UNIVERSITÀ COMMERCIALE LUIGI BOCCONI
PHD SCHOOL

PhD Program in Economics and Finance
Cycle: 31
Disciplinary field: SECS P/01 Economia Politica

Essays in Health and Labour Economics

Advisor: Jérôme ADDA

PhD Thesis by
Blanka IMRE
ID number: 3006865

Academic Year 2020/2021

Abstract

This PhD thesis consists of three chapters on various topics in health and labour economics.

The first, coauthored, chapter studies the efficiency of invoking individuals' social preferences to increase vaccination intentions. We present results from a laboratory experiment which show that the presence of a passive player, whose well-being depends on active participants, creates a four- to ninefold increase in vaccine uptake. We interpret these results as suggestive of that social-preference focused public health campaigns may be more successful in raising vaccination rates than corrective information ones.

The second chapter examines the effect of the marital property regime on marital investments and outcomes. I model marriage as a relationship under contractual incompleteness and estimate the causal effect of the marital property regime on fertility, female labour supply, marriage and divorce, using the regional variation in default marital property systems in Spain and the 2005 divorce reform. I find substantial differences in female labour force participation, fertility, and marriage rate between property systems depending on the degree of integration, which is in line with the predictions of property rights theory.

The third chapter investigates whether marital contracts are useful because they enhance the value of a continued marriage or because they help deconstruct the relationship in case of separation or divorce. Using a novel, high-quality dataset on marital contracts I digitized from the records of Spanish notaries and a reform of Catalan civil law, I find strong evidence for the latter: marital contracts are valuable only if they can refer to the breakdown of the marriage.

Acknowledgements

I thank Jérôme Adda for his support and guidance throughout the years I have worked on this thesis. Discussions with Moshe Hazan about the marital property regimes project resulted in great improvements to the paper, for which I am very grateful. I am indebted to Francisco Javier Fajardo Fernández for the guidance on Spanish family law he provided, which has been instrumental in writing the second and third chapters, and to Beatriz Simón and Sofía Ruiz-Palazuelos who spared no effort in helping me obtain the marital contracts and judiciary statistics data used in said chapters. I thank Nenad Kos, Thomas Le Barbanchon, Matthias Doepke and Diego Ubfal for helpful comments and suggestions on the paper featured as the second chapter of this thesis, and my co-authors on the paper of the first chapter, Maria Cucciniello, Alessia Melegaro, Paolo Pin and Greg Porombescu, for their work.

Contents

Chapter 1

Altruism and Vaccination Intentions: Evidence from Behavioral Experiments

(with Maria Cucciniello, Alessia Melegaro, Paolo Pin and Greg Porombescu)

Abstract

Vaccine hesitancy has been on the rise throughout much of the world for the past two decades. At the same time existing pro-vaccination public health communication strategies have proven ineffective.

We present a novel approach to increase vaccination intentions, which appeals to individuals' other-regarding preferences. Specifically, we assess how vaccination intentions are influenced by the presence of people who cannot vaccinate, such as the immunosuppressed, newborns or pregnant women, using a game where there is a passive player whose welfare depends on the decisions of other, active players.

Results from a survey experiment targeting parents and from a laboratory experiment provide support for a twofold positive effect of the presence of the passive player on vaccination intentions. These findings suggest messages that invoke altruistic, other-regarding preferences may be an effective approach to increasing vaccination intentions.

Our findings could be extended to other campaigns where the population is invited to adopt behaviors that can help the most susceptible people, as is the case of the self-quarantine measures adopted during the outbreak of CoVID-19 in the beginning of 2020. If the attention of people is focused on the positive effect that they can have on those that cannot protect themselves, then the message may be more effective and people may be more responsive.

1.1 Introduction

Despite great progress in infectious disease control and prevention during the past century, infectious pathogens continue to pose a threat to humanity. This point is clearly exemplified by the current CoVID-19 pandemic, but also by past experiences such as SARS, H1N1 influenza, Ebola, and resurgent measles outbreaks, all of which have drastically disrupted everyday life, diminished public health resources and dominated media headlines. Vaccines, when available, represent one of the most significant, cost-effective and safe public health interventions capable of mitigating such outbreaks. However, vaccine refusal has steadily increased and routine immunisation coverage for infectious diseases, such as measles, has decreased over time (WHO-UNICEF coverage estimates, 2018). New estimates from the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (CDC) imply that as a result of vaccine refusal more than 140,000 people died from measles in 2018 worldwide. While the greatest impacts have been in the poorest countries, particularly sub-Saharan Africa, wealthier countries have also struggled to contain measles outbreaks, with significant ramifications for public health. In 2019, the United States reported its highest number of cases in 25 years, while four countries in Europe - Albania, the Czech Republic, Greece, and the United Kingdom – lost their measles elimination status in 2018 following protracted outbreaks.

The prevalence of vaccine refusal and subsequent re-emergence of measles and, more generally, of vaccine preventable diseases (VPD) is partially associated with the emerging phenomenon of vaccine hesitancy. According to the WHO Strategic Group of Experts (WHO, 2014), vaccine hesitancy is a complex behavioural concept, which is context-specific, and varies across time, place and vaccine type. More formally, it is defined as "a delay in acceptance or refusal of vaccines despite availability of vaccination services" (Bedford et al., 2018)), fuelled by the widespread misperception that many serious infections no longer circulate or that vaccines themselves are dangerous. Indeed, after decades of successful immunisation activities, low incidence rates associated with VPD have decreased public concerns with respect to infectious diseases. At the same time, there has been a preponderance of sensationalised reports of adverse vaccine events (Fefferman and Naumova, 2015). This phenomenon has the potential to undermine benefits of past immunisation efforts and eliminate herd immunity of the population. These outbreaks follow a prolonged period of largely sub-optimal vaccine uptake, which began in 1998, following Wakefield's paper, later retracted for scientific fraud (Dyer, 2010), which supposedly documented a causal link between the trivalent vaccine against measles, mumps and rubella (MMR) and autism in children. The MMR

scare, demonstrates a worrying ability of anti-vaccination rhetoric to persist in the long term, despite authoritative dismissals (Hviid et al., 2019; Taylor et al., 2014). Even with respect to COVID-19, for the time when a vaccine will be available, anti-vaccination movements may affect the efficacy of vaccination policies.

In response to the surge in vaccine hesitancy, public health authorities have released several technical reports that summarise and address concerns about vaccines, and have also developed interventions aimed at increasing vaccination rates (ECDC, 2017). Reports indicate the leading causes of vaccine hesitancy are: i) fear of vaccine side effects, ii) perceived low risk of VPD, and iii) mistrust in health care providers. Unfortunately, providing corrective information on vaccine safety, refuting vaccine myths (such as the link between the MMR vaccine and autism) and providing information on the dangers of contracting infectious diseases has been shown to be ineffective and, might even reduce vaccination intentions (Nyhan and Reifler, 2015; Nyhan, Reifler, and A Ubel, 2012; Nyhan, Reifler, Richey, et al., 2014). Compulsory childhood vaccination is yet another tool that governments have to increase coverage levels and a few countries (ie., Italy, France, Germany, Australia) have introduced it in their national programs or are currently debating its appropriateness (MacDonald et al. 2018). Studies show that requiring vaccination can improve rates in high-income countries, although there is limited evidence in low- or middle-income settings (Omer et al., 2019). A challenge with compulsory vaccination is that it can increase inequities in access to resources, because penalties for non-compliance can disproportionately affect disadvantaged groups. Another approach to convincing people to vaccinate, that has received less attention, is to trigger altruistic behaviour, as prompting greater concern for others' welfare may lead individuals to vaccinate even when the coverage level is above herd immunity and the incentive to free-ride is high (Chapman et al., 2012; Shim et al., 2012). In a vaccination context, altruistic behavior might be evoked by drawing people's attention to individuals who cannot vaccinate due to personal medical conditions, and therefore are critically dependent on herd immunity, to be protected from the disease.

This paper explores the relationship between altruistic behavior and vaccination intentions. Our expectation is that people are driven by a desire to care for those vulnerable individuals who are not able to get vaccinated for medical reasons, such as the immunocompromised, or for safety concerns as is the case of newborns and pregnant women. We expect this sense of altruism to be even stronger among those who experienced this status at some point in their own life, either because they personally suffered from a health-related condition or because they cared for someone who was immunocompromised and not eligible for vaccination. We are also interested in the

relative importance of public health concerns as they relate to cooperation. If people care about public health outcomes, we expect to see greater cooperation using a more explicit (i.e., vaccine-related) communication strategy rather than a neutral one. To empirically assess these mechanisms, we conducted a survey experiment on a sample of Italian parents and a lab experiment with graduate students in an Italian University. In the former, we asked parents to play a standard one-shot game with two players and pay-offs mimicking the trade-off between vaccinating or not. A three-player game was included in the survey to assess the impact of a passive player on individual cooperative behaviour. Building upon this baseline, we used lab experiment to test the effect of framing (vaccination vs. neutral) and the level of detail of the narratives (high detail and numerical vs. low detail and narrative). To thoroughly explore the determinants of the decision-making process we asked participants in the lab experiment to play thirty rounds of the game, either as active or passive players. Results from both studies highlight the importance of altruistic behavior in vaccination decisions and allowed us to better disentangle the mechanisms in place.

The paper is structured as follows. Section 1.2 introduces our experimental methods, both the online survey - with parents- and the laboratory experiment. Section 1.3 presents findings, and Section 1.4 discusses the main implications of the study.

1.2 Methods

To answer the above questions, two separate data collection strategies were undergone: an online parents survey and a laboratory game experiment among Italian university students.

Parents online survey

A total of 507 Italian parents, with at least one child under the age of 5 years old were recruited for the study. Quota sampling was used to ensure that the resulting sample was representative of the general Italian population of parents on parameters of age, income, gender, and education level.

Once enrolled, participants were randomly assigned to either a two-player or three players variant of the Hawk-Dove game (Table 1.1), which was initially framed in neutral terms (Choice 1 and Choice 2). The framing was later expanded for the laboratory experiment. In the first variant, two active players had to make a choice between two actions, a cooperative and a non-cooperative one. In the second variant, a third player was introduced, who had no action in the game and whose payoff depended on the

actions of the active players, with the payoff being highest when both active players cooperated, second-highest when at least one cooperated, and lowest when no one cooperated. Note that there is trade-off between what is best for the passive player and for society: total surplus is higher (17 versus 15) if only one active player chooses the cooperative action but the passive player is much better off if both cooperate. In addition, the game was designed to make the payoff difference between the uncooperative and the cooperative action very salient by assigning a payoff that is noticeably higher (two digits and double the cooperative payoff) for the free-rider action. Both of these design elements are there to highlight the attractiveness of uncooperative behaviour so that the cooperative choice can be more confidently interpreted as a sign of altruism.

		Player B	
		Choice 1	Choice 2
Player A	Choice 1	5,5	5,10
	Choice 2	10,5	2,2

(a) Two players

		Player B	
		Choice 1	Choice 2
Player A	Choice 1	5,5,5	5,10,2
	Choice 2	10,5,2	2,2,0

(b) Three players

Table 1.1: Game with Neutral Wording

The payoffs were chosen in a way that mimics the trade-off between vaccinating or not in a real-world decision context although the game was framed in neutral terms (Choice 1 and Choice 2). There is a risk-free decision that is collaborative (representing vaccination) and a risky decision to free ride on the behavior of others (i.e. no vaccination). Both players were better off if one cooperated, while the other did not, than if both cooperated. The worst outcome was obtained if no one cooperated. In the three-player version of the game, the third player had no choice (passive player) and his payoff was determined by the choices of the two active players. In the setup of our game, the passive player mimics those who cannot vaccinate. The best outcome for the passive player was if both active players cooperated, and the worst was if no one cooperated. The active players were aware of the presence of the passive player and the way his payoff depended on their actions.

Both the two-player and three-player games have two pure Nash equilibria strategies where one player plays the cooperative action (Choice 1/Vaccinate) and the other the selfish action. These are also the strategy profiles that players should aim for if they wanted to maximize total social surplus, in the sense that they maximize the sum of all payoffs, even when the passive player is present.

In addition to participating in the games, all participants were asked to complete an online questionnaire after having watched a 90-second clip about a real outbreak of an infectious disease in Italy. The clip was included to enhance the credibility of

the treatments. Participants were then randomly assigned to a treatment group, which could either be high detail or low detail, consisting of a prompt that presented a hypothetical scenario of a serious outbreak of measles with a high mortality rate and an effective and free vaccine. The high detail prompt contained numerical information on morbidity and vaccine side effects, whereas the low detail prompt was characterised by less precise non-numeric descriptions. See the text of the prompts in Appendix 1.B.

After reading the treatment, to assess the level of understanding and actual vaccination behaviour, participants were asked to respond to a series of questions about the prompt they just read and to book a time-slot to visit a local public health center to get free vaccination.

At the end of the game, participants were also asked to fill in a questionnaire gathering background socio-demographic characteristics as well participants' attitudes about vaccination behaviors. The survey experiment with parents acted as a baseline for testing the effect of the presence of a third player on collaboration. It had strong external validity because it was based on a representative sample of Italian parents. However, the gathered data provided only one observation for each participant. To better explore the effect of altruism and the mechanisms and drivers of individual behavior, a laboratory experiment was run in Italy, whereby participants were asked to play different variants of the game several times.

Laboratory Experiment

A total of 374 subjects participated in a total of 16 sessions. Participants were graduate students in an Italian university, recruited via an experimental laboratory recruitment system. Further details have been included in Appendix 1.A.

We used a mixed 2 (number of players: two or three) x 2 (framing: neutral or vaccination) x 3 (detail: no narrative, low detail prompt, high detail prompt) design. Detail is always a between-subjects factor. The other two factors are between-subjects in some sessions and within-subjects in other sessions; i.e., we conducted sessions where participants played either the two-player or the three-player game with a change in framing after a given number of rounds, and sessions where framing was fixed but subjects played the two-player game for some rounds and the three-player game afterwards.

In the lab we had the opportunity to study the role of learning in the decision process, by repeating several rounds of the game and alternating treatments and subjects' roles. In each session, subjects played thirty rounds of the game, divided into two parts (the first 9 rounds and the remaining 21 rounds) for which the variant of the game played differed. In each session, either the number of players varied and the wording was kept unchanged, or the wording varied and the number of players was

kept unchanged throughout the 30 rounds. For the two-to-three player games, the wording of the game was the same throughout the entire experimental session, but until round 10 participants played in pairs and then switched to playing in groups of three. In some of the sessions where wording was not always neutral, subjects were also shown a (high or low detail) prompt at the beginning of the first block of the vaccination game. Since allocation to different designs of the game was random, we can consider them as if they were treatments in a randomized experiment and treat the estimates as causal effects. At every round, we also elicited participants' beliefs about the action of other active subjects, who were not part of their own group in that round. In particular, participants were asked to guess the number of active players in the room that were choosing the cooperative action.

Roles within a group were allocated according to the following procedure. Participants were assigned a number taking a value from 1-3 for each treatment, which remained the same for the entire session for three player games and for round 10-30 for two-to-three player games. Then, subjects were rotated to play the passive player, being passive for one third of the rounds played per game versions, as shown in Table 1.2. Groups were reshuffled at every round, which participants were aware of. We chose to change group composition in every round so as not to leave room for retaliation against opponents in the previous round.

		ID in group		
Game type	Round	Active 1	Active 2	Passive
First variant	1-3	3	1	2
	4-6	1	2	3
	7-9	2	3	1
Second variant	10-16	3	1	2
	17-23	1	2	3
	24-30	2	3	1

Table 1.2: Role in Group

More than one week before the experiment, we asked participants to fill in an online questionnaire aimed at measuring their level of risk aversion, altruism, and positive reciprocity (Falk et al., 2016). This allowed us to control in the statistical analysis for individual characteristics that could affect subject behavior in the game (see the Appendix for more details). Given the richer information that was available from the laboratory experiment, we proceeded with an econometric analysis of the laboratory data with treatment variables for the presence of the third player, framing (vaccination

versus neutral wording), and the degree of technicality of the narrative (if given). Controls include perceived cooperation, experience of having been passive, the round of the game for the player in the same session, and background demographic and health variables that we obtained from the survey before the laboratory session.

Regarding the econometric specification, the binary dependent variable requires a logit model. Furthermore, in our experiment, each participant made 30 choices throughout the game, forming clusters of the dependent variable, since choices made by the same individual are necessarily correlated. This implies that we cannot run a simple logit, because the residuals and regressors are not mean-independent. Multilevel modeling allows to disentangle the within- and between-cluster effects; hence, we ran two-level logistic models. We think of choices (level 1) as nested into individuals (level 2). Our treatment variables are level 1, but we control for level 2 (individual) characteristics as well. Model 1 is then a two-level logit with controls described above. In Model 2, we also allow for individual heterogeneity in the treatment effects by including random coefficients. For each model, we report odds ratios (exponentiated coefficients) and corresponding standard errors. Table 1.3 shows the regression results.

We elicited the beliefs of participants in every round about the action of other active subjects in the same room that were not in their group in that given round. Participants were asked to guess the number of active players in the room who they thought were choosing the cooperative action (Choice 1 or Vaccinate, depending on the wording). That is, they had to select an integer (on a sliding scale) between 0 and M given by the formula

$$M = \begin{cases} \underbrace{\text{number of players in session}}_{\text{number of active players}} - \underbrace{2}_{\text{active players in own group}} & \text{if 2-player game} \\ \underbrace{\text{number of players in session} \times 2/3}_{\text{number of active players}} - \underbrace{2}_{\text{active players in own group}} & \text{if 3-player game} \end{cases}$$

Correct guesses were incentivised by letting the payoff corresponding to this exercise increase in the distance of the guess and the actual number of players who chose the cooperative action according to the following formula:

$$\text{payoff} = \max\{0, 12 - |\text{player's guess} - \sum_{\text{number active-2}} \mathbb{1}_{\text{Choice 1/Vaccinate}}|\}$$

Data Analysis

We estimated two-level mixed effects logistic models in the general form

$$Pr(y_{ri} = 1|x_{ri}) = H(x_{ri}\beta + z_{ri}u_i) \tag{1.1}$$

	Dependent variable: uptake			
	Model 1		Model 2	
Third player (3)	4.274***	1.087	9.137***	2.861
Framing (V)	1.792	0.699	2.067	1.022
Low detail (LD)	1.051	0.508	1.085	0.701
High detail (HD)	0.978	0.412	0.914	0.514
Perceived cooperation	5.054***	0.826	5.582***	1.001
Has been passive (P)	3.986***	0.830	6.778***	1.768
Round (R)	0.949*	0.026	0.953*	0.025
3*V	0.307*	0.216	0.204**	0.165
3*VLD	6.942**	5.586	8.464**	8.019
3*VHD	3.576	2.786	4.485*	4.075
Altruism, donation	1.001*	0.000	1.000	0.000
Altruism, self-assessment	1.055**	0.028	1.063**	0.030
Demographics controls	yes		yes	
Health controls	yes		yes	
Risk aversion, reciprocity	yes		yes	
Interactions with P,R	yes		yes	
Session fixed effects	yes		yes	
Random intercept by id	yes		yes	
Random coefficient by id	no		yes (3,V)	
Number of observations/subjects	9840/328		9840 /328	

Exponentiated coefficients; Standard errors in second column

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.3: Two-Level Mixed-Effects Logistic Regression Results

where $r = 1, \ldots, 30$ denotes rounds, $i = 1, \ldots, I$ denotes subjects with $I = 374$ when no survey data is used and $I = 328$ when matched data is used, x_{ri} are the fixed effects with regressions coefficients β and z_{ri} are the covariates corresponding to the random effects. The random effects u_i are I realizations from a multivariate normal distribution with mean 0 and variance Σ where we allow for correlation between random effects on the subject level. H is the logistic cumulative distribution function $H(v) = \exp(v)/(1 + \exp(v))$.

The treatment variables are indicators of the presence of a third player (0 if two player games is played, 1 if three player game is played), framing (0 if neutral, 1 if vaccination), low detail (1 if low detail prompt is provided, 0 otherwise) and high detail (1 if high detail prompt is provided, 0 otherwise). The reference condition is two-player, neutral wording, no detail. Perceived cooperation is the normalized guess on other active players' cooperative action; reported guesses were divided by the number of active players-2 in the given round. "Has been passive" is an indicator that takes one if the subject has played as the passive player in a previous block of rounds.

Tables 1.A.3-1.A.6 report covariate balance, separately reported for each treatment variable, on participant-round level. Participant-round is used as a unit of treatment, instead of participant, because treatment varied within session (see below for the exact description of the experiment). Since balance does not hold for several covariates obtained from the survey, we control for these in the regressions.

1.3 Results

In the survey experiment, in the two-player game, parents in the lowest bracket of self-reported net income (<= 30000 euros, N=149 people, or 29% of the sample) were more likely to choose the cooperative action when compared to those in the highest income group (Choice 1 was selected by, respectively, 79% vs. 67% respondents) and this difference was statistically significant at the 99% level. This result, in line with previous work (Shim et al., 2012; Yang et al., 2016) may be a consequence of heterogeneous risk attitudes, with lower income people being more risk averse and interested in a sure payoff (i.e. how much they earn).[1] However, we found that the inclusion of

[1]Of further note is that vaccine hesitancy in high income countries appears to be higher among those who are better educated and wealthier. For example, Smith et al. (2004) show that unvaccinated children tend to have mothers who are college graduates and live in a household with an annual income exceeding $75, 000. Similarly, Kim et al. (2007), using data from the 2003 National Immunization Survey, found low maternal education levels and low socioeconomic status were associated with higher rates of completion of recommended vaccination series (4:3:1:3) among children in the US . More recently Yang et al. (2016) show that higher household income was strongly associated with increased exemptions

a third passive player in the game increased cooperation of parents across all income brackets (the remaining 71% of our sample) but the lowest. In particular, for parents in the lowest income bracket the proportion of those deciding to cooperate significantly dropped from 79% to 61%, whereas, for parents in the highest income bracket, the overall proportion increased from 67% to 80%, suggesting that altruistic behavior may drive cooperation.

These findings were confirmed by the lab experiment, which also showed that cooperation, as measured by the frequency of selecting Choice 1, was significantly associated with the presence of a dependent player, with an odds ratio of 9 for our second, more restrictive, model specification (Table 1.3, Model 2). In other words, in the presence of a passive player in the game, an individual odds ratio to adopt a cooperative action increases by 9 times, all else being equal.[2] Moreover, experience of being passive was also highly significant and positively associated with cooperative behavior, with an odds ratio close to 7, meaning that if an individual had already played as passive in the game, when they became active again, the odds ratio to cooperate with the other players increases by 7. The estimated coefficients on framing and detail of the narrative in itself were found to be statistically insignificant indicating that these treatments had no effect on the subjects' cooperative action. Our results offer evidence of conditional cooperation, the more subjects believed that others around them were choosing to cooperate, the more likely they were to do so. Note that this goes against what selfish behavior would suggest in our game; ie.; the higher an individual belief about the other players taking the cooperative action, the stronger the incentive to free ride and take the opposite action.

There is a positive and highly significant effect of both perceived cooperation (OR=5.582) and being passive previously (OR=6.778) on cooperation as measured by Choice 1 or vaccine uptake. In addition to that, the presence of the third player has a significant positive effect (OR=9.137), and in three-player games enhancing the vaccination wording with a low detail prompt has a positive effect (OR=8.464). These results provide evidence for the hypothesis that an individual uptake increases when the three-player game is being played. Our results are also rather favourable to the fact that being

from mandatory vaccinations, as parents' education level, though to a lesser degree.

[2]Odds ratio variations are the easiest way to interpret logit regression, because of the logistic exponential formula for the probabilities. Their interpretation is as follows. Suppose that a player, given her characteristics, is expected to play the collaborative action with probability .4. This implies that her odd ratios are $\frac{.4}{1-.4} = 2/3$. If a dummy has expected odd ratios variation of 4, then the odd ratios of that player, if that dummy was originally 0 and becomes 1, will become $4\times 2/3 = 8/3 \approx \frac{.73}{1-.73}$, so that her new expected probability is around .73. In general formulas, if the odd ratio is x, then the probability is $\frac{x}{1+x}$. If the variation in the odd ratios is α, then the new probability is $\frac{\alpha x}{1+\alpha x}$.

previously passive has a significant positive effect on cooperation in all specifications considered. We also find evidence of conditional cooperation; the more subjects believe that others around them are choosing the cooperative action, the more likely they are to do so as well.Framing and narrative both seem to have no effect on vaccine uptake. Among the survey controls, self-reported altruism has a small but significant positive effect (OR=1.068), education has a significant positive effect at the highest level (graduate, OR=2.105), and check-up frequency has a negative effect but only if it takes the value of 5 (OR=0.518). None of the other covariates obtained from the survey predict uptake.

1.4 Discussion

Our data from both experiments show that highlighting the presence of a passive player increases vaccine uptake along two channels: first, it has a positive effect on those who are active and second, it has a lagged positive effect increasing uptake for those who have been passive. We interpret these results as a successful pro-vaccination communication strategy, suggesting that messages targeting other-regarding preferences may be an effective way of increasing vaccination intentions. To this end, messaging strategies invoking altruistic behaviour by, for example, conveying how our vaccination decisions impact the well-being of more vulnerable segments of the population, may be a more effective means of fighting vaccination hesitancy when compared to alternative strategies such as those providing corrective information about vaccine risks or emphasizing the morbidity risks of the disease. The positive effect of a dependent period on vaccine uptake lends support to the importance of emphasizing vaccine interventions during pregnancy, especially in cases of first-time mothers (e.g, Corben and Leask (2018), Massimi et al. (2017), Cunningham et al. (2018)).

Another pattern that we find is conditional cooperation in a social dilemma situation (see the seminal paper of Fehr et al. (1993)): subjects vaccinate more when they believe others vaccinate at higher rates. The positive effect of perceived cooperation suggests that national health authorities might find it beneficial to use messages that emphasize how many have already vaccinated, as opposed to, for example, by how much uptake was below the target. Our results suggest narratives do not affect uptake, in line with Nyhan, Reifler, and A Ubel (2012) and Nyhan, Reifler, Richey, et al. (2014).

In an experiment consisting of variants of a simple coordination game, we find evidence for conditional cooperation and a significant positive effect of the presence of a passive player whose welfare depends on the altruistic behavior of fellow players.

Narratives aimed at increasing vaccine uptake seem largely ineffective. Our findings suggest that pro-vaccine messages that nudge people to behave more altruistically may be effective in increasing vaccination intentions.

Our findings could be extended to other campaigns where the population is invited to adopt behaviours that can help the most susceptible people, as is the case of the self-quarantine measures adopted during the outbreak of CoVID-19 in the beginning of 2020. If the attention of people is focused on the positive effect that they can have on those that cannot protect themselves, then the message may be more effective and people may be more responsive. In relation to CoVID-19, it is also important to stress that, once a vaccine will be available, policies will need to incentivize vaccination for many people for which the perception of risk from the disease is low, such as the youngest. In this sense, a focus on the fact that their vaccination can save lives among the elderly part of the population could be effective strategy.

Ethics

This project received ethical approval from Bocconi University ethics committee on the 4th of April 2018.

Acknowledgements

Maria Cucciniello acknowledges funding from Bocconi University. She was awarded the Young Researcher Grant to conduct this study. Paolo Pin acknowledges funding from the Italian Ministry of Education Progetti di Rilevante Interesse Nazionale (PRIN) grant 2017ELHNNJ. We thank Professors Jérôme Adda and Pamela Giustinelli for valuable comments, and Claudia Marangon for excellent research assistance. We thank the Bocconi BELSS Lab for providing space and support. We thank the DONDENA Centre at Bocconi University for hosting the project.

References

Bedford, H., Attwell, K., Danchin, M., Marshall, H., Corben, P., & Leask, J. (2018)). Vaccine hesitancy, refusal and access barriers: The need for clarity in terminology. *Vaccine*, *36*(44), 6556–6558.

Chapman, G. B., Li, M., Vietri, J., Ibuka, Y., Thomas, D., Yoon, H., & Galvani, A. P. (2012). Using game theory to examine incentives in influenza vaccination behavior. *Psychological Science*, *23*(9), 1008–1015.

Corben, P., & Leask, J. (2018). Vaccination hesitancy in the antenatal period: A cross-sectional survey. *BMC Public Health*, *18*(556).

Cunningham, R. M., Minard, C. G., Guffey, D., Swaim, L. S., Opel, D. J., & Boom, J. A. (2018). Prevalence of vaccine hesitancy among expectant mothers in Houston, Texas. *Academic Pediatrics*, *18*(2), 154–160.

Dyer, C. (2010). Lancet retracts wakefield's mmr paper. *BMJ*, *340*. doi:10.1136/bmj.c696

ECDC. (2017). *Catalogue of interventions addressing vaccine hesitancy*. European Centre for Disease Prevention and Control. Stockholm.

Falk, A., Becker, A., Dohmen, T., Huffman, D., & Sunde, U. (2016). *The preference survey module: A validated instrument for measuring risk, time, and social preferences*. IZA Discussion Paper No. 9674.

Fefferman, N., & Naumova, E. (2015). Dangers of vaccine refusal near the herd immunity threshold: A modeling study. *The Lancet Infectious Diseases*, *15*. doi:10.1016/S1473-3099(15)00053-5

Fehr, E., Kirchsteiger, G., & Riedl, A. (1993). Does fairness prevent market clearing? An experimental investigation. *The Quarterly Journal of Economics*, *108*(2), 437–459.

Hviid, A., Hansen, J. V., Frisch, M., & Melbye, M. (2019). Measles, mumps, rubella vaccination and autism. *Annals of Internal Medicine*, *170*(8), 513–520.

Kim, S. S., Frimpong, J. A., Rivers, P. A., & Kronenfeld, J. J. (2007). Effects of maternal and provider characteristics on up-to-date immunization status of children aged 19 to 35 months. *American Journal of Public Health*, *97*, 259–266.

Massimi, A., Rosso, A., Marzuillo, C., Vacchio, M., De Vito, C., & Villari, P. (2017). Vaccine hesitancy: Old defeat or new challenge for public health? A survey on pregnant women in Rome. *European Journal of Public Health*, *27*(suppl3), 2ckx187.117.

Nyhan, B., & Reifler, J. (2015). Does correcting myths about the flu vaccine work? an experimental evaluation of the effects of corrective information. *Vaccine*, *33*(3), 459–464.

Nyhan, B., Reifler, J., & A Ubel, P. (2012). The hazards of correcting myths about health care reform. *Medical care*, *51*.

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective messages in vaccine promotion: A randomized trial. *Pediatrics*. doi:10.1542/peds.2013-2365

Omer, S. B., Betsch, C., & Leask, J. (2019). Mandate vaccination with care. *Nature*, *571*(7766), 469–472.

Shim, E., Chapman, J. P., G. B.and Townsend, & Galvani, A. P. (2012). The influence of altruism on influenza vaccination decisions. *Journal of the Royal Society Interface*, *9*(74), 2234–2243.

Smith, P., Chu, S., & Barker, L. (2004). Children who have received no vaccines: Who are they and where do they live? *Pediatrics*, *114*, 187–95.

Taylor, L. E., Swerdfeger, A. L., & Eslick, G. D. (2014). Vaccines are not associated with autism: An evidence-based meta-analysis of case-control and cohort studies. *Vaccine*, *32*(29), 3623–3629.

WHO. (2014). *WHO SAGE vaccine hesitancy working group report*. WHO. Geneva.

Yang, Y. T., Delamater, P. L., Leslie, T. F., & Mello, M. M. (2016). Sociodemographic predictors of vaccination exemptions on the basis of personal belief in california. *American Journal of Public Health*, *106*(1), 172–177.

1.A Methods and Materials

Parents Online Survey

Once enrolled, participants were randomly assigned to one of the two variants of the game (Table S1), which was framed in neutral terms (Choice 1 and Choice 2) to avoid confounding effects that we could not test for in a one-shot question (as we did in the laboratory experiment, described below). In the first variant, two active players had to make a choice between two actions, a cooperative and a non-cooperative one. In the second variant, a third player was introduced, who had no action in the game and whose payoff depended on the actions of the active players, with the payoff being highest when both active players cooperated, second-highest when at least one cooperated, and lowest when no one cooperated. Participants were paid as part of a survey response panel based in Italy, operated and maintained by the online survey firm Qualtrics. The compensation was calculated as a fixed amount topped up with the payoffs from Table S2, multiplied by 0.50 Euros. The invitation to participate in the study was sent via an email, which included a link to the stimuli and subsequent survey. Quota sampling was used to ensure that the resulting sample was representative of the general Italian population of parents on parameters of age, income, gender, and education level.

Laboratory Experiment

Participants were students in an Italian university, recruited via an experimental laboratory recruitment system (BELSS - Bocconi Experimental Laboratory for the Social Sciences). In the invitation, we sent subjects a link to the Qualtrics survey, explaining that if they had not filled in the survey before the laboratory session, they would not be allowed to participate. Upon finishing the survey, subjects received a random number that they had to present before they could enter the laboratory. The laboratory experiment itself was conducted May 3-10, 2018, with some pilot sessions run on May 3. Participants played forty rounds of the games on May 3 (pilot sessions), and thirty rounds on later days on a computer, at separate stations. The experiment was completely anonymous. We ran five sessions per day on May 3, May 7, and May 8, and two sessions per day on May 9 and 10. We discarded data from the first three sessions on May 3 because of technical problems that occurred during those sessions. See Table 1.A.2 for more details.

Study participants were paid with Amazon gift cards. In particular, at the end of the experiment, subjects were asked to sign a receipt for the gift card, correspond-

	2-to-3		3-player only		
Variable	Mean	Standard deviation	Mean	Standard deviation	Difference
Age	36.33	7.75	43.53	122.60	7.20
Number of children	1.86	0.81	1.75	0.72	-0.11
General health (0-100)	80.55	15.71	81.56	14.22	1.00
Flu shot number	2.22	1.81	2.28	1.86	0.06
Observations	254		254		508
	2-to-3		3-player only		
Categorical variable	Frequency	Percent	Frequency	Percent	Pearson χ^2
Gender					
Female	127	50.2%	123	48.4%	
1	126	49.8%	131	51.6%	0.16
Total	253	100.0%	254	100.0%	
Education					
High school or less	46	18.2%	57	22.4%	
Some college but no degree	56	22.1%	43	16.9%	
Old system degree	48	19.0%	49	19.3%	3.60
Bachelor's degree	50	19.8%	57	22.4%	
Graduate/Post-graduate degree	53	20.9%	48	18.9%	
Total	253	100.0%	254	100.0%	
Partner's education					
High school or less	82	32.4%	78	30.7%	
Some college but no degree	26	10.3%	38	15.0%	
Old system degree	49	19.4%	47	18.5%	7.39
Bachelor's degree	47	18.6%	52	20.5%	
Graduate/Post-graduate degree	5	2.0%	10	3.9%	
Not applicable	44	17.4%	29	11.4%	
Total	253	100.0%	254	100.0%	
Income					
Less than €30,000	72	28.5%	77	30.3%	
€30,000 to €44,999	53	20.9%	50	19.7%	
€45,000 to €59,999	33	13.0%	35	13.8%	
€60,000 to €74,999	22	8.7%	27	10.6%	
€75,000 to €89,999	19	7.5%	18	7.1%	1.44
€90,000 to €104,999	9	3.6%	9	3.5%	
€105,000 or more	39	15.4%	33	13.0%	
Prefer not to answer	6	2.4%	5	2.0%	
Total	253	100.0%	254	100.0%	
Political views					
Lega	76	30.0%	68	26.8%	
Forza Italia	22	8.7%	17	6.7%	
Partito Democratico	24	9.5%	28	11.0%	
M5S	90	35.6%	95	37.4%	
Other center-right	4	1.6%	4	1.6%	2.02
Other center-left	9	3.6%	12	4.7%	
Other	28	11.1%	30	11.8%	
Total	253	100.0%	254	100.0%	
Religious					
Yes	142	56.1%	143	56.3%	
No	105	41.5%	99	39.0%	
Prefer not to answer	4	1.6%	6	2.4%	2.58
Don't know	2	0.8%	6	2.4%	
Total	253	100.0%	254	100.0%	
Religion					
Roman Catholic	134	94.4%	136	95.1%	
Protestant	1	0.7%	2	1.4%	
Eastern Orthodox	2	1.4%	1	0.7%	
Other Christian Denomination	0	0.0%	1	0.7%	
Jewish	0	0.0%	1	0.7%	7.01
Islamic	2	1.4%	0	0.0%	
Buddhist/Confucianism	2	1.4%	1	0.7%	
Other Non-Christian Religion	1	0.7%	0	0.0%	
Hindu	0	0.0%	1	0.7%	
Prefer not to answer	142	100.0%	143	100.0%	
Number of check-ups per year					
Never	36	14.2%	19	7.5%	
Once a year	53	20.9%	68	26.8%	
Twice a year	43	17.0%	32	12.6%	10.11**
Three times a year	57	22.5%	57	22.4%	
More than three times a year	64	25.3%	78	30.7%	
Total	253	100.0%	254	100.0%	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.A.1: Balance Table, Survey with Italian Parents

ing to their earnings (details below), which was mailed to them by Amazon within a few weeks after the experiment. Since the laboratory had 27 stations and we needed the number of participants to be a multiple of six for some sessions, there were a few participants who had filled in the survey but could not participate in the laboratory session. They were paid 5 euros as a show-up fee using the same Amazon gift card process. Subjects who participated in pilot sessions that were not used in the analysis were paid and those who took part in sessions we used data from were paid according to the same procedure. The experimental design was approved by the Bocconi University Ethics Committee.

Payoffs were given in experimental tokens which were converted, at the end of the experiment, at a conversion rate known to subjects. The final payoff was determined by random decision selection from each block of rounds. For each block we selected, with probability 0.5, the vaccination game choices or the belief elicitation exercise to count towards the final payoff. Then one decision per block was selected, of the given type (choice in game or belief) and the corresponding experimental tokens earned were summed and converted to euros at a rate of 1 token=0.50 Euros. Participants were paid in Amazon gift cards that were mailed to them after the experiment. On average, subjects earned 13.14 euros.

Date	Session number	Players	Wording	Detail (prompt)	Number of rounds	Number of participants	Used in the analysis
03/05/2018	1	3	Neutral, then vaccination	-	10+30	21	No
03/05/2018	2	3	Neutral, then vaccination	-	10+30	21	No
03/05/2018	3	3	Neutral, then vaccination	-	10+30	27	No
03/05/2018	4	2	Neutral, then vaccination	-	10+30	24	Yes
03/05/2018	5	2	Neutral, then vaccination	High	10+30	26	Yes
07/05/2018	1	3	Neutral, then vaccination	-	9+21	18	Yes
07/05/2018	2	3	Neutral, then vaccination	High	9+21	27	Yes
07/05/2018	3	3	Neutral, then vaccination	Low	9+21	27	Yes
07/05/2018	4	2-to-3	Neutral	-	9+21	24	Yes
07/05/2018	5	2-to-3	Vaccination	-	9+21	18	Yes
08/05/2018	1	2-to-3	Vaccination	High	9+21	24	Yes
08/05/2018	2	2-to-3	Vaccination	Low	9+21	24	Yes
08/05/2018	3	2-to-3	Neutral	-	9+21	24	Yes
08/05/2018	4	3	Neutral, then vaccination	Low	9+21	24	Yes
08/05/2018	5	3	Neutral, then vaccination	High	9+21	24	Yes
09/05/2018	1	2-to-3	Neutral	-	9+21	18	Yes
09/05/2018	2	2-to-3	Vaccination	Low	9+21	24	Yes
10/05/2018	1	2-to-3	Neutral	-	9+21	24	Yes
10/05/2018	2	2-to-3	Vaccination	High	9+21	24	Yes

Table 1.A.2: Sessions Summary

Data Analysis

Tables 1.A.3-1.A.6 report covariates balance, separately reported for each treatment variable, on participant-round level. Participant-round is used as a unit of treatment,

instead of participant, because treatment varied within session (see below for the exact description of the experiment). Since balance does not hold for several covariates obtained from the survey, we control for these in the regressions.

	2-player		3-player		
Continuous variable	Mean	Standard deviation	Mean	Standard deviation	Difference
Altruism, donation (0-1000)	149.76	178.64	153.99	176.04	4.22
Risk aversion, price list (2.6-9.4)	6.77	2.14	6.58	2.15	-0.18***
General health (0-100)	76.68	14.04	75.81	15.10	-0.86**
Flushot number	1.66	1.70	1.46	1.68	-0.20***
Observations	3,336		7,884		11,220
	2-player		3-player		
Categorical variable	Frequency	Percent	Frequency	Percent	Pearson χ^2
Gender					
Female	1,317	49.7%	3,213	44.7%	
Male	1,335	50.3%	3,975	55.3%	19.19***
Total	2,652	100.0%	7,188	100.0%	
Education					
High school	1,977	74.5%	5,403	75.2%	
Undergraduate	537	20.2%	1,413	19.7%	0.44
Graduate	138	5.2%	372	5.2%	
Total	2,652	100.0%	7,188	100.0%	
Political views					
Strong liberal	300	11.3%	630	8.8%	
Moderate liberal	1,635	61.7%	4,455	62.0%	
Moderate conservative	420	15.8%	1,17	16.3%	
Strong conservative	18	0.7%	102	1.4%	32.32***
Populist	36	1.4%	144	2.0%	
Libertarian	102	3.8%	348	4.8%	
Other	141	5.3%	339	4.7%	
Total	2,652	100.0%	7,188	100.0%	
Religious					
No	2,295	68.8%	4,995	63.4%	
Yes	1,041	31.2%	2,889	36.6%	30.47***
Total	3,336	100.0%	7,884	100.0%	
Number of check-ups per year					
Never	1,032	38.9%	2,688	37.4%	
Once	897	33.8%	2,313	32.2%	32.39***
Twice	516	19.5%	1,344	18.7%	
Three times	99	3.7%	441	6.1%	
More than three times	108	4.1%	402	5.6%	
Total	2,652	100.0%	7,188	100.0%	
Doctor antivax					
No	2,472	93.2%	6,768	94.2%	
Yes	180	6.8%	420	5.8%	3.02
Total	2,652	100.0%	7,188	100.0%	
Altruism, self-assessment					
0	162	6.1%	318	4.4%	
1	315	11.9%	615	8.6%	
2	192	7.2%	768	10.7%	
3	273	10.3%	657	9.1%	
4	237	8.9%	663	9.2%	
5	168	6.3%	552	7.7%	103.05***
6	291	11.0%	639	8.9%	
7	489	18.4%	1,221	17.0%	
8	345	13.0%	1,035	14.4%	
9	99	3.7%	441	6.1%	
10	81	3.1%	279	3.9%	
Total	2,652	100.0%	7,188	100.0%	
Positive reciprocity					
1	297	11.2%	783	10.9%	
2	681	25.7%	1,749	24.3%	
3	636	24.0%	1,794	25.0%	
4	498	18.8%	1,302	18.1%	10.98*
5	387	14.6%	1,023	14.2%	
6	153	5.8%	537	7.5%	
Total	2,652	100.0%	7,188	100.0%	
Risk loving, self-assessment					
0	75	2.8%	165	2.3%	
1	132	5.0%	228	3.2%	
2	174	6.6%	726	10.1%	
3	297	11.2%	933	13.0%	
4	321	12.1%	849	11.8%	
5	186	7.0%	474	6.6%	106.06***
6	333	12.6%	1,167	16.2%	
7	576	21.7%	1,254	17.4%	
8	438	16.5%	1,002	13.9%	
9	81	3.1%	309	4.3%	
10	39	1.5%	81	1.1%	
Total	2,652	100.0%	7,188	100.0%	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.A.3: Balance Table, 3-Player Treatment

	Neutral wording		Vaccination wording		
	2-player		3-player		
Continuous variable	Mean	Standard deviation	Mean	Standard deviation	Difference
Altruism, donation (0-1000)	149.30	164.11	155.15	184.45	5.86
Risk aversion, price list (2.6-9.4)	6.55	2.16	6.69	2.14	0.14***
General health (0-100)	76.15	15.40	75.98	14.45	-0.18
Flushot number	1.48	1.67	1.53	1.70	0.05
Observations	4,230		6,990		11,220
	2-player		3-player		
Categorical variable	Frequency	Percent	Frequency	Percent	Pearson χ^2
Gender					
Female	1,692	43.7%	2,838	47.5%	
Male	2,178	56.3%	3,132	52.5%	13.77***
Total	3,870	100.0%	5,970	100.0%	
Education					
High school	2,697	69.7%	4,683	78.4%	
Undergraduate	888	22.9%	1,062	17.8%	114.05***
Graduate	285	7.4%	225	3.8%	
Total	3,870	100.0%	5,970	100.0%	
Political views					
Strong liberal	339	8.8%	591	9.9%	
Moderate liberal	2,412	62.3%	3,678	61.6%	
Moderate conservative	597	15.4%	993	16.6%	
Strong conservative	48	1.2%	72	1.2%	116.16***
Populist	108	2.8%	72	1.2%	
Libertarian	243	6.3%	207	3.5%	
Other	123	3.2%	357	6.0%	
Total	3,870	100.0%	5,970	100.0%	
Religious					
No	2,592	61.3%	4,698	67.2%	
Yes	1,638	38.7%	2,292	32.8%	40.77***
Total	4,230	100.0%	6,990	100.0%	
Number of check-ups per year					
Never	1,464	37.8%	2,256	37.8%	
Once	1,266	32.7%	1,944	32.6%	
Twice	642	16.6%	1,218	20.4%	51.50***
Three times	273	7.1%	267	4.5%	
More than three times	225	5.8%	285	4.8%	
Total	3,870	100.0%	5,970	100.0%	
Doctor antivax					
No	3,6	93.0%	5,64	94.5%	
Yes	270	7.0%	330	5.5%	8.61***
Total	3,870	100.0%	5,970	100.0%	
Altruism, self-assessment					
0	222	5.7%	258	4.3%	
1	354	9.1%	576	9.6%	
2	216	5.6%	744	12.5%	
3	366	9.5%	564	9.4%	
4	423	10.9%	477	8.0%	
5	228	5.9%	492	8.2%	265.43***
6	438	11.3%	492	8.2%	
7	744	19.2%	966	16.2%	
8	489	12.6%	891	14.9%	
9	183	4.7%	357	6.0%	
10	207	5.3%	153	2.6%	
Total	3,870	100.0%	5,970	100.0%	
Positive reciprocity					
1	477	12.3%	603	10.1%	
2	1,038	26.8%	1,392	23.3%	
3	843	21.8%	1,587	26.6%	
4	762	19.7%	1,038	17.4%	63.88***
5	516	13.3%	894	15.0%	
6	234	6.0%	456	7.6%	
Total	3,870	100.0%	5,970	100.0%	
Risk loving, self-assessment					
0	117	3.0%	123	2.1%	
1	156	4.0%	204	3.4%	
2	306	7.9%	594	9.9%	
3	402	10.4%	828	13.9%	
4	480	12.4%	690	11.6%	
5	222	5.7%	438	7.3%	213.20***
6	747	19.3%	753	12.6%	
7	723	18.7%	1,107	18.5%	
8	444	11.5%	996	16.7%	
9	216	5.6%	174	2.9%	
10	57	1.5%	63	1.1%	
Total	3,870	100.0%	5,970	100.0%	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.A.4: Balance Table, Framing Treatment

	No detail		Low detail		
Continuous variable	Mean	Standard deviation	Mean	Standard deviation	Difference
Altruism, donation (0-1000)	148.00	170.76	169.16	194.68	21.17***
Risk aversion, price list (2.6-9.4)	6.71	2.11	6.39	2.27	-0.32***
General health (0-100)	75.86	14.95	76.66	14.38	0.80**
Flushot number	1.52	1.68	1.49	1.72	-0.03
Observations	8,709		2,511		11,220
Categorical variable	Frequency	Percent	Frequency	Percent	Pearson χ^2
Gender					
Female	3,438	45.3%	1,092	48.4%	
Male	4,146	54.7%	1,164	51.6%	6.61**
Total	7,584	100.0%	2,256	100.0%	
Education					
High school	5,643	74.4%	1,737	77.0%	
Undergraduate	1,461	19.3%	489	21.7%	90.50***
Graduate	480	6.3%	30	1.3%	
Total	7,584	100.0%	2,256	100.0%	
Political views					
Strong liberal	738	9.7%	192	8.5%	
Moderate liberal	4,764	62.8%	1,326	58.8%	
Moderate conservative	1,119	14.8%	471	20.9%	
Strong conservative	69	0.9%	51	2.3%	100.80***
Populist	159	2.1%	21	0.9%	
Libertarian	378	5.0%	72	3.2%	
Other	357	4.7%	123	5.5%	
Total	7,584	100.0%	2,256	100.0%	
Religious					
No	5,67	65.1%	1,62	64.5%	
Yes	3,039	34.9%	891	35.5%	0.30
Total	8,709	100.0%	2,511	100.0%	
Number of check-ups per year					
Never	2,772	36.6%	948	42.0%	
Once	2,529	33.3%	681	30.2%	
Twice	1,47	19.4%	390	17.3%	138.54***
Three times	345	4.5%	195	8.6%	
More than three times	468	6.2%	42	1.9%	
Total	7,584	100.0%	2,256	100.0%	
Doctor antivax					
No	7,107	93.7%	2,133	94.5%	
Yes	477	6.3%	123	5.5%	2.13
Total	7,584	100.0%	2,256	100.0%	
Altruism, self-assessment					
0	357	4.7%	123	5.5%	
1	858	11.3%	72	3.2%	
2	594	7.8%	366	16.2%	
3	684	9.0%	246	10.9%	
4	687	9.1%	213	9.4%	
5	465	6.1%	255	11.3%	458.58
6	849	11.2%	81	3.6%	
7	1,269	16.7%	441	19.5%	
8	1,122	14.8%	258	11.4%	
9	399	5.3%	141	6.3%	
10	300	4.0%	60	2.7%	
Total	7,584	100.0%	2,256	100.0%	
Positive reciprocity					
1	816	10.8%	264	11.7%	
2	1,938	25.6%	492	21.8%	
3	1,758	23.2%	672	29.8%	
4	1,482	19.5%	318	14.1%	75.31***
5	1,083	14.3%	327	14.5%	
6	507	6.7%	183	8.1%	
Total	7,584	100.0%	2,256	100.0%	
Risk loving, self-assessment					
0	159	2.1%	81	3.6%	
1	288	3.8%	72	3.2%	
2	591	7.8%	309	13.7%	
3	966	12.7%	264	11.7%	
4	912	12.0%	258	11.4%	
5	456	6.0%	204	9.0%	196.74***
6	1,293	17.0%	207	9.2%	
7	1,362	18.0%	468	20.7%	
8	1,149	15.2%	291	12.9%	
9	309	4.1%	81	3.6%	
10	99	1.3%	21	0.9%	
Total	7,584	100.0%	2,256	100.0%	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.A.5: Balance Table, Low Detail Treatment

	No detail		High detail		
Continuous variable	Mean	Standard deviation	Mean	Standard deviation	Difference
Altruism, donation (0-1000)	160.06	179.68	132.36	166.46	-27.70***
Risk aversion, price list (2.6-9.4)	6.62	2.16	6.67	2.11	0.05
General health (0-100)	76.39	14.58	75.07	15.47	-1.32***
Flushot number	1.50	1.68	1.55	1.71	0.06
Observations	8,163		3,057		11,220
Categorical variable	Frequency	Percent	Frequency	Percent	Pearson χ^2
Gender					
Female	3,438	47.2%	1,092	42.6%	
Male	3,84	52.8%	1,47	57.4%	16.25***
Total	7,278	100.0%	2,562	100.0%	
Education					
High school	5,34	73.4%	2,04	79.6%	
Undergraduate	1,53	21.0%	420	16.4%	40.02***
Graduate	408	5.6%	102	4.0%	
Total	7,278	100.0%	2,562	100.0%	
Political views					
Strong liberal	573	7.9%	357	13.9%	
Moderate liberal	4,398	60.4%	1,692	66.0%	
Moderate conservative	1,323	18.2%	267	10.4%	
Strong conservative	99	1.4%	21	0.8%	186.56***
Populist	159	2.2%	21	0.8%	
Libertarian	357	4.9%	93	3.6%	
Other	369	5.1%	111	4.3%	
Total	7,278	100.0%	2,562	100.0%	
Religious					
No	5,22	63.9%	2,07	67.7%	
Yes	2,943	36.1%	987	32.3%	13.86***
Total	8,163	100.0%	3,057	100.0%	
Number of check-ups per year					
Never	2,793	38.4%	927	36.2%	
Once	2,319	31.9%	891	34.8%	
Twice	1,329	18.3%	531	20.7%	99.32***
Three times	489	6.7%	51	2.0%	
More than three times	348	4.8%	162	6.3%	
Total	7,278	100.0%	2,562	100.0%	
Doctor antivax					
No	6,822	93.7%	2,418	94.4%	
Yes	456	6.3%	144	5.6%	1.38
Total	7,278	100.0%	2,562	100.0%	
Altruism, self-assessment					
0	408	5.6%	72	2.8%	
1	519	7.1%	411	16.0%	
2	675	9.3%	285	11.1%	
3	684	9.4%	246	9.6%	
4	657	9.0%	243	9.5%	
5	555	7.6%	165	6.4%	252.74***
6	714	9.8%	216	8.4%	
7	1,38	19.0%	330	12.9%	
8	1,002	13.8%	378	14.8%	
9	396	5.4%	144	5.6%	
10	288	4.0%	72	2.8%	
Total	7,278	100.0%	2,562	100.0%	
Positive reciprocity					
1	834	11.5%	246	9.6%	
2	1,788	24.6%	642	25.1%	
3	1,884	25.9%	546	21.3%	
4	1,236	17.0%	564	22.0%	49.66***
5	1,038	14.3%	372	14.5%	
6	498	6.8%	192	7.5%	
Total	7,278	100.0%	2,562	100.0%	
Risk loving, self-assessment					
0	198	2.7%	42	1.6%	
1	330	4.5%	30	1.2%	
2	735	10.1%	165	6.4%	
3	792	10.9%	438	17.1%	
4	903	12.4%	267	10.4%	
5	447	6.1%	213	8.3%	288.58***
6	1,149	15.8%	351	13.7%	
7	1,398	19.2%	432	16.9%	
8	909	12.5%	531	20.7%	
9	318	4.4%	72	2.8%	
10	99	1.4%	21	0.8%	
Total	7,278	100.0%	2,562	100.0%	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.A.6: Balance Table, High Detail Treatment

1.B Procedure – Vaccination Game

Instructions: Two Players, Neutral Wording

Welcome!
This experiment consists of a number of stages in which you can earn experimental tokens. At the end of the experiment, the tokens will be exchanged for real money at a rate of X tokens for one euro. The experiment is expected to last about 1 hour. In this experiment, one game you are going to play is with two players, Player A and Player B and two choices, Choice 1 and Choice 2. You will be allocated the role of either Player A or Player B. Then both you and the other player will select Choice 1 or Choice 2. The choices will be made independently and at the same time. Your payoff will depend on both your and your opponent's choice. These payoffs are displayed in the table below, in which the amount to the left in each cell is the payoff of Player A and the payoff to the right is that of Player B.

