
Years 3-4		0.194***		0.072		0.127***
		(0.057)		(0.044)		(0.035)
Years 5-6		0.217***		0.078		0.145***
		(0.067)		(0.050)		(0.040)
Years 7-8		0.232***		0.049		0.140**
		(0.074)		(0.063)		(0.064)
Years 9-10		0.263***		0.026		0.112*
		(0.054)		(0.057)		(0.060)
Years 11-12		0.175***		-0.096*		-0.021
		(0.049)		(0.057)		(0.052)
Years 13-14		0.156***		-0.154**		-0.070
		(0.056)		(0.061)		(0.053)
Years 15 Onwards		0.396***		-0.041		0.061
		(0.042)		(0.060)		(0.047)
Log (Real GDP per capita)	1.005***	0.981***	1.011***	0.939***	0.133	0.068
	(0.144)	(0.141)	(0.296)	(0.299)	(0.188)	(0.185)
Log (CPI)	0.256***	0.260***	-0.088	-0.089	-0.576***	-0.573***
	(0.043)	(0.044)	(0.073)	(0.074)	(0.068)	(0.068)
Log (Population density)	1.284***	1.501***	1.469***	1.527***	0.645***	0.697***
	(0.267)	(0.284)	(0.308)	(0.309)	(0.246)	(0.246)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.842	0.850	0.889	0.891	0.939	0.941
Observations	657	657	657	657	657	657

Note: Sample period: 1940-2008. Dependent variable: log(Real House Price Index). All models include a constant. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table A5. Population-weighted least squares: Static and dynamic effects of divorce law reforms, 1960-2008

	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.070*		0.054*		0.065**	
	(0.040)		(0.030)		(0.026)	
First 2 years		-0.030		0.036		0.014
		(0.059)		(0.032)		(0.031)
Years 3-4		0.054		0.115***		0.099***
		(0.059)		(0.035)		(0.037)
Years 5-6		0.055		0.111***		0.103**
		(0.073)		(0.043)		(0.040)
Years 7-8		0.069		0.098		0.092
		(0.085)		(0.065)		(0.066)
Years 9-10		0.080		0.058		0.059
		(0.059)		(0.057)		(0.059)
Years 11-12		-0.034		-0.080		-0.066
		(0.050)		(0.051)		(0.049)
Years 13-14		-0.050		-0.119**		-0.094*
		(0.055)		(0.060)		(0.052)
Years 15 Onwards		0.148***		-0.023		0.048
		(0.046)		(0.063)		(0.046)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.734	0.745	0.869	0.876	0.904	0.910
Observations	488	488	488	488	488	488

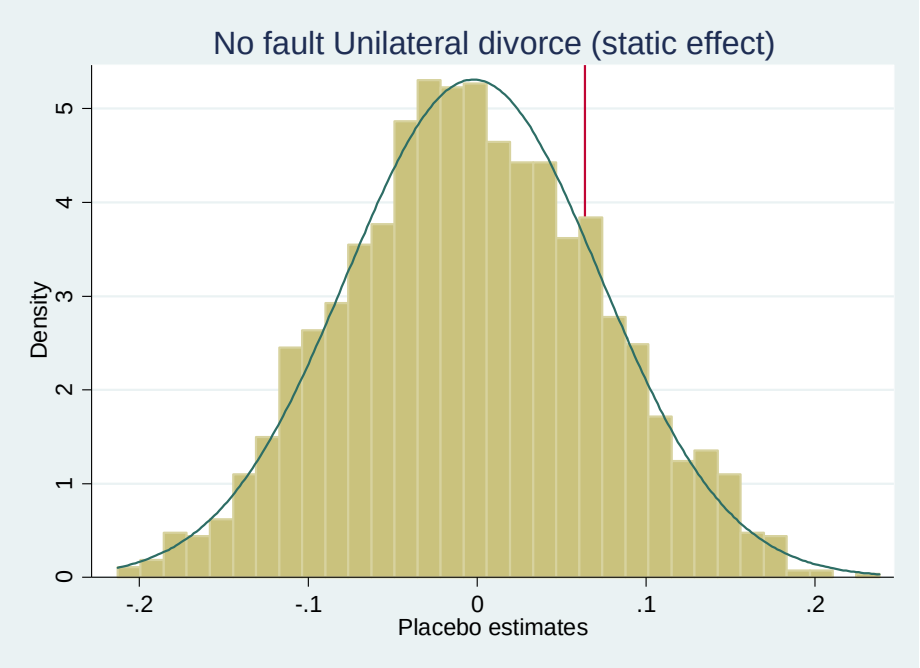
Note: Sample period: 1960-2008. Dependent variable: log(Real House Price Index). All models include a constant. Estimates weighted by total country log-population. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Table A6. Population-weighted least squares: Static and dynamic effects of divorce law reforms, Country-specific controls, 1960-2008