		Player B	
		Choice 1	Choice 2
Player A	Choice 1	5,5	5,10
	Choice 2	10,5	2,2

For example, if Player A selects Choice 2 while Player B selects Choice 1, then A receives 10 tokens and B receives 5 tokens. Each player will choose whether they want to play Choice 1 or Choice 2, and then the computer will match the answers and calculate the appropriate payoffs. You will play the game above several times, in different roles, and against different partners. You will never play against the same opponent twice in a row. To calculate your final payoff, some of rounds of the experimental tasks will be selected randomly, and the tokens earned in these rounds will be converted to euros at the end of the experiment.
Click "Next" to proceed.

Instructions: Two Players, Vaccination Wording

Welcome!
This experiment consists of a number of stages in which you can earn experimental tokens. At the end of the experiment, the tokens will be exchanged for real money at a rate of X tokens for one euro. The experiment is expected to last about 1 hour. In this experiment, one game you are going to play is with two players, Player A and Player B and two choices, Vaccinate and Don't vaccinate (shortened to "Don"'). You

will be allocated the role of either Player A or Player B. Then both you and the other player will select Vaccinate or Don't. The choices will be made independently and at the same time. Your payoff will depend on both your and your opponent's choice. These payoffs are displayed in the table below, in which the amount to the left in each cell is the payoff of Player A and the payoff to the right is that of Player B.

		Player B	
		Vaccinate	Don't
Player A	Vaccinate	5,5	5,10
	Don't	10,5	2,2

For example, if Player A selects Don't while Player B selects Vaccinate, then A receives 10 tokens and B receives 5 tokens. Each player will choose whether they want to play Vaccinate or Don't, and then the computer will match the answers and calculate the appropriate payoffs. You will play the game above several times, in different roles, and against different partners. . You will never play against the same opponent twice in a row. To calculate your final payoff, some of rounds of the experimental tasks will be selected randomly, and the tokens earned in these rounds will be converted to euros at the end of the experiment.
Click "Next" to proceed.

Instructions: Three Players, Neutral Wording

Welcome!
The game you are going to play now is with three players, Player A, Player B, and Player C, and two choices, Choice 1 and Choice 2. You will be allocated the role of one of the three players, A, B, or C. Then Players A and B will select Choice 1 or Choice 2. The choices will be made independently and at the same time. Your payoff will depend on both your and your opponent's choice. Player C has no action in this game, but note that his/her payoff depends on your actions. These payoffs are displayed in the table below, in which the amount to the left in each cell is the payoff of Player A, in the middle is the payoff of Player B and on the right is the payoff of Player C.

		Player B	
		Choice 1	Choice 2
Player A	Choice 1	5,5,5	5,10,2
	Choice 2	10,5,2	2,2,0

For example, if Player A selects Choice 2 while Player B selects Choice 1, then A receives 10 tokens, B receives 5 tokens and C receives 2 tokens. Players A and B will choose whether they want to play Choice 1 or Choice 2, and then the computer will match the answers and calculate the appropriate payoffs. You will play the game above several times, in different roles, and against different partners. . You will never play against the same opponent twice in a row. To calculate your final payoff, some of rounds of the experimental tasks will be selected randomly, and the tokens earned in these rounds will be converted to euros at the end of the experiment.
Click "Next" to proceed.

Three players, Vaccination Wording

Welcome!
The game you are going to play now is with three players, Player A, Player B, and Player C, and two choices, Vaccinate and Don't vaccinate (shortened to "Don't"). You will be allocated the role of one of the three players, A, B, or C. Then Players A and B will select Vaccinate or Don't. The choices will be made independently and at the same time. Your payoff will depend on both your and your opponent's choice. Player C has no action in this game, but note that his/her payoff depends on your actions. These payoffs are displayed in the table below, in which the amount to the left in each cell is the payoff of Player A and the payoff to the right is that of Player B.

		Player B	
		Vaccinate	Don't
Player A	Vaccinate	5,5,5	5,10,2
	Don't	10,5,2	2,2,0

For example, if Player A selects Don't while Player B selects Vaccinate, then A receives 10 tokens and B receives 5 tokens. Each player will choose whether they want to play Vaccinate or Don't, and then the computer will match the answers and calculate the appropriate payoffs. You will play the game above several times, in different roles, and against different partners. . You will never play against the same opponent twice in a row. To calculate your final payoff, some of rounds of the experimental tasks will be selected randomly, and the tokens earned in these rounds will be converted to euros at the end of the experiment.
Click "Next" to proceed.

Instructions: Three players, Vaccination Wording, High/Low Detail

Welcome!

The game you are going to play now is with three players, Player A, Player B, and Player C, and two choices, Vaccinate and Don't vaccinate (shortened to "Don't"). You will be allocated the role of one of the three players, A, B, or C. Then Players A and B will select Vaccinate or Don't. The choices will be made independently and at the same time. Your payoff will depend on both your and your opponent's choice. Player C has no action in this game, but note that his/her payoff depends on your actions. Before making your choice in the game, you will also read a short scenario about a disease outbreak. These payoffs are displayed in the table below, in which the amount to the left in each cell is the payoff of Player A and the payoff to the right is that of Player B.

		Player B	
		Vaccinate	Don't
Player A	Vaccinate	5,5,5	5,10,2
	Don't	10,5,2	2,2,0

For example, if Player A selects Don't while Player B selects Vaccinate, then A receives 10 tokens and B receives 5 tokens. Each player will choose whether they want to play Vaccinate or Don't, and then the computer will match the answers and calculate the appropriate payoffs. You will play the game above several times, in different roles, and against different partners. . You will never play against the same opponent twice in a row. To calculate your final payoff, some of rounds of the experimental tasks will be selected randomly, and the tokens earned in these rounds will be converted to euros at the end of the experiment.

Click "Next" to proceed.

High Detail Message

Italy will be affected by an outbreak of a severe and highly infectious new form of measles. Studies show that 67% of those infected will die. 97.5% of those infected are expected to suffer major health issues as a result. Scientists at Italian Ministry of Health recently spent Euros 2,419,325 to develop a vaccine that can protect citizens from this virus. Among those who receive the vaccine 5% are expected to experience mild problems (local rash and swelling), 0.1% moderate problems (febrile convulsions), whereas for 0.00004% the vaccination may lead to coma and permanent brain damage. The vaccination will be provided to those who want it for free. Player C cannot be vaccinated,

therefore his/her level of protection from infection and well-being depends on your actions.

Low Detail Message

Italy will be affected by an outbreak of a severe and highly infectious new form of measles. Studies show that around two third of those infected will die. Almost all of the survivors are expected to report some long-term sequelae such as febrile convulsions, pneumonia and serious brain complication. Scientists at Italian Ministry of Health recently developed a vaccine that fully protects citizens from this virus. Among those who receive the vaccine a small number are expected to experience mild problems (local rash and swelling), a very small proportions are expected to experience moderate problems (febrile convulsions), whereas very severe complications such as coma and permanent brain damage will be extremely rare. The vaccination will be provided to those who want it for free. Player C cannot be vaccinated, therefore his/her level of protection from infection and well-being depends on your actions.

Chapter 2

Marital Property Regimes and Investments: Evidence from Spain

Abstract

I estimate causal effects of the default marital property regime on a wide range of marital investments and outcomes, utilising the regional variation in marital property systems in Spain and the 2005 divorce reform. I find that the separate property regime promotes higher female labour supply, a family model of fewer children, and a lower marriage rate than the community property regime. These results provide substantial empirical support to property rights theory in that the ownership of assets matters for relationship-specific investments, and that joint ownership provides stronger incentives to make specific investments while non-integration encourages general investments.

2.1 Introduction

Marriage is a romantic and economic union. Civil law describes the economic union of the spouses by the marital property regime which defines the ownership structure over marital assets and the division of the jointly owned assets upon dissolution of the marriage.[1] The marital property regime's characteristics affect the spouses' incentives to work in the labour market, accumulate wealth, invest in raising their children, and to remain in the relationship. In economics, the impact of the type of the marital property regime on investments and marital outcomes has not been studied extensively, unlike in the law literature where debates on the merits and economic effects of various marital property systems date back at least to the nineteenth century (e.g. Alonso Martínez (1884), Duran i Bas (1883)). The choice of the default marital property system is a central question in family law, with different systems of jurisprudence selecting either the separate property or the community property regime as the default, a variation that reflects the impact of Roman and Germanic law on the statute law of modern European and American countries.[2]

The type of marital property system affects the incentives to make investments that yield more within versus outside of the relationship and the ease of exiting the marriage. The ownership structure determines how easy it is for the other party to appropriate the returns on one's investment ex post, influencing the incentive to make ex ante investments; the easier appropriation is, the lower the incentive to invest. Ownership also has an impact on the cost of breaking up the relationship, depending on the size of the joint asset holdings. The more assets are under joint ownership, the larger the cost of liquidating the property regime becomes, leading to more difficult separation and divorce.

My paper makes several contributions to the literature on the economic impact of ownership structures within marriage. Most importantly, I estimate causal effects of the marital property regime on a wide range of marriage-related outcomes. In order to derive testable hypotheses on the impact of the property system on various investments, I model marriage as a relationship subject to contractual incompleteness by building on the seminal Grossman-Hart-Moore model and Cai (2003). I then develop a research design to identify the causal effect of marital property regimes by relying

[1] A marriage can be dissolved by the death of one of the spouses or divorce. If the dissolution is due to death, the division of marital assets occurs between the surviving spouse and the heirs of the deceased. In this paper, I focus on the case when dissolution is by divorce and omit the discussion of inheritance.

[2] Separation of property is the default marital property regime in Roman law, while the community property system originates in Germanic customary law.

on historical differences in the default marital property regime across regions of Spain and a major divorce reform. I find that separation of property encourages more general and less relationship-specific investments and results in a lower marriage rate than community property. In what follows, I discuss these contributions in more detail.

The Grossman-Hart-Moore theory of property rights (Grossman and Hart, 1986; Hart, 1995; Hart and Moore, 1990) predicts that under contractual incompleteness[3] the ownership of physical assets matters for relationship-specific investments. The intuition behind this result is that the ownership of an asset gives the owner control over production decisions, hence the distribution of ex post surplus, which shapes his incentives to make investments ex ante. Cai (2003) shows that if there are two types of investments, relationship-specific and general[4], joint ownership creates the strongest incentives to make specific investments. I adapt these insights of property rights theory to the marital setting. Looking at marriage as an incomplete contract is a conceptual innovation in the family economics literature where marriage is rather modelled following the collective approach.[5] The property rights model is a simple yet powerful tool which can be used to derive testable predictions on a large number of marriage-related outcomes.

I estimate causal effects of the marital property regime on female labour supply, fertility, marriage, divorce, and separation rates using regional variation in the legal default marital property system in Spain and the 2005 divorce reform. The Spanish setting is ideal to study the impact of marital property regimes. Spain is a plurilegislative country where regions have considerable autonomy; regarding marriage, the provisions of the Spanish Civil Code are universally applicable across the country, with the exception of marital property regimes that are regulated by the local civil law, resulting in variation in the default. In Catalonia and the Balearic Islands, the default property regime is separate property, while in the other provinces of Spain it is community property. Otherwise marital legislation is uniform, including divorce laws. Divorce was legalized in 1981, and it underwent a major reform in 2005. The 1981 law obliged couples to obtain legal separation and spend at least one year separated before they were allowed to file for divorce. Altogether, it would take 1.5-5 years from the date of filing for separation to obtain divorce. In July 2005, two sweeping reforms of family law came into effect, the legalization of same-sex marriage and an extensive divorce

[3]The incomplete contracts assumption is that investments and production decisions are sufficiently complex so that they cannot be specified in a contract ex ante. Assuming that parties can observe investment and production choices but they are non-verifiable to any third party also yields ex ante non-contractibility.

[4]General investments are those that are more productive in the outside option.

[5]e.g. Chiappori et al. (2002)

reform.[6] These reforms were largely unexpected, first, because the Socialist government that introduced them had obtained a surprise victory in the previous year (partly due to the effect of the Madrid train bombings three days before the elections[7]), and second, because there had been little to no political discourse about either a marriage or a divorce reform during the preceding two terms when the conservative Popular Party (PP) governed. The motivation of 2005 divorce reform does not claim to have a desired effect on any of the outcomes I consider in this paper; combined with its unexpectedness, this means that it can be viewed as an exogenous source of variation. The key element of the 2005 divorce reform was the elimination of mandatory separation before divorce, which lowered the costs of divorce in two ways. First, abolishing the double dissolution procedure made divorce easier for all couples, independent of the property regime they were married under. Second, it likely brought about a decrease in the liquidation cost by reducing the time that passes between the spouses' decision to divorce and finalizing the divorce and the related property division process. This second effect only applies to the community property system. Therefore, the 2005 divorce reform is considered as a shock to the community property regimes that made them more similar to the separate property system, through a substantial decrease in the cost of liquidation. The impact of this shock is what I identify, and I interpret the results as causal effects of the default marital property regime.

Using a difference-in-differences approach with the 2005 divorce reform as the policy change that demarcates the two time periods, separate property default regions (Catalonia and the Balearic Islands) as the control units, and community property default regions (all other regions of Spain) as the treated units, I show that the 2005 divorce reform increased female employment by 5-10%, increased female labour force participation by 4-12%, and decreased the share of home makers in the total working age population by 12-17% compared to the baseline (average across the default community property regions in 2004). Moreover, the reform caused a shift in the family structure towards a family model with fewer children, by increasing the first-born fertility rate by 3-4% and the second-born fertility rate by 4-11%, and decreasing the third-born fertility rate by 10-18%. The marriage rate decreased following the reform, by 7-12% . The divorce rate seems to be unaffected by the reform, apart from a temporary decrease lasting a few years afterwards, which was likely an effect of both the pent-up demand for divorce and that while divorce became easier under community property as well, it was still less costly and faster to obtain (without a liquidation pro-

[6]Legalization of same-sex marriage: Act 13/2005 of the 1st of July 2005. Modification of the Civil Code regarding separation and divorce: Act 15/2005, of the 8th of July 2005.

[7]Bali (2007) and Montalvo (2011)

cess) under the separate property regime. The separation rate increased in response to the reform; this effect originates in the long-run increase in the mutual agreement separation rate. Although most of the discussion in this paper is about married couples, since cohabiting couples and those living in registered partnerships are naturally living under the separate property system, the results are relevant to them as well.

The economics literature on divorce laws focuses on the impact of the change from bilateral to unilateral and from fault to no-fault divorce on a wide range of outcomes, including divorce rate, marriage rate, fertility, female labour supply, domestic violence, investment in the spouse's education, and long-run implications for children exposed to unilateral divorce.[8] The effect of the marital property regime on marriage-related outcomes has been largely neglected. Some notable exceptions are Cigno (2012), Fisher (2012), Brassiolo (2013), Bayot and Voena (2015), and Piazzalunga (2016) who study the effect of property regimes on household investments, and Frémeaux and Leturcq (2020) who document the evolution of prenuptial agreements, property regime choices, and the share of wealth held as exclusive assets in France. Both my conceptual approach and empirical strategy are considerably different from all of the aforementioned papers. To the best of my knowledge, using property rights theory to model marriage and data on Spanish property systems and the 2005 divorce reform are unique in the literature.[9]

The paper is structured as follows. Section 2.2 describes the institutional background, Section 2.3 presents the model, Section 2.4 describes the empirical strategy and data, Section 2.5 reports the results, and Section 2.6 concludes.

2.2 Marriage and Divorce in Spain

Spain is a plurilegislative country where regions hold considerable autonomy; Aragon, the Balearic Islands, the Basque Country, Catalonia, Galicia, and Navarre even have their own civil law. The main legislative source is the Spanish Civil Code, while the regional civil law is codified in compilations of civil laws or, in case of Catalonia, the

[8] See, for example, Chiappori et al. (2002), Gray (1998), Stevenson (2007), Stevenson (2008), and Voena (2015) on female labour supply, Stevenson (2007) on fertility, Rasul (2003) and Rasul (2006) on marriage rate, Friedberg (1997), González and Viitanen (2009), Kneip and Bauer (2009), Peters (1986), Peters (1992), and Wolfers (2006) on divorce rate, Brassiolo (2016) and Stevenson and Wolfers (2006) on domestic violence, Stevenson (2007) on investment in the spouse's education, and González and Viitanen (2018) and Gruber (2004) on the long-run impact on children.

[9] Brassiolo (2013) uses the same regional variation in property regimes in Spain, but the policy change in his paper is a reform of the Catalan Civil Code which addressed compensation for domestic work, not the 2005 divorce reform.

Civil Code of Catalonia (*Código Civil de Cataluña/Codi Civil de Catalunya*).
Regarding the applicability of the difference civil laws coexisting in Spain[10], the Spanish Civil Code states that the provisions of its Preliminary Title and those of Title IV of Book I (on marriage) are universally applicable in Spain, with the exception of the provisions related to marital property systems. For the rest, fully respecting any regional law, the provisions of the Civil Code shall apply on a subsidiary basis.[11]
A person is subject to local civil law based on his or her civil citizenship. Civil citizenship is primarily acquired by birth, with the child holding the same civil citizenship as the parents.[12] Marriage does not alter it. Civil citizenship can also be acquired based on residence and request: two years continued residence and the person requesting civil citizenship of the given region, or ten years continued residence, unless the person declares that he or she does not want the local civil citizenship.[13]
The rest of this section summarizes the legislation of marital property regimes in Spain and the divorce reforms of 1981 and 2005.

2.2.1 Marital Property Regimes

The marital property regime determines the ownership structure of the marital assets. The ownership structure describes which assets are considered as separate (exclusive) property of each spouse and which assets are jointly owned, and a sharing rule over the joint property in case the marriage is dissolved by death or divorce. Marital property regimes are distinguished by the degree of community of assets (integration), that is, how much of the total assets of the spouses is jointly owned. There are two main types of marital property systems: separate and community property. Under separate property, assets remain exclusive property of the title holder, while under community property most assets obtained during the marriage become jointly owned. Community property has many variants that differ on exactly which assets become common and which are kept separate.[14]

[10] *Código Civil de España* Preliminary Title, Chapter V

[11] *Código Civil de España* art. 13

[12] If the parents have different civil citizenship upon birth or adoption of their child, then the child is given that parent's civil citizenship with respect to whom filiation is determined first; in absence of that, the civil citizenship of the place of birth, and lastly, the Common Law (*derecho común*) citizenship. Within six months of birth, either parent may attribute his or her own civil citizenship to the child, and the child is also free to choose between the parents' and the birthplace civil citizenship after his or her fourteenth birthday.

[13] *Código Civil de España* arts. 14-15.

[14] Generally speaking, they vary with respect to the default sharing rule over common assets as well, specifying equal or equitable division. Since in Spain all community property systems prescribe equal division, I do not emphasize this distinction.

The two marital property regime types originate in different legal traditions. Separation of property is the statutory marital property system in Roman law, while the community property system was the default under Germanic customary law. In Western Europe, the transition from Roman to Germanic law that occurred in the Germanic successor states to the Western Roman Empire between the fifth and eight centuries[15] resulted in either the adoption of some form of community property as the sole default regime or the co-existence of the two regime types. This duality of the Roman and Germanic law has influenced the statute law of modern European and American countries; for example, the USA has both community property and separate property (common law) states, in Italy spouses are asked to choose between the two systems at the time of the marriage, and in Spain the property regime type varies by region. Spain is a particularly good example of the long-term coexistence of Roman and Germanic legal traditions. Catalonia and the Balearic Islands have had separate property as the default regime, adopted during the Roman Empire's rule, while other Spanish regions have used some form of community property, adopted during the Visigothic Kingdom in the seventh century (Visigothic Code, 654). The translation of the Visigothic Code to Castilian, the *Fuero Juzgo* (enacted in 1241), remained in effect until the creation of the Spanish Civil Code in the late nineteenth century (1889). The *Fuero Juzgo* is the first legal reference for the *sociedad de gananciales* (common acquisitions), the default regime of the central and southern Spanish regions. Some northern regions, namely Aragon, Navarre, and Vizcaya, obtained privileges and adopted other variants of the community property system between the twelfth and sixteenth centuries. The latest property regime adoption date is that of the *fuero del Baylío*, in the eighteenth century; however, this property system is not recognized as a default system in the Spanish Civil Code. For more details, see the Appendix.

The Spanish Civil Code and all local civil laws in Spain give priority to whatever property regime the couple agrees on in a marital contract (*capitulaciones matrimoniales*, see the Appendix for details on the relevant regulation). If the spouses do not sign a contract specifying a marital property system, they will be married under the local legal default which is regulated by the civil laws applicable in the given region.

There is large variation in default marital property systems in Spain, with six default regimes, as shown in Table 2.2.1 and Figure 2.2.1[16]. In addition, there exist property systems that the Spanish Civil Code and some local civil laws recognize as popular

[15]Examples of codified law from this period that combine elements of Roman, Germanic and Catholic law include the Lex Salica (around 507-511), the Lex Ripuaria (around 630), the Visigothic Code also known as Liber Iudiciorum (654), the Lex Saxonum (782-803), and the Lex Frisionum (late eighth-early ninth century).

[16]The maps were created by me, on mapchart.net.

or traditional alternatives to the default system, resulting in an even greater variation (see the Appendix for details). In most regions, some form of the community property system is the default, while in Catalonia and the Balearic Islands the default is separation of property. Figure 2.2.1 illustrates this regional division.

In what follows, I summarize the relevant legislation separately for each jurisdiction of Spain: first the common law (*derecho común*), codified in the Spanish Civil Code, and then local civil laws. More details on the administrative division of Spain and on marital property systems can be found in the Appendix.

Type	Autonomous community	Province	Default marital property system
Community property	Andalusia	Almería, Cádiz, Córdoba, Granada, Huelva, Jaén, Málaga, Sevilla, Huelva	*sociedad de gananciales*
	Aragon	Huesca, Teruel, Zaragoza	*consorcio conyugal*
	Asturias	Asturias	*sociedad de gananciales*
	Canary Islands	Las Palmas, Santa Cruz de Tenerife	*sociedad de gananciales*
	Cantabria	Cantabria	*sociedad de gananciales*
	Castile and Leon	Ávila, Burgos, León, Palencia, Salamanca, Segovia, Soria	*sociedad de gananciales*
	Castile-La Mancha	Albacete, Ciudad Real, Cuenca, Guadalajara, Toledo	*sociedad de gananciales*
	Extremadura	Badajoz*	*sociedad de gananciales*, *fuero del Baylío*
		Cáceres	*sociedad de gananciales*
	Galicia	A Coruña, Lugo, Ourense, Pontevedra	*sociedad de gananciales*
	Madrid	Madrid	*sociedad de gananciales*
	Murcia	Murcia	*sociedad de gananciales*
	Navarre	Navarra	*sociedad conyugal de conquistas*
	Basque Country	Álava*, Guipúzcoa, Vizcaya*	*sociedad de gananciales*, *comunicación foral*
	La Rioja	La Rioja	*sociedad de gananciales*
	Ceuta	Ceuta	*fuero del Baylío*
	Melilla	Melilla	*sociedad de gananciales*
	Valencia except 2008-2016	Alicante, Castellón, Valencia	*sociedad de gananciales*
Separate property	Balearic Islands	Illes Balears	*separación de bienes*
	Catalonia	Barcelona, Girona, Lleida, Tarragona	*separación de bienes*
	Valencia 2008-2016	Alicante, Castellón, Valencia	*separación de bienes*

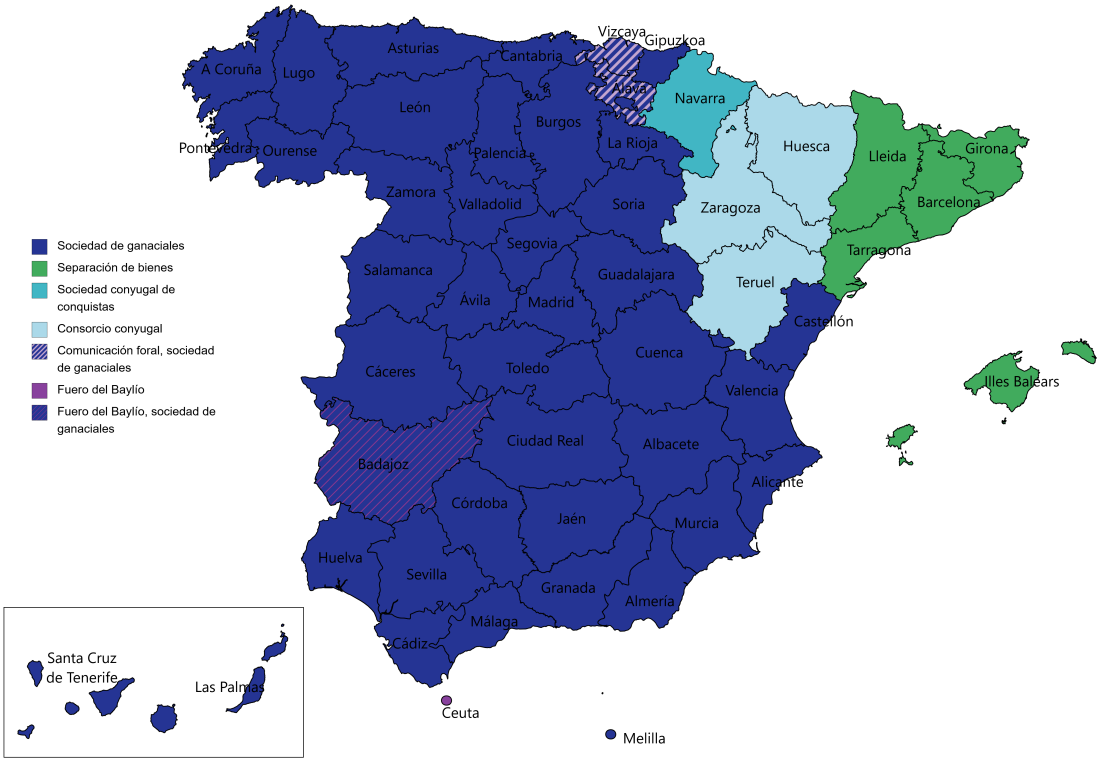
* The default regime varies by municipality.

Table 2.2.1: Marital Property Regimes in Spain

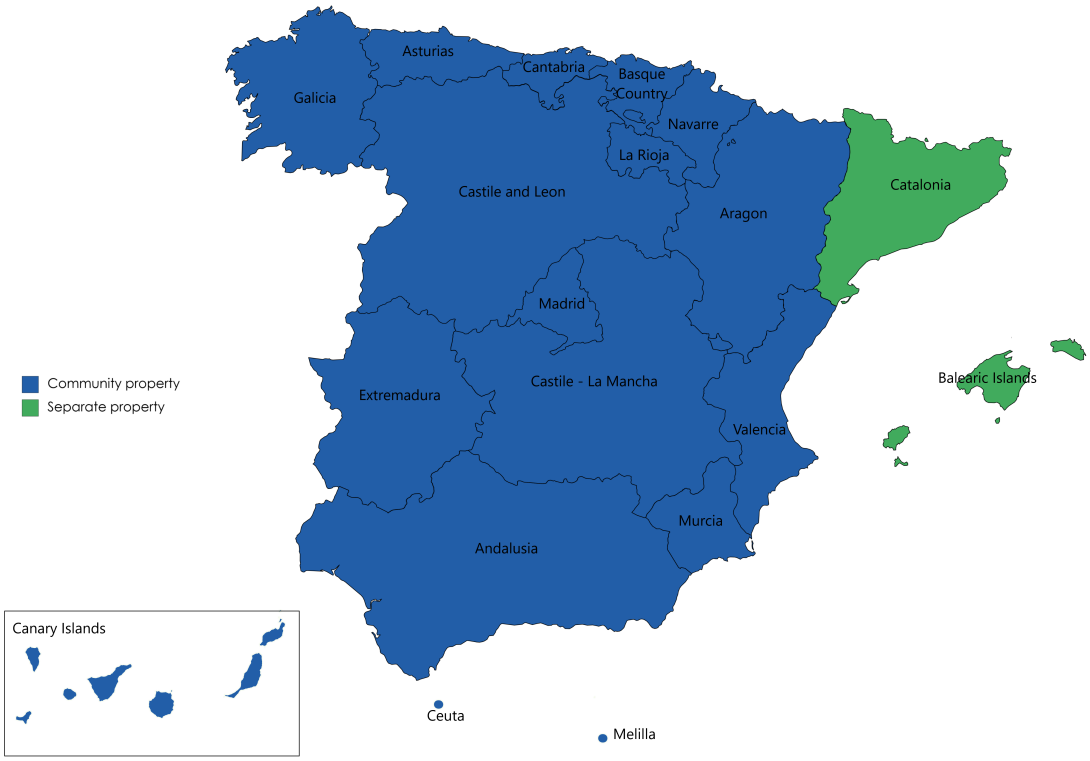
Spanish Civil Code

The Spanish Civil Code states that unless the spouses agree on a different marital property regime and sign the corresponding contract (*capitulaciones matrimoniales*), the marital property regime is *sociedad de gananciales*[17] which is a system of community property, more precisely, common acquisitions. Common acquisitions is a property system whereby most goods acquired during the marriage fall under joint ownership, with each spouse holding an *undivided half-interest* in the jointly owned goods.

[17] *Código Civil de España* arts. 1315-1316



(a) Default regimes by province



(b) Regime type by region

Figure 2.2.1: Default Marital Property Regimes in Spain

It is worth emphasizing both undivided and half-interest. It is not that each spouse owns 50% of each asset that is part of the community property. Instead, they jointly own a pool of assets without having ownership of a specific share in any of these common assets. The translation to half-interest to an actual share in each asset only occurs when the marriage is dissolved, either by death of one of the spouses or by divorce. In the first case, the community property is divided between the surviving spouse and the heirs of the deceased; in the second case, between the spouses.

Most assets that are acquired during the marriage are common, including labour income and profits earned by either spouse, while inheritance, gifts, and assets that were bought prior to the marriage remain separate property.[18] The expenses of the marriage, such as childcare costs and household maintenance costs, should be borne jointly, in proportion to the resources of each spouse. Domestic work counts as a contribution towards the costs of the marriage, and the spouse working significantly more at home[19] is entitled to a financial compensation if the marriage ends. The use of the family home and furniture should be arranged with the consent of both spouses, even if it is owned exclusively by one of them.

The regime of community property is terminated by marital dissolution (due to death or divorce), annulment, legal separation, judicial decree, or the spouses agreeing on a different marital regime in a marital contract.[20] Termination of the regime means that the assets the spouses acquire afterwards are their exclusive property, not gains of the matrimony.[21] Dividing the pool of common assets between the spouses, thereby realizing their share is the liquidation process. Liquidating the community property is a potentially lengthy and costly procedure.[22] The Civil Code states that after its termination the community property system should be liquidated but it does not set a deadline. While there are advantages of liquidating the community property regime as part the separation or divorce process - corresponding taxes can be lower and there are no costs of a separate judiciary procedure - the legislation allows couples to defer liquidation even until after divorce is finalized.

[18] Personal property of no extraordinary value and goods needed for one's profession are also separate property.

[19] Some regions grant this compensation only if the person did not work outside the home.

[20] *Código Civil de España*, arts. 1392-93.

[21] This interim regime is known as *comunidad post-ganancial* where the ownership status of the spouses is most similar to that of co-heir before the partition of the estate. Reference on partitioning an estate: *Código Civil de España*, arts. 1051-1072.

[22] It starts with taking inventory of all the common assets and estimating their value, estimating the value of outstanding liabilities incurred by the spouses and paying outstanding debts, and finally the net assets of the community are divided by the spouses (or the respective heirs, if the marriage was dissolved by death). *Código Civil de España* arts. 1396-1410.

The Spanish Civil Code describes two more marital property regimes: participation in gains (*régimen de participación en las ganancias*) and separate property (*régimen de separación de bienes*).[23] Participation in gains means that at the time of the termination of the regime, the initial net wealth, meaning wealth at the celebration of the marriage, and the final net wealth is calculated for each spouse, and the spouse for whom the gain is smaller receives half the difference in gains.[24] Participation in gains is not a default marital property regime anywhere in Spain.

Separate property is a marital property system in which the economic union of the spouses is very limited. The goods held by each spouse at the celebration of the marriage and all goods which one subsequently acquires pursuant to any title belongs to that spouse. Separate property applies if the spouses agreed upon it in a nuptial contract, or if they agreed on not having common acquisitions but did not agree on an alternative.[25]

Regional Civil Law

In several regions of Spain, the default marital property system is a community property variant which differs from common acquisitions in which assets become part of the community property and which remain separate (the differences tend to be subtle).[26] This is the case in Aragon and its default *consorcio conyugal*[27], Navarre and the *sociedad conyugal de conquistas*[28], and the Basque Country with a mix of common acquisitions and *régimen de comunicación foral de bienes*. The latter regime consists of universal community and common acquisitions, depending on the presence of common children and how the marriage ended, and applies only to couples who are from certain areas of Vizcaya and Álava province.[29] The applicable regime is common acquisitions if the marriage was dissolved by annulment, separation or divorce or if the couple did not have common children (no matter how the marriage dissolved). If the marriage produced children and was ended by the death of one spouse, universal community applies.[30] Apart from these areas of Vizcaya and Álava, common acquisitions is the

[23] *Código Civil de España* Part III, Chapter V-VI

[24] *Código Civil de España* arts. 1411-1434

[25] *Código Civil de España* art. 1435

[26] More details on the characteristics of community property variants can be found on the Appendix.

[27] *Código del Derecho Foral de Aragón* art 193, Book II, Chapter IV.

[28] *Compilación del Derecho Civil Foral de Navarra*, Book I, Title VI

[29] Vizcaya province except for the following municipalities: Villas de Balmaseda, Bermeo, Durango, Ermua, Guernica/Gernika-Lumo, Lanestosa, Lekeitio, Markina-Xemein, Ondarroa, Otxandio, Portugalete, Plentzia, Urduña/Orduña, Bilbao; and two municipalities in Álava province, Laudio/Llodio and Aramaio.

[30] *Derecho Civil Vasco* Title III

default regime in the Basque Country. Galicia has its own civil law, but the marital property regime is regulated the same way as in common law jurisdiction, with common acquisitions as the default.[31] The *fuero del Baylío* (literally: privilege of the Baylío) is customary law that is observed in about a dozen municipalities in the province of Badajoz, in Extremadura[32] and in the province of Ceuta.[33] The default marital property regime of the *fuero del Baylío* is universal community: once the marriage has been celebrated, everything owned by the spouses becomes community property.[34]

In Catalonia and the Balearic Islands, the default marital property regime is separation of property, regulated by the Catalan Civil Code (*Código Civil de Cataluña/Codi civil de Catalunya*) and the *Compilación del Derecho Civil de Baleares*, respectively. In the Balearic Islands, there are subtle differences in the marital legislation across the islands.[35] Under the separate property system, all assets acquired before the marriage and during the marriage by one spouse remains the property of that spouse.[36] A spouse who has worked significantly more at home than the other is entitled to financial compensation in case of annulment, separation or divorce. The right to this compensation can be waived in Catalonia in a nuptial contract, but not in the Balearic Islands. Along separation of property, Catalan Civil Code also recognizes other property regimes: common acquisitions[37], participation in gains[38], the *asociación a compras y mejoras*[39], the *agermanament*[40], and the *pacto de convinença*[41], the last three of which are community property system variants which are traditional in certain parts of Catalonia. Over the last thirty years, Catalonia introduced several important modifications to the regulation of marital contracts and the consequences of marital dissolution through reforms of the Catalan Civil Code. Three main reforms, Act 8/1993, Act 9/1998, and

[31] *Ley 2/2006, de 14 de junio, de derecho civil de Galicia* Book IX, Chapter I-II

[32] Alburquerque, Alconchel, Atalaya, Burguillos del Cerro, Cheles, Fuentes de León, Higuera de Vargas, La Codosera, Jerez de los Caballeros (and becuase they fall into the same municipality, also in Brovales, La Bazana, Valuengo), Oliva de la Frontera, Olivenza (and surroundings San Benito, San Francisco de Olivenza, San Jorge, San Rafael, Santo Domingo), Táliga, Valencia de Mombuey, Valencia del Ventoso, Valverde de Burguillos, Valle de Matamoros, Valle de Santa Ana, Villanueva del Fresno, Zahínos.

[33] Source: *Boletín Oficial de las Cortes Generales, Proposición de Ley, 17/10/1984*

[34] The *fuero del Baylío* has not been codified yet, but it has been recognized in case law.

[35] *Compilación del Derecho Civil de Baleares* Mallorca and Menorca: Book I, Title I; Ibiza and Formentera: Book III, Title I, Chapter I-II.

[36] If an asset was bought, it belongs to the holder (by whom it was formally bought), even if it was paid for using the other spouse's funds, in which case donation is assumed.

[37] *Código Civil de Cataluña*, arts. 232-30–232-38

[38] *Código Civil de Cataluña*, arts. 232-13–232-24

[39] *Código Civil de Cataluña*, arts. 232-25–232-27

[40] *Código Civil de Cataluña*, arts. 232-28

[41] *Código Civil de Cataluña*, arts. 232-29

Act 25/2010, occurred over the period which is considered in this paper. All three addressed compensation for domestic work, each introducing more extensive regulation. The 1998 reform also extended the regulation of the consequences of marital dissolution, separation and divorce agreements, alternative dispute resolution, and scope of marital contracts. The 2010 reform introduced several modifications to family law, including marital contracts, issues related to cohabiting with the children of one's partner such as the contribution to household expenses and adoption, and the consequences of divorce and separation such as alimony, the use of the family home, and custodial arrangements. In the analysis below, I control for these reforms since they might have had an effect on the outcomes of interest of this paper.

Valencia region (Alicante, Castellón, and Valencia provinces) has had community property (*gananciales*) as its default system throughout most of the period considered in this paper. However, in 2007 a law was passed in Valencia, entering into effect on April 25, 2008, that changed the default property regime from common acquisitions to separate property.[42] The Constitutional Court ruled this measure unconstitutional on April 28, 2016, reinstating common acquisitions (*gananciales*) as the default property regime. Therefore, marriages celebrated in Valencia region between the 25th of April 2008 and 28th of April 2016 had separate property as the default regime; those celebrated before or after had common acquisitions. Since it cannot be ruled out that this legislative change occurred at least partly in response to the 2005 divorce reform, I omit data related to Valencia from every specification estimated.

2.2.2 Divorce

Marital legislation in Spain underwent three main reforms since the restoration of democracy in 1976. Act 30/1981[43] legalized divorce, Act 13/2005[44] legalized same-sex marriage, and Act 15/2005[45] eliminated mandatory separation before divorce and fault in case of unilateral divorce among other measures that made divorce easier. The legalization of same-sex marriage did not imply any changes to the regulation of marital dissolution, hence it will not be discussed here in more details. The content of the two divorce reforms is summarized below.

Act 30/1981, introduced separation and divorce into Spanish family law. Before 1981, a marriage could only be dissolved by annulment, which was rarely granted, or by the death of one of the spouses.[46] According to the 1981 law, spouses could file

[42] *Ley de Régimen Económico Valenciano 10/2007*

[43] July 7, 1981, entering into effect on August 9, 1981.

[44] July 1, 2005.

[45] July 8, 2005, entering into effect on July 10, 2005.

[46] More precisely, divorce was legal in Spain once before, during the Second Republic. Little is known

for separation or divorce jointly or separately, after having been married at least for one year. Filing for divorce had to be preceded by a period of mandatory separation whose length depended on whether the spouses had filed for separation jointly or not and, in case of unilateral separation, if fault could be proven. Bilateral separation or divorce was the fastest to obtain, followed by unilateral where the demandant could prove fault on part of his or her spouse, and then unilateral without fault grounds. Obtaining a divorce by mutual agreement would take at least 1.5 years plus procedural delay, while obtaining a unilateral no-fault divorce would take at least 5 years plus procedural delay.[47] [48]

In July 2005, two sweeping reforms of family law came into effect, the legalization of same-sex marriage and an extensive divorce reform.[49] These reforms were largely unexpected, first, because the Socialist government that introduced them had obtained a surprise victory in the previous year, and second, because there had been little to no political discourse about either a marriage or a divorce reform during the preceding two terms when the conservative Popular Party (PP) governed. In 2004, the Socialist Party (PSOE) won the general elections, despite expectations set by pre-election polls that indicated a clear advantage of the incumbent Popular Party. Three days before the election the Madrid train bombings occurred, the deadliest terrorist attack ever carried out in Spain. Both the popular press and scientific papers suggested that the mishandling of this attack greatly contributed to the defeat of the Popular Party (Bali, 2007; Montalvo, 2011). As for the lack of political discourse on same-sex marriage and divorce, at the time the Popular Party had been in power for two consecutive terms (since 1996), and showed no intention to carry out major family law reforms. The introduction to the reform motivates it by referring to respecting one's will to no longer stay married, in line with the constitutional guarantee of free development of personality, and by reducing the personal costs that result from the double dissolution

about divorces during the Civil War; during the Francoist era divorce was again illegal.

[47] The spouses could file jointly for separation after six months of not having lived together. In case of unilateral separation, the claimant had to prove fault (abandonment, infidelity or violence) on part of his or her spouse. Without the consent of the other spouse and lacking fault grounds, three years of de facto separation was necessary to obtain legal separation. The legally acceptable reasons for divorce were the following. At least one year of no marital cohabitation since filing for separation in the bilateral case or since separation declared in the unilateral case. At least two years of no marital cohabitation since the start of de facto separation by mutual agreement or unilateral with fault proven. At least five years of no marital cohabitation if no fault can be proven and one wants to divorce unilaterally. Immediate divorce was granted only if one spouse was found guilty of attempted murder the other spouse or his/her ancestors or descendants.

[48] *Código Civil de España* (1981), arts. 81-86.

[49] Legalization of same-sex marriage: Act 13/2005 of the 1st of July 2005. Modification of the Civil Code regarding separation and divorce: Act 15/2005, of the 8th of July 2005.

procedure, especially the damage caused to the parent-child relationship by a long divorce procedure.[50] The motivation of reform does not claim to have a desired effect on any of the outcomes I consider in this paper; combined with its unexpectedness, this means that the 2005 reform can be viewed as an exogenous source of variation.

Act 15/2005 eliminated the mandatory separation period prior to divorce and fault grounds in case of unilateral divorce, reduced the required duration of marriage before being able to file for separation or divorce from one year to three months, introduced alternative dispute resolution instead of a court procedure for mutual agreement divorces[51], and substantially extended the the sections of the Civil Code addressing custody, visitation and other childcare provisions during and following divorce.

This reform made divorce easier in several ways, independent of the property system the couple was married under. By eliminating the need to prove fault in case of unilateral divorce or separation, Spain moved to a pure no-fault divorce regime. Reducing the time required to pass between the celebration of marriage and filing for its dissolution and allowing to file directly for divorce lowers the emotional costs of remaining in a marriage which at least one spouse no longer wishes to continue with. The recognition of alternative dispute resolution and the extended regulation of custodial agreements decreases the length of the divorce procedure, likely decreasing emotional and financial costs related to it.

However, the elimination of mandatory separation has had another effect, beyond the decrease in psychological costs, on marriages under the community property regime. This effect originates in the need to liquidate the community property upon divorce. Not only is liquidation costly in terms of money, but the length of the procedure may result in a financial hardship for the economically weaker spouse, as the common gains of the couple no longer increase but the parties may have difficulties in withdrawing their share of the marital assets. Moreover, the spouse who does not wish to divorce might actively hold the other up in selling the marital assets and dividing the proceeds. This problem is much less likely to arise under the separate property regime, where the property system does not generate large holdings of common assets. The elimination of mandatory separation before divorce likely brought forward the liquidation process, substantially decreasing the risk of interim financial difficulties of the economically weaker spouse under the community property regime.

[50] Act 15/2005, *Exposición de motivos*

[51] Act 15/2015 of July 23, 2015 took this possibility to avoid the judiciary process one step further by allowing for divorce or separation to be administered by a public notary or court clerk, if it is by mutual agreement and the couple has no children who are minors or incapacitated. *Código Civil de España* arts. 82, 87.

2.3 Model

The difference in incentives to wealth accumulation, investment in children, and in the efficiency of insuring the wife and the children's welfare after dissolution of the marriage that distinct marital property systems provide has long been a subject of interest of jurists. In Spain, the debate on the relative merits of the separate and the community property regime dates back to the late nineteenth century, when the first Spanish Civil Code was redacted and a legal default property system had to be selected. The writings of Alonso Martínez (1884) and Duran i Bas (1883) highlight the arguments in favour of and against having common acquisitions (*gananciales*) as the single default regime in Spain, and those for an exception to be made in Catalonia so as to keep the separate property system as the legal default. The late twentieth century brought several changes that reshaped the incentives of marital property systems, among them the legalization of divorce and the increased participation of women in education and in the labour market. Faced with the possibility of divorce, the incentives that marital property systems provide for women to work outside the home and to have children largely depend on the probability of marital dissolution and the assets they receive if divorce occurs.

In what follows, I argue that the separate property regime provides stronger incentives for female labour force participation and weaker incentives for childcare and homemaking than the community property regime. This pattern is a result of four factors. First, marital investments and production choices are observable to the parties but non-verifiable to an outsider, which makes them ex ante non-contractible. Consequently, parties will make investment choices non-cooperatively and there is room for inefficiencies. Second, the marital property system determines which assets each spouse receives if they divorce. In other words, the ownership structure affects the outside options. Third, some investments spouses can make are worth more in the relationship, such as domestic work or childcare, and others are worth more outside of the relationship, such as labour force participation or education. Let us call the first type specific investment and the second type general investment. Fourth, general and relationship-specific investments are substitutes. The substitutability assumption is quite natural in a family setting, as spouses have to allocate their time between working outside the home and domestic tasks. Under these conditions, joint ownership (community property) provides the largest incentives of all ownership structures to make specific investments by discouraging general investments.[52] The intuition for this result is that since asset ownership affects this outside options in which general

[52]This is the main result of Cai (2003), derived in the more general context of an investment game.

investment is productive, exclusive ownership of assets incentivizes general investment. General and specific investments are substitutes, therefore the more assets a party owns exclusively, the lower the incentive to make specific investments. Under joint ownership, every asset is co-owned, meaning that parties can appropriate each other's general investment, which lowers the incentive to make such investments and increases the incentive to make specific investments.

The marriage rate is likely to be lower under separate property. Due to the lower level of relationship-specific investment, the value of the relationship itself decreases, leading to a lower probability of entry.

Divorce and separation rates are likely to be higher under separation of property. The probability of divorce is influenced by the outside options and the cost of divorce. Under separation of property, spouses are likely to make more general investments which leads to better outside options. Furthermore, since co-owned asset holdings are non-existent or small, liquidation costs are likely to be negligible, making divorce and separation relatively less costly than under community property.

The rest of this section is divided into two subsections. Subsection 2.3.1 presents the formal model which treats marriage as a relationship where investments and production decisions are ex ante non-contractible and characterizes general and relationship-specific investments under non-integration and pure joint ownership. Subsection 2.3.2 discusses the assumptions of the model and the related findings from the family and labour economics literature.

2.3.1 A Property Rights Model of Marriage

The model builds on Cai (2003) who in turn builds on the Grossman-Hart-Moore property rights theory (Grossman and Hart, 1986; Hart, 1995; Hart and Moore, 1990) to include two types of investments, general and relationship-specific. I extend these models in several ways. First, I extend the outside option to better capture the marital setting by adding general divorce cost, liquidation cost, and a marital shock that may lead to divorce. Second, I allow both types of investments to generate returns in both inside and outside of the relationship.

Preliminaries Two parties, 1 and 2 (indexed by i), are engaged in a relationship that lasts two periods. There are two assets, $a_1, a_2 \geq 0$ whose ownership is determined at date 0. At date 1, the parties make investments that enhance their productivity in the second period. For example, one can think of experience in the labour market or giving birth to a child as investment, and generating labour income or child quality

as production. At date 2, production takes place, and returns are realized.[53] Returns depend both on investments and the ownership of assets. Investments and production choices are observable to the parties ex post but not verifiable in court, which makes them ex ante non-contractible.

Ownership structure (t=0) Let A be the set of all assets $A = \{a_1, a_2\}$. The ownership structure is a partition of A, denoted $\mathcal{A} = \{A_1, A_2, A_{12}\}$, $A_1 \subseteq A$ are the assets owned exclusively by 1, $A_2 \subseteq A$ are the assets owned exclusively by 2, and $A_{12} \subseteq A$ are the jointly owned assets. Joint ownership means that the assets have co-owners with equal rights: neither can be excluded from using the asset and both have veto power over the use or sale of the asset. I assume that the ownership structure is exogenous, specified by the legal default marital property system.

Two ownership structures will be considered, non-integration and joint ownership. Non-integration models separation of property, denoted $\mathcal{A}^S$, under which $A_1 = \{a_1\}$, $A_2 = \{a_2\}, A_{12} = \emptyset$. Joint ownership models the community property regime, denoted $\mathcal{A}^C$, under which $A_1 = A_2 = \emptyset$ and $A_{12} = \{a_1, a_2\}$. In marital legislation terms, this ownership structure is universal community. Most community property systems allow for some assets to be kept separate and therefore would be described more precisely by a hybrid structure where only some assets are co-owned. In the interest of simplicity, and to better highlight the different investment incentives these two ownership structures provide, I do not include hybrid structures in the model. Pure joint ownership is a good approximation of all community property systems as long as the spouses are neither very wealthy prior to marriage, nor inherit large sums during the marriage (both would remain separate assets), as is likely the case for most of the population.

The definition of joint ownership also has to include a default sharing rule in case the relationship is dissolved. Assume that there is a market for assets that values them by the function v which is non-negative, differentiable, and increasing. If the relationship brakes down, the market value of the jointly owned assets is divided so that 1 receives $\alpha v(A_{12})$ and 2 receives $(1-\alpha)v(A_{12})$ where $\alpha \in (0, 1)$. Most community property systems stipulate equal division, so that $\alpha = 0.5$. In this framework, having all assets under joint ownership is like having no individual control over any assets. Since the law requires consent from all co-owners for any decisions regarding the management

[53] For the sake of simplicity, and because I believe that in a marital context this type of renegotiation is less likely to occur, I do not discuss renegotiation of production choices at date 2, but it can be included in the model. Assume that renegotiation entails a transfer p from one party to the other, and that the parties split the increase in surplus resulting from renegotiation 50-50, as in Grossman and Hart (1986). The date 1 investment problem is then solved by the agents by maximizing the payoffs augmented by the renegotiation gains.

of the jointly owned asset, this formalization is reasonable.

Investments (t=1) Assume that agents choose investments simultaneously and non-cooperatively at date 1. There are two types of investment, general and relationship-specific. The agents choose both the type and the level of the investments. General investments are more productive outside the relationship, while specific investments are productive in the relationship. Furthermore, assume that general and specific investments are substitutes. In the marital context, examples of general investment are labour force participation or education, which will continue to generate returns even after the marriage has ended, while specific investments are those that only generate value within the marriage, such as homemaking, or that generate more value within the marriage than outside of it, such as caring for the children of the couple. The substitutability assumption is quite natural in a family setting, as spouses have to allocate their time between working outside the home and domestic tasks.

Formally, let $l_i \geq 0$ denote i's general investment and $e_i \geq 0$ i's specific investment. $R_i(e_i, l_i)$ is the return on i's investments in the relationship and $O_i(e_i, l_i; \mathcal{A})$ the return on investments in the outside option. Let R_i and O_i be non-negative, additively separable, and continuously differentiable with respect to e_i, l_i for $i = 1, 2$. In addition, let R_i be increasing and weakly concave in l_i and strictly increasing and strictly concave in e_i, and let O_i be increasing and weakly concave in e_i and strictly increasing and strictly concave in l_i. Using additive separability, let $R_i(e_i, l_i) = f_i(e_i) + g_i(l_i)$ and $O_i(e_i, l_i, A_i) = p_i(e_i, A_i) + q_i(l_i, A_i)$ with $f_i, g_i, p_i, q_i \geq 0$, $f_i' > 0, f_i'' < 0$, $g_i' \geq 0, g_i'' \leq 0$, $p_i' \geq 0, p_i'' \leq 0$, $q_i' > 0, q_i'' < 0$ for $i = 1, 2$. Notice that O_i depends on the ownership structure while R_i does not, which is the usual assumption in property rights theory based on the idea that while parties cooperate both have unrestricted access to all assets. Assume that the specific investment is marginally more productive than the general investment in the relationship, and that the general investment is more productive than specific investment in the outside option. Formally, for all $e_i, l_i, \mathcal{A}$ $i = 1, 2$

$$f_i'(x) > g_i'(x) \quad \text{and} \quad q_i'(x) > p_i'(x) \, \forall x \geq 0 \tag{A1}$$

Furthermore, assume that asset ownership strictly increases the marginal productivity of the general investment and weakly increases the marginal productivity of the specific investment in the outside option. Formally, for all $(e_i, l_i) \quad i = 1, 2$,

$$\begin{aligned} f_i'(e_i) > p_i'(e_i, \{a_1, a_2\}) \geq p_i'(e_i, \{a_i\}) \geq p_i'(e_i, \{\emptyset\}) \\ q_i'(l_i, \{a_1, a_2\}) > q_i'(l_i, \{a_i\}) > q_i'(l_i, \{\emptyset\}) \geq g_i'(l_i) \end{aligned} \tag{A2}$$

Investments costs are given by $C_i(l_i, e_i)$. Assume that C_i is non-negative, continuously differentiable, strictly increasing, and strictly convex in both arguments. Moreover,

assume that general and specific investments are perfect substitutes:

$$C_i(l_i, e_i) = C_i(l_i + e_i) \tag{A3}$$

Now I add some elements to the outside option that are not present in Cai (2003) but are necessary to describe the divorce payoffs.

$$\widetilde{O}_i(e_i, l_i; \mathcal{A}) = \begin{cases} O_i(e_i, l_i; \{\emptyset\}) + v(A_i) - d + \xi_i & \text{if } \mathcal{A} = \mathcal{A}^S \\ O_i(e_i, l_i, \{\emptyset\}) + 0.5(1-\lambda)v(A_{12}) - d + \xi_i & \text{if } \mathcal{A} = \mathcal{A}^C \end{cases} \tag{2.1}$$

First, divorce has costs – independent of the property system – captured by $d > 0$. Second, community property has to be liquidated upon divorce, diminishing the value of the marital assets. Liquidation costs include the procedural costs and other legal fees associated with the liquidation process, and the costs arising from the delay in receiving one's share of the assets after divorce. This is modelled as liquidation eliminating $\lambda \in [0, 1)$ part of assets. Under the separate property system liquidation costs are likely to be much smaller than under community property, hence there $\lambda = 0$ is assumed. Notice that if half the marital assets are about the same value as one's separate holding this also implies that the relationship is less likely to break down under community property because the outside options are less likely to bind. In other words, divorce (or separation) are more likely under separation of property. Finally, I add an individual-specific shock to the outside option, $\xi_i \sim N(0, \sigma_i)$, to ensure that the individual rationality constraints can always bind with some probability, ending the relationship. The distribution of the shocks are common knowledge, and its realization is observable to both parties *after* investments have been made and observed.

Production (t=2) At date 2, agents make production decisions (whether or not to engage in joint production) and bargain over the net surplus. Assume that the ownership structure cannot be renegotiated at this point. Further, let the bargaining protocol be Nash bargaining[54] and assume that information is symmetric and that the parties have equal bargaining power. These assumptions imply that the parties will split the net surplus by half. Define the net surplus of the relationship as

$$S((e_i, l_i)_{i=1,2}, \mathcal{A}) = \sum_i (R_i(e_i, l_i) - \widetilde{O}_i(e_i, l_i, A_i))$$

The agents will continue with the relationship (remain married) if both participation constraints hold.

$$R_i(e_i, l_i) \geq \widetilde{O}_i(e_i, l_i, A_i) \tag{P_i}$$

[54]Nash bargaining assumes that parties receive their outside options during the bargaining or in the event bargaining breaks down, the latter of which seems appropriate for the case of marriage.

In other words, the marriage subsists if $S \geq 0$. In this case, each spouse receives their outside options and half of the net surplus of the relationship:

$$U_i^m = \widetilde{O}_i(e_i, l_i, A_i) + \frac{S}{2} \tag{2.2}$$

If both participation constraints bind or one binds but the net surplus is too small to allow for compensation of the party who wants to leave (in this sense, the set-up allows for both bilateral and unilateral divorce), the relationship breaks down, and both parties receive their outside options.

First best Fix the ownership structure and denote it by $\bar{\mathcal{A}}$. If investment levels are ex ante contractible, the optimal investment choice if the spouses remain married maximizes the joint surplus

$$\max_{(e_i,l_i)_{i=1,2}} \sum_i (R_i(e_i, l_i) - C_i(e_i + l_i)) \tag{2.3}$$

Assuming that the solutions are interior, (e_i^{*m}, l_i^{*m}) for $i = 1, 2$ solve

$$\frac{\partial R_i(e_i, l_i)}{\partial e_i} = \frac{\partial C_i(e_i + l_i)}{\partial e_i} \quad \text{and} \quad \frac{\partial R_i(e_i, l_i)}{\partial l_i} = \frac{\partial C_i(e_i + l_i)}{\partial l_i} \tag{2.4}$$

Using additive separability of the payoff functions, these conditions translate to

$$f_i'(e_i) = C_i'(e_i + l_i) = g_i'(l_i)$$

In case of divorce, maximize the sum of expected outside option payoffs net of investment costs

$$\max_{(e_i,l_i)_{i=1,2}} E\left[\sum_i (\widetilde{O}_i(e_i, l_i, \bar{\mathcal{A}}) - C_i(e_i + l_i))\right] \tag{2.5}$$

and (e_i^{*d}, l_i^{*d}) $i = 1, 2$ solve

$$\frac{\partial O_i(e_i, l_i, \bar{\mathcal{A}})}{\partial e_i} = \frac{\partial C_i(e_i + l_i)}{\partial e_i} \quad \text{and} \quad \frac{\partial O_i(e_i, l_i, \bar{\mathcal{A}})}{\partial l_i} = \frac{\partial C_i(e_i + l_i)}{\partial l_i} \tag{2.6}$$

Equivalently,

$$p_i'(e_i, A_i) = C_i'(e_i + l_i) = q_i'(l_i, A_i)$$

Comparing Equations (2.4) and (2.6) and using the assumptions made on the cost and return functions, it can be seen that – in line with our intuition – specific investment is larger in the marriage equilibrium and general investment is (weakly) greater in the divorce equilibrium.

Equilibria under contractual incompleteness Returning to the case when investment and production is ex ante non-contractible, if the net surplus of the relationship is positive, then the parties maintain it, maximizing their respective expected payoff as in (2.2), that is

$$\max_{e_i,l_i} E\left[\widetilde{O}_i(e_i,l_i,A_i)+\frac{\sum_i(R_i(e_i,l_i)-\widetilde{O}_i(e_i,l_i,A_i))}{2}-C_i(l_i+e_i)\right]$$

Focusing on equilibria in pure strategies and interior solutions, the optimal investment levels $(\hat{l}_i^m,\hat{e}_i^m)$ $i=1,2$ satisfy the first order conditions

$$\begin{aligned}\frac{1}{2}\frac{\partial O_i(e_i,l_i,A_i)}{\partial e_i}+\frac{1}{2}\frac{\partial R_i(e_i,l_i)}{\partial e_i}&=\frac{\partial C_i(e_i+l_i)}{\partial e_i}\\ \frac{1}{2}\frac{\partial O_i(e_i,l_i,A_i)}{\partial l_i}+\frac{1}{2}\frac{\partial R_i(e_i,l_i)}{\partial l_i}&=\frac{\partial C_i(e_i+l_i)}{\partial l_i}\end{aligned} \tag{2.7}$$

Using separability,

$$\frac{1}{2}g_i'(l_i)+\frac{1}{2}q_i'(l_i,A_i)=C_i'(e_i+l_i)=\frac{1}{2}f_i'(e_i)+\frac{1}{2}p_i'(e_i,A_i)$$

If the relationship is dissolved, parties simply receive their outside options. The optimal investment levels maximize the individual expected outside option payoff net of investment costs,

$$\max_{e_i,l_i} E\left[\widetilde{O}_i(e_i,l_i,A_i)-C_i(l_i+e_i)\right]$$

leading to $(\hat{e}_i^d,\hat{l}_i^d)$ for $i=1,2$ that solve

$$\frac{\partial O_i(e_i,l_i,A_i)}{\partial e_i}=\frac{\partial C_i(e_i+l_i)}{\partial e_i}\quad\text{and}\quad\frac{\partial O_i(e_i,l_i,A_i)}{\partial l_i}=\frac{\partial C_i(e_i+l_i)}{\partial l_i} \tag{2.8}$$

using separability

$$p_i'(e_i,A_i)=C_i'(e_i+l_i)=q_i'(l_i,A_i)$$

The comparison of (2.7) and (2.8) and the use of the assumptions made on the payoff and cost functions yields that the level of the specific investment is lower in the divorce equilibrium than in the marriage, while the general investment is higher.

Proposition 1. *Under any ownership structure, there is underinvestment in specific and overinvestment in general investments compared to the first best.*

The proof can be found in the Appendix. The intuition for this result is the usual one of externalities. If party i makes more specific investments, the gains from the relationship increase by the marginal within-relationship return of e_i but his within-relationship return will increase less than this amount, with the remaining gains belonging to the other party. Both parties ignore the effect of their own investment on the other party's payoff, investing too little in specific terms. For general investments, investing a little more increases i's own payoff more than it increases the gains from remaining in the relationship, leading to overinvestment.

Proposition 2. *Relative to joint ownership, non-integration increases general investments and decreases specific investments.*

The proof can be found in the Appendix. The intuition is that since higher asset ownership strictly increases the marginal product of the general investment, the agent will increase that, while substituting away from the relationship-specific investment. The general framework I have set up also allows the marginal productivity of the specific investment to rise with asset ownership, although only weakly. Since the degree of substitution is 1:1, the larger increase in the marginal productivity of the general investment dominates, leading to an overall higher general and lower specific investment under non-integration than joint ownership. [55]

In marital legislation terms, under community property, there will be more specific investment and less general investment than under separate property. Specific investments remain below the first best for all ownership structures, because through ex post surplus sharing one party can always appropriate part of the returns generated by the investment of the other.

Divorce reform In this model, a divorce reform like the 2005 one in Spain amounts to a reduction in the divorce cost d and a reduction in the liquidation cost λ. This has two implications. First, a reduction in d makes the outside option more likely to bind under both regimes, implying higher divorce rate post-reform, although the increase should not be different across regimes. Second, as $\lambda \to 0$ and $v(\{a_i\}) \approx 0.5v(\{a_1, a_2\})$ for $i = 1, 2$, the latter meaning that the value of assets a_1 and a_2 are not very different and there are no significant benefits to selling the assets together, the outside options under the two property systems become alike; a reduction in the liquidation cost λ makes community property more like separate property. The difference in payoffs, hence in the incentives to invest, between the two regimes originate from the different outside options. When they become more similar, one expects to see a convergence in the investment choices under the two regimes. While this model, and property rights theory in general, does not discuss how the parties form the relationship in the first place, lower relationship-specific investment likely affects the perceived value of the relationship, thereby entry rates into the relationship.

[55] In the standard Grossman-Hart-Moore model, where investments are perfect complements, more assets lead to an increase in all type of investments.

2.3.2 Discussion

The key assumptions of the model above are the standard Grossman-Hart-Moore ones and that general and relationship-specific investments are substitutes.

Grossman and Hart (1986) motivate the contractual incompleteness assumption, i.e. that investments and production decisions cannot be specified in a contract at the beginning of the relationship, saying that it may be prohibitively difficult to think about and unambiguously describe these choices as a function of many states of the world. This applies quite well to marriage. In addition, as mentioned before, many investment and production choices within marriage may be observable by the spouses but not verifiable by a third party. Take parenting, for example. The spouses know very well who spends more time with the children and what are their respective parenting skills but to an outsider this can be extremely difficult to verify. The assumption that asset ownership affects outside options is similarly intuitive in a marital setting.

Regarding substitutability, not only is it an intuitively appealing, there is ample evidence from the labour economics literature that supports it. Several studies have shown that after the birth of a child women fall behind men in their earnings (e.g. Adda et al. (2017), Fernández-Kranz et al. (2013), Goldin et al. (2017), Kleven, Landais, Posch, et al. (2019), and Kleven, Landais, and Søgaard (2019)). An even more striking finding is that their earnings never recover, not even decades after returning to work (Kleven, Landais, and Søgaard (2019)). The results of Adda et al. (2017) also indicate that women foresee this trade-off, adjusting labour force participation and occupational choices depending on their intended fertility.

Turning to marriage, separation and divorce, a key factor is the cost of divorce. In the labour and family economics literature, the effect of a reduction in the cost of divorce is studied in two settings, unilateral versus bilateral and fault versus no-fault divorce, and the evidence is mixed. Some document a rise in divorces following the move from mutual agreement to unilateral or from fault to no-fault divorce (e.g. Allen (1992), Friedberg (1997), González and Viitanen (2009), Gruber (2004), and Kneip and Bauer (2009)), while others find no evidence of an increase (e.g. Peters (1986), Peters (1992), and Wolfers (2006)). The impact of separation requirements on the divorce rate is a less explored topic in the literature; an exception is Zhylyevskyy (2012), who finds that eliminating mandatory separation increases the divorce rate by 4%. The evidence is also inconsistent on the impact on marriage rates (e.g. Alesina and Giuliano (2007) and Rasul (2003)). However, moving from unilateral to bilateral and from fault to no-fault divorce generates a reduction in the cost of divorce independent of the marital property system. In contrast, liquidation costs are very different under separate and community property, and mandatory separation before divorce likely also implies

different costs depending on the property system, as explained in the previous section.

Due to the absence of community property liquidation costs, in the broadest sense, divorce and separation are easier under the separate property system, hence they should be more frequent. Figures 2.5.5 and 2.5.6 show that prior to the 2005 reform, this was indeed the case. A reform that decreases the general divorce cost (d in the model) likely generates an increase in divorce rates for all property regimes, while a decrease in the liquidation cost might generate an additional increase in divorce and separation rates in the community property regime as it raises the outside option, increasing the probability that the participation constraint binds. An important point related to separations is that for couples who want to divorce, separation in itself is not a valuable option; it matters only to the extent that it affects the cost of divorce. Once separation is no longer mandatory, its incidence is expected to fall. Figure 2.5.6 indicates that in Spain this is indeed what happened: separation rates fell to almost zero after 2005. Individuals who are against divorce, for example, on religious grounds, might opt for a canonical annulment or separation without ever filing for divorce, but the data show that they must be a small minority in Spain.

The next section discusses how to identify the effects of marital property regimes on investments, marriage, divorce and separation.

2.4 Empirical Strategy and Data

The causal effects of marital property regimes on marital investments and outcomes are identified using the variation that results from the various regional default property regimes in Spain and from the 2005 divorce reform. The estimation method is difference-in-differences with the 2005 divorce reform as the policy change that demarcates the two time periods, regions where the default is separate property as the control units (Catalonia and the Balearic Islands), and community property default regions (all other regions of Spain) as the treated units.[56] As discussed in the Introduction, the 2005 divorce reform can be viewed as an exogenous source of variation because it was unexpected and it did not target any of the outcomes of interest. It is regarded as a shock to the community property systems that made them more similar to separation of property, and the estimated coefficients are interpreted as the effect of the property regime.

[56] In the analysis using survey data individuals are assigned to treated or control based on their region of residence at the time when the data was recorded.

The models estimated are of the form

$$\begin{aligned}\text{Outcome}_{a,t} = \beta_0 + \gamma\,&\text{Community property default}_a \\ &+ \sum_{k=1}^{14} \beta_k \times \text{year } k \text{ after 2005 reform}_t \times \text{Community property default}_a \\ &+ X_{a,t}\eta + \sum_t \delta_t \text{Year}_t + \sum_a \lambda_a \text{Area}_a + \nu_{a,t}\end{aligned} \tag{2.9}$$

where a indexes area, which can be region or province, and t indexes time (year).

The outcomes considered belong to one of four groups: female labour supply, fertility, marriage, and marital dissolution. The following paragraphs provide the definition of the dependent variables and discuss the observed trends across property system default regions from 1981 to 2018.

Female labour supply is measured by female employment rate, female labour force participation rate, and home makers' share in total working age population. Female employment and female labour force participation rate follow the standard definitions.[57] Home makers' share in total working age population is defined as the number of inactives who are engaged in domestic production divided by the population aged 16 years or older. This variable is not available by gender on province level; however, the national level gender decomposition suggests that home makers are almost exclusively women. Figures 2.5.1 and 2.5.2 shows the trends of these variables by default property regime region, excluding Valencia[58], and the decomposition by sex for homemakers. Trends in the share of homemakers is plotted only for the years 2001-2018 because the Spanish Statistical Office changed the definition of inactive in 2000[59], rendering data on homemakers before and after 2001 incomparable. In line with the reasoning in Section 2.3, both female employment rate and female labour force participation rate have always been higher for the separate property default region than for community property default, while the share of home makers has always been lower. A slight decrease in the gap between the default regions can be observed for labour force participation and homemakers' share following 2005.

Fertility is measured by percent born by order of birth which is defined as the ratio of fertility rate by order of birth and the global fertility rate, multiplied by 100 in order to report it as percentage. The global fertility rate is defined as the number of children

[57] Note, however, that INE defines the total working age population as population aged 16 and older, not as population aged 15-64 as often seen in other data sources.

[58] Hereafter all such graphs show date excluding Valencia region.

[59] Regulation No 1897/2000, of 7 September 2000, implementing Council Regulation (EC) No 577/98 on the organisation of a labour force sample survey in the Community concerning the operational definition of unemployment

born in the given province and year per 1,000 (resident) women aged 15-49. Fertility rates by order of birth are defined similarly: the number of first born, second born, third born, and fourth or later born children, respectively, per 1,000 women aged 15-49. I believe that percent born by order of birth is a better measure of family composition (with respect to children), than crude fertility rates by order of birth. Moreover, these variables satisfy the parallel pre-trends condition for a much longer time series than crude birth rates do, allowing for a better identification of pre-policy change trends. Figure 2.5.3 shows percent born by order of birth and global fertility rate by default region. On the left panel, the dashed lines correspond to separate property default, the solid lines to community property default. Order of birth is colour-coded, with two shades each: blue is first born, orange is second born, green is third born. Throughout this period, families have been more likely to have fewer children in the separate property default region, indicated by a larger share of first borns among all newborns and a lower share of children of higher order of birth.

The marriage rate is defined as the number of marriages per 1,000 persons in the given province and year. In Spain, the number of marriages are recorded both by place of celebration and place of residence. I present results for marriage by place of celebration in the main text and relegate marriage by place by residence to the Appendix. Marriage rate by marriageable is defined as the number of marriages per 1,000 18-50 years old persons, which I believe to be a better measure than the crude marriage rate, given that marriages are illegal among the very young and infrequent among the elderly. Setting marriageable age as 18-50 years old was based on the marriage census data, which indicates that the bulk of the population marries between age 18 and 50, with women marrying somewhat younger than men. See Figure 2.4.1. Figure 2.5.4 shows the marriage rates by place of celebration for the period 1998-2018, for which data is used to estimate the main results. The Appendix shows the corresponding graphs for the period 1981-2018. Since the 1990s, the marriage rate has declined, from about 5 marriages per 1,000 persons per year to 3.5, with the marriage rate in community property default region exceeding that of the separate property region for most years. The corresponding rate by 1,000 marriageable decreased from about 10 to 7-8 by the 2010s.

The crude divorce rate is defined as the number of divorces per 1,000 persons in the given year and region. Divorce rate by marriageable is the number of divorces per 1,000 marriageable (aged 18-50) persons. Mutual agreement and contested divorce rates are derived from the decomposition of the total number of divorces. Separation rates are defined analogously. Divorce rate by type (total, mutual agreement, contested) are shown in Figure 2.5.5 for the period 1998-2018, for which data is used to

estimate the main results, and in the Appendix for the period 1989-2018. Divorce rates have been rising since 1989, with a sharp increase from 2004 to 2006, stabilizing at a higher level than before the reform. For total and mutual agreement divorces, the corresponding rates have always been higher in the default separate property region than in the community property region. Mutual agreement divorces seem to have continued to increase after the peak around 2005. The contested divorce rate shows a different pattern, with the separate property default region having a higher rate until 2005, and an essentially identical trend afterwards. Separation rate by type is depicted in Figure 2.5.6 for the period 1998-2018. The total separation rate fell to almost zero between 2004 and 2006, suggesting a strong effect of the 2005 reform. Since then, trends across different default marital property system regions are almost identical. Contested separations follow a somewhat different pattern, where the gap between the trends belonging to the two default regime regions started to decrease in the late 90s and was almost gone by 2004.

The following controls are used for the province and region level specifications, denoted by $X_{a,t}$.[60] Local civil law indicators for all property systems other than common acquisitions and separate property, described in the section on regional civil law (*fuero del Baylío*, *asociación a compras y mejoras*, etc.), capture the subtle difference between community property regime variants. Indicators for the three reforms of the Catalan Civil Code (1993, 1998, 2010) are included to control for the change in Catalan outcomes that might have resulted from changes in family law other than the 2005 reform. Age profiles by gender, defined as the resident population of the province segmented into age groups of 5 years normalized by the total population of the region, control for the potentially different population composition of different areas.[61] The share of students aged 16 years or older in the total working age population, definted as the number of inactives who are students divided by the total working age population, is used because participation in higher education delays both the entry to the labour force and childbearing. GDP share, defined as the GDP of the given province in the given year divided by the national GDP of that year, is used as a proxy for the relative wealth of the territory. As a robustness check, I also used the GPD share multiplied by the population share of the given territory ($GDP_{a,t}/\sum_a GDP_{a,t} \times Population_{a,t}/\sum_a Population_{a,t}$) to disentangle populousness and productivity, and found that the estimations were remarkably robust to this change.[62] Unemployment rate by gender is included among

[60] There is a slight abuse of notation, as not all controls are area- and time-varying; some only vary by area, some only by time, and some by both.

[61] 0-4 years old females/total female population,..., 80-84 year old females/total female population, 85+year old females/total female population; and the same for males.

[62] Perhaps unsurprisingly, as the correlation coefficient between the two factors, GDP share and pop-

the controls when the outcome is marriage, divorce or separation rate. The idea behind the addition of this covariate is that individuals of both sexes have better options in the marriage (or remarriage) market if they are employed or have higher income.For female labour supply and fertility choices, controlling for unemployment would confound the results; hence, for these outcomes on the share of students in the working age population is used as a labour market control. Five lags of the separation rate are added when the outcome is divorce rate, because prior to 2005, separation had to precede divorce. The maximum number of lags was set to be five years, as it used to be the longest period of mandatory separation prescribed by law.

The first post-reform year is taken to be 2005. The reference year is 2004; therefore all coefficients of the type *year n after reform* $\times$ *community property default* express a change compared to the 2004 value of the outcome at hand. Standard errors are clustered at the appropriate level of aggregation, province or region. Since Valencia region, with its three provinces, is excluded from all analysis, there are 49 provinces and 18 regions.

I would like to emphasize that the effect I estimate is only the *default* effect. The property system actually chosen by a couple can differ from the regional default. Still, the default matters because it probably has a strong influence on the individual property regime choice. First, many people might not change from the default simply because the opt-out is costly[63], or due to status quo bias[64]. Second, to the extent that the choice of the default expresses local norms and customs, people might prefer it because it is the culturally most acceptable option to them.

Identification The main identifying assumption of difference-in-differences is parallel counterfactual trends across treated and control units. Since this assumption refers to a counterfactual scenario, it cannot be verified by definition. The customary approach in labour economics is to test whether trends in outcomes in the treated and control groups were parallel before the policy change. Parallel pre-reform trends are then considered as evidence supporting the parallel counterfactual trends assumption. I believe that this approach has its shortcomings, if only because it heavily relies on the implicit assumption that past trends can be extrapolated into the future without any additional considerations, nonetheless I present regression results using leads of the treatment variable and the set of controls described above. The parallel pre-trends

ulation share is 0.98 on province level for the period 1981-2018. Estimation results are available by request.

[63]Notary fees are regulated, so it is not very costly in monetary terms: a marital contract costs about 30-70 euros at time of writing this paper, which is quite affordable by Spanish standards.

[64]See the seminal paper of Zeckhauser and Samuelson (1988). Keller et al. (2011) cite many examples.

checks take the form

$$\begin{aligned}\text{Outcome}_{a,t} = \beta_0 + \gamma\,&\text{Community property default}_a \\ &+ \sum_{j=2}^{M} \beta_j \times \text{year } j \text{ before 2005 reform}_t \times \text{Community property default}_a \\ &+ \sum_{k=1}^{14} \beta_k \times \text{year } k \text{ after 2005 reform}_t \times \text{Community property default}_a \\ &+ X_{a,t}\eta + \sum_t \delta_t \text{Year}_t + \sum_p \lambda_p \text{Area}_a + \nu_{a,t}\end{aligned} \tag{2.10}$$

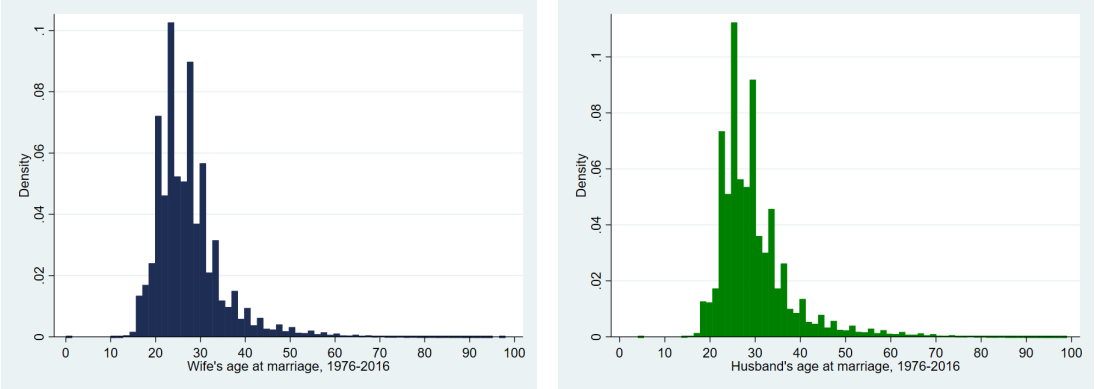
where a indexes area (region (autonomous community) or province) and t indexes time (year). M denotes the largest number of pre-reform years used in the given regression. If parallel trends do not seem to hold since 1981, I cut the sample at the year from which they do and re-estimate the difference-in-difference specification as in (2.9) on this restricted sample. When more than one cut-off year could be considered for an outcome due to several measurements being used, I ran regressions with and without leads of the treatment variable using different starting years as robustness checks. The outcomes for which I consider more than one series are female employment rate, marriage, divorce and separation rates. I find that the results are robust to the choice of the number of pre-policy change years included in the sample used for estimation. These robustness checks are relegated to the Appendix.

The estimates reported in Section 2.5 were obtained using a sample for which parallel pre-trends reasonably hold for the given family of outcomes: 1981 for female labour supply and fertility, and 1998 for marriage, separation and divorce. As for percent born by order of birth, parallel trends hold since 1981 for all three outcomes, giving me no reason to experiment with shorter time series. The alternative cut-offs that were considered were 1994 and 2001 for marriage, divorce and separation rates and 2001 for female labour force participation and female employment. Due to a data issue with inactives described before, I had to discard data on homemakers prior to 2001. For consistency across the female labour supply variables, I also presents estimates of the effect on female employment rate and female labour force participation rate obtained using the series 2001-2018. The results agree in sign and magnitude, but are more precisely estimated for the series starting with 2001.

Data

Most of the data used in this paper were collected and published by the Spanish Statistical Office (*Instituto Nacional de Estadística*, hereafter INE): the number of marriages,

annulments, divorces and separations, population by age and gender, labour market statistics, GDP by province, fertility statistics, and data from two surveys, the Fertility Survey of 1999 and of 2018. In addition to these data, I use annulment, separation and divorce statistics for the period 1989-1996 published by the General Council of the Judiciary (*Consejo General del Poder Judicial*, hereafter CGPJ) and the number of all marriage-related contracts for 1976-2016 published by the Directorate General of Registries and Notaries (*Dirección General de los Registros y del Notariado*, hereafter DGRN). These data, by the CGPJ and the DGRN, are only available in printed sources and were digitized by me. I never use data from before 1981, because marital investment behaviour was likely different when divorce was still illegal. Further details on the data are relegated to the Appendix. Summary statistics are also reported in the Appendix.



(a) Wife (b) Husband

Figure 2.4.1: Age at Marriage (Source: Boletín Estadístico de Matrimonio, INE)

2.5 Results

In this section, I report estimation results using province and region level data and a full set of controls, including province or region and year fixed effects, indicators of local civil law and reforms of the Catalan Civil code, labour market controls and the ratio of the GDP of the territory to national GDP. These results are interpreted in Subsection 2.5.1 as percentage changes over the average of the given variable in the community default region in 2004 (see Table 2.5.1). Subsection 2.5.2 describes various robustness checks, including an individual-level analysis using survey data and omitting Barcelona and Madrid from the province-level specifications.

2.5.1 Main Results

Figure 2.5.7 provides evidence that separation of property incentivizes that women work in the labour market. The estimated effects are positive and significant for female employment rate and female labour force participation, and negative and significant for homemakers's share in the working age population. The coefficients on labour force participation and homemakers's share are indicative of a long-run, stable effect, while the increase in female employment was transitory, ending around 2010. The annual effect sizes, as percentages of the respective average in the community property default provinces in 2004, are 5-10% for female employment, 4-12% for female labour force participation, and 12-17% for homemakers' share. Note that results obtained from using data since 1981 and 2001 are shown for female employment rate and female labour participation rate, while for homemakers' share only the results obtained on data from 2001 are presented due to incomparability of the data on inactives before and after 2001. Regression results for female employment and labour force participation were computed on a shorter sample for the sake of consistency across the three variables.

Figure 2.5.10 indicates that family models differ across marital property regimes: under separation of property, people are more likely to have one or two children and less likely to have three. As a result of the 2005 reform, the share of first borns in all newborns has increased by 3-4% of its 2004 value, the share of second borns increased by 4-11% and that of third borns decreased by 10-18%.[65] Beyond the effect signs and sizes, the impact dynamics are very interesting. First born share converges more quickly following the reform. Second born share responds with a few years lag, which is reasonable if the bulk of the effect comes from newlyweds (it takes time to produce multiple children), and the increase persists, while third born share in fertility responds faster and then shows a similar long-run effect, somewhat increasing in magnitude. The effect sizes also increase with order of birth. Both of these suggest that the impact on fertility mostly originates from a shift away from having many (more than two) children.

Figure 2.5.12 presents the estimated effect on the marriage rate which is significant and negative for the 2010s. Two measures of the marriage rate are shown, marriages by place or celebration per 1,000 persons and per 1,000 marriageable persons. The sign and significance of the estimated coefficients are robust to the way marriage rate is

[65] In order to look at the effect on fourth and later born children, one would have to use significantly shorted time series, starting in 1999, to ensure that parallel pre-trends hold. Moreover, estimation results show no effect. The effect on global fertility rate (number of children born by 1,000 women aged 15-49) is a transitory increase in most specifications, likely driven by the increase in first-born fertility.

measured. The effect size is 9-12% of the corresponding baseline by place of celebration. The corresponding results using marriages by place of residence are relegated to the Appendix. They are similar to those obtained by using marriages by place of residence, only somewhat smaller in magnitude (7-9% of the baseline). Since parallel pre-trends checks suggest that trends in marriage rates were parallel from a date later than 1981, in the Appendix I present robustness checks varying the length of the series I used for the difference-in-difference estimation. I find that the results are remarkably robust to these changes.

Figure 2.5.14 shows that divorce rates temporarily decreased in response to the reform and separation rates have risen in the long run, both of which effects originate in the mutual agreement processes. Contested divorces and separations seem to be unaffected by the reform, apart from a single significant coefficient right after the reform (in 2005 or 2006). Recall that the property system-independent part of the effect of the reform on divorce and separation rates cannot be estimated by the current design. Figures 2.5.5 and 2.5.6 show that divorce rates rose and separation rates fell sharply after the reform in both separate and community property default regions. The interpretation of the transitory decrease of the divorce rate (19-35% of the baseline) under default community property is that probably there was a large pent-up demand for divorce prior to the elimination of mandatory separation, and because it is much easier to divorce under separation of property (no need to liquidate marital assets), the demand for divorce could be satisfied faster. Once all these people divorced, the difference between the two default regime regions disappeared. The increase in the mutual agreement separation rate, which is what translates to an increase in the total separation rate, signals a convergence between the two default regimes, as separations rates have always been higher in the separate property default region. However, since all types of separations fell close to zero after 2005, this finding is of less interest.

Figures 2.5.8, 2.5.9, 2.5.11, 2.5.13, and 2.5.16 show coefficient plots including pre-trends (leads of the treatment variable) as supportive evidence for a valid identification.

To summarize, the evidence is supportive of fewer relationship-specific and more general investments under separate property: women participate more in the labour force, are less likely to be homemakers, and have fewer children. The lower marriage rate is also indicative of a lower level of specific investments. In the long run, the divorce rate seems to be unaffected by the property regime.

Finally, note that it is possible that under the new divorce regime more newlyweds would opt out from the community property system, choosing separation of property, which would reinforce the effect of the reform. Figure 2.5.17 suggests that demand for

the separate property system might have increased, as the number of marriage-related contracts, which includes agreements on the marital property system, soared in the community property default region around the time of the reform.

2.5.2 Robustness Checks

Excluding Barcelona

A possible worry about the results discussed above is that they might be driven by Barcelona, one of the richest and most populous provinces of Spain and, without doubt, the dominant province of Catalonia, which might also have unobservable characteristics resulting in different marital outcomes. Barcelona does not seem to follow different trends in terms of any of the outcomes I consider in this paper compared to the other separate property default provinces of Catalonia and the Balearic Islands.[66] Nevertheless, to address this issue, I estimate specifications that use the full set of controls described in Section 2.4 omitting Barcelona province in the first modified version and both Barcelona and Madrid in the second. The motive to exclude Madrid as well is that it is the natural counterpart of Barcelona, the leading province of the default community property territory. Since these robustness checks had to be carried out using province-level data, this is what I use for divorce and separation as well.[67] Results are robust both to the exclusion of Barcelona alone and to the exclusion of Madrid and Barcelona. The sign and significance of the estimated coefficients remains stable across specifications, and the magnitude changes only slightly. In the Appendix, figures show the estimated coefficients with and without Barcelona and Madrid side-by-side, illustrating this robustness check. Detailed regression results are available upon request.

Individual Level Data: Fertility Surveys

The main advantage of the individual-level analysis is that one can control for several factors that likely affect fertility and labour supply decisions for which aggregate level data is difficult or outright impossible to obtain, for example, medical conditions that result in infertility, reasons why one had fewer children than desired, and characteristics of interviewee's partner. The disadvantage is that a dynamic specification analogous to those I use for aggregate level data cannot be estimated. Moreover, the 1999 and the 2018 Fertility Survey had a very different design, which substantially re-

[66] Figures illustrating this fact are available upon request.

[67] The disadvantage is that province-level divorce and separation data is only available since 1998, and the use of lags of the separation rate when divorce is the dependent variable further decreases the sample, which is why I opt to use regional data for the main results.

stricts that set of controls that can be used when data from both are needed.
The models estimated are of the form

$$\begin{aligned}\text{Outcome}_{i,r,t} = \beta_0 + \gamma\,\text{Community property default}_r + \delta_t\text{Post-reform}_t \\ + \beta_1\,\text{Post-reform}_{i,t} \times \text{Community property default}_r \\ + X_i\eta + \sum_r \lambda_r\text{Region}_r + \mu_{i,r,t}\end{aligned} \tag{2.11}$$

where i indexes the individual, r the region of residence, t the year of the survey. Post-reform$_{i,t}$ is simply defined by survey data: all data from the 1999 survey is considered as pre-reform and all data from the 2018 survey as post-reform.

Community property default$_r$ is defined by the region where the interviewee was resident at the time of the survey. This might be problematic only if respondents got married in a different default region than where they live now. Since all regions except Catalonia and the Balearic Islands fall into the community property default group, what I assume here is only that people did not move in or out of Catalonia or the Balearic Islands in the time elapsed between getting married (if they are married) and taking part in the survey. I believe that the number of respondents for whom this assumption does not hold is very likely to be negligible.

X_i includes region fixed effects, age (linear and quadratic term), degree of urbanization of the place of residence, religion (reference group: Roman Catholic) and highest achieved education, with some additional controls depending on the dependent variable at hand.

Outcome variables were defined as follows.
Female labour supply outcomes are indicators for the interviewee being employed, active, or a home maker during the reference week at the time of the survey. In addition to the controls mentioned above, an indicator for having been employed previously, and the current partner's age, educational achievement and employment status were added.
Desired fertility is measured by the number of children survey participants said they would like to (or would have liked to) have and an indicator for the fertility gap, that is, when the number of children the individual had at the time of the survey and the number she wished she had were not equal. Some controls related to fertility were added: an indicator for known spontaneous infertility (not a result of sterilization) and the reasons why the participant had more or fewer children than she would have liked to have.[68]

[68]In both the 1999 and the 2018 Fertility Survey, respondents were presented with a list of approximately 20 potential reasons, and they were asked to choose three that they deemed most important. These were recoded to eliminate minor differences between the two designs.

Realized fertility is measured by the number of biological children of the interviewee. To look at family composition, indicators were defined for having one child, two children, or three children. 42% of the individuals in the sample had no children, 20% had one, 29% had two, 7% had three, and the remaining 2% had four or more. Since so few people in the sample had four or more children, I omitted fourth-born fertility from the analysis. The sample was restricted to those whose first child was born in or after 1981. The infertility indicators and the reasons for fertility gap added to the common set of controls.