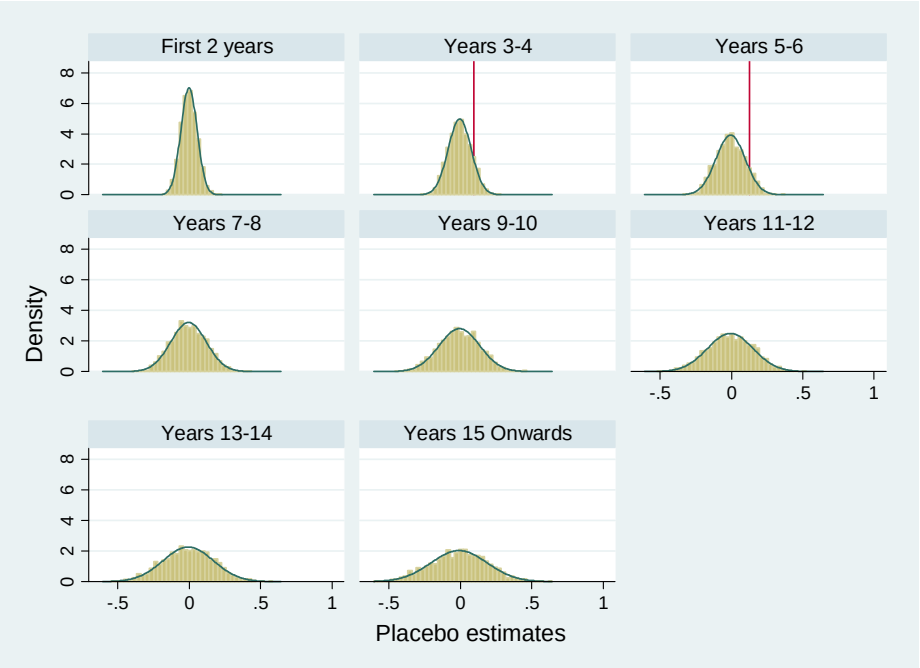
	Basic specification		Country-specific linear trends		Country-specific linear & quadratic trends	
	(1)	(2)	(3)	(4)	(5)	(6)
No fault Unilateral divorce	0.241***		0.112***		0.060**	
	(0.035)		(0.027)		(0.027)	
First 2 years		0.074*		0.049*		0.008
		(0.040)		(0.027)		(0.028)
Years 3-4		0.177***		0.137***		0.089**
		(0.039)		(0.031)		(0.035)
Years 5-6		0.230***		0.168***		0.117***
		(0.057)		(0.038)		(0.039)
Years 7-8		0.246***		0.152***		0.090
		(0.073)		(0.057)		(0.061)
Years 9-10		0.292***		0.161***		0.091*
		(0.054)		(0.047)		(0.053)
Years 11-12		0.263***		0.082		0.010
		(0.048)		(0.050)		(0.049)
Years 13-14		0.251***		0.035		-0.039
		(0.055)		(0.057)		(0.052)
Years 15 Onwards		0.331***		0.086*		0.031
		(0.040)		(0.049)		(0.048)
Log (Real GDP per capita)	1.056***	1.048***	1.171***	1.100***	1.491***	1.460***
	(0.120)	(0.116)	(0.198)	(0.206)	(0.296)	(0.293)
Log (CPI)	0.326***	0.327***	-0.085	-0.114	-0.117	-0.152
	(0.053)	(0.052)	(0.101)	(0.099)	(0.123)	(0.121)
Log (Population density)	0.690***	0.837***	0.698***	0.713***	0.287	0.322*
	(0.225)	(0.256)	(0.196)	(0.196)	(0.188)	(0.189)
Unemployment rate	-0.047***	-0.048***	-0.027***	-0.026***	-0.016***	-0.013**
	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.006)
FLFP	-0.006*	-0.006**	-0.011***	-0.011***	-0.003	-0.002
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)	(0.006)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × time	No	No	Yes	Yes	Yes	Yes
Country × time^2	No	No	No	No	Yes	Yes
Adjusted R^2	0.846	0.856	0.904	0.907	0.919	0.923
Observations	488	488	488	488	488	488

Note: Sample period: 1960-2008. Dependent variable: log(Real House Price Index). All models include a constant. Estimates weighted by total country log-population. Robust standard errors in parentheses. Statistical significance at ***1%, **5%, *10% level.

Figure A1. Distribution of the placebo estimates



(a) Placebo estimates of the 'No fault Unilateral divorce' dummy's coefficient (Column 5 in Table 5)



(b) Placebo estimates of the law reform time dummies' coefficient (Column 6 in Table 5)

Notes: Distribution of the estimated coefficients from 2,000 placebo regressions with random law reform dates. The vertical red line represents the corresponding values obtained in Table 4 (columns 5 and 6, respectively), when they are significant.