The individual-level counterpart of the marriage rate is an indicator for being married. 39% of the sample has never married, 59.5% got married once and 1.5% married twice.[69] Because such a small part of the sample married more than once and because remarriage is likely to be different from a first marriage, for instance, because of the presence of children from a previous marriage, I chose to focus on first marriages only. Omitting the people who married more than once is a loss of 1.5% of the sample. Divorce and separation is treated similarly as marriage: the outcome is an indicator for being divorced or legally separated. Given the design of the 1999 Fertility Survey, which codes divorce and legal separation as the same outcome, the two cannot be distinguished. 93.1% of individuals in the sample never divorced or separated, Of the 6.9% who did, 6.7% divorced once and 0.2% divorced twice. The sample used to estimate the results I present was restricted to those who married at most once, in order to study the first divorce or separation.

The estimation results with a full set of controls are reported in Table 2.5.2. Detailed results, with an expanding set of controls, are available upon request. The effect of the reform on being employed is positive and significant: an increase of 4 percentage points in the probability of being employed. The estimated effects on being active and being a homemaker have the same sign as those of the province-level results but the former is statistically insignificant and the latter is only marginally significant. With respect to fertility, the estimates indicate a highly significant 3 percentage point increase in first-born fertility and a marginally significant decrease of about 1 percentage point in third born fertility. Interestingly, there is a strong effect on desired fertility, measured by the desired number of children. The effect on having a fertility gap (difference between the desired and actual number of children) is also positive, although only marginally significant. My interpretation of these results is that having fewer children seems to be due to a change in constraints rather than preferences. Finally, the effect on being married is not significant, but the effect on being legally separated or divorce is positive (an increase of 2 percentage points) and highly significant.

[69] Only 2 people out of 20,036 married three times.

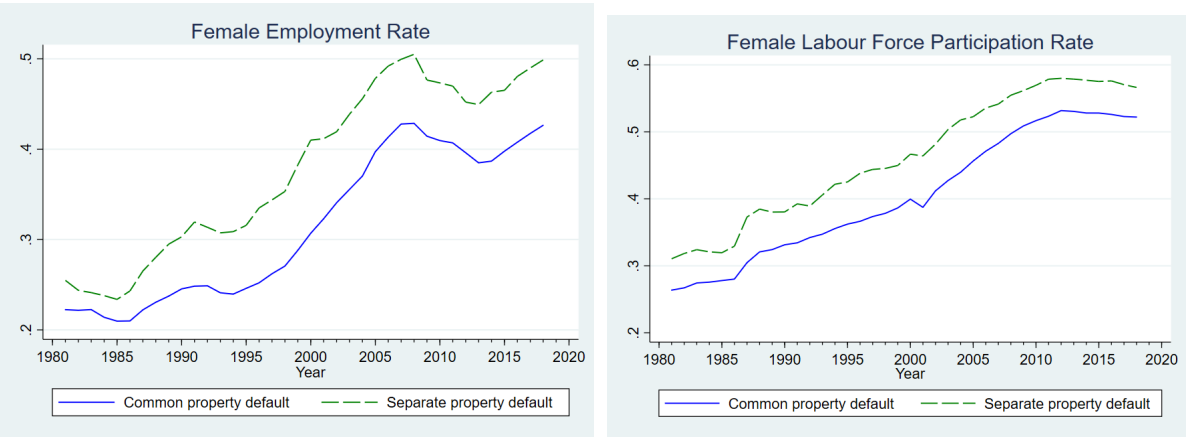
To summarize, these individual-level results are qualitatively supportive of the ones obtained using aggregate data: separation of property encourages women to work more outside the home and to have fewer children than they would under the community property system and makes them more likely to be separated or divorced.

In the 2018 survey substantially more data was collected than in its 1999 counterpart, and one of the most valuable additions were questions about the interviewee's family background and values on marriage, raising children and their valuation of the impact of a child on various aspects of work and personal life. While their relevance is clear, these variables could not be added to the analysis above because they were not recorded in the 1999 dataset. Table 2.5.3 presents correlations between the outcomes of interest and having community property default, controlling for family background and values related to marriage and children. Family background controls include the type of family of origin (mother and father with/without siblings, single parent with/without siblings, other relatives with/without siblings), the number of siblings, an indicator for divorced parents, and the participant's mother's age when she had her first child. Values were measured by three-level Likert items (agree; neither agree, nor disagree; disagree). The perceived impact of having children on various aspects of life (e.g. one's relationship with her partner, her parents, maintaining work-family balance) are collected in "Valuation of the effect of having children" and are added as controls for desired fertility outcomes. The complete list of the value items and the corresponding summary statistics can be found in the Appendix.

The correlations in Table 2.5.3 agree with the general picture I have painted about the differences between separate and community property systems so far in this paper and with the causal effects shown above: female labour supply is lower, fertility is higher, and the chance of being divorced or separated is lower. The correlation with respect to being married is positive but not significant. Lower female labour supply are indicated by lower female employment and labour force participation under community property, and a higher chance of being a homemaker. Higher fertility are signalled by the total number of children, the chance of having three children, the desired number of children, and the chance of wanting more children being higher under default community property.

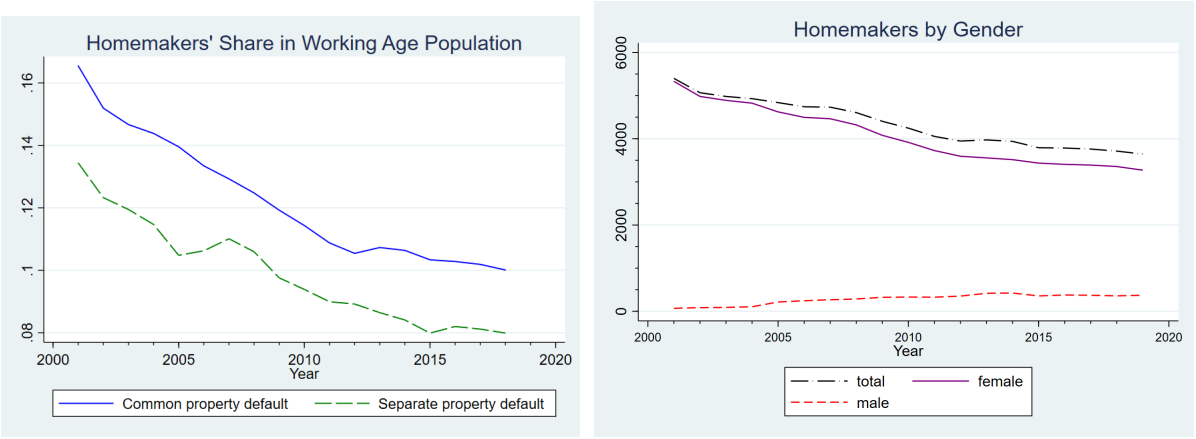
Family of outcomes	Community property default	Separate property default			
		Mean	Standard deviation	Mean	Standard deviation
Fertility (family composition)	Percent born, first	54.518	4.033	58.072	3.441
	Percent born, second	35.575	2.638	32.408	2.481
	Percent born, third	7.498	2.062	7.146	0.978
Female labour supply	Female employment rate	0.345	0.057	0.458	0.031
	Female labour force participation rate	0.414	0.055	0.512	0.045
	Homemakers/total working age population	0.150	0.026	0.116	0.010
Marriage	Marriages by residence per 1,000 persons	4.660	0.784	4.974	0.352
	Marriages by celebration per 1,000 persons	5.150	0.721	5.220	0.564
	Marriages by residence per 1,000 marriageable aged persons	9.505	1.262	9.805	0.684
	Marriages by celebration per 1,000 marriageable aged persons	10.572	1.527	10.301	1.209
	Observations (province)	44		5	
Divorce	Divorces per 1,000 persons	1.092	0.315	1.667	0.118
	Mutual agreement divorces per 1,000 persons	0.600	0.193	1.174	0.059
	Contested divorces per 1,000 persons	0.491	0.191	0.493	0.059
	Divorces per 1,000 marriageable persons	2.166	0.558	3.220	0.147
	Mutual agreement divorces per 1,000 marriageable persons	1.191	0.345	2.269	0.056
	Contested divorces per 1,000 marriageable persons	0.975	0.357	0.951	0.091
Separation	Separations per 1,000 persons	1.788	0.381	2.306	0.065
	Mutual agreement separations per 1,000 persons	1.162	0.198	1.766	0.022
	Contested separations per 1,000 persons	0.626	0.248	0.540	0.043
	Separations per 1,000 marriageable persons	3.555	0.645	4.457	0.013
	Mutual agreement separations per 1,000 marriageable persons	2.313	0.338	3.413	0.044
	Contested separations per 1,000 marriageable persons	1.241	0.455	1.043	0.057
	Observations (region)	16		2	

Table 2.5.1: Average Outcome Values by Default Property Region in 2004



Notes: Alicante, Castellón, Valencia provinces excluded. Series 1981-2018.

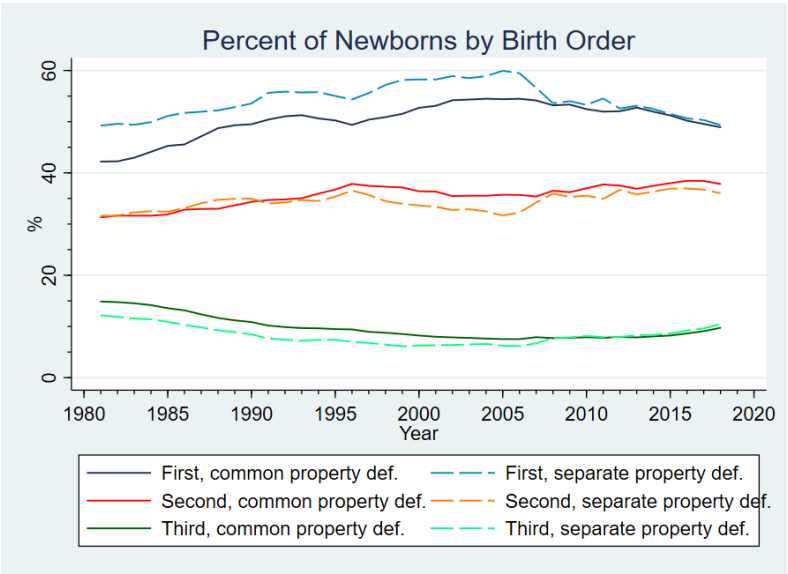
Figure 2.5.1: Trends, Female Employment and Labour Force Participation Rate



(a) By default property regime region (b) National

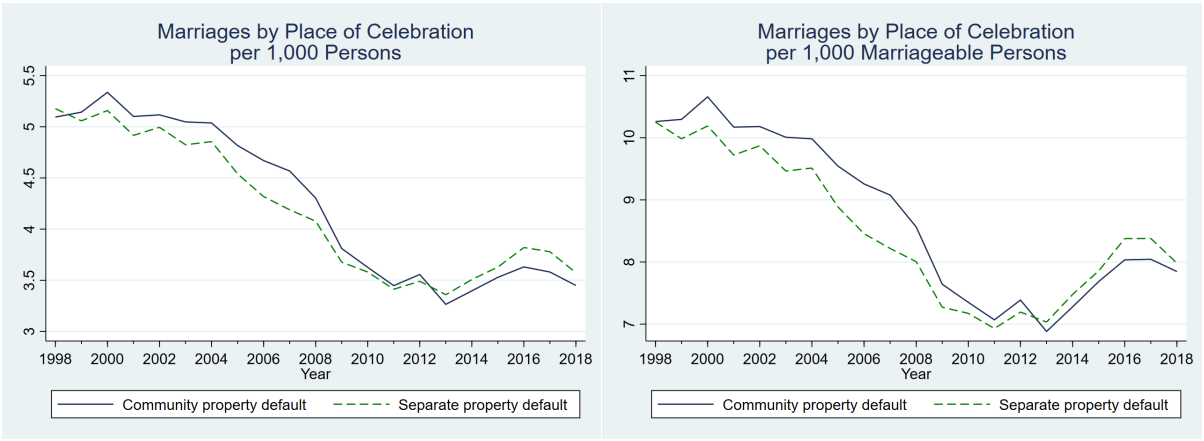
Notes: Valencia region excluded. Series 2001-2018.

Figure 2.5.2: Trends, Homemakers' Share



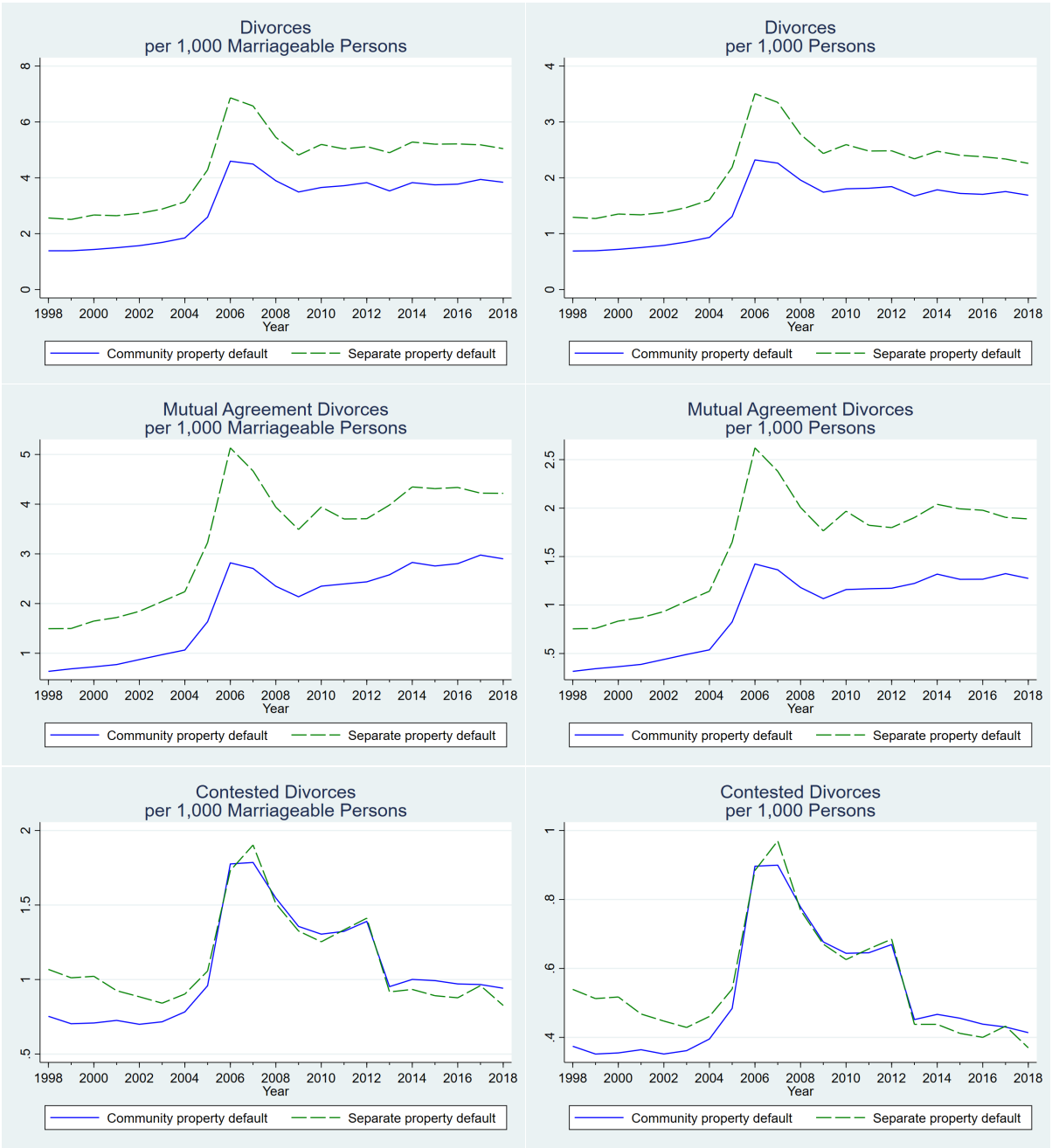
Notes: Alicante, Castellón, Valencia provinces excluded. Series 1981-2018.

Figure 2.5.3: Trends, Percent Born by Order of Birth



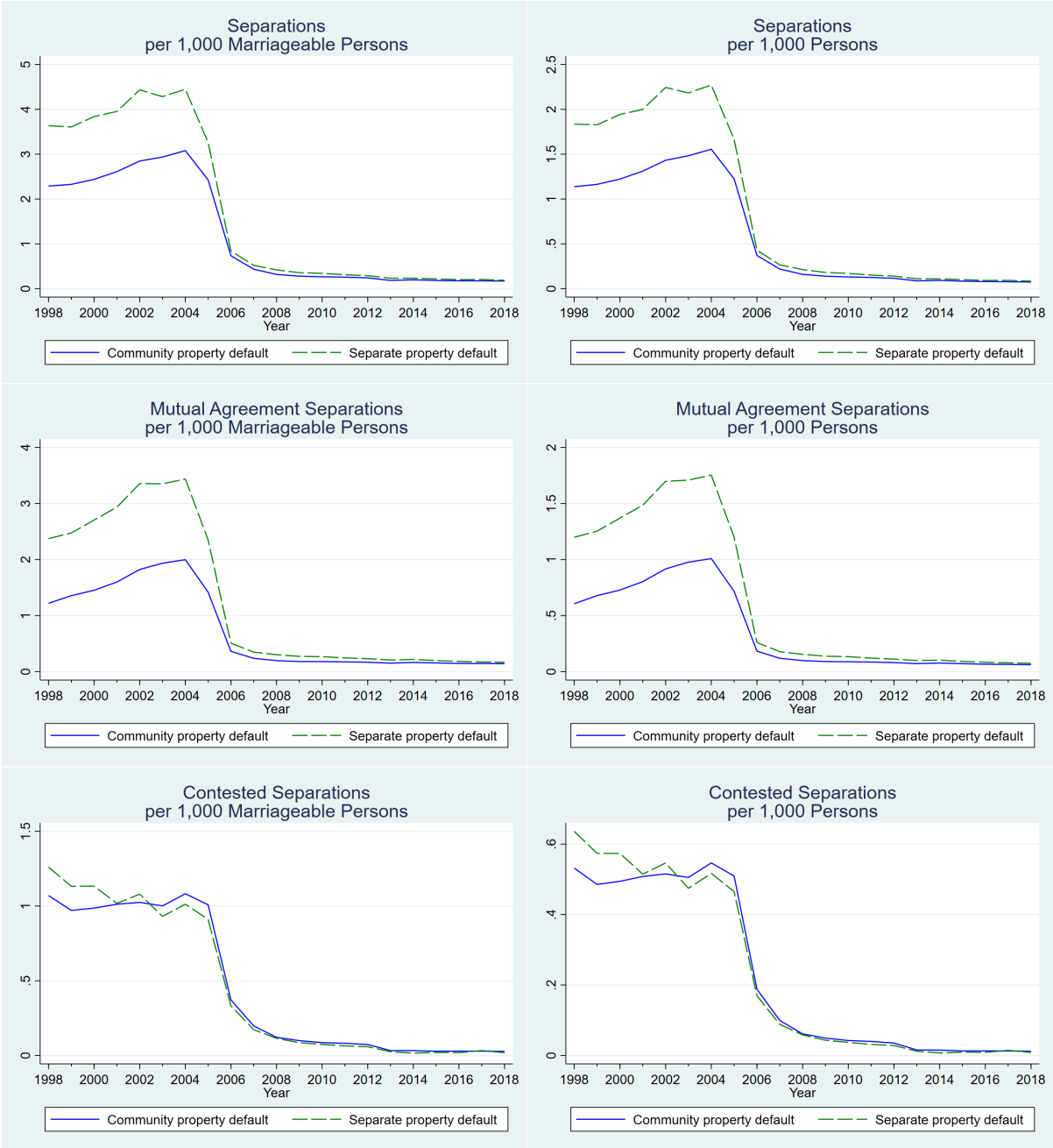
Notes: Alicante, Castellón, Valencia provinces excluded. Series 1998-2018.

Figure 2.5.4: Trends, Marriage Rate



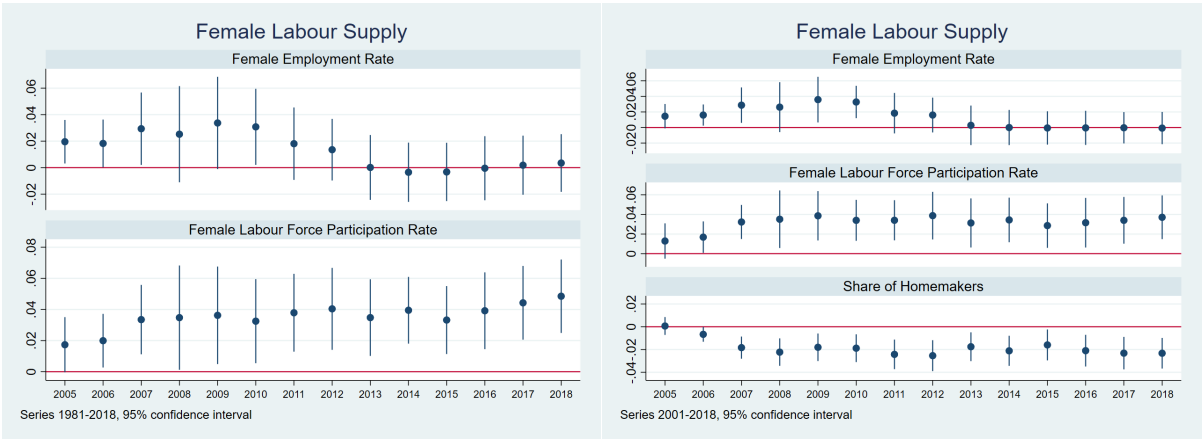
Notes: Valencia region excluded. Series 1998-2018.

Figure 2.5.5: Trends, Divorce Rate by Type



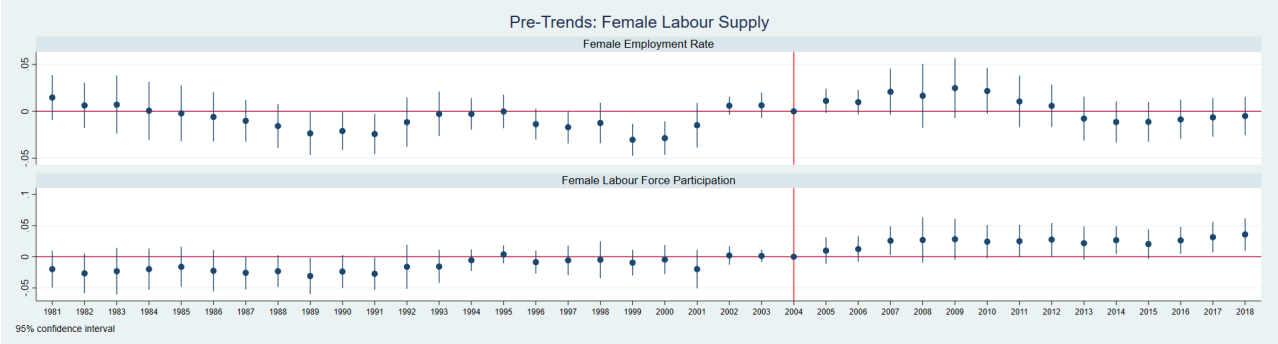
Notes: Valencia region excluded. Series 1998-2018.

Figure 2.5.6: Trends, Separation Rate by Type



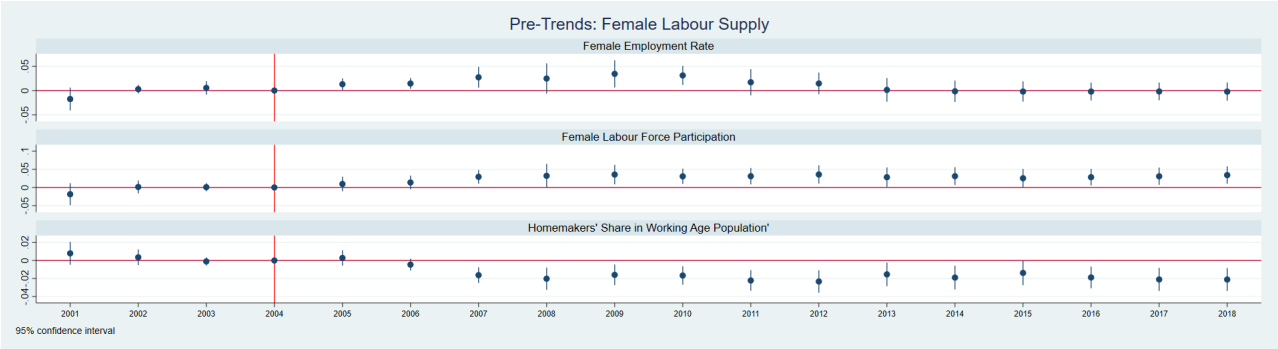
Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. Sample series: 1981-2018, 2001-2018, respectively. 95% confidence intervals.

Figure 2.5.7: Estimation Results: Female Labour Supply



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.5.8: Parallel Pre-Trends Checks, Female Employment and Labour Force Participation, Series: 1981-2018.



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.5.9: Parallel Pre-Trends Checks, Female Labour Supply, Series: 2001-2018.

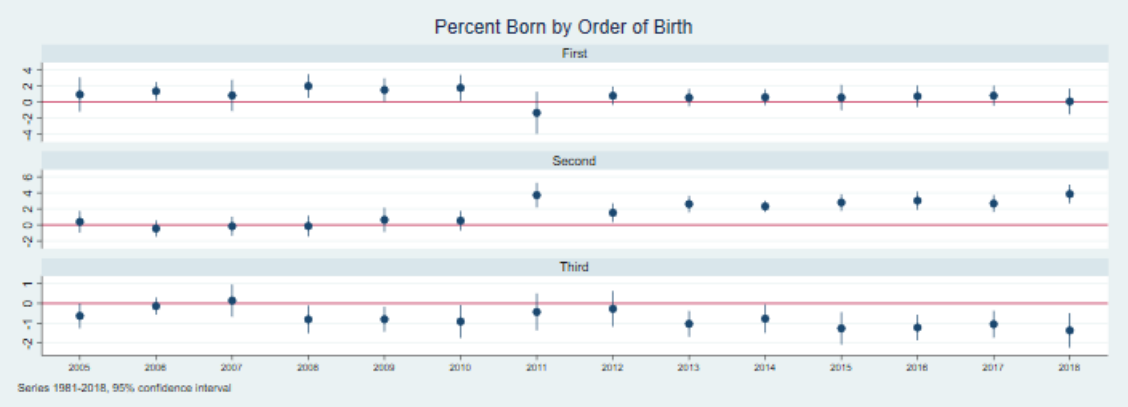
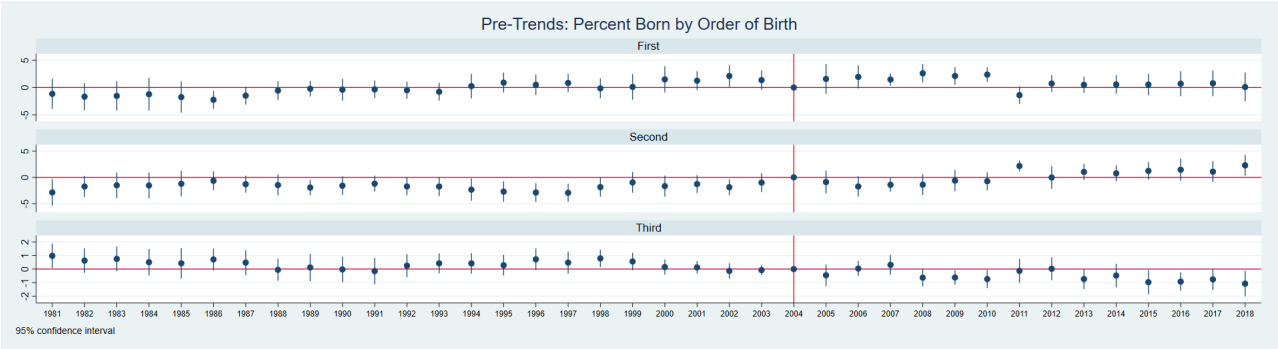


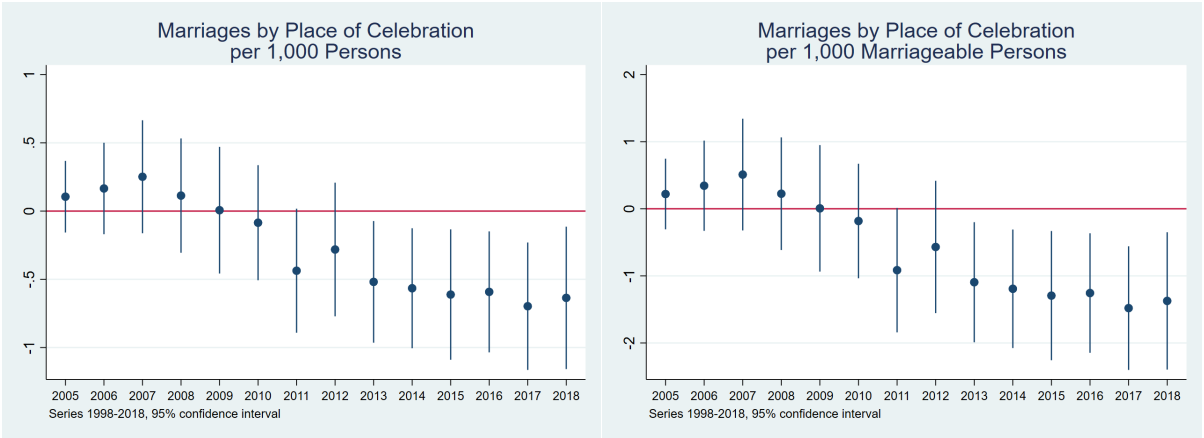
Figure 2.5.10: Estimation Results: Percent Born by Order of Birth

Notes: Full set of controls included in the regressions. 2004 is the baseline. All observations corresponding to Alicante, Castellón, and Valencia provinces were discarded, along with Tarragona 2005-2006. Standard errors clustered at province level. Sample series: 1981-2018. 95% confidence intervals.



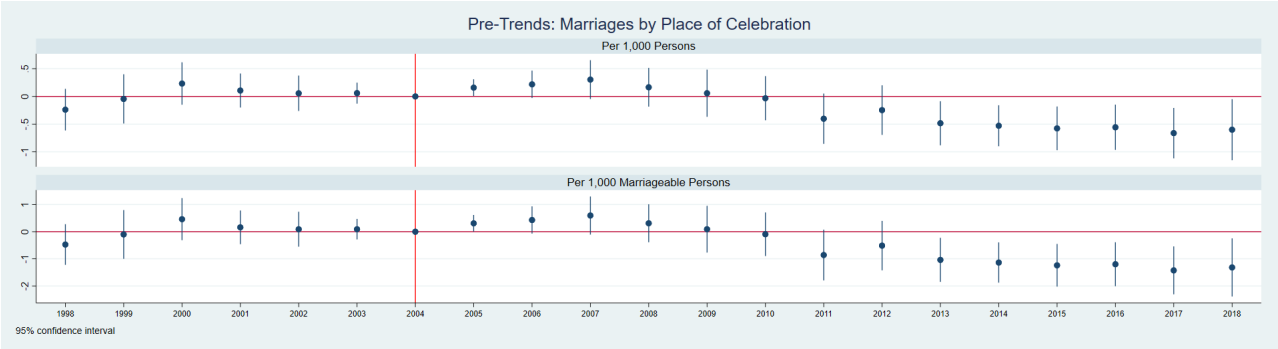
Notes: Full set of controls included in the regressions. 2004 is the baseline. All observations corresponding to Alicante, Castellón, and Valencia provinces were discarded, along with Tarragona 2005-2006. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.5.11: Parallel Pre-Trends Checks, Fertility, Series: 1981-2018.



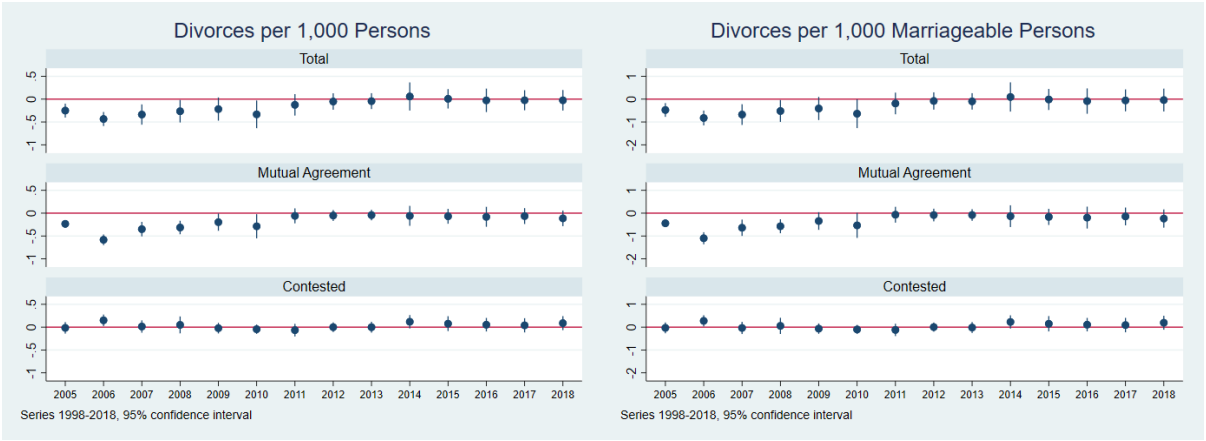
Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.5.12: Estimation Results: Marriage Rate by Place of Celebration



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.5.13: Parallel Pre-Trends Checks, Marriage Rate by Place of Celebration

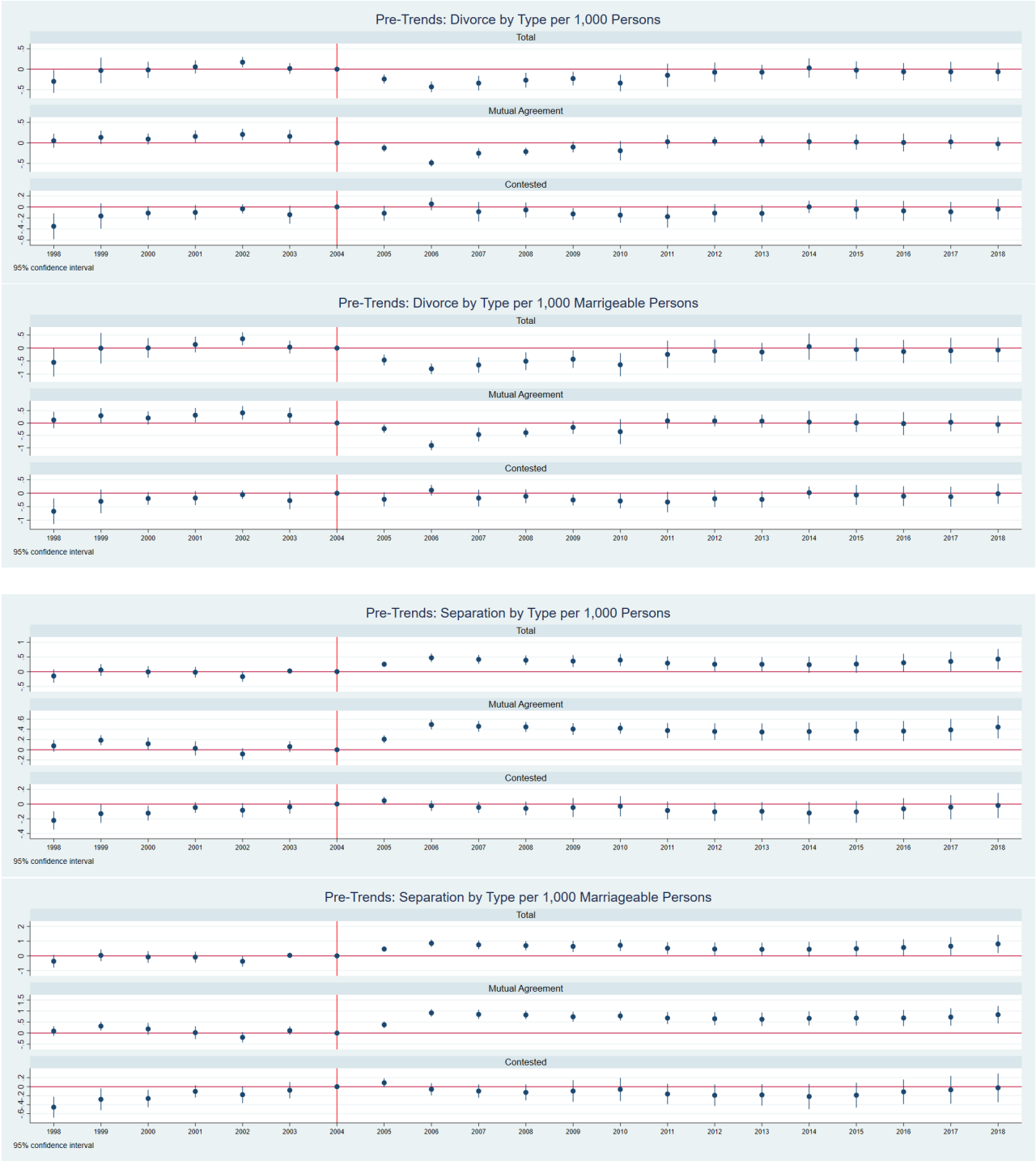


Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.5.14: Estimation Results: Divorce Rate by Type of Dissolution Procedure

Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.5.15: Estimation Results: Separation Rate



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.5.16: Parallel Pre-Trends Checks, Divorce and Separation, Series: 1998-2018.

	Female labour supply			Desired fertility		Realized fertility: number of children				Marriage	
	Employed	Active	Homemaker	Desired number of children	Fertility gap	Total	One	Two	Three	Married	Divorced or separated
Post-2005 reform	0.108***	0.158***	-0.160***	-0.270***	-0.0377***	-0.0183	-0.0346***	0.00615	0.0127***	-0.135***	-0.0153***
	(0.0104)	(0.0218)	(0.0180)	(0.0321)	(0.00509)	(0.0160)	(0.00725)	(0.0243)	(0.00428)	(0.00703)	(0.00347)
Community property default	-0.228***	-0.143***	0.105***	0.0391	-0.0161***	0.0627***	-0.0444***	0.0268	0.0268***	-0.00159	-0.0363***
	(0.00707)	(0.0145)	(0.0110)	(0.0394)	(0.00378)	(0.0184)	(0.00512)	(0.0172)	(0.00354)	(0.00546)	(0.00336)
Post-2005 reform *Community property default	0.0364***	0.0269	-0.0352*	0.190**	0.0193***	-0.0298	0.0288***	-0.0362	-0.0115*	-0.00112	0.0215***
	(0.0110)	(0.0243)	(0.0189)	(0.0791)	(0.00565)	(0.0269)	(0.00757)	(0.0260)	(0.00564)	(0.00731)	(0.00493)
Region fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Age, urban, religion, education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Previous employment	✓	✓	✓								
Current partner's characteristics	✓	✓	✓	✓	✓						
Infertility				✓	✓	✓	✓	✓	✓		
Reasons for fertility gap				✓	✓	✓	✓	✓	✓		
Observations	13427	13427	13427	2328	9425	17063	17063	17063	17063	19933	19933

Standard errors in parentheses, clustered by region

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Individuals residing in Valencia region were excluded. Education refers to highest education achieved. Partner's characteristics: age (quadratic), highest education achieved, labour market status.

Table 2.5.2: Robustness Check: Estimates with Fertility Survey Data (Fertility Survey 1999, 2018)

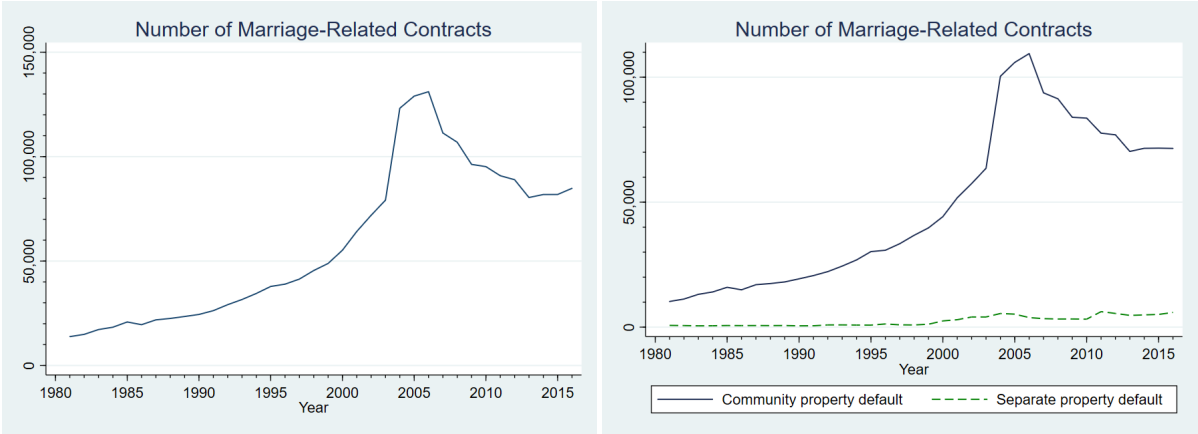
	Female labour supply			Desired fertility		Realized fertility: number of children				Marriage		
	Employed	Active	Homemaker	Desired number of children	Fertility gap	Total	One	Two	Three	Married	Divorced	Separated
Community property default	-0.194***	-0.112***	0.0787***	0.0961**	0.0254**	0.0245***	-0.00448	0.00161	0.00668***	0.00281	-0.00402**	-0.0138***
	(0.00474)	(0.00382)	(0.00353)	(0.0375)	(0.0115)	(0.00609)	(0.00345)	(0.00366)	(0.00139)	(0.00526)	(0.00156)	(0.00103)
Region fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Age, urban, religion, education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Family of origin characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Values related to marriage and children	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Previous employment	✓	✓	✓									
Current partner's characteristics	✓	✓	✓	✓	✓							
Infertility				✓	✓	✓	✓	✓	✓			
Reasons for fertility gap				✓	✓							
Valuation of the effect of having children				✓	✓							
Observations	7463	7463	7463	1185	1632	10543	10543	10543	10543	11864	11864	11864

Standard errors in parentheses, clustered by region

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Individuals residing in Valencia region were excluded. Family of origin characteristics: type of family of origin (mother and father with/without siblings, single parent with/without siblings, other relatives with/without siblings), number of siblings, indicator for divorced parents, mother's age when she had her first child. Education refers to highest education achieved. Partner's characteristics: age (quadratic), highest education achieved, labour market status, monthly net income.

Table 2.5.3: Correlations from the 2018 Fertility Survey



(a) National (b) By default marital property regime, excluding Valencia

Figure 2.5.17: Marriage-Related Contracts

2.6 Conclusion

In this paper, I present causal effects of the default marital property regime on female labour supply, fertility, marriage, divorce, and separation. I show that under the separate property regime female employment and labour force participation is higher, while the likelihood of having more than two children and being a homemaker is lower than under the community property system. The lower marriage rate under separate property also reflects less relationship-specific investment.

The main contribution of this paper is twofold. First, my paper is the first one to provide estimates of the causal effects of marital property systems on a range of marital investments and outcomes. Second, the use of property rights theory in the context of marriage is a conceptual innovation. Property rights theory predicts that the incentives to make general versus relationship-specific investments depends on the ownership of assets and on the complementarity of investments; if investments are substitutes, then joint ownership provides the greatest incentives to make relationship-specific investments, relative to which non-integration incentivizes general investments. My findings confirm these predictions, providing empirical support to property rights theory in a setting in which it has not been tested before. In addition, this paper contributes to the behavioural literature on default effects by quantifying the effect of default marital property regimes, and to the law and economics literature by studying the impact of family law on economic outcomes.

Exploring the economic consequences of intrafamily ownership structures and contracts and, more generally, utilizing the insights of the theory of incomplete contracts in family and labour economics are exciting topics for future research.

References

Adda, J., Dustmann, C., & Stevens, K. (2017). The career costs of children. *Journal of Political Economy*, *125*(2), 293–337.

Alesina, A., & Giuliano, P. (2007). Divorce, fertility and the value of marriage. *SSRN Electronic Journal*.

Allen, D. W. (1992). Marriage and divorce: Comment. *American Economic Review*, *82*(3), 679–685.

Alonso Martínez, M. (1884). *El Código Civil en sus relaciones con las legislaciones forales*. Madrid: Establecimiento Tipográfico de P. Núñez.

Bali, V. (2007). Terror and elections: Lessons from Spain. *Electoral Studies*, *26*, 669–687.

Bayot, D., & Voena, A. (2015). *Prenuptial contracts, labor supply and household investments*. University of Chicago.

Boletín Oficial de las Cortes Generales, Proposición de Ley, 17/10/1984.

Brassiolo, P. (2013). *The effect of property division laws on divorce and labor supply: Evidence from Spain* (Research Department working papers No. 246). CAF Development Bank Of Latinamerica.

Brassiolo, P. (2016). Domestic violence and divorce law: When divorce threats become credible. *Journal of Labor Economics*, *34*(2), 443–477.

Cai, H. (2003). A theory of joint asset ownership. *The RAND Journal of Economics*, *34*(1), 63–77.

Chiappori, P., Fortin, B., & Lacroix, G. (2002). Marriage market, divorce legislation, and household labor supply. *Journal of Political Economy*, *110*(1), 37–72.

Cigno, A. (2012). Marriage as a commitment device. *Review of Economics of the Household*, *10*.

Código Civil de Cataluña. Comunidad Autónoma de Cataluña, Ley Primera: «BOE» núm. 32, de 6 de febrero de 2003, páginas 4912 a 4918, Libro Segundo: «BOE» núm. 203, de 21 de agosto de 2010, páginas 73429 a 73525.

Código Civil de España. Ministerio de Gracia y Justicia, «Gaceta de Madrid» núm. 206, de 25/07/1889. Formal title: Real Decreto de 24 de julio de 1889 por el que se publica el Código Civil.

Código del Derecho Foral de Aragón. Comunidad Autónoma de Aragón, «BOA» núm. 67, de 29 de marzo de 2011, páginas 6490 a 6616.

Compilación del Derecho Civil de Baleares. Comunidad Autónoma de las Islas Baleares, «BOIB» núm. 120, de 02/10/1990. Formal title: Decreto Legislativo 79/1990, de 6 de septiembre, por el que se aprueba el texto refundido de la compilación del derecho civil de las Islas Baleares.

Compilación del Derecho Civil Foral de Navarra. Comunidad Foral de Navarra, «BOE» núm. 137, de 8 de junio de 2019, páginas 59756 a 59877.

Derecho Civil Vasco. Comunidad Autónoma del País Vasco, «BOE» núm. 176, de 24 de julio de 2015.

Duran i Bas, M. (1883). *Memoria acerca de las instituciones del derecho civil de Cataluña*. Barcelona: Casa de Caridad.

Fernández-Kranz, D., Lacuesta, A., & Rodriguez-Planas, N. (2013). The motherhood earnings dip: Evidence from administrative records. *Journal of Human Resources*, *48*(1), 169–197.

Fisher, H. (2012). Divorce property division laws and the decision to marry or cohabit. *Journal of Law, Economics, & Organization*, *28*, 734–753.

Frémeaux, N., & Leturcq, M. (2020). Inequalities and the individualization of wealth. *Journal of Public Economics*, *184*, 104145.

Friedberg, L. (1997). Did unilateral divorce raise divorce rates? Evidence from panel data. *American Economic Review*, *88*(3), 608–627.

Goldin, C., Kerr, S. P., Olivetti, C., & Barth, E. (2017). The expanding gender earnings gap: Evidence from the LEHD-2000 census. *American Economic Review: Papers and Proceedings*, *107*(5), 110–114.

González, L., & Viitanen, T. (2009). The effect of divorce laws on divorce rates in Europe. *European Economic Review*, *53*(2), 127–138.

González, L., & Viitanen, T. (2018). The long-term effects of legalizing divorce on children. *Oxford Bulletin of Economics and Statistics*, *80*(2), 327–357.

Gray, J. S. (1998). Divorce-law changes, household bargaining, and married women's labor supply. *American Economic Review*, *88*(3), 628–42.

Grossman, S. J., & Hart, O. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, *94*(4), 691–719.

Gruber, J. (2004). Is making divorce easier bad for children? The long-run implications of unilateral divorce. *Journal of Labor Economics*, *22*(4), 799–833.

Hart, O. (1995). *Firms, contracts, and financial structure*. Oxford University Press.

Hart, O., & Moore, J. (1990). Property rights and the nature of the firm. *Journal of Political Economy*, *98*(6), 1119–1158.

Keller, P., Harlam, B., Loewenstein, G., & Volpp, K. (2011). Enhanced active choice: A new method to motivate behavior change. *Journal of Consumer Psychology*, *21*, 376–383.

Kleven, H., Landais, C., Posch, J., Steinhauer, A., & Zweimüller, J. (2019). Child Penalties across Countries: Evidence and Explanations. *AEA Papers and Proceedings*, *109*, 122–126.

Kleven, H., Landais, C., & Søgaard, J. E. (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, *11*(4), 181–209.

Kneip, T., & Bauer, G. (2009). Did unilateral divorce laws raise divorce rates in Western Europe? *Journal of Marriage and Family*, *71*(3), 592–607.

Ley 2/2006, de 14 de junio, de derecho civil de Galicia. Comunidad Autónoma de Galicia, «DOG» núm. 124, de 29/06/2006, «BOE» núm. 191, de 11/08/2006.

Ley de Régimen Económico Valenciano 10/2007.

Montalvo, J. (2011). Voting after the bombings: A natural experiment on the effect of terrorist attacks on democratic elections. *The Review of Economics and Statistics*, *93*, 1146–1154.

Peters, H. E. (1986). Marriage and divorce: Informational constraints and private contracting. *The American Economic Review*, *76*(3), 437–454.

Peters, H. E. (1992). Marriage and divorce: Reply. *The American Economic Review*, *82*(3), 686–693.

Piazzalunga, D. (2016). *Till money us do part: Property division at divorce and married couples' time use behaviour*. FBK-IRVAPP.

Rasul, I. (2003). *The impact of divorce laws on marriage*.

Rasul, I. (2006). Marriage markets and divorce laws. *The Journal of Law, Economics, and Organization*, *22*(1), 30–69.

Stevenson, B. (2007). The impact of divorce laws on marriage-specific capital. *Journal of Labor Economics*, *25*(1), 75–94.

Stevenson, B. (2008). Divorce law and women's labor supply. *Journal of Empirical Legal Studies*, *5*(4), 853–873.

Stevenson, B., & Wolfers, J. (2006). Bargaining in the Shadow of the Law: Divorce Laws and Family Distress. *The Quarterly Journal of Economics*, *121*(1), 267–288.

Voena, A. (2015). Yours, mine, and ours: Do divorce laws affect the intertemporal behavior of married couples? *American Economic Review*, *105*(8), 2295–2332.

Wolfers, J. (2006). Did unilateral divorce laws raise divorce rates? A reconciliation and new results. *American Economic Review*, *96*(5), 1802–1820.

Zeckhauser, R., & Samuelson, W. (1988). Status quo bias in decision-making. *Journal of Risk and Uncertainty*, *1*, 7–59.

Zhylyevskyy, O. (2012). Spousal conflict and divorce. *Journal of Labor Economics*, *30*(4), 915–962.

2.A Marital Legislation: Details

2.A.1 Marital Contracts

A marital contract specifying the matrimonial property regime (*capitulaciones matrimoniales*) can be signed before or after the celebration of the marriage.[70] In this contract, the spouses can agree on the use of any marital property system, replacing or customizing the legal default one. A marital contract is null and void under the same conditions as any other contract, for instance, if it was signed under false information or duress. To be valid, it must be authorized by a notary. It may be modified during the marriage with the consent of both parties, with the modification agreement being subject to the same validity and registration requirements as the original contract.[71] The regulation of marital agreements is practically uniform across Spain. Since nuptial contracts are related to the marital property regime, local civil laws could prescribe provisions that are different from those of the Spanish Civil Code; however, even those local civil codes that devote a chapter to marital contracts, for example the *Compilación del Derecho Civil de Baleares* and the *Compilación del Derecho Civil Foral de Navarra*, essentially contain the same format, content and registration requirements as the Spanish Civil Code.

2.A.2 Common and Separate Assets Under Different Defaults

Common acquisitions (Sociedad de gananciales) The most important jointly owned assets are profits earned by either spouse during the marriage, labour income, profit and interest earned on goods owned by either spouse (even if the asset itself is separate property), goods that were paid for using common assets, and undertakings started during the marriage by either spouse at the expense of the community property.[72] Separate property are goods acquired prior to the marriage, inheritance, gifts, other assets bought at the cost of separate property, compensation or damages paid on it, clothes and personal objects that do not have extraordinarily high value, and the tools necessary for one's job.[73] Expenses that should be borne jointly in the common acquisitions regime are the maintenance of the family, food and education of the children in common, insurance expenses, acquisition and maintenance of the community property, ordinary administration cost of separate property, and regular costs of business con-

[70] If it is signed before marriage, at most one year can pass between the date of the agreement and the celebration of the marriage.

[71] *Código Civil de España*, Book IV, Title III, Chapter II

[72] *Código Civil de España* art. 1347

[73] *Código Civil de España* art. 1346

ducted by either spouse.[74]

Consorcio conyugal At the beginning of the matrimony, the jointly owned assets are those that the spouses decide to contribute to the community property and those donated to them as wedding gifts. During the marriage, assets become part of the community property if they are donated to the couple, or the spouses decide to hold some goods in joint ownership, or if they were purchased at the expense of common income; labour income including compensation for the termination of work of either spouse; profits and interest on goods held by either spouse; companies founded during the marriage and shares obtained at the expense of common goods.[75] Separate property are goods that the couple decided to keep separate at the beginning of the marriage, accession and gains on own assets, any preferential acquisition or access to property belonging privately to one of the spouses, and those bought with common funds if the spouses establish the exclusive attribution to one of them, inheritance, pension entitlements and life insurance payments.[76]

Separate property (Separación de bienes) All assets acquired before the marriage and during the marriage by one spouse remains the property of that spouse. If an asset was bought, it belongs to the holder (by whom it was formally bought), even if it was paid for using the other spouse's funds, in which case donation is assumed. If the goods are bought for the use of the family, they belong to both spouses, each holding half.[77] If the ownership of an asset is doubtful, each spouse is assumed to hold half of it. A spouse who has worked significantly more at home than the other is entitled to financial compensation in case of annulment, separation or divorce, with the amount of compensation depending on the duration and intensity of domestic production, limited to no more than a quarter of the difference between the increases in the assets of the spouses. In view of a possible marital dissolution, it is possible to agree on the increase, decrease or waiver of said economic compensation in a marital contract.[78]

Sociedad conyugal de conquistas Common goods are those included in the common asset pool by covenants or provisions, assets acquired at the expense of the common goods or by any acquisition right belonging to the *conquistas* regime, assets acquired at the expense private goods if the spouses agree on making them common, labour

[74] *Código Civil de España* art. 1362

[75] *Código del Derecho Foral de Aragón* art. 210

[76] *Código del Derecho Foral de Aragón* art. 211-212.

[77] Note that this is not the case of undivided half-interest, as with community property. Here, each spouse owns 50% of the given asset.

[78] *Código Civil de Cataluña* Book II, Chapter II

income, profits on both common and private goods, tenant rights for contracts signed during the marriage, and accessions or increases of the common goods. Assets that are not clearly exclusive are assumed to be part of the common goods. Separate property are those assets that were acquired prior to marriage and any accrued income on them, those bought with assets that are separate property, those acquired at the expense of the common goods if both spouses state that it should be owned by only one of them, compensation of damages on private property, and inherent property rights and assets that are non-transferable inter vivos. The family home and household goods belong to the spouse who bought them. If they both contributed towards the price or used some common assets, the ownership will be proportional to their respective contribution. The expenses related to the support of the family, ordinary administration costs of all assets, and expenses related to the profession of each and activities that benefit the couple should be borne jointly.[79]

2.A.3 Traditional Property Systems in Catalonia

The *asociación a compras y mejoras*, literally "association of purchases and improvements", is the tradition marital property system in Camp de Tarragona. Either spouse can share ownership of the goods that the other has bought or obtained by work (these are the purchases) and of the increase in the value of the goods owned (the improvements).

Agermanament, literally "twinning", is universal community, that is, all pre-marital and marital assets are jointly owned by the spouses. It is traditionally used in the city of Tortosa.

The *pacto de convinença*, literally "cohabitation agreement", is the traditional marital property regime in Valle de Arán[80] in Lleida province, whereby the spouses have to contribute equally to the household costs and divide the gains from the marriage equally upon dissolution of the marriage, if they do not have children.

None of these are default, not even in the territories where it the traditional choice. In order to choose one of these property systems, the spouses have to sign a marital contract. In all matters that are not specified in the nuptial contract, the Catalan Civil Code, or the Constitution, the terms of the property regime are governed by the customs of the region. Failing that, the participation system serves as a governing regime for *asociación a compras y mejoras* and common acquisitions for *agermanament*.

[79] *Compilación del Derecho Civil Foral de Navarra*, Book I, Title VI

[80] Arrés, Bausen, Bosost/Bossòst, Las Bordas/Bòrdes, Es Caneján, Les Alto Arán/Naut Aran, Viella Mitg Arán/Vielha e Mijaran, Vilamós

2.A.4 Fuero del Baylío

Figure 2.A.1: Towns Where the Fuero del Baylío Applies

2.A.5 Origins of the Default Marital Property Systems

Jurisdiction	Default property system	Origin	First legal reference	Current legal reference
Derecho común	sociedad de gananciales	VII. century	Fuero Juzgo (1214) 4, 2, 17	Art. 1316 Código Civil de España (1889)*
Aragon	consorcio conyugal		Fuero Municipal de Teruel (1175)	Art. 193.3 Código de Derecho Foral de Aragón (2011)
Balearic Islands	separación de bienes	Roman Law		Art. 3.1, 67.1 Compilación del Derecho Civil Foral de las Islas Baleares (1990)**
Catalonia	separación de bienes	Roman Law		Art. 231-10.2 Código Civil de Cataluña (2010)
Galicia	sociedad de gananciales	VII. century	Fuero Juzgo (1214) 4, 2, 17	Art. 171 Ley de Derecho Civil de Galicia (2006)
Navarre	sociedad conyugal de conquistas	1558	Ley 38 Cortes de Tudela (1558)	Ley 87 Fuero Nuevo de Navarra (1973)***
Tierra Llana de Vizcaya	comunicación foral	1526	Fuero Nuevo de Vizcaya (1526)	Art. 127 Ley de Derecho Civil Foral del País Vasco (2015)
Rest of Basque Country	sociedad de gananciales	VII. century	Fuero Juzgo (1214) 4, 2, 17	Art. 127 Ley de Derecho Civil Foral del País Vasco (2015)
Fuero del Baylío	régimen del Fuero del Baylío	1778	Pragmática Sanción de Carlos III of 20/12/1778	Pragmática Sanción de Carlos III of 20/12/1778
Valencia 2008-2016	separación de bienes	2007	Ley de Régimen Económico Matrimonial Valenciano (2007)	declared void by the Constitutional Court on 28/04/2016

* last amendment in 1981
** last amendment in 2017
*** last amendment in 2019

Table 2.A.1: Adoption Dates of the Default Marital Property Systems in Spain (Source: Table Compiled by Javier Fajardo)

2.A.6 Reforms of the Catalan Civil Code (1993, 1998, 2010)

Act 8/1993, of September 30, had a dual purpose. First, to restructure the part of the Catalan Civil Code so that provisions related to marital property regime, which had been scattered throughout the text, would be better organized, and second, to introduce the possibility of financial compensation for the spouse who had worked at home upon dissolution of the marriage. A spouse who worked at home or for the other spouse for little or no compensation became entitled to a compensation if the marital regime were to be ended by judicial decree, annulment, separation or divorce. The amount of the compensation would be determined by the judge, taking into account the effect of the claimant's work on the family, the amount of inequality in wealth between the spouses and other circumstances. The compensation could be paid in money or with the assets of the spouse who was supposed to pay, as he or she chose, within a period not exceeding three years.

Act 9/1998, of July 15, re-created the book of family law within the Catalan Civil Code. Compared to the previous compilation of family law, the new one was enlarged (271 articles versus 91) and reorganized (8 titles instead of 4). With this restructuring came many innovations of which I will cover only those that are directly relevant to marital contracting, property systems or dissolution. First, regarding marital contracting, the new Catalan family law explicitly allowed for marital contracts to be written in anticipation of the marriage breaking down.[81] The previous wording did not allow for provisions in case of a marital crisis to be included. Second, as part of the regulation of the separate property regime, provisions related to financial compensation for working at home were extended and made more precise, following Act 8/1993 which introduced this right of the home-maker spouse. Under this law, the spouse who had been working at home or for the other spouse without sufficient compensation, leading to an economic inequality between the spouses, is entitled to financial compensation upon annulment, separation or divorce. This compensation has to be paid in cash, unless a judge decides otherwise. The right to compensation for working at home is compatible with other rights to financial compensation corresponding to the spouse who is the beneficiary (e.g. alimony and child support), and it has to be taken into account when determining the amount of these. Finally, it can only be exercised when filing for annulment, separation or divorce and cannot be requested at a later step of the process.[82] Third, in the process of annulment, separation or divorce, either spouse can request the division of assets held in pro indiviso ownership throughout the marriage. Fourth, detailed regulation of the consequences of annulment, separation and divorce was introduced, including the contents of a settlement agreement and the use of alternative dispute resolution.[83]

Act 25/2010, of July 29, brought forth many corrections and innovations of the Catalan Civil Code related to the needs of modern family models, nuptial contracts in anticipation of a marital crisis, compensation for domestic work, alimony, and parental duties following divorce, among others. It aimed at answering to the needs of families of a single parent and his/her children and remarried parents cohabiting with children from their previous marriages with a more careful regulation of adoption and contribution to family expenses. In response to the legalization of same-sex marriage in 2005, it adapted the regulation of stable non-marital partnership which used to be a form of legally recognized partnership partly aimed at same-sex couples. Recognizing the insufficient regulation of marital agreements in anticipation of a marital breakdown it established formal and content requirements, limiting the contracting power of the

[81] Act 9/1998, Art. 15.
[82] Act 9/1998, arts. 41-42.
[83] Act 9/1998, arts. 76-86.

parties regarding arrangements on alimony and compensation for domestic work, and included protective measures for the spouse to whose interests the agreement might be detrimental at the time of compliance. Provisions related to compensation for domestic work were reviewed, providing clearer normative guidelines to what the claimant should prove to receive compensation and to the calculation of the amount. The regulation of the consequences of marital dissolution was extended, adding a revocation option in case of amicable separation agreements, better enforcing parental responsibilities towards children after divorce, refining the regulation of alimony and the attribution of the use of the family home, and allowing for a broader use of mediation.

2.B Proofs

Proof of Proposition 1

Proof. By (A2)

$$\frac{1}{2}\frac{\partial O_i(e_i, l_i, A_i)}{\partial e_i} + \frac{1}{2}\frac{\partial R_i(e_i, l_i)}{\partial e_i} < \frac{\partial R_i(e_i, l_i)}{\partial e_i}$$
$$\frac{1}{2}\frac{\partial O_i(e_i, l_i, A_i)}{\partial l_i} + \frac{1}{2}\frac{\partial R_i(e_i, l_i)}{\partial l_i} \geq \frac{\partial R_i(e_i, l_i)}{\partial l_i}$$

since $(\hat{l}_i^m, \hat{e}_i^m)$ satisfy (2.7) and (e_i^{*m}, l_i^{*m}) satisfy (2.4)

$$\frac{\partial C_i(\hat{e}_i^m + l_i)}{\partial e_i} < \frac{\partial C_i(e_i^{*m} + l_i)}{\partial e_i}$$
$$\frac{\partial C_i(e_i + \hat{l}_i^m)}{\partial e_i} \geq \frac{\partial C_i(e_i + l_i^{*m})}{\partial e_i}$$

and C_i is strictly convex, leading to $\hat{e}_i^m < e_i^{*m}$ and $l_i^{*m} \leq \hat{l}_i^m$. □

Proof of Proposition 2

Proof. (2.7) and assumptions (A1), (A2) imply that the general investment l_i increases with the exclusive asset holding A_i which in turn leads to lower specific investment e_i by the substitutability assumption (A3). Since asset ownership is assumed to weakly increase the productivity of the specific investment, an increase in exclusive property holdings might generate some increase in the level of specific investments at the expense of general. However, under (A1), (A2), the effect of ownership on investments is stronger for general than for specific. □

2.C Data Description and Summary Statistics

2.C.1 Data

INE

The annual data on population by age and gender, available by province or region, are from the semestral series "Resident population by date, sex and age" 1971-2019.

The total number of marriages by place or residence and celebration for couples of difference sex are available since 1941 from INE under Vital Statistics: Marriages (*Estadística de matrimonios. Movimiento natural de la población*). The anonymized census of marriages for each year is published in the *Boletín estadístico de matrimonio*. This data set contains the date of the marriage, where the marriage was celebrated, if it was civil or Catholic, and some basic information on each spouse: age, nationality, marital status, municipality of residence. I used these data to define marriageable age based on the age at marriage for each spouse.

All labour market data is from INE's Economically Active Population Survey (*Encuesta de población activa*). These data are available since 1976. Due to a Commission Regulation passed in 2000 regarding the definition of unemployed[84], INE warns that the number of inactives is not directly comparable before and after 2001. The year fixed effects I use in each model should absorb the resulting variation, allowing me to use the entire series.

Data on GDP by province and autonomous community comes from the Spanish Regional Accounts (*Contabilidad regional de España*), published by INE.

The global fertility rate by province and the fertility rate by province and order of birth are among the fertility statistics published by INE, available since 1975.

The 1999 Fertility Survey was conducted with 7,749 women aged 15-49. I use the 1999 data pooled with the more extensive 2018 survey. Some design elements of the 1999 survey limit the analysis on the pooled sample, especially regarding marriage and divorce. While the 1999 survey includes a section on relationship history, the way questions were asked does not allow for distinguishing marriages from more casual past relationships, making it impossible to reconstruct individual relationship timelines from the data. Moreover, divorce and legal separation are recorded as the same way of ending a relationship, leading to divorce and separation being a single outcome in the individual level analysis.

[84] Commission Regulation (EC) No 1897/2000, of 7 September 2000, implementing Council Regulation (EC) No 577/98 on the organisation of a labour force sample survey in the Community concerning the operational definition of unemployment.

The 2018 Fertility Survey by INE is a rich dataset obtained from a survey conducted with 14,446 women and 2,591 men aged 18-55, representative of the Spanish population, in the spring of 2018. Men are omitted from the analysis below, mainly because for them the autonomous community of residence was deleted from the publicly available dataset during the anonymization process, which makes it impossible to assign them to marital property default regions. After cleaning the data, 14,021 women remained in the main sample, 1,110 of whom resided in Valencia region which was excluded from the analysis, resulting in a sample size of 12,911.

General Council of the Judiciary

Data on separations and divorces comes from the yearbooks of the General Council of the Judiciary (*Memoria del Consejo General del Poder Judicial*). Here, the number of annulments, divorces and separations are reported by region, year and whether the dissolution was contested or by mutual agreement. I was able to recover data starting with the year 1989. Before 1989, the data is reported by *colegios*, a grouping of provinces used by some authorities, which does not always coincide with autonomous communities. For 1997, the corresponding numbers are the result of linear interpolation using the series 1989-1996 and 1998-2018, as I was unable to find data for that year. The number of annulments have been negligible throughout this period, never exceeding 200 per year for the entire nation, so I chose to omit it from the analysis. See the Figure 2.C.1.

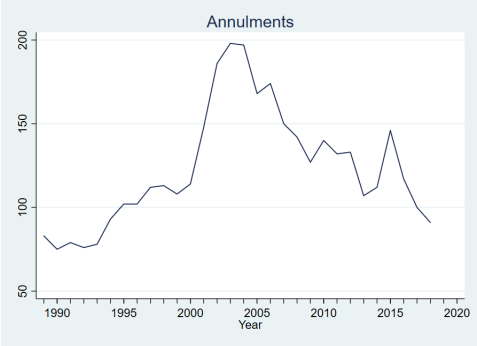


Figure 2.C.1: Number of Annulments in Spain, 1989-2018

Directorate General of Registries and Notaries

The number of marital contracts in each year and province was obtained from the records of the Directorate General for Registers and Notaries (*Anuario de la Dirección General de los Registros y del Notariado*). The yearbooks of the DGRN report the number

of all kinds of contracts that are subject to notarial registration, among them marriage-related contracts, by notary.

2.C.2 Summary Statistics

		Community property default		Separate property default		Total	
	Variable name	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Outcomes	Fertility rate	41.671	10.521	42.938	5.737	41.800	10.143
	Fertility rate, 1st child	20.691	3.750	22.919	3.328	20.918	3.769
	Fertility rate, 2nd child	14.645	2.973	14.786	2.053	14.659	2.892
	Fertility rate, 3rd child	4.196	2.480	3.806	1.306	4.156	2.389
	First born, percent	50.618	5.319	53.272	4.876	50.889	5.335
	Second born, percent	35.573	3.364	34.392	2.981	35.453	3.346
	Third born, percent	9.383	3.131	8.695	2.038	9.313	3.044
	Female employment rate	0.300	0.094	0.388	0.088	0.309	0.097
	Female labour force participation rate	0.387	0.101	0.460	0.096	0.395	0.103
	Home makers/total working age population	0.176	0.066	0.145	0.056	0.173	0.065
	Marriages by residence per 1,000 persons	4.490	1.072	4.668	0.884	4.508	1.055
	Marriages by residence per 1,000 marriageable aged persons	9.802	2.426	9.876	2.092	9.810	2.393
	Marriages by celebration per 1,000 persons	4.864	1.064	4.793	0.829	4.857	1.042
	Marriages by celebration per 1,000 marriageable aged persons	10.658	2.574	10.138	1.977	10.605	2.524
Controls	Province GDP/national GDP	0.016	0.025	0.042	0.049	0.018	0.030
	Female unemployment rate	0.231	0.096	0.157	0.060	0.223	0.095
	Male unemployment rate	0.144	0.075	0.109	0.061	0.140	0.074
	Students aged 16+/total working age population	0.075	0.015	0.058	0.010	0.073	0.015
	Total population	683760	840550	1493826	1763701	766419	1005217
	Total male population	335664	405795	734975	858906	376410	487234
	Total female population	348096	434828	758851	904840	390010	518062
	Number of years	38		38		38	
	Number of provinces	44		5		49	
	Observations	1672		190		1862	

Table 2.C.1: Summary statistics for province-level data, 1981-2018

		Community property default		Separate property default		Total	
	Variable name	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Outcomes	Divorces per 1000 persons	1.399	0.773	1.868	0.719	1.453	0.781
	Mutual agreement divorces per 1000 persons	0.860	0.572	1.298	0.643	0.910	0.597
	Contested divorces per 1000 persons	0.540	0.284	0.570	0.156	0.543	0.272
	Divorces per 1,000 marriageable persons	2.919	1.598	3.755	1.414	3.015	1.599
	Mutual agreement divorces per 1,000 marriageable persons	1.803	1.222	2.613	1.298	1.896	1.256
	Contested divorces per 1,000 marriageable persons	1.116	0.550	1.142	0.283	1.119	0.526
	Separations per 1,000 persons	0.763	0.645	1.083	0.857	0.799	0.679
	Mutual agreement separations per 1,000 persons	0.435	0.375	0.713	0.590	0.467	0.414
	Contested separations per 1,000 persons	0.327	0.303	0.370	0.303	0.332	0.303
	Separations per 1,000 marriageable persons	1.557	1.268	2.166	1.691	1.627	1.335
	Mutual agreement separations per 1,000 marriageable persons	0.888	0.734	1.421	1.152	0.949	0.810
	Contested separations per 1,000 marriageable persons	0.669	0.603	0.745	0.614	0.678	0.604
Controls	Regional GDP/national GDP	0.043	0.047	0.107	0.083	0.050	0.056
	Female unemployment rate, com. aut.	0.228	0.096	0.162	0.053	0.221	0.095
	Male unemployment rate, com. aut.	0.140	0.070	0.119	0.057	0.138	0.069
	Total population, com. aut.	1917672	2015134	3838324	2974090	2131078	2223052
	Total male population, com. aut.	941451	986473	1889905	1460508	1046834	1089635
	Total female population, com. aut.	976221	1028968	1948419	1513727	1084243	1133691
	Number of years	30		30		30	
	Number of regions	16		2		18	
	Observations	480		60		540	

Table 2.C.2: Summary statistics for regional date, 1989-2018

	Community property default		Separate property default		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Employed						
0	7,873	45.1%	831	32.1%	8,704	43.4%
1	9,576	54.9%	1,756	67.9%	11,332	56.6%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Active						
0	5,657	32.4%	629	24.3%	6,286	31.4%
1	11,792	67.6%	1,958	75.7%	13,750	68.6%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Homemaker						
0	14,275	81.8%	2,242	86.7%	16,517	82.4%
1	3,174	18.2%	345	13.3%	3,519	17.6%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Fertility gap						
0	6,582	62.3%	1,015	63.7%	7,597	62.5%
1	3,977	37.7%	578	36.3%	4,555	37.5%
Total	10,559	100.0%	1,593	100.0%	12,152	100.0%
Has one child						
0	14,010	80.3%	2,066	79.9%	16,076	80.2%
1	3,439	19.7%	521	20.1%	3,960	19.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Has two children						
0	12,415	71.2%	1,799	69.5%	14,214	70.9%
1	5,034	28.8%	788	30.5%	5,822	29.1%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Has three children						
0	16,209	92.9%	2,425	93.7%	18,634	93.0%
1	1,240	7.1%	162	6.3%	1,402	7.0%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Married						
0	7,987	45.8%	1,208	46.7%	9,195	45.9%
1	9,462	54.2%	1,379	53.3%	10,841	54.1%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Divorced or separated						
0	16,481	94.5%	2,390	92.4%	18,871	94.2%
1	968	5.5%	197	7.6%	1,165	5.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Degree of urbanization at place of residence						
Urban	6,275	36.0%	1,070	41.4%	7,345	36.7%
Intermediate	6,628	38.0%	1,001	38.7%	7,629	38.1%
Rural	4,546	26.1%	516	19.9%	5,062	25.3%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Religion						
Roman Catholic	12,486	71.6%	1,542	59.6%	14,028	70.0%
Protestant	65	0.4%	26	1.0%	91	0.5%
Muslim	292	1.7%	71	2.7%	363	1.8%
Other Christian	194	1.1%	40	1.5%	234	1.2%
Other	465	2.7%	76	2.9%	541	2.7%
None	2,732	15.7%	619	23.9%	3,351	16.7%
Prefer not to answer	1,215	7.0%	213	8.2%	1,428	7.1%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Highest education achieved						
1 - Less than primary education	327	1.9%	39	1.5%	366	1.8%
2 - Primary education	2,563	14.7%	286	11.1%	2,849	14.2%
3 - First part of secondary education or equivalent	3,274	18.8%	501	19.4%	3,775	18.8%
4 - Second part of secondary education or equivalent	3,181	18.2%	508	19.6%	3,689	18.4%
5 - Post-secondary degree, not equivalent to university	1,105	6.3%	213	8.2%	1,318	6.6%
6 - Arts, design, sports degree equivalent to university degree (BA)	2,232	12.8%	331	12.8%	2,563	12.8%
7 - University degree up to 240 credits (BA/BSc)	2,287	13.1%	312	12.1%	2,599	13.0%
8 - University degree more than 240 credits (MA/MSc)	2,347	13.5%	371	14.3%	2,718	13.6%
9 - Doctoral degree	133	0.8%	26	1.0%	159	0.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Has been employed before						
0	6,432	36.9%	729	28.2%	7,161	35.7%
1	11,017	63.1%	1,858	71.8%	12,875	64.3%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Partner's highest education achieved						
1 - Less than primary education	330	2.5%	29	1.5%	359	2.4%
2 - Primary education	2,379	18.3%	265	13.8%	2,644	17.7%
3 - First part of secondary education or equivalent	2,780	21.4%	416	21.7%	3,196	21.4%
4 - Second part of secondary education or equivalent	2,342	18.0%	402	20.9%	2,744	18.4%
5 - Post-secondary degree, not equivalent to university	737	5.7%	143	7.4%	880	5.9%
6 - Arts, design, sports degree equivalent to university degree (BA)	1,574	12.1%	204	10.6%	1,778	11.9%
7 - University degree up to 240 credits (BA/BSc)	1,153	8.9%	188	9.8%	1,341	9.0%
8 - University degree more than 240 credits (MA/MSc)	1,563	12.0%	256	13.3%	1,819	12.2%
9 - Doctoral degree	127	1.0%	17	0.9%	144	1.0%
Total	12,985	100.0%	1,920	100.0%	14,905	100.0%
Partner's labour market status						
Employed	10,927	84.2%	1,710	89.1%	12,637	84.8%
Unemployed	1,034	8.0%	103	5.4%	1,137	7.6%
Student	381	2.9%	32	1.7%	413	2.8%
Pensioner	362	2.8%	31	1.6%	393	2.6%
Disabled	100	0.8%	14	0.7%	114	0.8%
Homemaker	21	0.2%	3	0.2%	24	0.2%
Other	160	1.2%	27	1.4%	187	1.3%
Total	12,985	100.0%	1,920	100.0%	14,905	100.0%
Infertile						
0	15,418	95.4%	2,209	94.9%	17,627	95.4%
1	736	4.6%	119	5.1%	855	4.6%
Total	16,154	100.0%	2,328	100.0%	18,482	100.0%
Continuous variables	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Number of desired children	2.224	0.831	2.187	0.851	2.220	0.834
Number of biological children	1.073	1.112	1.055	1.059	1.071	1.105
Age	37.087	10.505	36.930	10.317	37.067	10.480
Partner's age	41.253	10.089	41.020	9.629	41.224	10.032
Observations	17449		2587		20036	

Education coded according to the 2018 survey

Table 2.C.3: Summary Statistics, Fertility Surveys 1999 and 2018

	Community property default		Separate property default		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Reason for fertility gap: wants to continue studying						
0	17,408	99.8%	2,584	99.9%	19,992	99.8%
1	41	0.2%	3	0.1%	44	0.2%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: health issues						
0	16,970	97.3%	2,540	98.2%	19,510	97.4%
1	479	2.7%	47	1.8%	526	2.6%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: pregnancy, delivery and caring for children are difficult for a woman						
0	17,309	99.2%	2,560	99.0%	19,869	99.2%
1	140	0.8%	27	1.0%	167	0.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility: too old to have more children						
0	16,958	97.2%	2,513	97.1%	19,471	97.2%
1	491	2.8%	74	2.9%	565	2.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: want to or has to work outside home						
0	16,416	94.1%	2,432	94.0%	18,848	94.1%
1	1,033	5.9%	155	6.0%	1,188	5.9%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: insufficient financial resources						
0	16,376	93.9%	2,424	93.7%	18,800	93.8%
1	1,073	6.1%	163	6.3%	1,236	6.2%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: house is too small						
0	17,258	98.9%	2,569	99.3%	19,827	99.0%
1	191	1.1%	18	0.7%	209	1.0%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: too many household chores						
0	17,367	99.5%	2,568	99.3%	19,935	99.5%
1	82	0.5%	19	0.7%	101	0.5%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: nurseries and kindergartens are too expensive						
0	17,404	99.7%	2,582	99.8%	19,986	99.8%
1	45	0.3%	5	0.2%	50	0.2%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: marital status of the interviewee						
0	17,380	99.6%	2,573	99.5%	19,953	99.6%
1	69	0.4%	14	0.5%	83	0.4%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: marital status of her partner						
0	17,051	97.7%	2,526	97.6%	19,577	97.7%
1	398	2.3%	61	2.4%	459	2.3%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: unemployment (own or partner's)						
0	17,055	97.7%	2,537	98.1%	19,592	97.8%
1	394	2.3%	50	1.9%	444	2.2%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: fear that the child might be born with health problems						
0	17,282	99.0%	2,567	99.2%	19,849	99.1%
1	167	1.0%	20	0.8%	187	0.9%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: less freedom and time for other activities						
0	17,402	99.7%	2,579	99.7%	19,981	99.7%
1	47	0.3%	8	0.3%	55	0.3%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: worries or problems that having a child entails						
0	17,248	98.8%	2,551	98.6%	19,799	98.8%
1	201	1.2%	36	1.4%	237	1.2%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: still plans to have more children						
0	16,583	95.0%	2,465	95.3%	19,048	95.1%
1	866	5.0%	122	4.7%	988	4.9%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: failure of birth control method used						
0	17,265	98.9%	2,565	99.1%	19,830	99.0%
1	184	1.1%	22	0.9%	206	1.0%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: unawareness of birth control methods						
0	17,392	99.7%	2,580	99.7%	19,972	99.7%
1	57	0.3%	7	0.3%	64	0.3%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%
Reason for fertility gap: other						
0	16,955	97.2%	2,519	97.4%	19,474	97.2%
1	494	2.8%	68	2.6%	562	2.8%
Total	17,449	100.0%	2,587	100.0%	20,036	100.0%

Reasons for fertility gap coded according to the 1999 survey

Table 2.C.4: Summary Statistics, Fertility Surveys 1999 and 2018

Group	Statement	Possible answers	Baseline
Marriage	It's good for a couple to live together even if they have no intention to get married	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	It's good for an unfaithful married couple to divorce even if they have children	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	Taking care of the family is just as satisfying as paid employment	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	Men should participate in chores to the same extent as women	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
Children	A woman should have children to feel fulfilled	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	A man should have children to feel fulfilled	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	A child needs a home with his/her father and mother to have a happy childhood	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	A woman can raise a child by herself if she doesn't want to maintain a stable relationship with a man	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	For a woman, the priority should be her family rather than her career	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	The father or the mother should be the main caretaker in the period of 0 to 3 years	Agree (1), Neither agree nor disagree (2), Disagree (3)	2
	If the parents divorce it's better for the child to stay with the mother than the father	Agree (1), Neither agree nor disagree (2), Disagree (3)	2

Table 2.C.5: Values, 2018 Fertility Survey

	Community property default		Separate property default		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Values: It's good for a couple to live together even if they have no intention to get married						
Agree	10,764	87.3%	1,457	86.4%	12,221	87.2%
Neither agree, nor disagree	1,141	9.3%	145	8.6%	1,286	9.2%
Disagree	430	3.5%	84	5.0%	514	3.7%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: It's good for an unfaithful married couple to divorce even if they have children						
Agree	11,146	90.4%	1,509	89.5%	12,655	90.3%
Neither agree, nor disagree	843	6.8%	110	6.5%	953	6.8%
Disagree	346	2.8%	67	4.0%	413	2.9%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: Taking care of the family is just as satisfying as paid employment						
Agree	4,013	32.5%	505	30.0%	4,518	32.2%
Neither agree, nor disagree	3,779	30.6%	638	37.8%	4,417	31.5%
Disagree	4,543	36.8%	543	32.2%	5,086	36.3%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: Men should participate in chores to the same extent as women						
Agree	11,489	93.1%	1,526	90.5%	13,015	92.8%
Neither agree, nor disagree	717	5.8%	129	7.7%	846	6.0%
Disagree	129	1.0%	31	1.8%	160	1.1%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: A woman should have children to feel fulfilled						
Agree	825	6.7%	207	12.3%	1,032	7.4%
Neither agree, nor disagree	1,542	12.5%	273	16.2%	1,815	12.9%
Disagree	9,968	80.8%	1,206	71.5%	11,174	79.7%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: A man should have children to feel fulfilled						
Agree	698	5.7%	179	10.6%	877	6.3%
Neither agree, nor disagree	1,641	13.3%	303	18.0%	1,944	13.9%
Disagree	9,996	81.0%	1,204	71.4%	11,200	79.9%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: A child needs a home with his/her father and mother to have a happy childhood						
Agree	4,594	37.2%	628	37.2%	5,222	37.2%
Neither agree, nor disagree	3,346	27.1%	470	27.9%	3,816	27.2%
Disagree	4,395	35.6%	588	34.9%	4,983	35.5%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: A woman can raise a child by herself if she doesn't want to maintain a stable relationship with a man						
Agree	11,035	89.5%	1,468	87.1%	12,503	89.2%
Neither agree, nor disagree	995	8.1%	164	9.7%	1,159	8.3%
Disagree	305	2.5%	54	3.2%	359	2.6%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: For a woman, the priority should be her family rather than her career						
Agree	3,263	26.5%	439	26.0%	3,702	26.4%
Neither agree, nor disagree	4,111	33.3%	588	34.9%	4,699	33.5%
Disagree	4,961	40.2%	659	39.1%	5,620	40.1%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: The father or the mother should be the main caretaker in the period of 0 to 3 years						
Agree	9,199	74.6%	1,276	75.7%	10,475	74.7%
Neither agree, nor disagree	2,206	17.9%	303	18.0%	2,509	17.9%
Disagree	930	7.5%	107	6.3%	1,037	7.4%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%
Values: If the parents divorce it's better for the child to stay with the mother than the father						
Agree	2,004	16.2%	337	20.0%	2,341	16.7%
Neither agree, nor disagree	5,274	42.8%	730	43.3%	6,004	42.8%
Disagree	5,057	41.0%	619	36.7%	5,676	40.5%
Total	12,335	100.0%	1,686	100.0%	14,021	100.0%

Table 2.C.6: Summary Statistics, Fertility Survey 2018, Values

	Community property default		Separate property default		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Impact of having a child on the use of free time						
Positive	1,226	25.9%	140	21.4%	1,366	25.4%
Neither positive, nor negative	1,192	25.2%	153	23.4%	1,345	25.0%
Negative	2,316	48.9%	360	55.1%	2,676	49.7%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on work opportunities						
Positive	739	15.6%	81	12.4%	820	15.2%
Neither positive, nor negative	1,037	21.9%	156	23.9%	1,193	22.1%
Negative	2,958	62.5%	416	63.7%	3,374	62.6%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on professional growth						
Positive	737	15.6%	82	12.6%	819	15.2%
Neither positive, nor negative	1,403	29.6%	197	30.2%	1,600	29.7%
Negative	2,594	54.8%	374	57.3%	2,968	55.1%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on financial situation						
Positive	716	15.1%	74	11.3%	790	14.7%
Neither positive, nor negative	1,109	23.4%	185	28.3%	1,294	24.0%
Negative	2,909	61.4%	394	60.3%	3,303	61.3%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on sex life						
Positive	952	20.1%	124	19.0%	1,076	20.0%
Neither positive, nor negative	2,683	56.7%	376	57.6%	3,059	56.8%
Negative	1,099	23.2%	153	23.4%	1,252	23.2%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on personal growth						
Positive	2,334	49.3%	312	47.8%	2,646	49.1%
Neither positive, nor negative	1,382	29.2%	203	31.1%	1,585	29.4%
Negative	1,018	21.5%	138	21.1%	1,156	21.5%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on the relationship with one's partner						
Positive	2,203	46.5%	272	41.7%	2,475	45.9%
Neither positive, nor negative	1,685	35.6%	266	40.7%	1,951	36.2%
Negative	846	17.9%	115	17.6%	961	17.8%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on security for old age						
Positive	1,404	29.7%	171	26.2%	1,575	29.2%
Neither positive, nor negative	2,335	49.3%	375	57.4%	2,710	50.3%
Negative	995	21.0%	107	16.4%	1,102	20.5%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on improving the relationship with one's parents						
Positive	1,693	35.8%	221	33.8%	1,914	35.5%
Neither positive, nor negative	2,142	45.2%	319	48.9%	2,461	45.7%
Negative	899	19.0%	113	17.3%	1,012	18.8%
Total	4,734	100.0%	653	100.0%	5,387	100.0%
Impact of having a child on dwelling conditions						
Positive	1,186	25.1%	130	19.9%	1,316	24.4%
Neither positive, nor negative	2,074	43.8%	300	45.9%	2,374	44.1%
Negative	1,474	31.1%	223	34.2%	1,697	31.5%
Total	4,734	100.0%	653	100.0%	5,387	100.0%

Table 2.C.7: Summary Statistics, Fertility Survey 2018, Impact of Having Children

	Community property default		Separate property default		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Primary motive for not having children						
I did not get pregnant or could not carry it to full term	295	6.2%	39	6.0%	334	6.2%
I did not have a partner or one who is adequate	704	14.9%	113	17.3%	817	15.2%
I do not (yet) want to become a mother	650	13.7%	78	11.9%	728	13.5%
I wanted to continue studying	359	7.6%	46	7.0%	405	7.5%
Health issues	108	2.3%	13	2.0%	121	2.2%
Pregnancy, birth and caring for children are hard for a woman	27	0.6%	3	0.5%	30	0.6%
I am too young to have children	1,318	27.8%	180	27.6%	1,498	27.8%
I am too old to have children	79	1.7%	6	0.9%	85	1.6%
It would have conflicted with my career	97	2.0%	15	2.3%	112	2.1%
Insufficient financial resources	396	8.4%	55	8.4%	451	8.4%
Bad living conditions	7	0.1%	4	0.6%	11	0.2%
Too much work at home	10	0.2%	1	0.2%	11	0.2%
Kindergartens are too expensive	1	0.0%	1	0.2%	2	0.0%
Labour market situation (own or partner's)	260	5.5%	29	4.4%	289	5.4%
Fear that the child would be born with health issues	25	0.5%	1	0.2%	26	0.5%
Supposed loss of freedom and not having time for other activities	78	1.6%	17	2.6%	95	1.8%
Worries and problems that raising children entails	67	1.4%	9	1.4%	76	1.4%
Difficulties reconciling work and family life	125	2.6%	25	3.8%	150	2.8%
My partner did not want to	44	0.9%	5	0.8%	49	0.9%
I do not like the state of society for a child	56	1.2%	9	1.4%	65	1.2%
Other reasons	12	0.3%	3	0.5%	15	0.3%
Taking care of other family members	6	0.1%	1	0.2%	7	0.1%
I do not live with my partner	6	0.1%	0	0.0%	6	0.1%
I did not have the opportunity to form a family	4	0.1%	0	0.0%	4	0.1%
Total	4,734	100.0%	653	100.0%	5,387	100.0%

Table 2.C.8: Summary Statistics, Fertility Survey 2018, Primary Reason for Not Having Children

2.D Parallel Pre-Trends Checks

This section presents graphs of trends that were not included in the main text and additional parallel pre-trends checks.

The regressions run to check parallel pre-trends are of the form

$$\begin{aligned}\text{Outcome}_{a,t} = \beta_0 + \gamma\,&\text{Community property default}_a \\ &+ \sum_{j=2}^{M} \beta_j \times \text{year j before 2005 reform}_t \times \text{Community property default}_a \\ &+ \sum_{k=1}^{14} \beta_k \times \text{year k after 2005 reform}_t \times \text{Community property default}_a \\ &+ X_{a,t}\eta + \sum_t \delta_t \text{Year}_t + \sum_p \lambda_p \text{Area}_a + \nu_{a,t}\end{aligned} \tag{2.12}$$

where a indexes area (region (autonomous community) or province) and t indexes time (year). M denotes the largest number of pre-reform years used in the given regression.

The outcomes are marriage rate, percent born by order of birth, female employment rate, female labour force participation, home makers' share in total working age population, divorce and separation rates by type of the dissolution procedure (mutual agreement or contested). Divorce and separation are measured on region level, the other variables are all province-level. The available time series for divorce and separation is shorter, starting with 1989; therefore, $j = 2, \ldots, 16$ in this case.

The controls included in $X_{a,t}$ are

- Local civil law indicators (*fuero del Baylío*, *conquistas*, *consorcio conyugal*)
- Indicators for the three reforms of the Catalan Civil Code (1993, 1998, 2010)
- Age profiles by gender: age groups of 5 years, normalized by the total population of the province (region), by gender, with the last age group being 85+ (0-4 years old females/total female population,..., 80-84 year old females/total female population, 85+year old females/total female population; same for males)
- Students aged 16+ divided by total working age population
- GDP share of the province (region): GDP of the province (region) divided by national GDP in year t
- Unemployment rate by gender, when the outcome is marriage, divorce or separation rate

- Lagged separation rate with lags 1-5, when the outcome is divorce

The first post-reform year is taken to be 2005. The reference year is 2004; therefore all coefficients of the type *n years before/after reform* $\times$ *community property default* express a change compared to the 2004 value. Standard errors are clustered by the appropriate level of aggregation (province or region). The three provinces of Valencia region are excluded from the analysis, leading to 49 clusters for province-level data and 18 clusters for regional data.

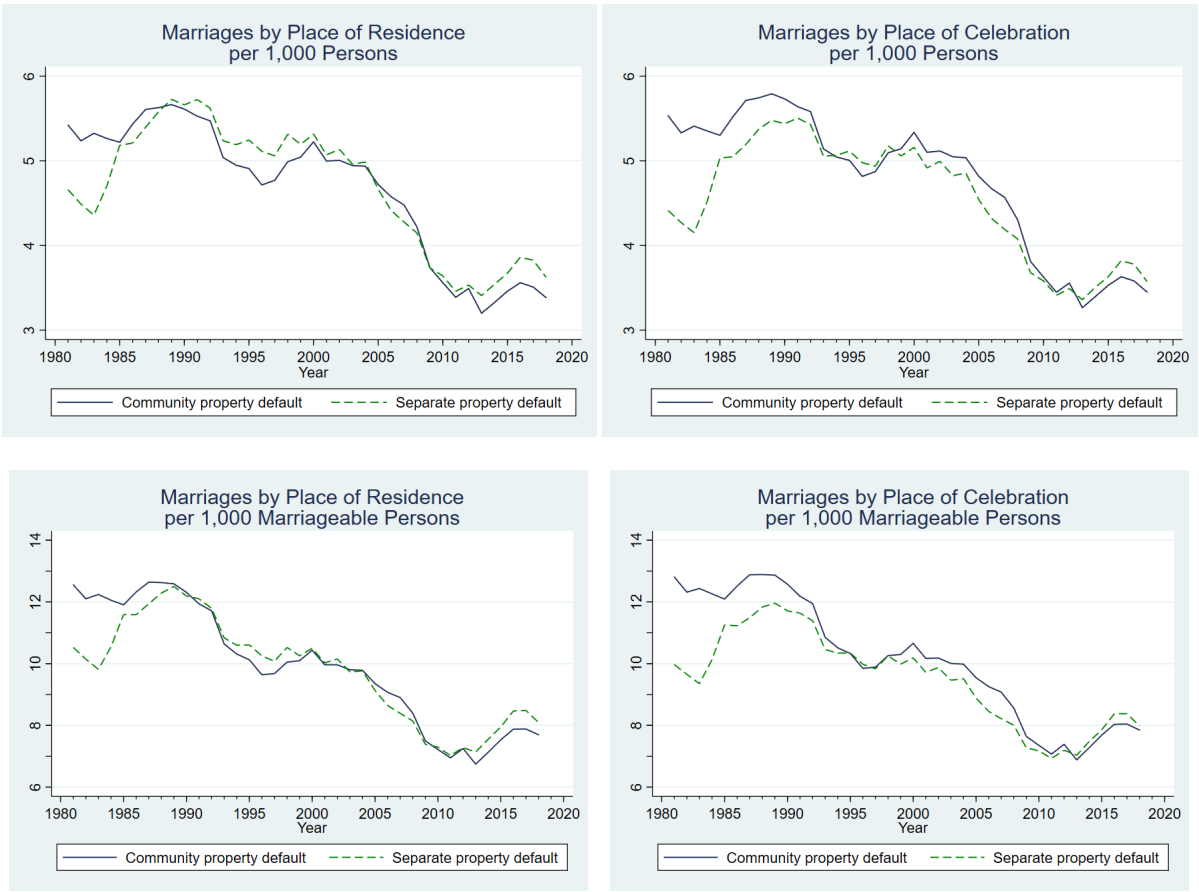
Female Labour Supply

See the results in the main text.

Fertility

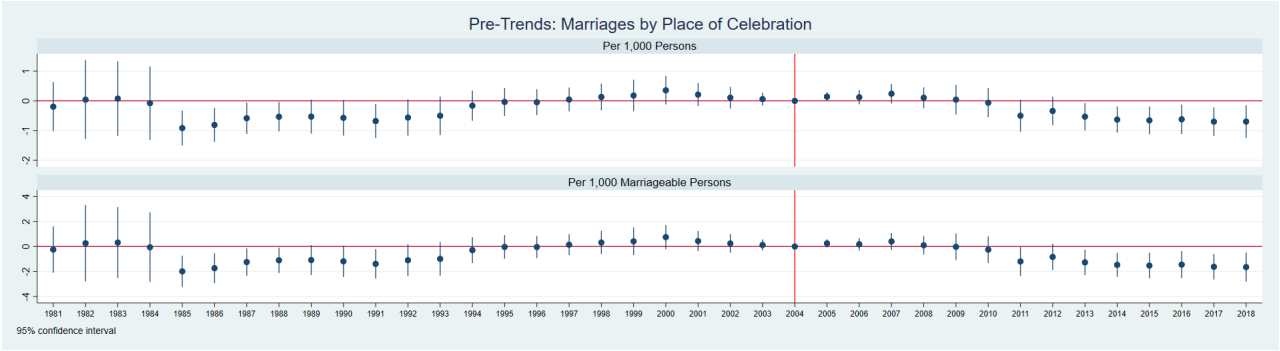
See the results in the main text.

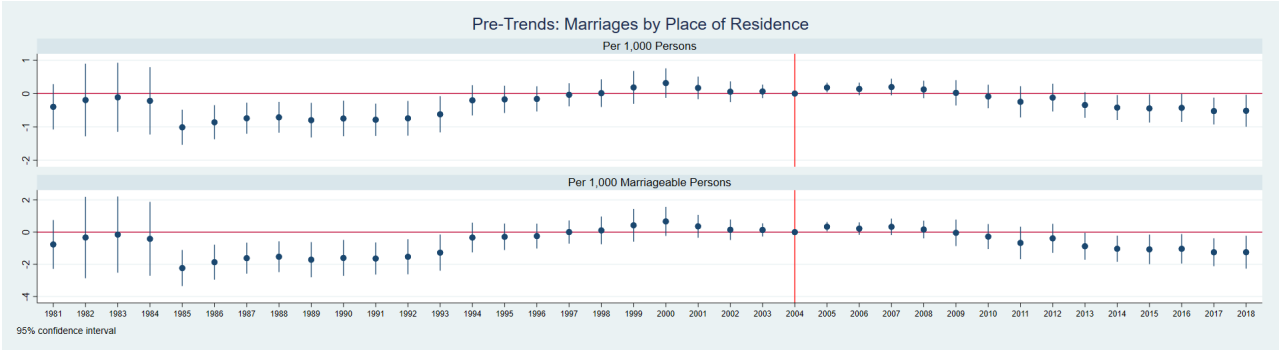
Marriage, Divorce and Separation



Notes: Valencia region excluded. Series 1981-2018.

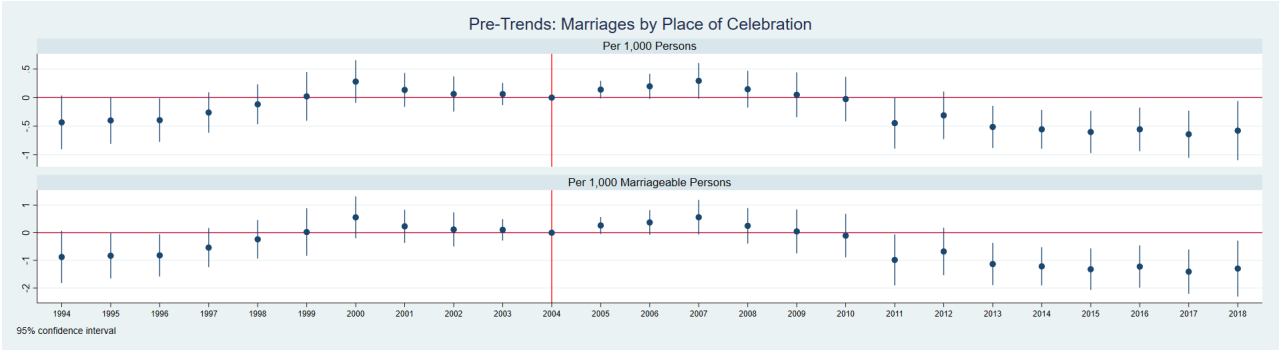
Figure 2.D.1: Trends, Marriage Rate

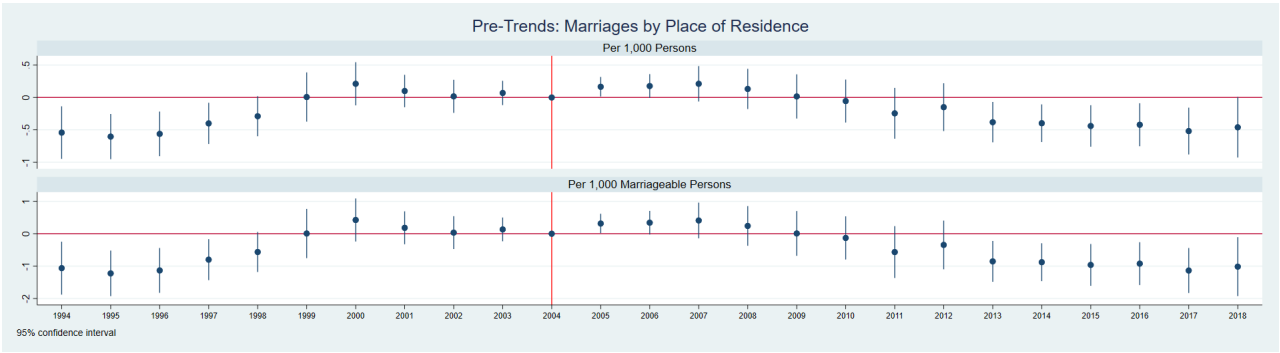




Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

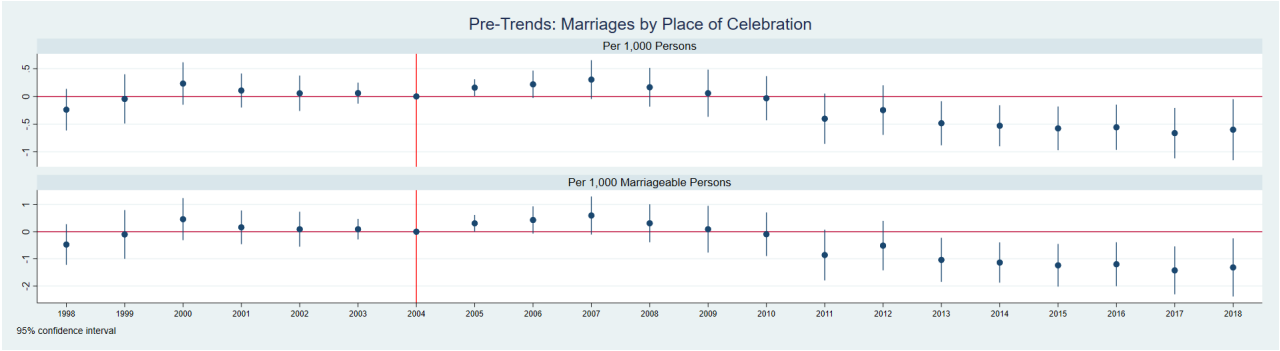
Figure 2.D.2: Parallel Pre-Trends Checks, Marriage Rate, Series 1981-2018.

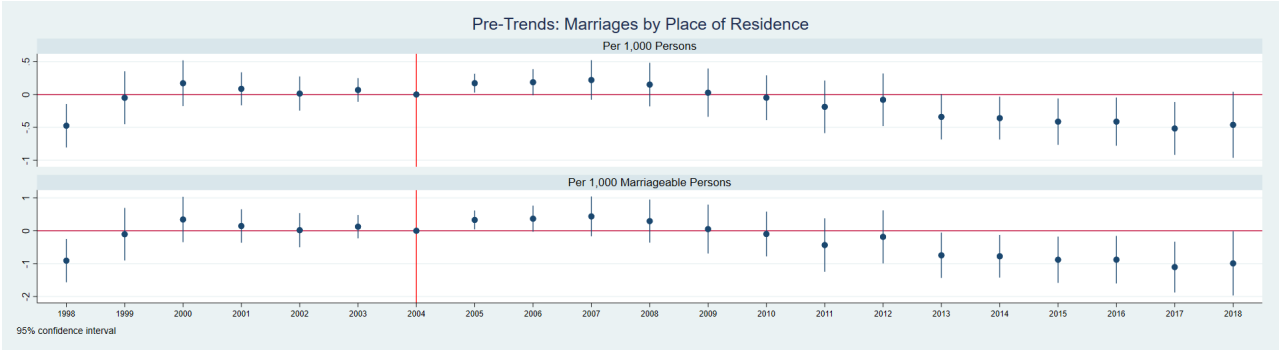




Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

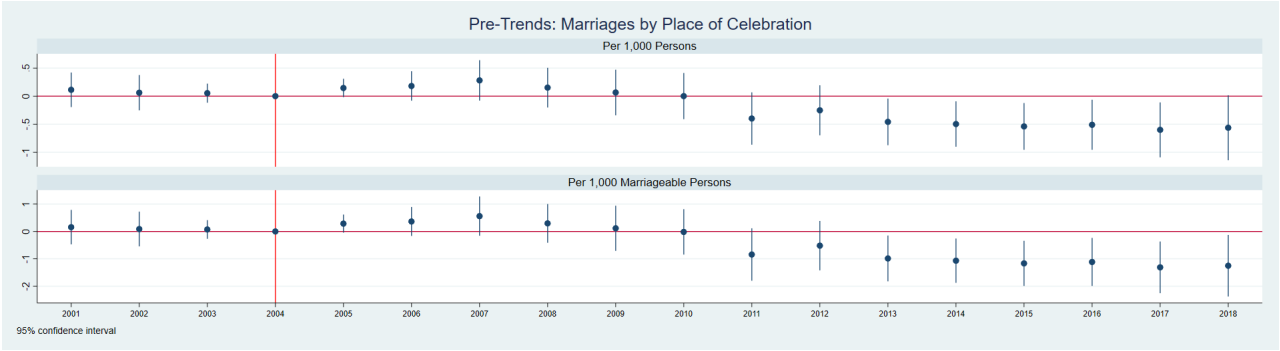
Figure 2.D.3: Parallel Pre-Trends Checks, Marriage Rate, Series 1994-2018

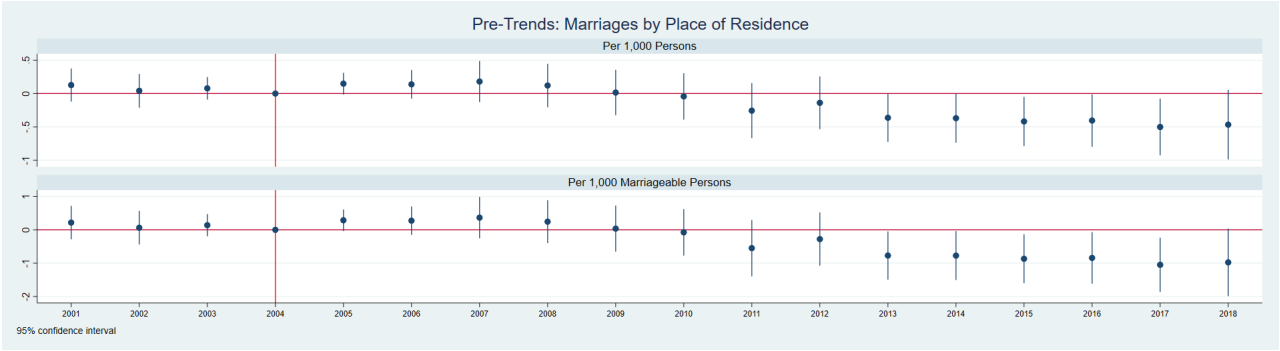




Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

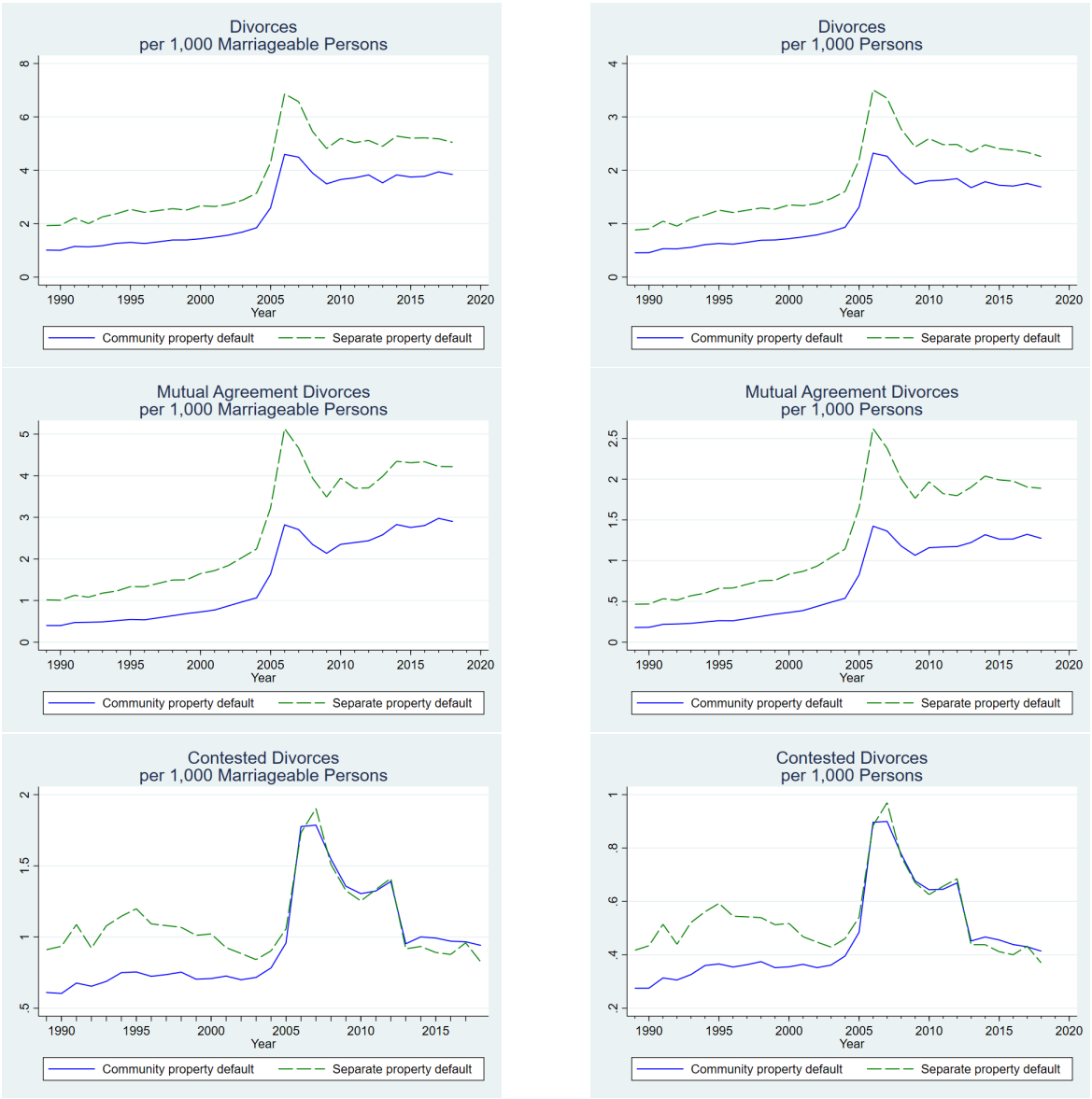
Figure 2.D.4: Parallel Pre-Trends Checks, Marriage Rate, Series 1998-2018





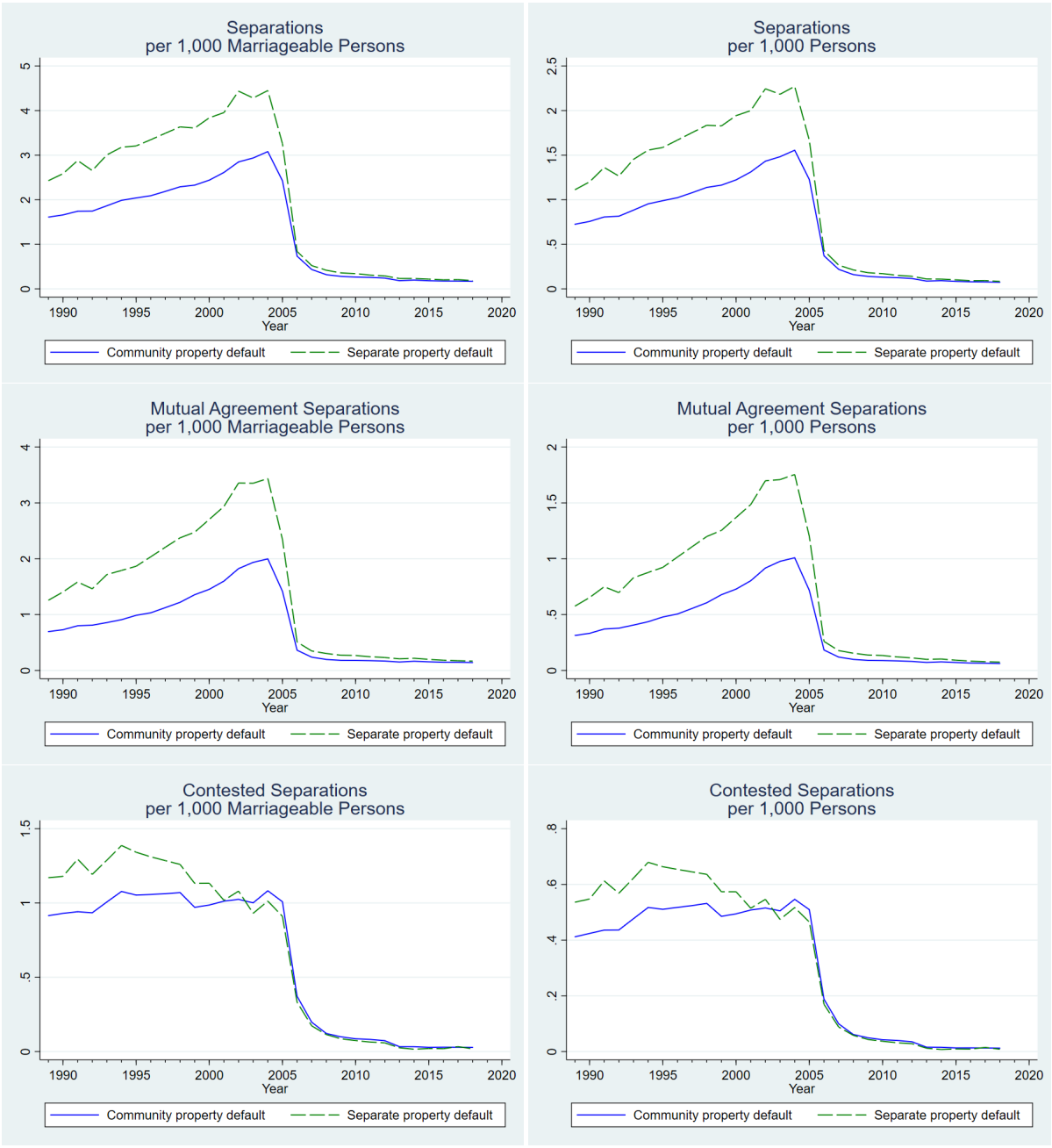
Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Alicante, Castellón, and Valencia provinces were discarded. Standard errors clustered at province level. 95% confidence intervals.

Figure 2.D.5: Parallel Pre-Trends Checks, Marriage Rate, Series 2001-2018



Notes: Valencia region excluded. Series 1989-2018.

Figure 2.D.6: Trends, Divorce Rate by Type

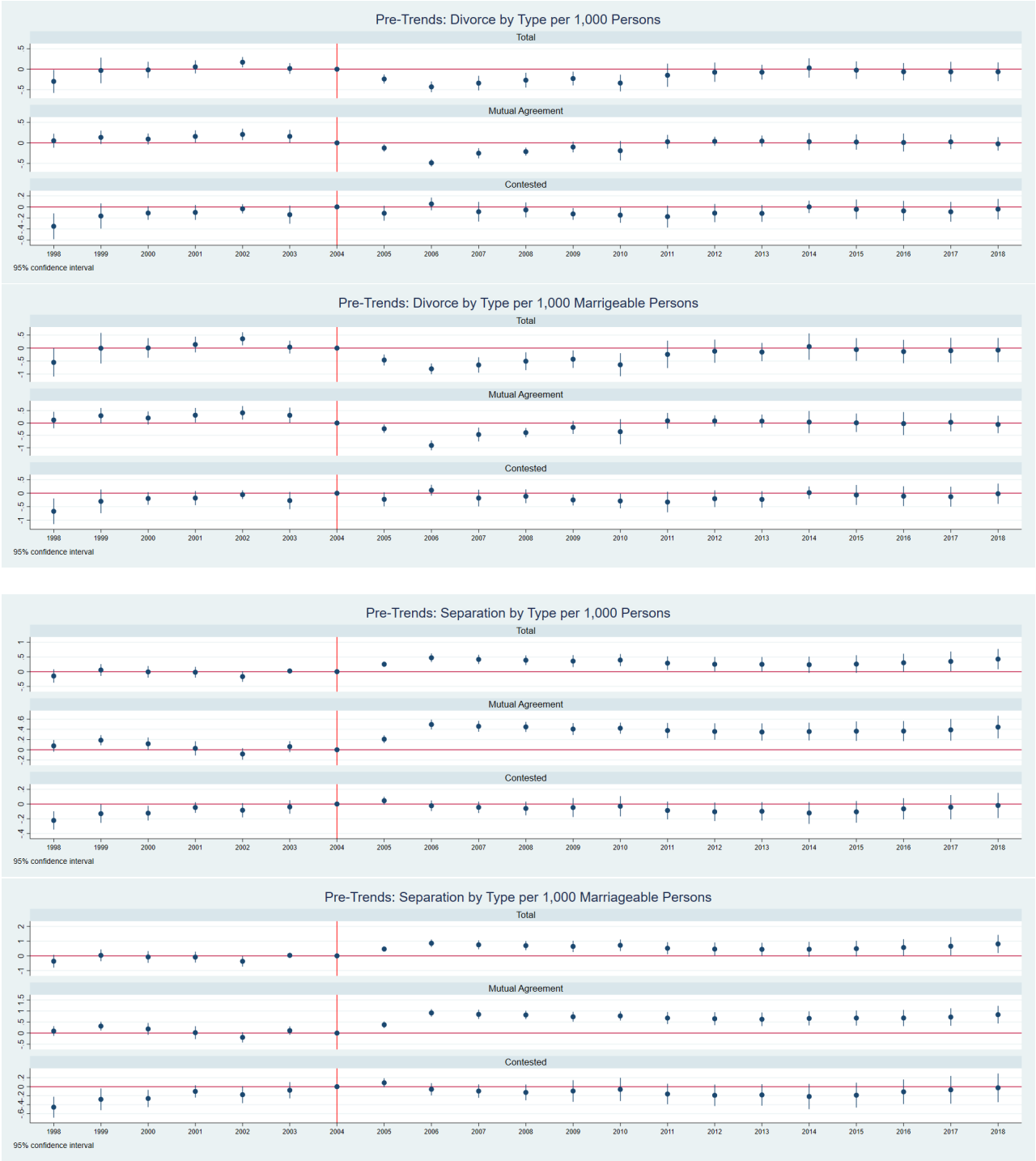


Notes: Valencia region excluded. Series 1989-2018.

Figure 2.D.7: Trends, Separation Rate by Type

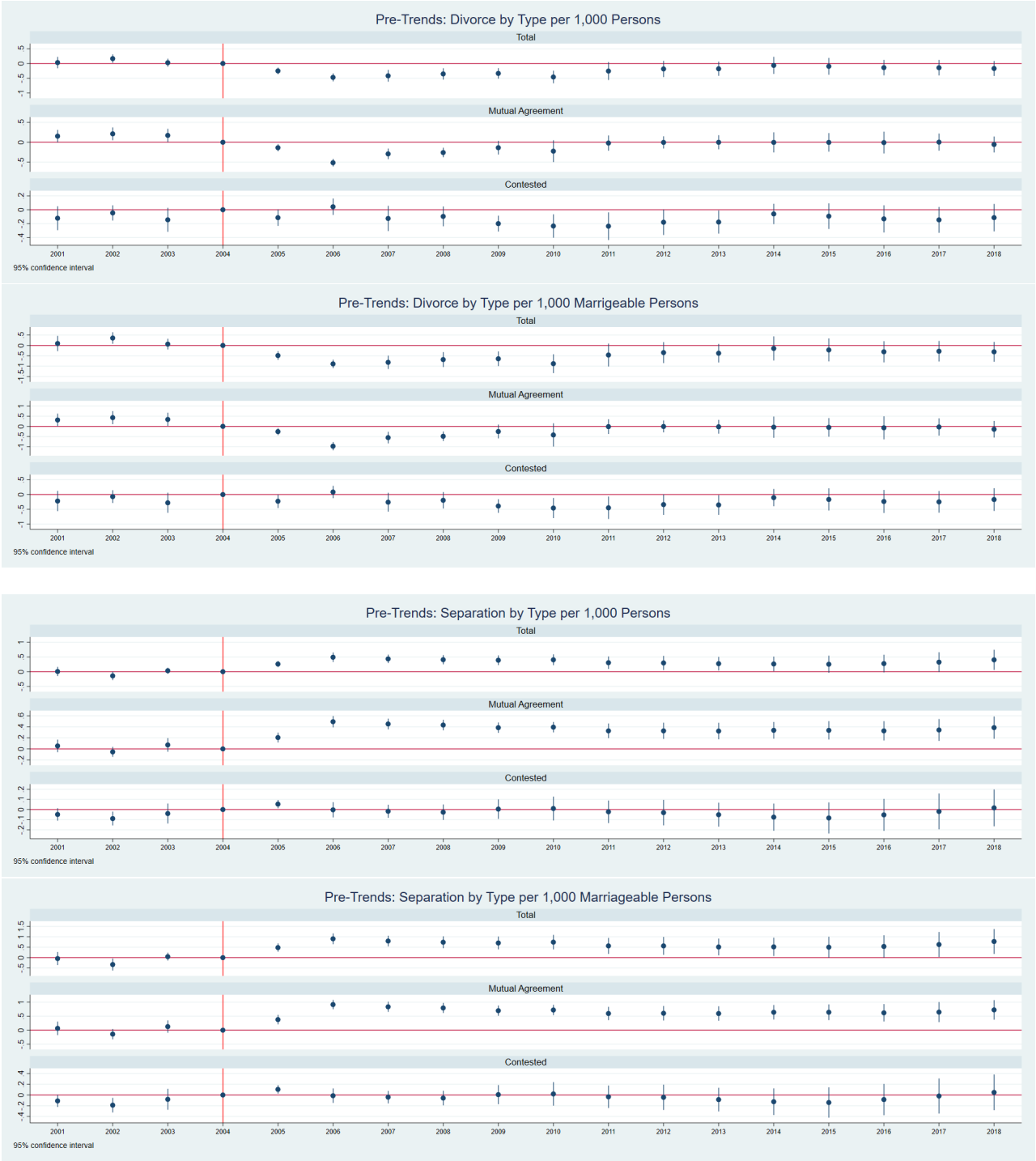
Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.D.8: Parallel Pre-Trends Checks, Divorce and Separation, Series 1994-2018



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.D.9: Parallel Pre-Trends Checks, Divorce and Separation, Series 1998-2018



Notes: Full set of controls included in the regressions. 2004 is the baseline. Observations corresponding to Valencia region were discarded. Standard errors clustered at region level. 95% confidence intervals.

Figure 2.D.10: Parallel Pre-Trends Checks, Divorce and Separation, Series 2001-2018

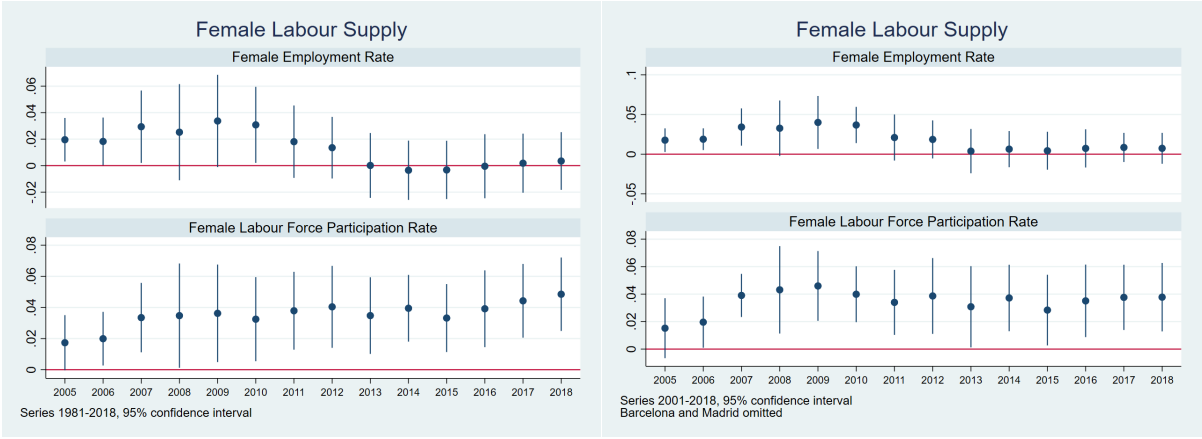
2.E Robustness Checks

In this section, I present various robustness checks. First, similar to the section on parallel pre-trends checks, I estimate the dynamic difference-in-differences specification (without leads of the treatment) on several samples for those outcome families, where regression results of the previous section indicated that the date from which trends were parallel is not 1981. Second, I investigate whether the results can be driven by Barcelona province, or by Barcelona and its natural community property counterpart, Madrid. These two provinces are also the richest and most populous of Spain. The hypothesis is that these leading regions might have unobserved characteristics resulting in different marital outcomes, driving the results.

The coefficient plots shown in this section were obtained using a full set of controls, as described in the main text and in Section 2.D. Estimation results with an expanding set of controls are available upon request.[85] As before, all three provinces of Valencia region (Alicante, Castellón, Valencia) are excluded from all specifications. Tarragona is excluded for 2005 and 2006 for variables derived from fertility by order of birth data, due to a coding error in the data in those years. Standard errors are clustered by province. For divorce and separation, the data I use for the main results is regional, which is the only level of aggregation that allows the series to be extended to 1989-2018. It is especially important to use series that are longer for divorce because one needs to control for lagged separation rates. However, the regional data does not allow for checking if the results are robust to the exclusion of Barcelona: only the entire region of Catalonia could be dropped. Therefore, I use the shorter province-level series for divorce and separation, with the same specification I used for with the regional data, including 5 lags of the separation rate when divorce is the outcome.

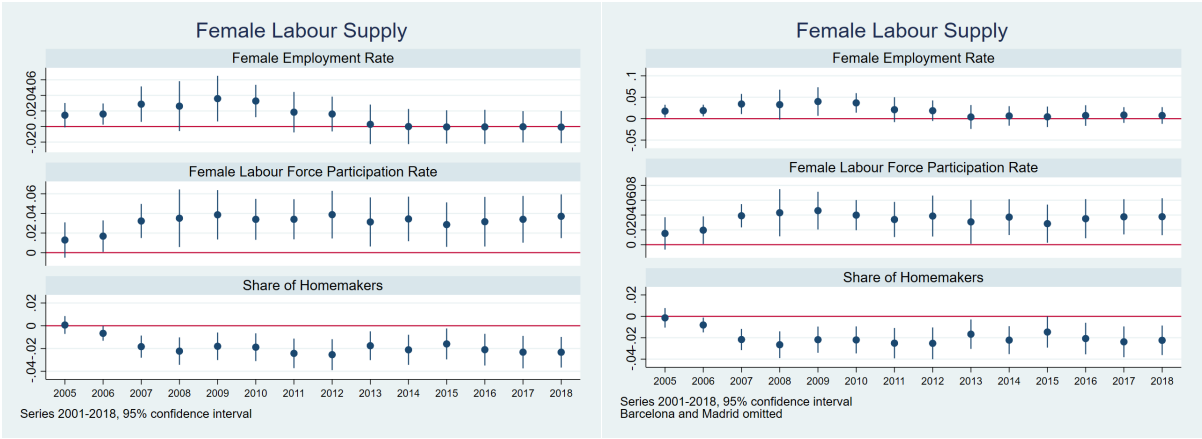
I find that the estimation results are remarkably robust to changes in the sample start date, the exclusion of Barcelona alone and the exclusion of both Madrid and Barcelona.

[85] These are constructed as follows. I begin with estimating a specification that controls only for area (province or region) fixed effects, year fixed effects, local civil law and the modifications of the Catalan Civil Code, denoted model (1). Then I add age profiles (quinquennial age groups normalized by the total population of the province) by gender in specification (2), and add GDP share of the province or region, students aged 16+ divided by the total working age population in specification (3). In addition to these, when the dependent variable is marriage, separation or divorce rate, I control for unemployment rate by gender in model (3). For divorce rate, I also add 5 lags of the separation rate as control, denoted as model (3b).



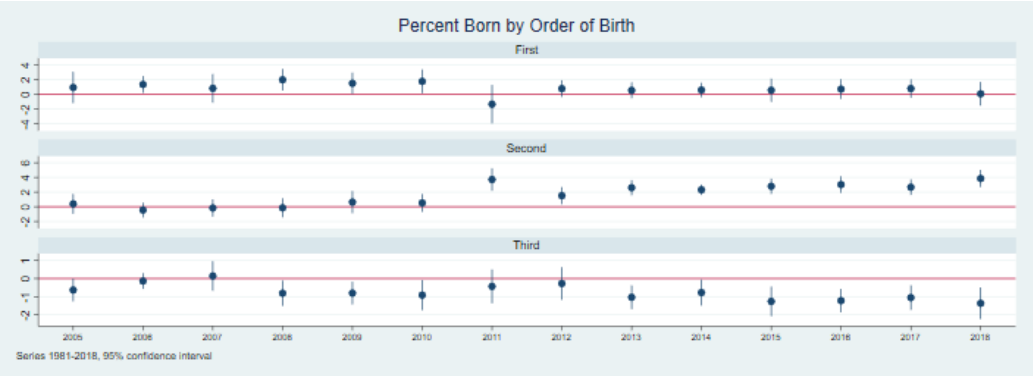
(a) 49 provinces, 1981-2018. (b) without Barcelona and Madrid, 1981-2018.

Figure 2.E.1: Robustness Check, Female Employment and Labour Force Participation Rate, Series 1981-2018.

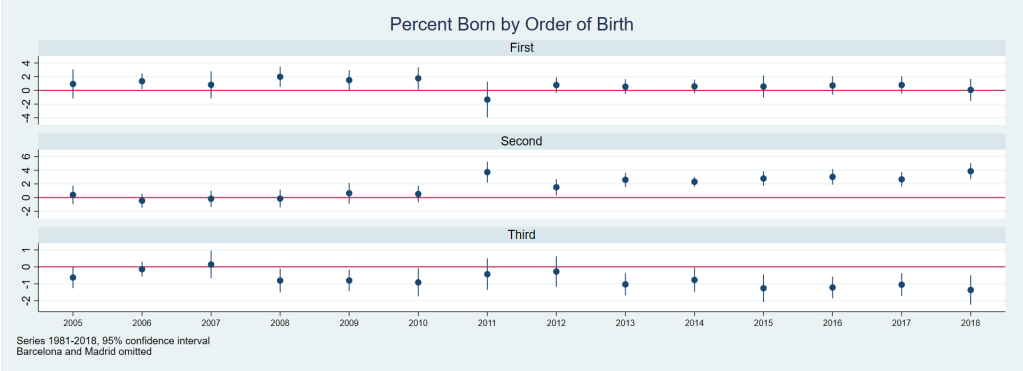


(a) 49 provinces, 2001-2018 (b) without Barcelona and Madrid, 2001-2018

Figure 2.E.2: Robustness Check, Female Labour Supply, Series 2001-2018.

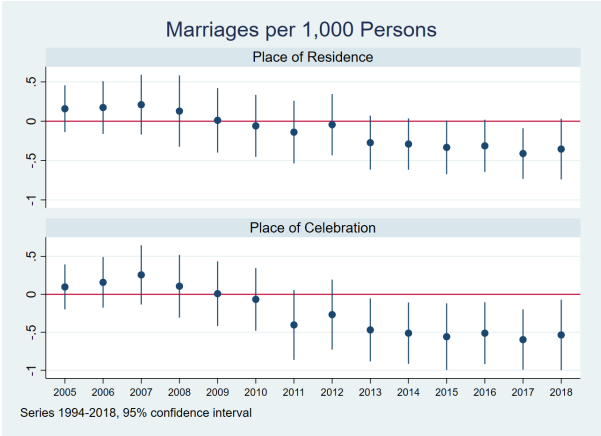


(a) 49 provinces

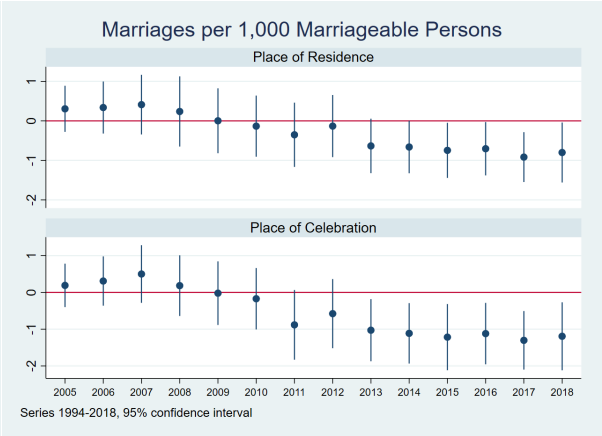


(b) without Barcelona and Madrid

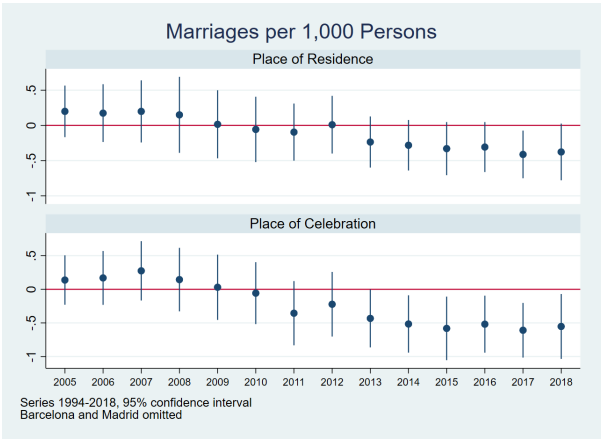
Figure 2.E.3: Robustness Check, Percent Born by Order of Birth, Series 1981-2018.



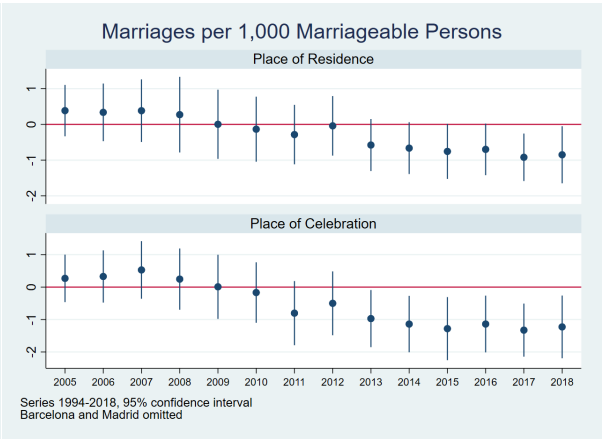
(a) 49 provinces



(b) 49 provinces

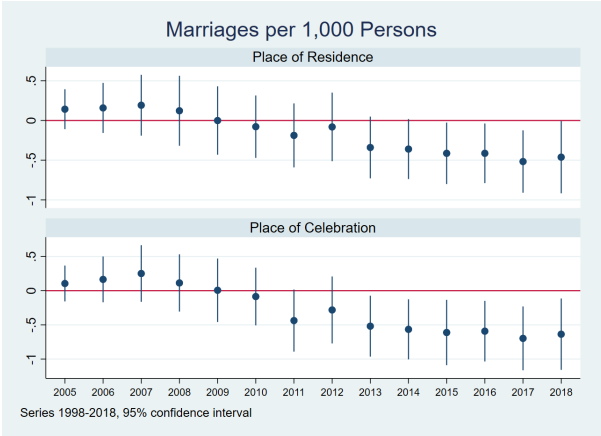


(c) without Barcelona and Madrid

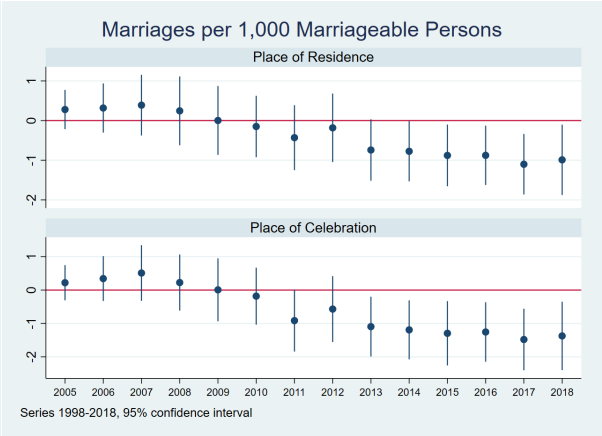


(d) without Barcelona and Madrid

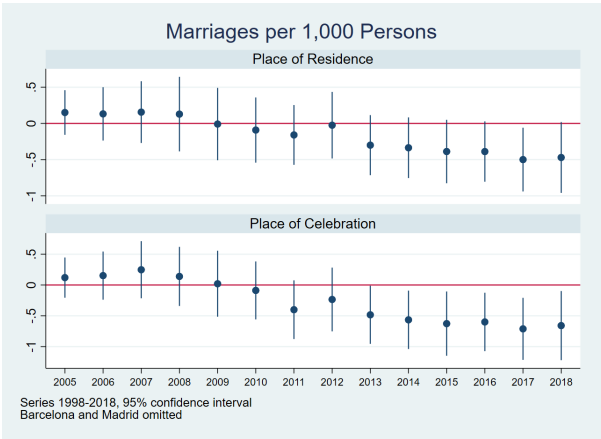
Figure 2.E.4: Robustness Check, Marriage Rate, Series 1994-2018.



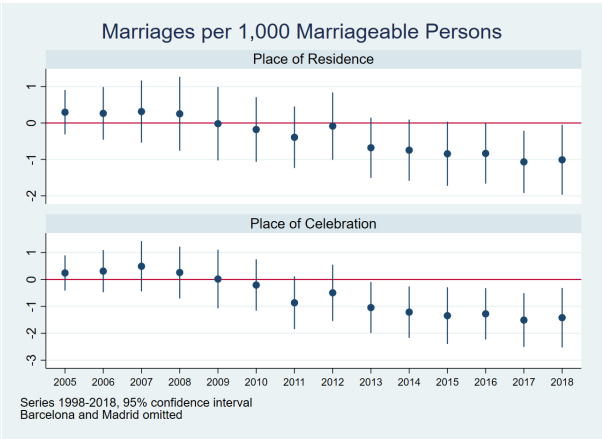
(a) 49 provinces



(b) 49 provinces

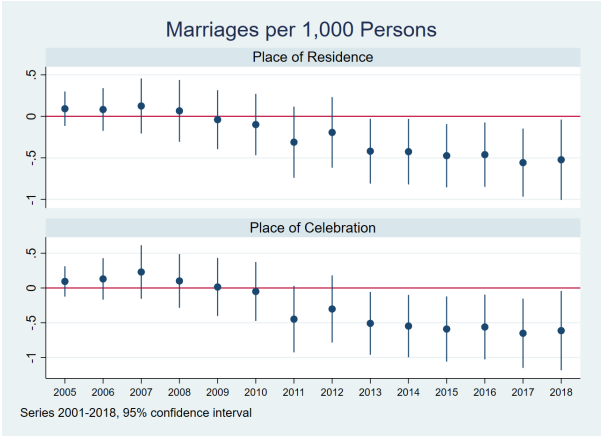


(c) without Barcelona and Madrid

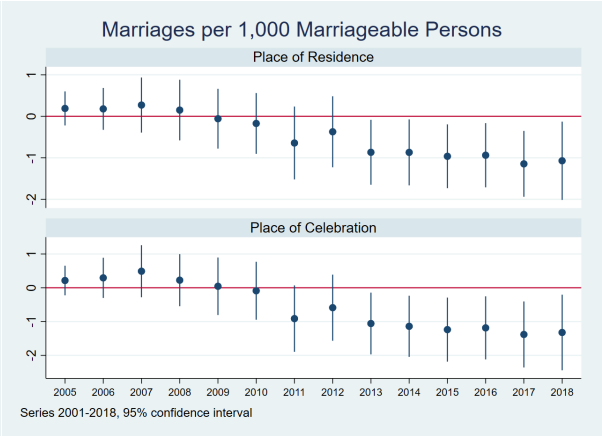


(d) without Barcelona and Madrid

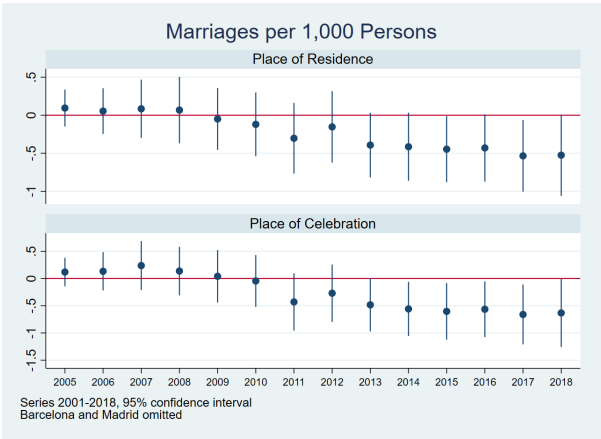
Figure 2.E.5: Robustness Check, Marriage Rate, Series 1998-2018.



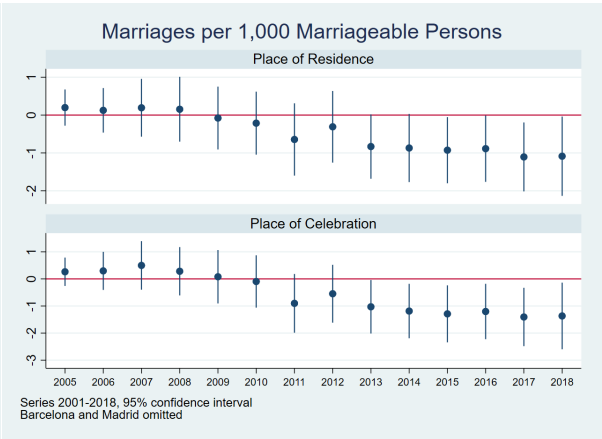
(a) 49 provinces



(b) 49 provinces

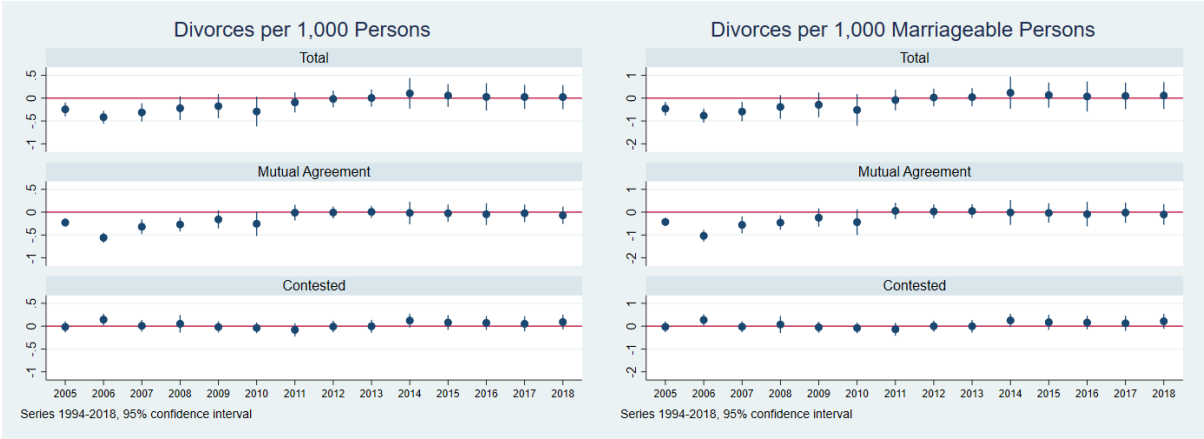


(c) without Barcelona and Madrid

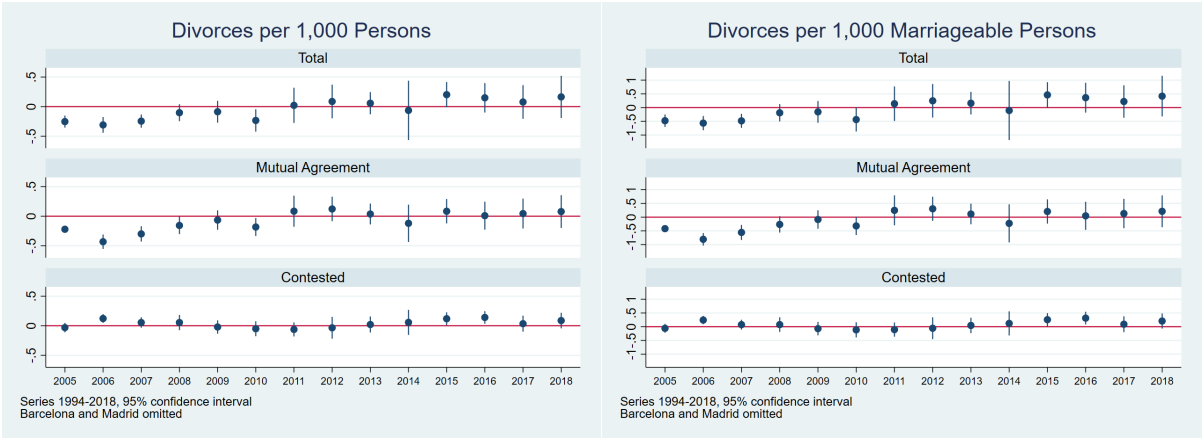


(d) without Barcelona and Madrid

Figure 2.E.6: Robustness Check, Marriage Rate, Series 2001-2018.

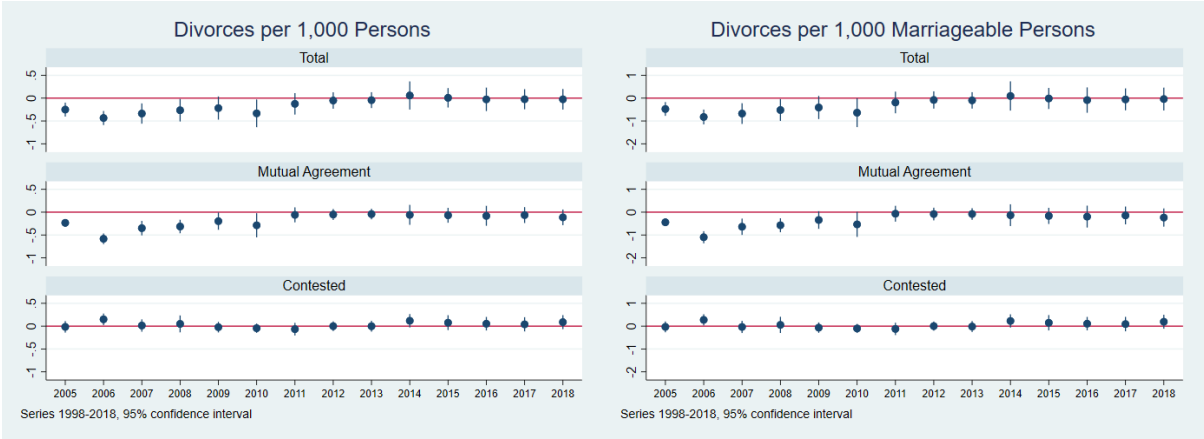


(a) 49 provinces (b) 49 provinces

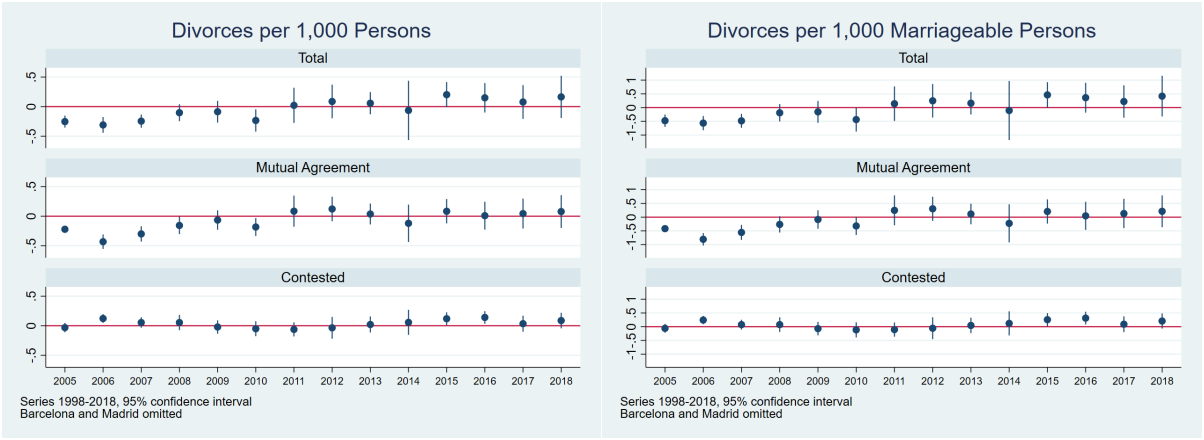


(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.7: Robustness Check, Divorce Rate, Series 1994-2018.

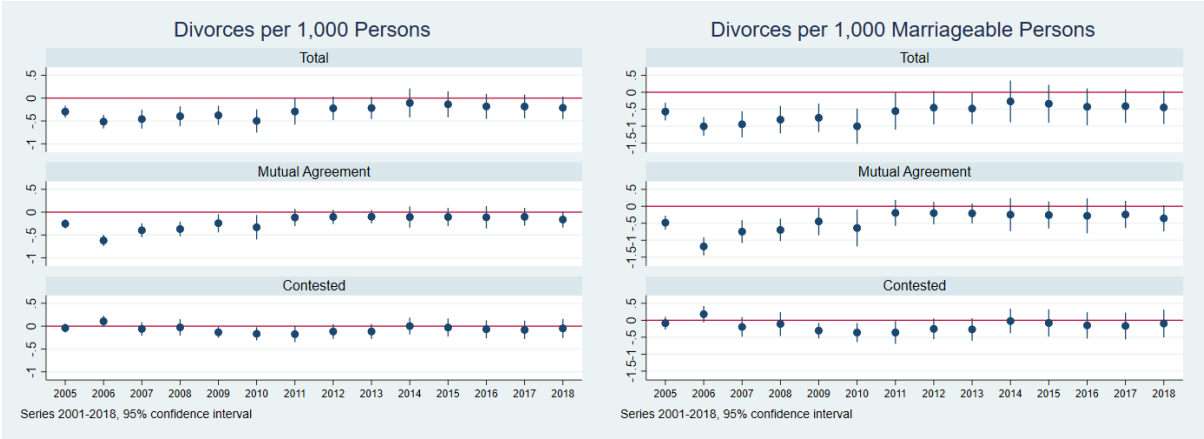


(a) 49 provinces (b) 49 provinces

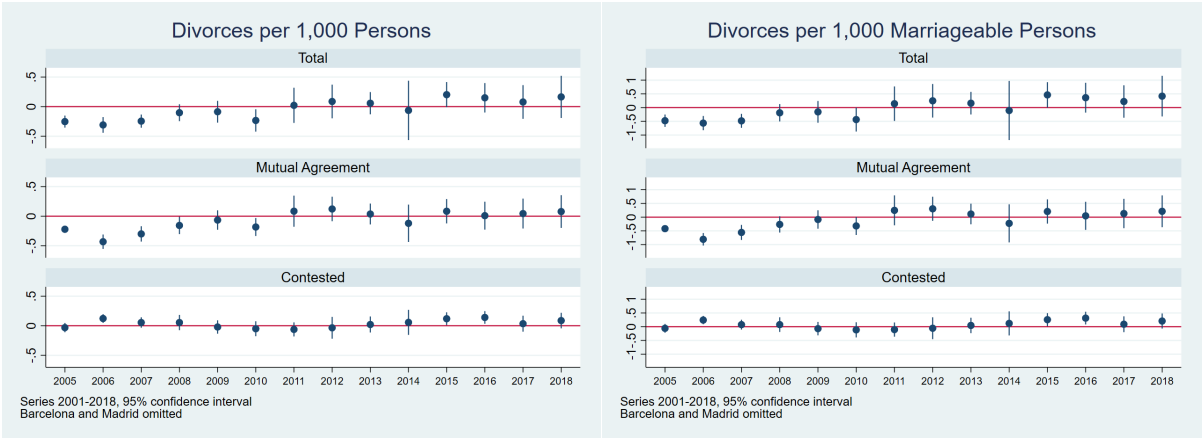


(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.8: Robustness Check, Divorce Rate, Series 1998-2018.



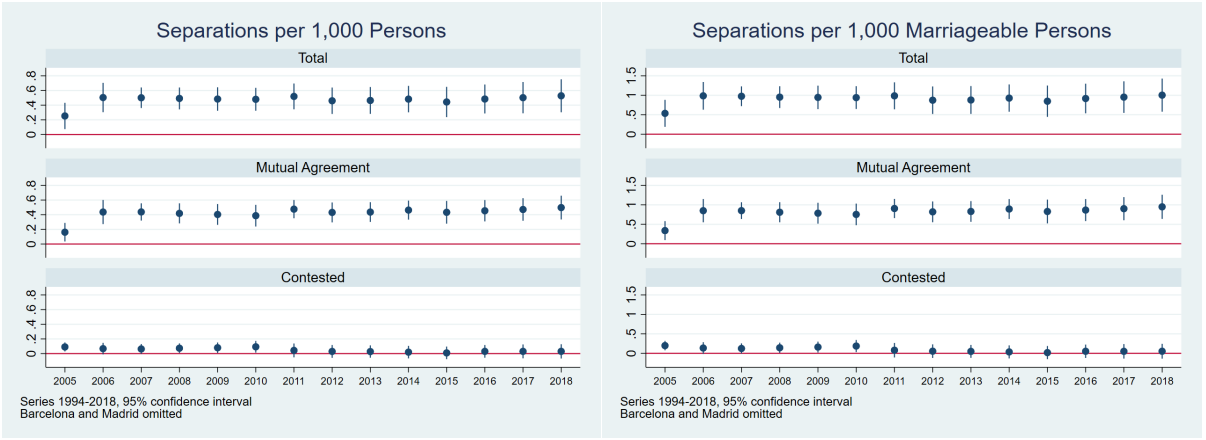
(a) 49 provinces (b) 49 provinces



(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.9: Robustness Check, Divorce Rate, Series 2001-2018.

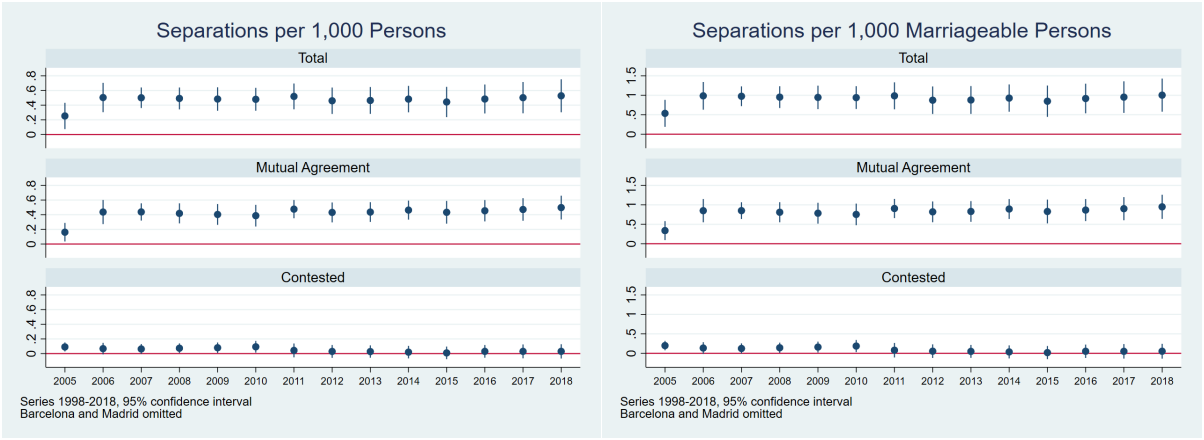
(a) 49 provinces (b) 49 provinces



(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.10: Robustness Check, Separation Rate, Series 1994-2018.

(a) 49 provinces (b) 49 provinces



(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.11: Robustness Check, Separation Rate, Series 1998-2018.

(a) 49 provinces (b) 49 provinces

(c) without Barcelona and Madrid (d) without Barcelona and Madrid

Figure 2.E.12: Robustness Check, Separation Rate, Series 2001-2018

Chapter 3

The Value of Marital Contracts

Abstract

In this paper I study whether a marital contract is useful because it enhances the value of a continued marriage or because it helps deconstruct it upon separation or divorce. Using a new, high-quality dataset of contracts I digitized from Spanish administrative records and an identification strategy that exploits variation in marital contracting regulation in Catalonia, I find strong evidence for the latter: marital contracts are valuable only if they can refer to the breakdown of the marriage.

3.1 Introduction

A fundamental question about marital contracts is through which channel they affect the marriage. Does a marital contract increase the utility spouses derive from the relationship by aligning preferences and leading to better coordination? Or does it work through its impact on the outside option, the payoff spouses receive if they separate or divorce? Or maybe both?

In this paper, I argue that if the main use of marital agreements is to manage a functioning marriage, then they will be written even if the law does not allow them to refer to the potential breakdown of the relationship. In contrast, if the value of a nuptial contract to the spouses originates in regulating the consequences of a marital crisis, then they will be signed only if the law allows provisions about divorce or separation to be included in the contract. I formalize this reasoning in a model that builds on the Grossman-Hart-Moore theory of property rights (Cai, 2003; Grossman and Hart, 1986; Hart, 1995; Hart and Moore, 1990), considering marriage as a relationship under contractual incompleteness. Unlike in the standard model, I let the ownership structure to affect the within-relationship payoffs as well as the outside options, and allow the ownership structure to be renegotiated before payoffs are realized.

To study the impact of marital agreements empirically, I built a new, large dataset of contracts signed in Spain by digitizing the yearbooks of the the Directorate General of Registries and Notaries (hereafter: DGRN). This dataset contains information on all types of contracts subject to notarial registration requirements at the notary level for the period 1976-2016, and on marital contracts at province level between 1921 and 2016. The Spanish Civil Code requires registration by a notary for a marital agreement to be valid; therefore, the DGRN records contain all legally enforceable contracts. For this paper, I use data on marital contracts signed in notaries in Catalonia and the Balearic Islands between 1990 and 2016. In addition, I briefly discuss the evolution of the number of marital contracts signed in Spain using province-level data since 1921.

My empirical strategy relies on the similarity in the marital legislation between two regions of Spain, Catalonia and the Balearic Islands, and a reform of the Catalan Civil Code in 1998 that extended the scope of marital contracts. In Spain, regions have substantial autonomy and some (namely Aragon, the Balearic Islands, the Basque Country, Catalonia, Galicia, and Navarre) even have their own civil law. With respect to marital legislation, the provisions of the Spanish Civil Code apply universally, except for the regulation of marital property systems. The regulation of marital agreements falls under this exception set by the Spanish Civil Code because they are the instrument for a couple to select or modify their marital property regime. Catalonia and the

Balearic Islands both have separate property as their default marital property systems, but the regulation of marital contracts differs across the two regions. The civil law of the Balearic Islands is aligned with that of the common law (*derecho común*) jurisdiction in Spain in that it allows both prenuptial and postnuptial contracts and the agreement can include provisions for a marital crisis. In Catalonia, marital contracts could not include clauses referring to a marital crisis until 1998. Act 9/1998 of the 15th of July,[1] modified the Catalan Civil Code by explicitly allowing nuptial agreements to be signed after the celebration of the marriage and to refer to a possible marital breakdown and its consequences.

Using a difference-in-differences approach with the 1998 reform of the Catalan Civil Code, I present robust evidence that marital agreements affect the marriage only through the outside option payoffs. I document a sharp and large rise in the number of marital contracts in Catalonia following the reform; the number of contracts more than quadrupled within two years of the reform and increased by sevenfold within five years. The long-run effect of the reform is even larger, having generated a more than tenfold increase by the 2010s compared to the average marital contracting rate in 1998. These results are remarkably robust to using various measures of the contracting rate (normalization by population or marriages), the inclusion of municipality and province-level controls, and the exclusion of observations related to Barcelona city.

Empirical work in the economics literature on modern marital contracts in Europe and the Americas is extremely scarce.[2] Among the institutional features of marriage, divorce laws have received the most attention from economists, who have studied the effect on unilateral versus bilateral and fault versus no-fault divorce on a range of outcomes including the marriage and divorce rate, labour supply, fertility, home ownership, and investment in the spouse's education.[3] The role of property allocation in the marriage and its impact on marriage-related outcomes has been subject to much less research.[4] Economic research on modern marital contracts is likely scarce because

[1] Ley 9/1998, de 15 de julio, del Código de Familia. It entered into effect on October 23, 1998.

[2] I emphasize the word *modern* here. A large literature exists on historical marital contracts, and on dowries and bride price in developing countries. See, for example, Hamilton (1999) on marital contracting behaviour in the early 19th-century Quebec, Botticini (1999), Botticini (2003), and Botticini and Siow (2003) on dowries, and Ambrus et al. (2010) and Ashraf et al. (2020) on bride price in developing countries. However, due to radical changes in women's life in 20th century with the legalization of divorce, the widespread use of contraception, and the increasing participation of women in education and the labour force, modern marital agreements have a very different scope than they historically had.

[3] See, for example, Chiappori et al., 2002; Rasul, 2006; Stevenson, 2007; Stevenson and Wolfers, 2006; Voena, 2015

[4] See Bayot and Voena (2015), Brassiolo (2013), Fisher (2012), and Piazzalunga (2016)

of the lack of data.[5] An important exception is Frémeaux and Leturcq (2018), describing the evolution of the number of prenuptials signed and the prevalence of various property regimes in France from 1855 to 2010 using a new series on prenuptial agreements the authors constructed. The closest to my paper is Lamarca i Marquès et al. (2003) which documents the effect of the 1998 reform on marital contracting in Catalonia. Lamarca i Marquès et al. (2003) examines the reform from a law perspective, emphasizing how it influenced family self-determination and describes its short-term impact. In this paper, I also provide estimates of the long-run effect of the reform on marital contracting and discuss what these results indicate about the value of marital agreements for the spouses.

The paper is structured as follows. Section 3.2 describes the institutional background, the regulation of marital contracts by the Spanish Civil Code and by the civil laws of Catalonia and the Balearic Islands. Section 3.3 describes the contracts data I collected from the DGRN archives and the evolution of marital contracting in Spain since the 1920s. Section 2.3 presents a model of marital contracting based on property rights theory. Section 2.4 discusses the empirical strategy and describes the data. Section 2.5 reports the results and Section 2.6 concludes.

3.2 Institutional Background

Spain is a plurilegislative country where regions hold considerable autonomy; some even have their own civil law.[6] The main legislative source is the Spanish Civil Code, while the regional civil law is codified in compilations of civil laws or, in case of Catalonia, the Civil Code of Catalonia (*Código Civil de Cataluña/Codi Civil de Catalunya*).

Regarding the applicability of the difference civil laws coexisting in Spain[7], the Spanish Civil Code states that the provisions of its Preliminary Title and those of Title IV of Book I (on marriage) are universally applicable in Spain, with the exception of the provisions related to marital property regimes. Otherwise local civil law is the primary legislative source, and the provisions of the Civil Code apply on a subsidiary basis.[8] This means that most of the marital legislation is uniform across the country;

[5] In the United States, for example, prenuptial contracts are generally not subject to registration requirements which impedes data collection, while in the United Kingdom prenuptials were historically not enforced by courts, resulting in a low demand for them. Better enforcement of prenuptials in the UK is a more recent development (following Radmacher v. Granatino in 2010).

[6] The autonomous communities that have their own civil law are Aragon, the Balearic Islands, the Basque Country, Catalonia, Galicia and Navarre.

[7] *Código Civil de España* Preliminary Title, Chapter V

[8] *Código Civil de España* art. 13

the important exception is the regulation of the marital property systems.

The marital property system specifies the ownership structure of marital assets, that is, which assets are exclusive property of the spouses and which are under joint ownership, and the division of jointly owned assets if the marriage is dissolved. The Spanish Civil Code and all local civil laws in Spain give priority to the couple's choice regarding the marital property system, and designate a default regime that applies if the spouses did not agree on any.

The empirical strategy of this paper relies on the legal framework of Catalonia and the Balearic Islands. Both regions have their own civil law, codified in the *Código Civil de Cataluña* and the *Compilación del Derecho Civil de Baleares*, respectively. In both territories, the legal default marital property regime is separate property. Under the separate property system, all assets acquired before the marriage and during the marriage by one spouse remains the property of that spouse. In Catalonia, the default is unique, but several other property systems which are traditional in certain areas of Catalonia are recognized in civil law.[9] In the Balearic Islands, the default marital property system is separate property with subtle differences in each island.[10] While the default marital property regime is the same, there are differences in the legislation with respect to some marital property system related issues such as the compensation for domestic work and the scope of marital contracts.

The general requirements a marital contract has to fulfil to be valid are set by the Spanish Civil Code. A marital contract specifying the matrimonial property regime (*capitulaciones matrimoniales*) can be signed before or after the celebration of the marriage.[11] The spouses can agree on the use of any marital property system, replacing or customizing the default one. A marital contract is null and void under the same conditions as any other contract, for instance, if it was signed under false information or duress. To be valid, it must be authorized by a notary. It may be modified during the marriage with the consent of both parties, with the modification agreement being subject to the same validity and registration requirements as the original contract.[12]

Since marital contracts are related to the marital property regime, local civil laws could prescribe provisions that are different from those of the Spanish Civil Code. The Spanish Civil Code allows nuptial contracts to include any provisions relevant to the

[9] These are the *asociación a compras y mejoras* in Camp de Tarragona (*Código Civil de Cataluña*, arts. 232-25–232-27), the *agermanament* in Tortosa (*Código Civil de Cataluña*, arts. 232-28), and the *pacto de convinença* in Vall d'Aran (*Código Civil de Cataluña*, arts. 232-29).

[10] *Compilación del Derecho Civil de Baleares* Mallorca and Menorca: Book I, Title I; Ibiza and Formentera: Book III, Title I, Chapter I-II.

[11] If it is signed before marriage, at most one year can pass between the date of the agreement and the celebration of the marriage.

[12] *Código Civil de España* arts 1325-1335

marital property system, independent of whether they refer to the breakdown of the marriage or not. Article 1325 of the Spanish Civil Code states: "In a nuptial agreement the executors may stipulate, amend or replace the property system of their marriage or adopt any other provisions by reason thereof."[13] The civil law of the Balearic Islands also allows for provisions in expectation of a marital crisis. On Mallorca and Menorca, Book I of the *Compilación del Derecho Civil de Baleares* is applicable in this regard, which does not forbid such clauses to be included in a marital contract, while Book III, which contains the laws applicable on Eivissa/Ibiza and Formentera, explicitly authorizes them.[14] Catalonia, on the other hand, has only allowed nuptial contracts to refer to a potential breakdown of the marriage since 1998.

The 1998 reform of the Catalan Civil Code, Act 9/1998, of July 15, re-created the book of family law within the Catalan Civil Code, and the new version explicitly authorized for marital contracts to be written in anticipation of a marital breakdown.[15] The previous wording of the Catalan Civil Code had not allowed such provisions. This is the policy change I use to study the channel on which nuptial contracts affect the marriage.

3.3 Marital Contracts Data

The number of marital contracts in each year and province was obtained from the records of the Directorate General for Registers and Notaries (*Anuario de la Dirección General de los Registros y del Notariado*). The DGRN records report the number of all contracts that are subject to notarial registration, among them marital contracts, by type of the contract and the name of the public notary who registered it, annually.

The number of marital contracts published by the DGRN (referred to as *contratos por razón de matrimonio*) is more than the contracts in which the spouses agree on the marital property system (*capitulaciones matrimoniales*), including separation and divorce settlements and their modifications, registered partnership documents, agreements about the liquidation of the marital property system, renunciation of the right to compensation for domestic work, agreements about contribution to community property, and declarations of separate property.

Figure 3.3.1 shows the evolution of the number of marital contracts from 1921 to 2016, aggregated to the national level and by default marital property regime (community or separate property). All regions except Catalonia and the Balearic Islands have

[13]Translation by the Ministry of Justice of Spain. Colección: Traducciones del Derecho Español, Ministerio de Justicia, Secretaría General Técnica, Madrid, 2016.

[14]*Compilación del Derecho Civil de Baleares* art. 66/6. b)

[15]Ley 9/1998, Art. 15.

some form of community property as their default marital property regime (the most frequent one is common acquisitions (*sociedad de gananciales*)). Valencia region is separated in the graph because its default property regime changed from community to separate property in 2008 and then community property was reinstated as the default in 2016.[16] See the table listing default marital property regimes in the Appendix.

Three general observations can be made by looking at Figure 3.3.1. First, marital contracts were not at all common before the mid-1970s. Second, there is a stark contrast between separate and community property regions. Third, for the community property default region, there were three notable moments where the trend changed: in the late 1930s, in the mid-1970s and around 2005. The Appendix shows the number of contracts during this period by province.

The national level figures are driven by provinces where the common acquisitions (*gananciales*) regime is the default, which are the majority of provinces in Spain (40 out of 52). The prevalence of marital contracts has been non-negligible (although not high in absolute terms, a couple hundred per year) in the first half of the twentieth century in provinces of Aragon, the Basque Country, Catalonia, and Navarre which are the regions with different defaults[17], which might have resulted in higher contracting activity.

The difference between the default regime regions derives from the different purposes these contracts might have had. Under the separate property system, the main question was the management of the wife's assets, including the dowry. While these assets remained her property, until 1975 her husband had the right to act on her behalf in legal matters. Some couples might have wanted to sign an agreement regulating the management of the wife's estate. Under community property, since most assets obtained during the marriage become jointly owned (including the profits on separately owned assets), the wife could hardly argue for having control rights (until 1975). There is one important scenario in which it makes sense for couples to write a contract under any property system: to regulate the consequences of divorce, but until 1981 divorce was not legal in Spain[18].

As for the changes in the trend, the dip in the late 1930s was a consequence of the Spanish Civil War, the steady increase in the community property default regions

[16] The *Ley de Régimen Económico Valenciano 10/2007*, entering into effect on on April 25, 2008, changed the default property regime from common acquisitions to separate property. The Constitutional Court ruled this law unconstitutional on April 28, 2016, reinstating common acquisitions as the default property regime.

[17] Aragon, the Basque Country and Navarre have variants of the community property system as the default (*consorcio conyugal*, *comunicación foral* and *sociedad conyugal de conquistas*, respectively).

[18] Apart from a short period during the Second Republic in the early 1930s.

began with the 1975 reform of the Civil Code (Act 14/1975, of the 2nd of May[19]), and the peak is likely a result of the 2005 divorce reform (Act 15/2005, of the 8th of July.)[20].

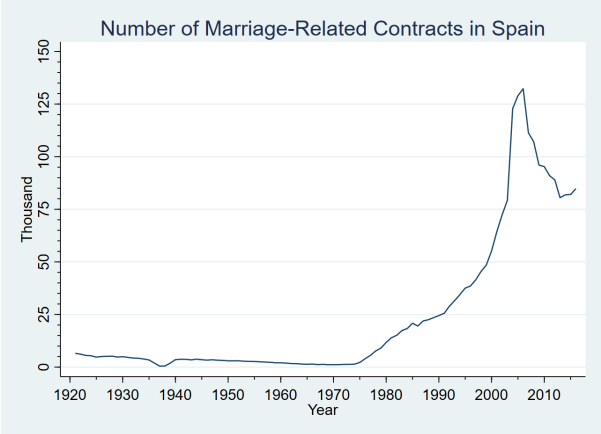
The 1975 reform annulled many bans on married women acting on their own behalf in legal matters related to marriage. Before this reform, marriage severely restricted women's capacity to act in legal matters and the husband assumed the wife's legal representation. For example, a married woman did not have the right to decide about where the couple should reside, manage her own assets, ask for the partition of assets upon legal separation or annulment of the marriage, accept or reject inheritance or ask for its partition without her spouse's consent, or become a guardian. Moreover, the reform allowed for postnuptial marital contracts in which spouses could renegotiate the marital property regime. The immediate rise in the number of agreements is probably a result of both female empowerment and the possibility to renegotiate the contract after the celebration of marriage. Other changes in the Spanish society and economy that began with the restoration of democracy in 1976 likely have contributed to the sustained increase in the number of marital contracts since 1975.

The 2005 divorce reform eliminated mandatory separation before divorce which reduced the general cost of divorce and the liquidation cost of the common asset holdings upon divorce, resulting in a sharp increase in the number of divorces (see Figure 2.D.6). In turn, this increased the number of divorce agreements and the number of liquidation agreements. In addition, easier divorce might have increased demand for the separate property system. Since couples living in regions other than Catalonia and the Balearic Islands have to sign a marital contract specifying the property regime choice (*capitulaciones matrimoniales*) if they want to be married under separation of property, this would also increase the total number of contracts signed. Figure 3.3.3 shows the distribution of types of marital contracts signed at the national level, averaged over the period 2011-2018 (these disaggregated data are currently only available since 2011). Property regime choice is the most frequent type of marital agreement signed, followed by contribution to community property (likely more frequent under the default regimes of Aragon and Navarre where the set of jointly owned assets is defined differently than under common acquisitions, or under default separate property if the couple wants to have co-owned assets), and liquidation agreements (applicable under community property). It seems reasonable to expect that divorce and liquidation agreements and property regime choice agreements all contributed to the peak in the total number of marital contracts between 2004 and 2010, although conclusive evi-

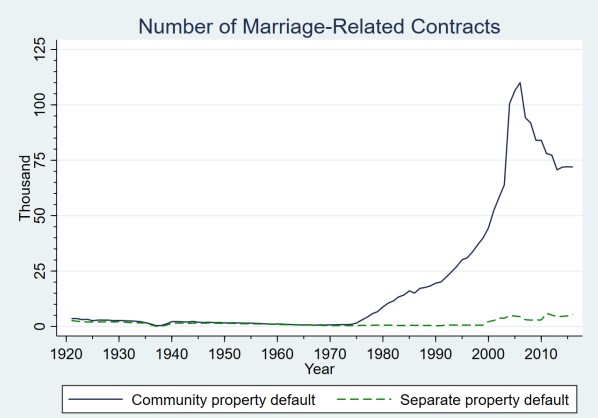
[19]Ley 14/1975, de 2 de mayo, sobre reforma de determinados articulos del Código Civil y del Código de Comercio sobre la situación jurídica de la mujer casada y los derechos y deberes de los conyuges.

[20]Ley 15/2005, de 8 de julio, por la que se modifican el Código Civil y la Ley de Enjuiciamiento Civil en materia de separación y divorcio.

dence can only be given once the contract types data becomes available for this period.



(a) National

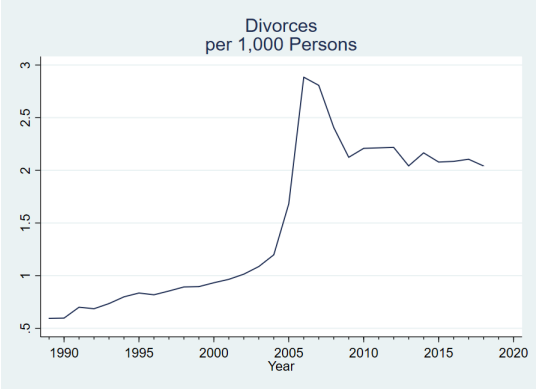


(b) By default marital property regime, excluding Valencia

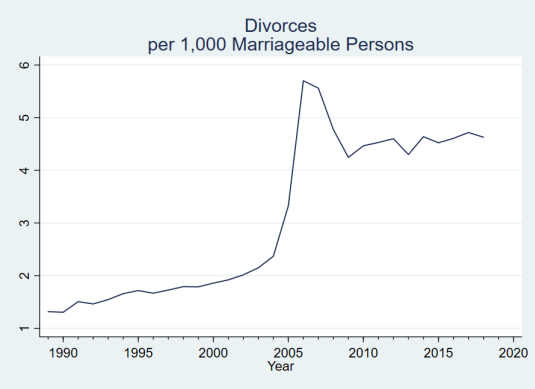
(c) Valencia

Notes: Number of contracts aggregated from notary to region level. Valencia region is separated because the default regime changed during this period (separate property default from 2008 to 2016, otherwise community property).

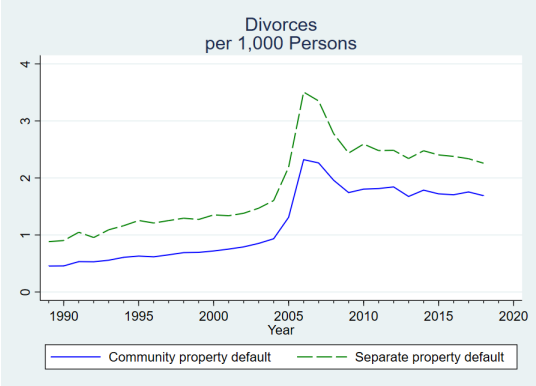
Figure 3.3.1: Marital Contracts in Spain, 1921-2016



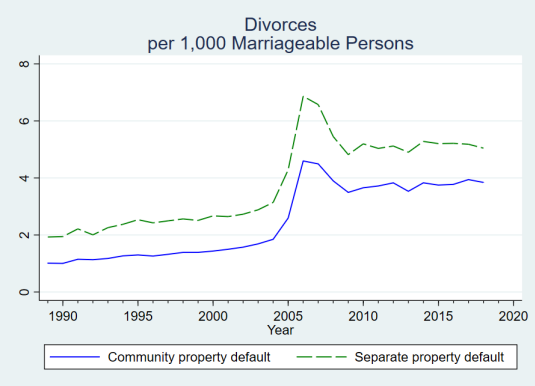
(a) National



(b) National

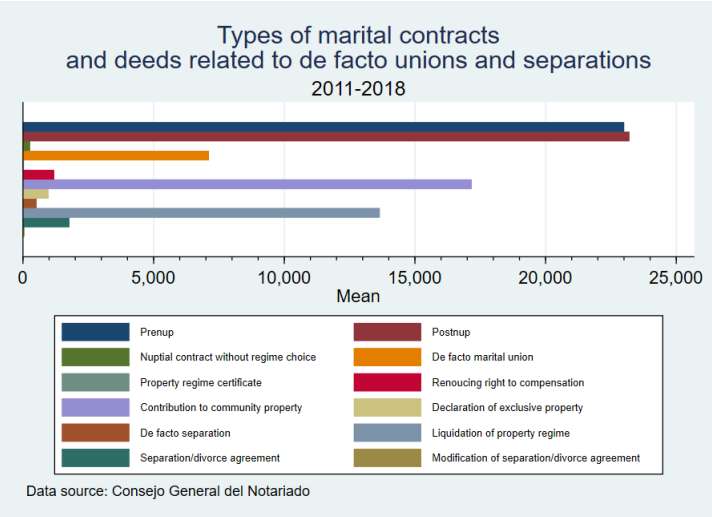


(c) By default marital property regime, excluding Valencia



(d) By default marital property regime, excluding Valencia

Figure 3.3.2: Trends in the Divorce Rate



Notes: Source: Consejo General del Notariado.

Figure 3.3.3: Marriage-Related Contract Types

3.4 Model

In this section, I present a model of marriage and ownership renegotiation that builds on the standard Grossman-Hart-Moore theory of property rights and Cai (2003). The core assumption of property rights theory is contractual incompleteness that says that investment and production choices to be made in the relationship cannot be described in a contract ex ante. My model deviates from the standard Grossman-Hart-Moore one by letting the ownership structure to affect the within-relationship returns. I also allow for ownership structure renegotiation (this extension appears in the standard model as well). In what follows, I discuss the main assumptions of the model and how marital contracts fit into this framework.

Contractual incompleteness can arise from several sources. Investment and production choices may be so complex that it is prohibitively costly to describe them. Alternatively, there might be substantial uncertainty regarding what production choices will be optimal in the future, making it impossible to foresee what investments should be made, again resulting in ex ante non-contractibility. If investment and production decisions are observable to the parties in the relationship but are not verifiable by a third party, any contract written would not be enforceable, hence pointless to write. In the marital context, when one can think of investments as working in the labour market, childbearing and childcare, or homemaking and production as generating the wealth of the family or child quality, the non-contractibility assumption is is natural.

One of the assumptions of property rights theory is that the ownership structure influences outside options, i.e. payoffs if the relationship breaks down, by enhancing

the productivity of investments but leaves the within-relationship payoffs unaffected. Grossman and Hart (1986), and all those who have built on their work, motivate this assumption by saying that while the relationship subsists parties have unrestricted access to each other's assets. While it is intuitive that as long as the parties cooperate, each can have easier access to the other's assets than under non-cooperation, the utility that each party derives from the continued relationship may still depend on the ownership structure. For example, joint ownership, whereby each decision regarding assets needs to be signed off by one's co-owner, may provide a better setting for learning about the other party's information and preferences, resulting in better coordination throughout the relationship, hence higher within-relationship payoffs.

Marital contracts are interpreted as a renegotiation of the ownership structure the deviates from the one specified by the state in the default marital property regime. The scope of the changes made to the default can range from minor adjustments to replacing the default regime by a completely different property system. The Catalan legislation of marital contracting before 1998 can be viewed as restricting renegotiation so that parties can only maximize the within-relationship payoff, not the outside options. The 1998 reform increased the scope of marital contracts by allowing outside options to be taken into account. If the assumption that the ownership structure over marital assets only affects payoffs through the outside options, fits reality well, then we should see little to no marital contracting in Catalonia before 1998 and a sharp increase in the number of contracts after the 1998 reform that is sustained in the long run. This is exactly what happened. Following the reform, the number of marital contracts signed in Catalonia quadrupled within two years and increased by almost seven-fold within 5 years.

Setup Two parties, 1 and 2 (indexed by i), are engaged in a relationship that lasts two periods. There are two assets, a_1 and a_2 whose ownership is determined at date 0. At date 1, the parties make investments that enhance their productivity in the second period. At date 2, production takes place, and returns are realized. Returns depend both on investments and the ownership of assets. Investments and production choices are observable to the parties ex post but not verifiable in court, which makes them ex ante non-contractible.

Let A be the set of all assets $A = \{a_1, a_2\}$. The ownership structure is a partition of A, denoted $\mathcal{A} = \{A_1, A_2, A_{12}\}$, $A_1 \subseteq A$ are the assets owned exclusively by 1, $A_2 \subseteq A$ are the assets owned exclusively by 2, and $A_{12} \subseteq A$ are the jointly owned assets. There is a default ownership structure which is exogenously given. In line with the laws of Catalonia and the Balearic Islands, assume that the default regime is separate

property, denoted $\mathcal{A}^S$, whereby $A_1 = \{a_1\}$, $A_2 = \{a_2\}, A_{12} = \emptyset$. The parties can agree on another ownership structure, according to the renegotiation rules set by the state, that maximizes the net surplus they can achieve.

Agents choose investments simultaneously and non-cooperatively at date 1. There are two types of investment, general and relationship-specific. (I do not assume anything about their complementarity.) The agents choose both the type and the level of the investments. General investments are more productive outside the relationship, while specific investments are productive in the relationship. In this paper, for simplicity, I use a model where the general investment only generates returns outside the relationship, and specific only within the relationship. This assumption can be relaxed without altering the conclusion this section arrives to.

Formally, let $l_i \geq 0$ denote i's general investment and $e_i \geq 0$ i's specific investment. $R_i(e_i, A_i)$ is the return on i's relationship-specific investment. Assume that R_i is continuously differentiable in both arguments, positive, strictly increasing and strictly concave in e_i, and non-negative and increasing in A_i. The outside option $O_i(l_i, A_i)$ function is non-negative, continuously differentiable, increasing and concave in both arguments. The investment cost $C_i(e_i, l_i)$ is non-negative, continuously differentiable, increasing, and convex in both arguments. Asset ownership increases the marginal productivity of the general investment in the outside option and of the relationship-specific investment in the relationship, but more so for the former. Formally, for all (e_i, l_i) $i = 1, 2$,

$$\frac{\partial^2 O_i(l_i, A_i)}{\partial l_i \partial A_i} > \frac{\partial^2 R_i(e_i, A_i)}{\partial e_i \partial A_i} \geq 0$$

Finally, there is an additive mean-zero shock ξ_i to the outside option whose distribution is common knowledge, and its realization is observable to both parties after investments have been made. For simplicity, assume $\xi_i \sim N(0, \sigma_i)$. The purpose of adding ξ_i is to ensure that the individual rationality constraints can always bind with some probability, ending the relationship. Define $\bar{O}_i = O_i(l_i; \mathcal{A}) + \xi_i$

At date 2, agents make production decisions (whether or not to engage in joint production) and bargain over the net surplus. Assuming Nash bargaining[21], symmetric information, and that the parties have equal bargaining power; these imply that they will split the net surplus by half. Define the net surplus of the relationship as $S((e_i, l_i)_{i=1,2}; \mathcal{A}) = \sum_i \left(R_i(e_i, l_i; \mathcal{A}) - \bar{O}_i(e_i, l_i; \mathcal{A})\right)$. The agents will continue with the relationship if $S \geq 0$.[22] In this case, each spouse receives their outside options and half

[21]Nash bargaining assumes that parties receive their outside options during the bargaining or in the event bargaining breaks down, the latter of which seems appropriate for the case of marriage.

[22]Recall that the realization of the outside option shock is observable before date 2 choices, so that agents can observe whether participation constraints hold before bargaining over the net surplus.

of the net surplus of the relationship:

$$U_i^m(e_i, l_i; \mathcal{A}) = \bar{O}_i(e_i, l_i; \mathcal{A}) + \frac{S}{2} \tag{3.1}$$

If $S < 0$, the relationship breaks down, and both parties receive their outside options $U_i^d(e_i, l_i; \mathcal{A}) = \bar{O}_i(e_i, l_i; \mathcal{A})$.

Ownership Renegotiation At date 2, after having observed the investments, it may be worthwhile for the parties to renegotiate the ownership structure. Assume that any gains from renegotiation are split by Nash bargaining with equal bargaining power. If $S \geq 0$, there are gains from renegotiation if there exits an ownership structure $\hat{\mathcal{A}}$ so that for all $\mathcal{A}$, $\sum_i R_i(e_i, l_i; \hat{\mathcal{A}}) \geq \sum_i R_i(e_i, l_i; \mathcal{A})$. Denote the resulting surplus by $\hat{S}$. The parties then receive

$$U_i^m(e_i, l_i; \hat{\mathcal{A}}) = \bar{O}_i(e_i, l_i; \hat{\mathcal{A}}) + \frac{\hat{S} - S}{2}$$

If $S < 0$, then ownership can be renegotiated to maximize the total dissolution payoff $\sum_i \bar{O}_i(e_i, l_i; \mathcal{A})$. Denote the maximizer $\mathcal{A}^*$. Then, under $\mathcal{A}^*$, each party receives

$$U_i^d(e_i, l_i; \mathcal{A}^*) = \bar{O}_i(e_i, l_i; \mathcal{A}^*) + \frac{\sum_i \bar{O}_i(e_i, l_i; \mathcal{A}^*) - \sum_i \bar{O}_i(e_i, l_i; \mathcal{A})}{2}$$

Allowing the spouses to renegotiate ownership in both cases, if the marriage is to be continued and if it is about to break down, clearly results in a higher expected surplus from the relationship. However, even under the stricter renegotiation rules, one should see contracting activity if the within-marriage payoff depends on the ownership structure. If no ownership renegotiations occur, that indicates that the within-relationship payoff does not depend on the ownership structure, in line with the Grossman-Hart-Moore reasoning. The next section turns to how to asses this hypothesis empirically.

3.5 Empirical Strategy

The estimation method is difference-in-differences using the 1998 reform of the Catalan Civil Code as the policy change, the municipalities of Catalonia as the treated units and the municipalities of the Balearic Islands as control units.
The models estimated are of the form

$$\begin{aligned} \text{Marital contract rate}_{m,t} &= \beta_0 + \sum_{k=1}^{18} \beta_k \times \text{year } k \text{ after 1998 reform}_t \times \text{Catalonia}_m \\ &+ \gamma\, \text{Catalonia}_m + X_{m,t}\eta + \sum_t \delta_t \text{Year}_t + \sum_m \mu_m \text{Municipality}_m + \varepsilon_{m,t} \end{aligned} \tag{3.2}$$

I also present results for a simpler, two-period differences-in-differences model of the form

$$\begin{aligned}\text{Marital contract rate}_{m,t} &= \beta_0 + \beta \times \text{Post-1998 reform}_t \times \text{Catalonia}_m \\ &+ \gamma\,\text{Catalonia}_m + X_{m,t}\eta + \sum_t \delta_t \text{Year}_t + \sum_m \mu_m \text{Municipality}_m + \varepsilon_{m,t}\end{aligned} \tag{3.3}$$

For both, m indexes municipality and t indexes year. The sample begins in 1990, when the *Compilación del Derecho Civil de Baleares* was published. I do not consider earlier years due to the lack of codified civil law of the Balearic Islands. Local customs might have been observed by judges before in family law cases, but that is hard to verify; working with codified law is preferable for the identification. The first post-policy change year is taken to be 1999. The 1998 reform entered into effect on October 23, 1998, but the two months of the year during which the reform was already in effect, a good part of one of which is holiday, seemed too short a time to count 1998 as the first post-reform year. All models I estimate include year and municipality fixed effects. Standard errors are clustered at municipality level.

Three measures of the marital contract rate are used. The first is the number of marital contract per 1,000 residents of the given municipality. The second and the third are normalizations of the number of contracts by the number of marriages. In Spain, the number of marriages is recorded in two ways: by place of residence of the couple, and by place of celebration of the marriage. I present regression results using contract rates derived from both.

The controls in $X_{m,t}$ include some municipality-level and some province-level variables. The municipality level controls include the share of male population, defined as male over total population of the municipality in the given year, marriage rate, defined as the number of marriages per 1,000 persons, and the ratio of the population of the municipality compared to the population of the province where it is located. The marriage rate is only included in specifications where the outcome is the contracting rate by population, and the relative population of the municipality is only featured when the outcome is marital contracts over marriages. Province level variables include the unemployment rate by gender, the relative GDP of the province to the total GDP of Catalonia and the Balearic Islands.

In addition to the 1998 reform, two more reforms of the Catalan Civil Code that occurred between 1990 and 2016 that might have had an effect on marital contracting. Act 8/1993, of September 30, introduced the compensation for the spouse who worked at home for little or no compensation if the marriage was ended by annulment, separation or divorce. Act 25/2010, of July 29, extended the 1998 regulation of marital agreements, establishing format and content requirements of the agreements, limiting

the contracting power of the parties regarding arrangements on alimony and compensation for domestic work, and included protective measures for the spouse to whose interests the agreement might be detrimental at the time of compliance. I control for the 1993 reform with an indicator that takes the value of 1 for years after 1993 and municipalities in Catalonia and zero otherwise. In the dynamic specifications, the year k after 1998 reform$_t \times$Catalonia$_m$ regressors pick up the variation that results from the 2010 reform, but in the two-period diff-in-diff specification I control for it by adding a dummy variable.
Finally, the 2005 divorce reform[23] which substantially decreased the cost of divorce, might have had an impact on the incentive to write marital agreements, so I control for it as well.

As supportive evidence to the identifying assumption to parallel trends of the dependent variable across treated and control units, I present regression results with leads of treatment variable and an expanding set of controls in the Appendix, and the resulting coefficient plots with full set of controls in Figure 3.6.4 in the main text. Figures 3.6.1 and 3.6.2 also indicate parallel trends prior to the reform, and show the sharp increase in marital contracting in Catalonia after 1998 and that the effect of the reform was not transitory.

The contracts data are described in detail in Section 3.3. All other data were published by the Spanish Statistical Office (*Instituto Nacional de Estadística*, hereafter INE). Population data by municipality and gender is available from the Municipal Registry (*Padrón municipal*). The number of marriages by municipality was aggregated from the anonymized census of marriages for each year, published in the *Boletín estadístico de matrimonio*. This dataset contains the date of the marriage, where the marriage was celebrated, if it was civil or Catholic, and some basic information on each spouse: age, nationality, marital status, municipality of residence. Labour market statistics and data on GDP are available on province level. All labour market data is from INE's Economically Active Population Survey (*Encuesta de población activa*). Data on GDP by province comes from the Spanish Regional Accounts (*Contabilidad regional de España*)

3.6 Results

The reform had a highly significant, positive, long-lasting effect on marital contracting in Catalonia. Figure 3.6.3 illustrates these results, including a robustness check of omitting Barcelona.

The magnitude of the estimated coefficients is impressive. The 1998 average val-

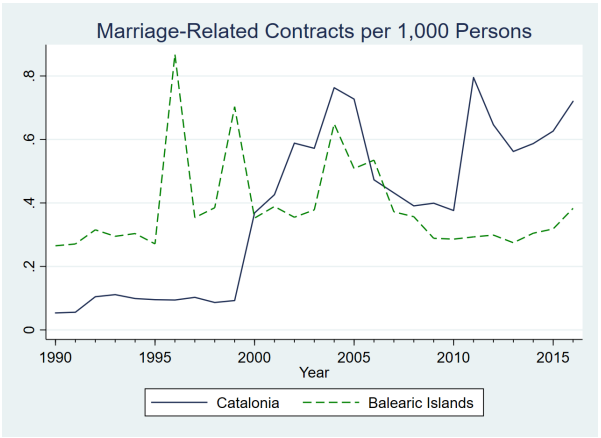
[23] Act 15/2005, of July 8, 2005

ues of the outcomes variables in Catalonia were 0.291 for number of contracts by 1,000 persons, 0.016 by marriages by place of residence and 0.018 by marriages by place of celebration. The estimated coefficients of the specification with a full set of controls and including Barcelona, range between 1.340 and 5.270 for the contracting rate by population which is 460-1810% increase. The corresponding estimate ranges and percentages for the contract rate by marriage by place of residence and celebration, are 0.052-0.202, an increase of 325-1263%, and 0.061-0.222, an increase by 338-1233% over the 1998 value, respectively. Table 3.6.1 shows the results of the two-period specification, with an expanding set of controls and the aforementioned robustness check of omitting Barcelona.

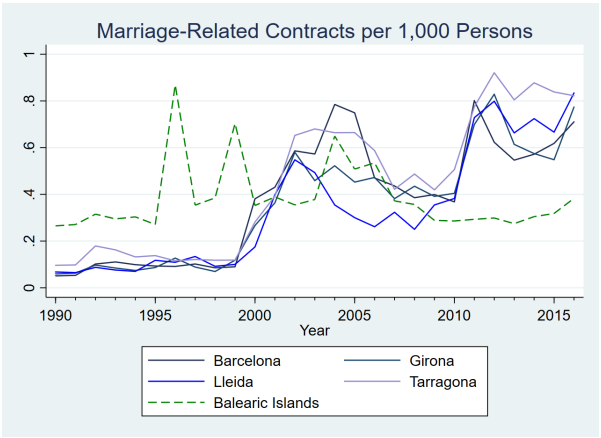
In the Appendix, I present the regression results of the dynamic specification with an expanding set of controls. As a robustness check, I drop the observations pertaining to Barcelona (city, not the entire province) for the last column. The estimated coefficients are also remarkably robust to the inclusion of various controls and to the omission of Barcelona.

The estimated effects of both the 2005 divorce reform and the 1993 reform of the Catalan Civil Code is insignificant or only marginally significant, which suggests that neither the ease of divorce, nor the introduction of compensation for domestic work had a significant impact on the incentive to write nuptial contracts. As Table 3.6.1 shows, the 2010 reform of the Catalan Civil Code, which refined the regulation of marital agreements, had a significant positive effect on the marital contract rate, which I read as further supportive evidence of the ownership structure productivity hypothesis.

The evidence is overwhelmingly in favour of the theory that the ownership structure within marriage affects marital surplus through its impact on the outside options, that is, the divorce payoffs.

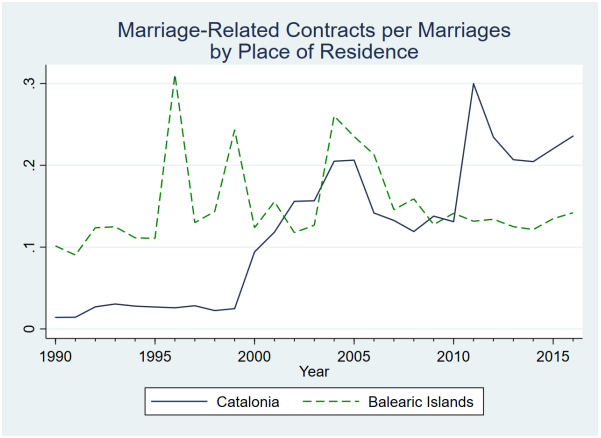


(a) By autonomous community

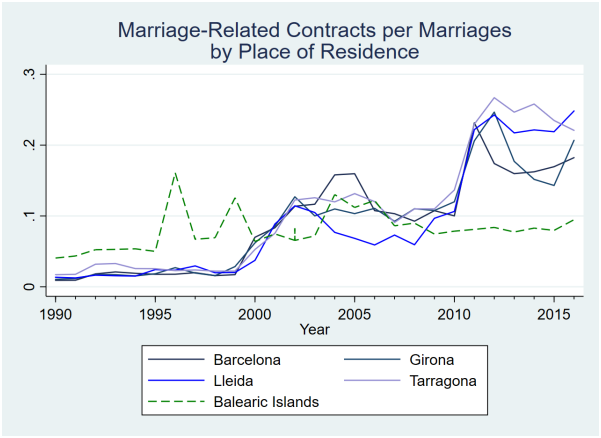


(b) By province

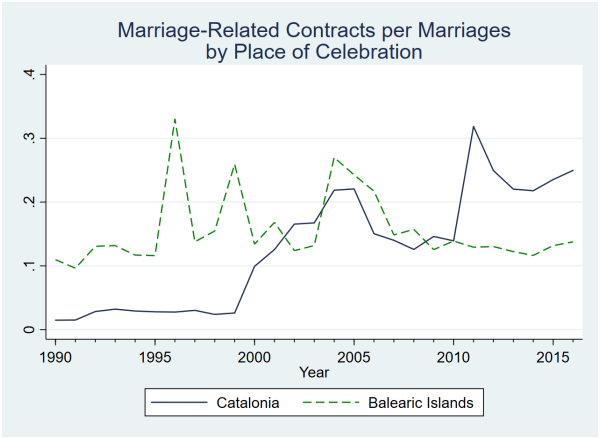
Figure 3.6.1: Marital Contracts per 1,000 Persons in the Separate Property Default Region, 1990-2016



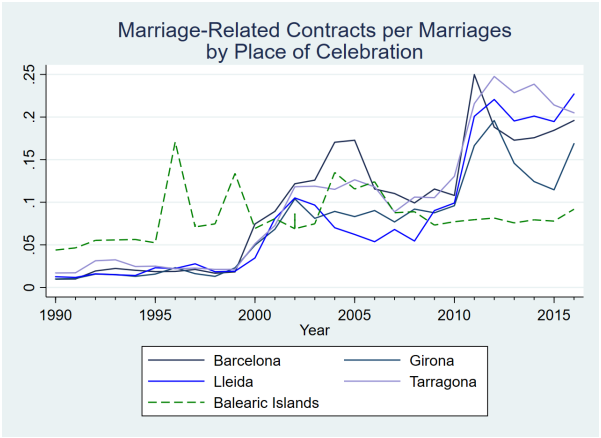
(a) By autonomous community



(b) By province



(c) By autonomous community



(d) By province

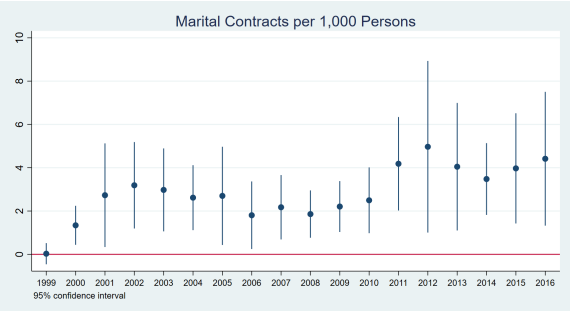
Figure 3.6.2: Marital Contracts per Marriages in the Separate Property Default Region, 1990-2016

	Number of marital contracts											
	per 1,000 persons				per marriages by place of residence				per marriages by place of celebration			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Post-1998 reform	0.702**	0.702**	1.187**	1.248**	0.0953***	0.0915***	0.0976***	0.0996***	0.0980***	0.0895***	0.0931***	0.0955***
	(0.273)	(0.273)	(0.548)	(0.544)	(0.0190)	(0.0196)	(0.0227)	(0.0230)	(0.0189)	(0.0194)	(0.0226)	(0.0228)
Catalonia	1.933***	1.933***	1.653***	1.735***	0.0952***	0.0891***	0.0830***	0.0836***	0.0960***	0.0868***	0.0834***	0.0840***
	(0.309)	(0.309)	(0.478)	(0.470)	(0.0123)	(0.0126)	(0.0146)	(0.0145)	(0.0132)	(0.0133)	(0.0152)	(0.0150)
Post-1998 reform × Catalonia	1.027***	1.027***	1.361***	1.342***	0.0588***	0.0608***	0.0742***	0.0745***	0.0714***	0.0739***	0.0829***	0.0835***
	(0.238)	(0.238)	(0.345)	(0.345)	(0.0107)	(0.0112)	(0.0139)	(0.0137)	(0.0111)	(0.0119)	(0.0147)	(0.0146)
Post-1993 Catalan Civil Code reform	-0.00316	-0.00316	0.198	0.222	-0.00853	-0.00809	-0.00873	-0.00864	-0.00624	-0.00476	-0.00911	-0.00866
	(0.182)	(0.182)	(0.305)	(0.303)	(0.00697)	(0.00683)	(0.0105)	(0.0106)	(0.00722)	(0.00659)	(0.0113)	(0.0113)
Post-2010 Catalan Civil Code reform	0.913***	0.913***	1.075***	1.053***	0.0796***	0.0796***	0.0858***	0.0857***	0.0904***	0.0906***	0.0940***	0.0931***
	(0.272)	(0.272)	(0.330)	(0.330)	(0.0192)	(0.0192)	(0.0208)	(0.0209)	(0.0165)	(0.0165)	(0.0183)	(0.0184)
Post-2005 reform	-0.355*	-0.355*	-0.191	-0.144	-0.0228	-0.0197	-0.0432	-0.0431	-0.0352*	-0.0330*	-0.0566*	-0.0564*
	(0.200)	(0.200)	(0.727)	(0.728)	(0.0222)	(0.0223)	(0.0341)	(0.0343)	(0.0193)	(0.0197)	(0.0330)	(0.0332)
Municipality and year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Share of male population		✓	✓	✓		✓	✓	✓		✓	✓	✓
Municipality/province population						✓	✓	✓		✓	✓	✓
Marriage rate by residence		✓	✓	✓								
Unemployment rate by gender			✓	✓			✓	✓			✓	✓
GDP share within region			✓	✓			✓	✓			✓	✓
Barcelona (city) omitted				✓				✓				✓
Observations	4825	4825	4825	4798	2846	2846	2846	2819	2843	2843	2843	2816
Number of clusters	221	221	221	220	137	137	137	136	137	137	137	136

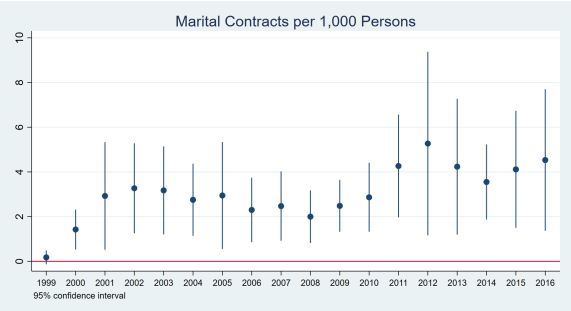
Standard errors in parentheses, clustered by municipality

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

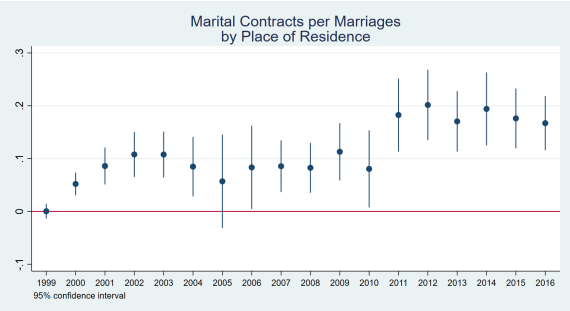
Table 3.6.1: Two-Period Difference-in-Differences Estimates



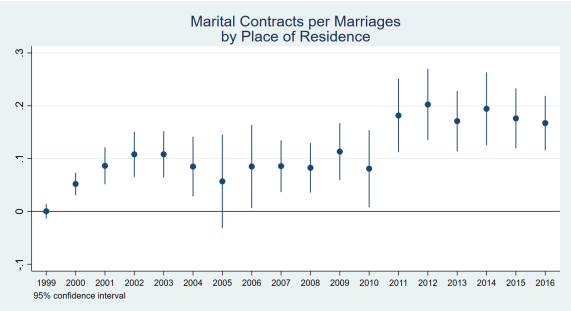
(a) All municipalities



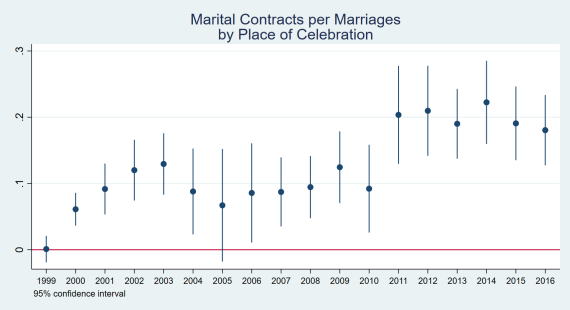
(b) Barcelona omitted



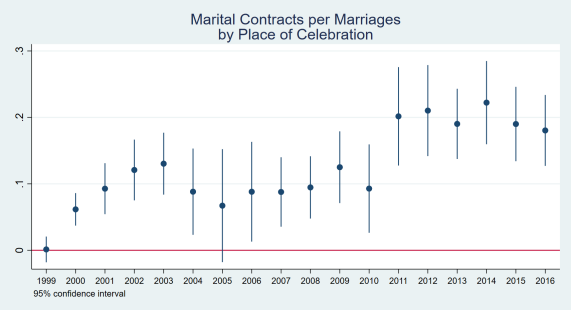
(c) All municipalities



(d) Barcelona omitted

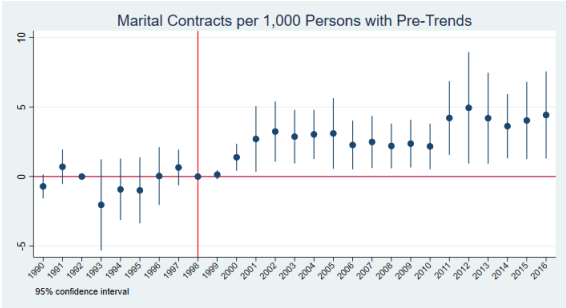


(e) All municipalities

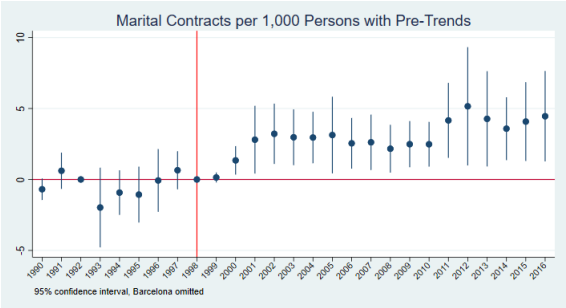


(f) Barcelona omitted

Notes: Full set of controls included. 95% confidence intervals. Series: 1990-2016.

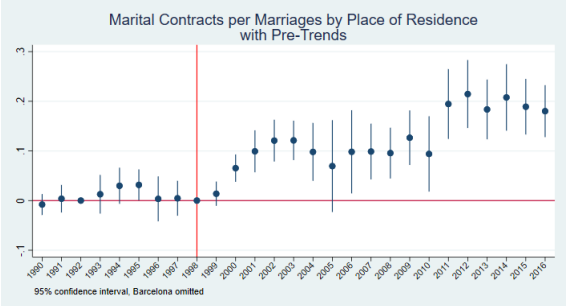


(a) All municipalities

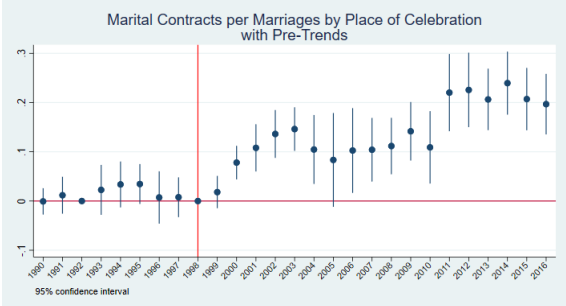


(b) Barcelona omitted

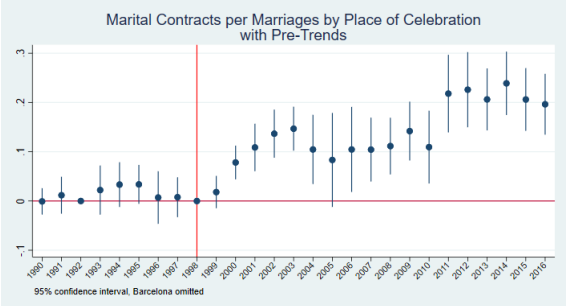
(c) All municipalities



(d) Barcelona omitted



(e) All municipalities



(f) Barcelona omitted

Notes: Full set of controls included. 95% confidence intervals. Series: 1990-2016.

Figure 3.6.4: Parallel Pre-Trends Checks

3.7 Conclusion

In this paper, I study the channels through which marital contracts can affect marriage. There are three possibilities. A marital agreement could affect the surplus from the marriage solely through the dissolution payoffs that the spouses receive if the marriage breaks down. Alternatively, it could enhance the utility spouses get from a continued marriage if, for example, having a contract aligns preferences at the beginning of the marriage, resulting in better coordination between the spouses. Or it could be both. I present evidence that nuptial agreements primarily impact the marriage through the outside option.

My paper contributes to the family and law and economics literature in several

ways. First, empirical work on intrafamily contracts, including nuptial contracts, is close to non-existent. This paper clarifies through which channel a marital agreement can affect the value of the marriage, with a particularly straightforward identification strategy. Second, I use a unique dataset on marital contract, digitized from the records of the Spanish notaries. Since one reason for the lack of empirical work on within-family contracts is the lack of data, having compiled this dataset is a contribution in itself. Third, I test one of the fundamental assumptions of property rights theory in a marital setting, and find that the evidence is strongly supportive of it. The assumptions and implications of property rights theory are generally not easy to test because most applications, from corporate finance or industrial organizations, are multidimensional problems with many agents and the legislation applicable to different units could vary a lot (think of firms belonging to different industries or located in different countries). Marriage, with two agents, two asset holdings, and a legal framework that is fairly similar across the world, is an ideal setting to test property rights theory.

A natural continuation of this work would be to collect individual level marital contracts data, in order to better understand the link between the content of the contract and the spouses' characteristics. This is left for future research.

References

Ambrus, A., Field, E., & Torero, M. (2010). Muslim family law, prenuptial agreements, and the emergence of dowry in Bangladesh. *The Quarterly Journal of Economics*, *125*(3), 1349–1397.

Ashraf, N., Bau, N., Nunn, N., & Voena, A. (2020). Bride price and female education. *Journal of Political Economy*, *128*(2), 591–641.

Bayot, D., & Voena, A. (2015). *Prenuptial contracts, labor supply and household investments*. University of Chicago.

Botticini, M. (1999). A loveless economy? Intergenerational altruism and the marriage market in a Tuscan town, 1415-1436. *The Journal of Economic History*, *59*(1), 104–121.

Botticini, M. (2003). Marriage payments. In J. Mokyr (Ed.), *The Oxford Encyclopedia of Economic History* (Vol. Volume 1, pp. 456–458). Oxford University Press.

Botticini, M., & Siow, A. (2003). Why dowries? *American Economic Review*, *93*(4), 1385–1398.

Brassiolo, P. (2013). *The effect of property division laws on divorce and labor supply: Evidence from Spain* (Research Department working papers No. 246). CAF Development Bank Of Latinamerica.

Cai, H. (2003). A theory of joint asset ownership. *The RAND Journal of Economics*, *34*(1), 63–77.

Chiappori, P., Fortin, B., & Lacroix, G. (2002). Marriage market, divorce legislation, and household labor supply. *Journal of Political Economy*, *110*(1), 37–72.

Código Civil de Cataluña. Comunidad Autónoma de Cataluña, Ley Primera: «BOE» núm. 32, de 6 de febrero de 2003, páginas 4912 a 4918, Libro Segundo: «BOE» núm. 203, de 21 de agosto de 2010, páginas 73429 a 73525.

Código Civil de España. Ministerio de Gracia y Justicia, «Gaceta de Madrid» núm. 206, de 25/07/1889. Formal title: Real Decreto de 24 de julio de 1889 por el que se publica el Código Civil.

Compilación del Derecho Civil de Baleares. Comunidad Autónoma de las Islas Baleares, «BOIB» núm. 120, de 02/10/1990. Formal title: Decreto Legislativo 79/1990, de 6 de septiembre, por el que se aprueba el texto refundido de la compilación del derecho civil de las Islas Baleares.

Fisher, H. (2012). Divorce property division laws and the decision to marry or cohabit. *Journal of Law, Economics, & Organization*, *28*, 734–753.

Frémeaux, N., & Leturcq, M. (2018). Prenuptial agreements and matrimonial property regimes in France, 1855–2010. *Explorations in Economic History*, *68*, 132–142.

Grossman, S. J., & Hart, O. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, *94*(4), 691–719.

Hamilton, G. (1999). Property rights and transaction costs in marriage: Evidence from prenuptial contracts. *The Journal of Economic History*, *59*(1), 68–103.

Hart, O. (1995). *Firms, contracts, and financial structure*. Oxford University Press.

Hart, O., & Moore, J. (1990). Property rights and the nature of the firm. *Journal of Political Economy*, *98*(6), 1119–1158.

Lamarca i Marquès, A., Artigot Golobardes, M., Azagra Malo, A., & Farnós Amorós, E. (2003). *Separate property and family self-determination in Catalonia: A peaceful model under a change?* InDret No. 4.

Ley de Régimen Económico Valenciano 10/2007.

Piazzalunga, D. (2016). *Till money us do part: Property division at divorce and married couples' time use behaviour*. FBK-IRVAPP.

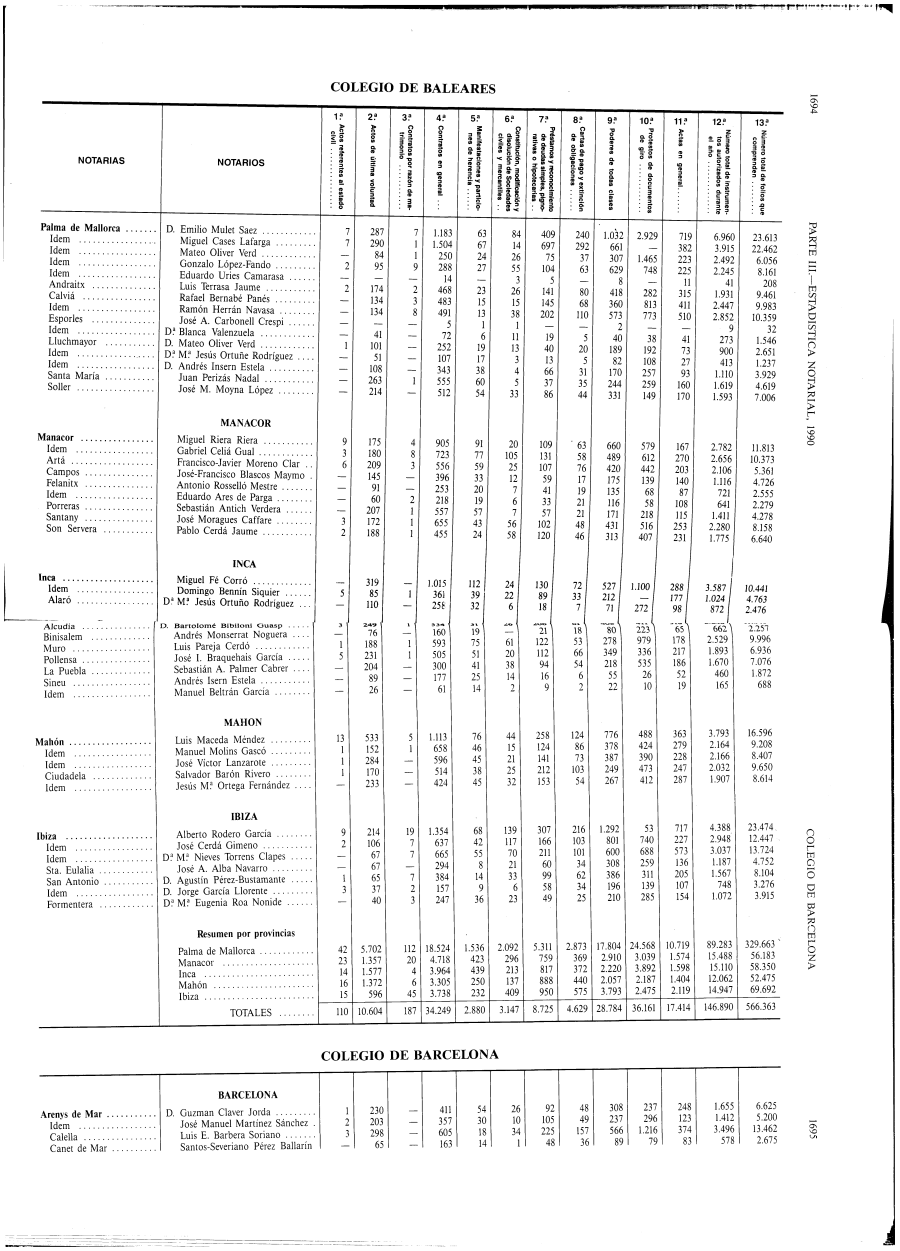
Rasul, I. (2006). Marriage markets and divorce laws. *The Journal of Law, Economics, and Organization*, *22*(1), 30–69.

Stevenson, B. (2007). The impact of divorce laws on marriage-specific capital. *Journal of Labor Economics*, *25*(1), 75–94.

Stevenson, B., & Wolfers, J. (2006). Bargaining in the Shadow of the Law: Divorce Laws and Family Distress. *The Quarterly Journal of Economics*, *121*(1), 267–288.

Voena, A. (2015). Yours, mine, and ours: Do divorce laws affect the intertemporal behavior of married couples? *American Economic Review*, *105*(8), 2295–2332.

3.A Contracts Data



COLEGIO DE BALEARES

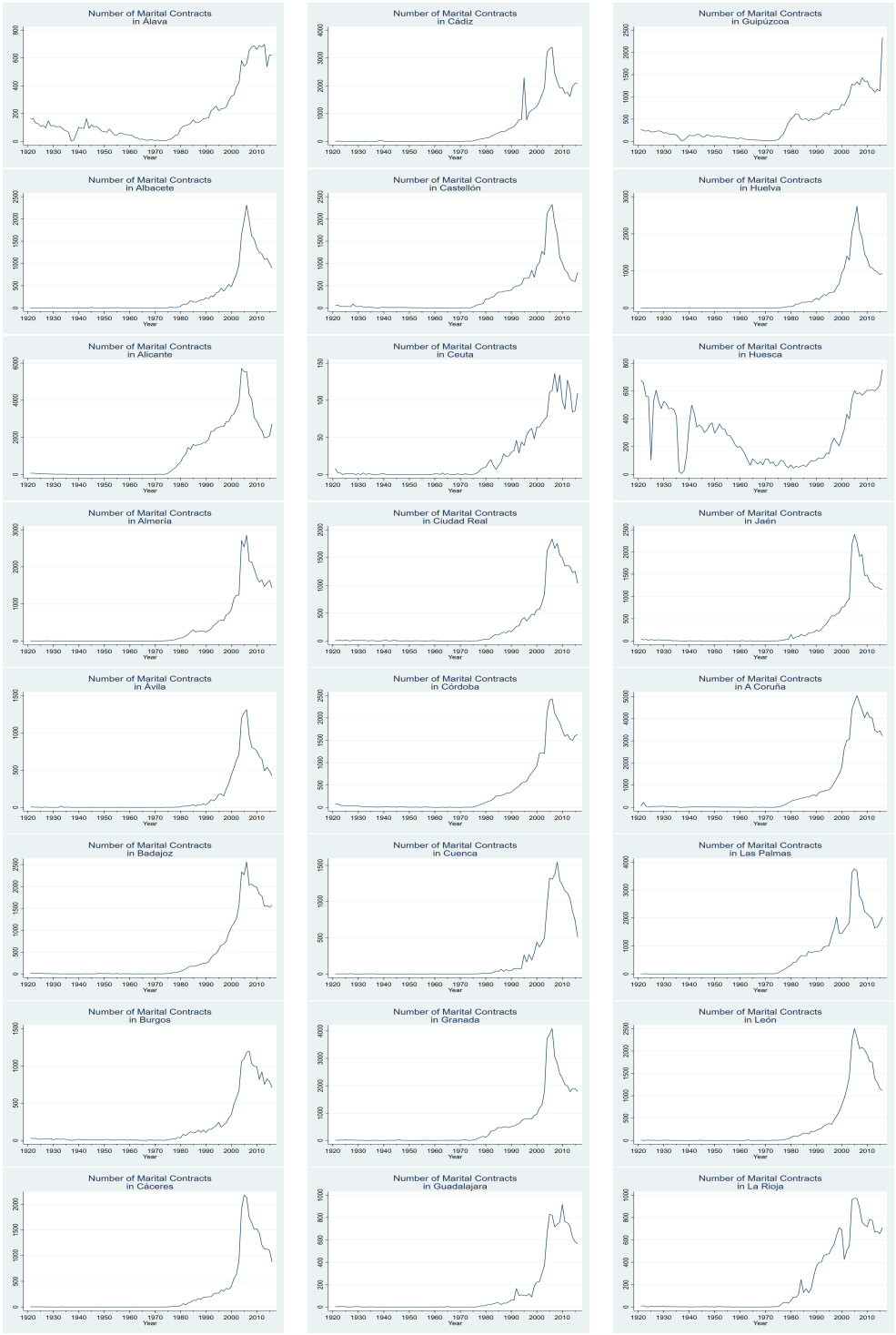
NOTARIAS	NOTARIOS	1.ª Actos referentes al estado civil	2.ª Actos de última voluntad	3.ª Comisión por razón de matrimonio	4.ª Contratos en general	5.ª Particiones de herencia	6.ª Constitución, modificación y cancelación de derechos reales	7.ª Préstamos y reconocimiento de deuda simple, pignoraticios o hipotecarios	8.ª Cartas de pago y extinción de obligaciones	9.ª Poderes de todas clases	10.ª Protestos de documentos de giro	11.ª Actas en general	12.ª Número total de instrumentos públicos autorizados durante el año	13.ª Número total de folios que comprenden
Palma de Mallorca	D. Emilio Mulet Saez	7	287	7	1.183	63	84	409	240	1.032	2.929	719	6.960	23.613
Idem	Miguel Cases Lafarga	7	290	1	1.504	67	14	697	292	661	—	382	3.915	22.462
Idem	Mateo Oliver Verd	—	84	1	250	24	26	75	37	307	1.465	223	2.492	6.056
Idem	Gonzalo López-Fando	2	95	9	288	27	55	104	63	629	748	225	2.245	8.161
Idem	Eduardo Uries Camarasa	—	—	—	14	—	3	5	—	8	—	11	41	208
Andraitx	Luis Terrasa Jaume	2	174	2	468	23	26	141	80	418	282	315	1.931	9.461
Calviá	Rafael Bernabé Panés	—	134	3	483	15	15	145	68	360	813	411	2.447	9.983
Idem	Ramón Herrán Navasa	—	134	8	491	13	38	202	110	573	773	510	2.852	10.359
Esporles	José A. Carbonell Crespi	—	—	—	5	1	1	—	—	2	—	—	9	32
Idem	Dª Blanca Valenzuela	—	41	—	72	6	11	19	5	40	38	41	273	1.546
Lluchmayor	D. Mateo Oliver Verd	1	101	—	252	19	13	40	20	189	192	73	900	2.651
Idem	Dª Mª Jesús Ortuño Rodríguez	—	51	—	107	17	3	13	5	82	108	27	413	1.237
Idem	D. Andrés Insern Estela	—	108	—	343	38	4	66	31	170	257	93	1.110	3.929
Santa María	Juan Perizás Nadal	—	263	1	555	60	5	37	35	244	259	160	1.619	4.619
Soller	José M. Moyna López	—	214	—	512	54	33	86	44	331	149	170	1.593	7.006
	MANACOR													
Manacor	Miguel Riera Riera	9	175	4	905	91	20	109	63	660	579	167	2.782	11.813
Idem	Gabriel Celiá Gual	3	180	8	723	77	105	131	58	489	612	270	2.656	10.373
Artá	Francisco-Javier Moreno Clar	6	209	3	556	59	25	107	76	420	442	203	2.106	5.361
Campos	José-Francisco Blascos Maymo	—	145	—	396	33	12	59	17	175	139	140	1.116	4.726
Felanitx	Antonio Rosselló Mestre	—	91	—	253	20	7	41	19	135	68	87	721	2.555
Idem	Eduardo Ares de Parga	—	60	2	218	19	6	33	21	116	58	108	641	2.279
Porreras	Sebastián Antich Verdera	—	207	1	557	57	7	57	21	171	218	115	1.411	4.278
Santany	José Moragues Caffare	3	172	1	655	43	56	102	48	431	516	253	2.280	8.158
Son Servera	Pablo Cerdá Jaume	2	188	1	455	24	58	120	46	313	407	231	1.775	6.640
	INCA													
Inca	Miguel Fé Corró	—	319	—	1.015	112	24	130	72	527	1.100	288	3.587	*10.441*
Idem	Domingo Bennin Siquier	5	85	1	361	39	22	89	33	212	—	*177*	*1.024*	*4.763*
Alaró	Dª Mª Jesús Ortuño Rodríguez	—	110	—	255	32	6	18	7	71	272	98	872	2.476
Alcudia	D. Bartolomé Bibiloni Guasp	3	249	1	535	35	29	221	118	80	223	65	662	2.257
Binisalem	Andrés Monserrat Noguera	—	76	—	160	19	—	21	18	80	223	65	662	2.257
Muro	Luis Pareja Cerdó	1	188	1	593	75	61	122	53	278	979	178	2.529	9.996
Pollensa	José I. Braquehais García	5	231	1	505	51	20	112	66	349	336	217	1.893	6.936
La Puebla	Sebastián A. Palmer Cabrer	—	204	—	300	41	38	94	54	218	535	186	1.670	7.076
Sineu	Andrés Isern Estela	—	89	—	177	25	14	16	6	55	26	52	460	1.872
Idem	Manuel Beltrán García	—	26	—	61	14	2	9	2	22	10	19	165	688
	MAHON													
Mahón	Luis Maceda Méndez	13	533	5	1.113	76	44	258	124	776	488	363	3.793	16.596
Idem	Manuel Molins Gascó	1	152	1	658	46	15	124	86	378	424	279	2.164	9.208
Idem	José Víctor Lanzarote	1	284	—	596	45	21	141	73	387	390	228	2.166	8.407
Ciudadela	Salvador Barón Rivero	1	170	—	514	38	25	212	103	249	473	247	2.032	9.650
Idem	Jesús Mª Ortega Fernández	—	233	—	424	45	32	153	54	267	412	287	1.907	8.614
	IBIZA													
Ibiza	Alberto Rodero García	9	214	19	1.354	68	139	307	216	1.292	53	717	4.388	23.474
Idem	José Cerdá Gimeno	2	106	7	637	42	117	166	103	801	740	227	2.948	12.447
Idem	Dª Mª Nieves Torrens Clapes	—	67	7	665	55	70	211	101	600	688	573	3.037	13.724
Sta. Eulalia	José A. Alba Navarro	—	67	—	294	8	21	60	34	308	259	136	1.187	4.752
San Antonio	D. Agustín Pérez-Bustamante	1	65	7	384	14	33	99	62	386	311	205	1.567	8.104
Idem	D. Jorge García Llorente	3	37	2	157	9	6	58	34	196	139	107	748	3.276
Formentera	Dª Mª Eugenia Roa Nonide	—	40	3	247	36	23	49	25	210	285	154	1.072	3.915
	Resumen por provincias													
	Palma de Mallorca	42	5.702	112	18.524	1.536	2.092	5.311	2.873	17.804	24.568	10.719	89.283	329.663
	Manacor	23	1.357	20	4.718	423	296	759	369	2.910	3.039	1.574	15.488	56.183
	Inca	14	1.577	4	3.964	439	213	817	372	2.220	3.892	1.598	15.110	58.350
	Mahón	16	1.372	6	3.305	250	137	888	440	2.057	2.187	1.404	12.062	52.475
	Ibiza	15	596	45	3.738	232	409	950	575	3.793	2.475	2.119	14.947	69.692
	TOTALES	110	10.604	187	34.249	2.880	3.147	8.725	4.629	28.784	36.161	17.414	146.890	566.363

COLEGIO DE BARCELONA

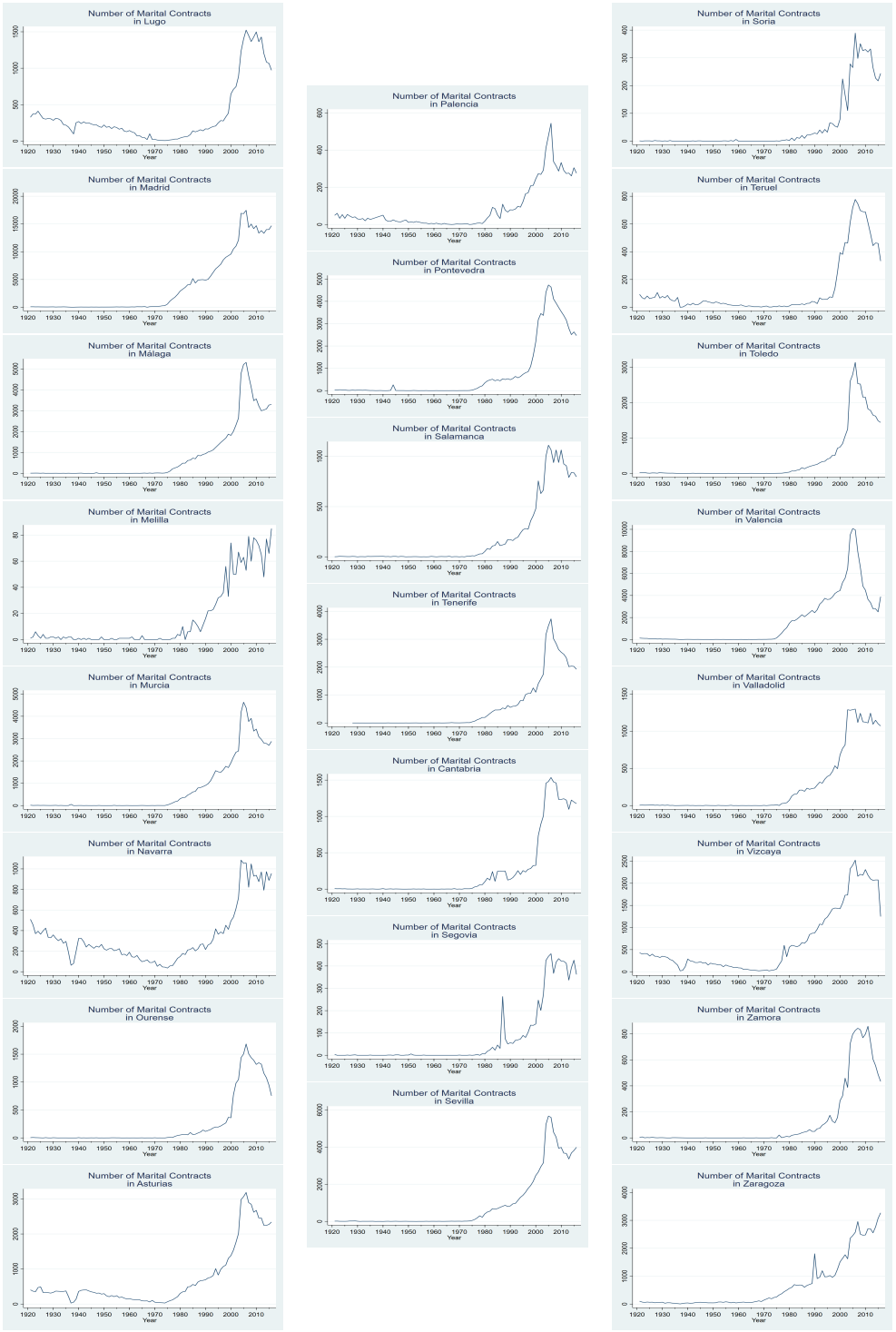
	BARCELONA													
Arenys de Mar	D. Guzman Claver Jorda	1	230	—	411	54	26	92	48	308	237	248	1.655	6.625
Idem	José Manuel Martínez Sánchez	2	203	—	357	30	10	105	49	237	296	123	1.412	5.200
Calella	Luis E. Barbera Soriano	3	298	—	605	18	34	225	157	566	1.216	374	3.496	13.462
Canet de Mar	Santos-Severiano Pérez Ballarín	—	65	—	163	14	1	48	36	89	79	83	578	2.675

1694 PARTE III.—ESTADISTICA NOTARIAL, 1990 COLEGIO DE BARCELONA 1695

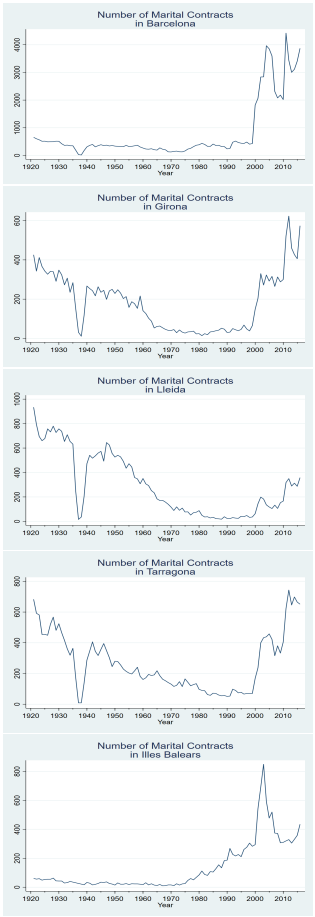
Figure 3.A.1: A Page of the Anuario de la Dirección General de los Registros y del Notariado



Marital Contracts in Spain by Province, 1921-2016, Default Regime: Common Property



Marital Contracts in Spain by Province, 1921-2016, Default Regime: Common Property



Marital Contracts in Spain by Province, 1921-2016, Default Regime: Separate Property

Type	Autonomous community	Province	Default marital property system
Community property	Andalusia	Almería, Cádiz, Córdoba, Granada, Huelva, Jaén, Málaga, Sevilla, Huelva	*sociedad de gananciales*
	Aragon	Huesca, Teruel, Zaragoza	*consorcio conyugal*
	Asturias	Asturias	*sociedad de gananciales*
	Canary Islands	Las Palmas, Santa Cruz de Tenerife	*sociedad de gananciales*
	Cantabria	Cantabria	*sociedad de gananciales*
	Castile and Leon	Ávila, Burgos, León, Palencia, Salamanca, Segovia, Soria	*sociedad de gananciales*
	Castile-La Mancha	Albacete, Ciudad Real, Cuenca, Guadalajara, Toledo	*sociedad de gananciales*
	Extremadura	Badajoz*	*sociedad de gananciales*, *fuero del Baylío*
		Cáceres	*sociedad de gananciales*
	Galicia	A Coruña, Lugo, Ourense, Pontevedra	*sociedad de gananciales*
	Madrid	Madrid	*sociedad de gananciales*
	Murcia	Murcia	*sociedad de gananciales*
	Navarre	Navarra	*sociedad conyugal de conquistas*
	Basque Country	Álava*, Guipúzcoa, Vizcaya*	*sociedad de gananciales*, *comunicación foral*
	La Rioja	La Rioja	*sociedad de gananciales*
	Ceuta	Ceuta	*fuero del Baylío*
	Melilla	Melilla	*sociedad de gananciales*
	Valencia except 2008-2016	Alicante, Castellón, Valencia	*sociedad de gananciales*
Separate property	Balearic Islands	Illes Balears	*separación de bienes*
	Catalonia	Barcelona, Girona, Lleida, Tarragona	*separación de bienes*
	Valencia 2008-2016	Alicante, Castellón, Valencia	*separación de bienes*

* The default regime varies by municipality.

Table 3.A.1: Marital Property Regimes in Spain

3.B Summary Statistics

	Catalonia		Balearic Islands		Total	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Number of marital contracts per 1,000 persons by municipality	1.104	3.758	0.394	1.050	1.006	3.518
Number of marital contracts per marriages by residence and municipality	0.114	0.154	0.081	0.083	0.110	0.148
Number of marital contracts per marriages by celebration and municipality	0.122	0.164	0.080	0.084	0.117	0.157
Total population by municipality	23291	65373	27667	28833	23897	61637
Total male population by municipality	11411	31000	13769	14069	11737	29257
Total female population by municipality	11880	34379	13899	14766	12159	32386
Marriages by residence per 1,000 persons	12.332	26.042	7.191	14.383	11.700	24.959
Marriages by celebration per 1,000 persons	10.851	22.094	6.048	9.302	10.259	21.003
Female unemployment rate	0.163	0.059	0.154	0.048	0.162	0.058
Male unemployment rate	0.119	0.063	0.115	0.061	0.118	0.063
GDP share within separate property default region	0.006	0.005	0.002	0.000	0.006	0.005
Observations	4164		668		4832	

Table 3.B.1: Summary Statistics

		Balearic Islands	Catalonia	Difference
Municipality level variables	Males/total population	0.498	0.496	-0.002***
		(0.005)	(0.008)	(0.001)
	Municipality population/province population	0.031	0.011	-0.020***
		(0.039)	(0.021)	(0.004)
	Marriages by residence per 1,000 persons	7.191	12.332	5.141
		(14.383)	(26.042)	(4.027)
	Marriages by celebration per 1,000 persons	6.048	10.851	4.802*
		(9.302)	(22.094)	(2.810)
Province level variables	Female unemployment rate	0.154	0.163	0.009***
		(0.048)	(0.059)	(0.002)
	Male unemployment rate	0.115	0.119	0.004
		(0.061)	(0.063)	(0.003)
	GDP share within separate property default region	0.002	0.006	0.004***
		(0.000)	(0.005)	(0.000)
	Observations	668	4,164	4,832

Standard errors clustered by municipality

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.B.2: Balance Table

3.C Robustness Checks

	Number of marital contracts											
	per 1,000 persons				per marriages by place of residence				per marriages by place of celebration			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1999 * Catalonia	-0.0713	0.625	0.603	0.632	-0.00589	-0.00444	0.000439	0.000385	-0.00438	-0.00281	0.00102	0.00131
	(0.104)	(0.686)	(0.643)	(0.489)	(0.00604)	(0.00667)	(0.00716)	(0.00698)	(0.00840)	(0.00971)	(0.0101)	(0.00979)
2000 * Catalonia	0.698***	1.544**	1.827**	1.810**	0.0420***	0.0443***	0.0521***	0.0521***	0.0538***	0.0561***	0.0611***	0.0616***
	(0.177)	(0.765)	(0.841)	(0.732)	(0.00943)	(0.0101)	(0.0109)	(0.0108)	(0.0106)	(0.0116)	(0.0125)	(0.0124)
2001 * Catalonia	1.025***	2.257**	3.084**	3.211**	0.0677***	0.0711***	0.0860***	0.0864***	0.0804***	0.0840***	0.0917***	0.0927***
	(0.271)	(1.087)	(1.472)	(1.371)	(0.0139)	(0.0142)	(0.0177)	(0.0177)	(0.0149)	(0.0155)	(0.0194)	(0.0194)
2002 * Catalonia	1.570***	3.051**	3.616**	3.617***	0.0873***	0.0907***	0.108***	0.108***	0.106***	0.110***	0.120***	0.121***
	(0.373)	(1.249)	(1.413)	(1.286)	(0.0185)	(0.0191)	(0.0216)	(0.0215)	(0.0194)	(0.0205)	(0.0232)	(0.0231)
2003 * Catalonia	1.539***	2.633**	3.305**	3.431***	0.0860***	0.0882***	0.108***	0.108***	0.114***	0.116***	0.129***	0.130***
	(0.371)	(1.123)	(1.350)	(1.252)	(0.0171)	(0.0176)	(0.0220)	(0.0221)	(0.0181)	(0.0188)	(0.0235)	(0.0236)
2004 * Catalonia	1.277***	2.784***	3.475***	3.422***	0.0643**	0.0666**	0.0849***	0.0850***	0.0724**	0.0757**	0.0879***	0.0882***
	(0.378)	(1.039)	(1.206)	(1.112)	(0.0262)	(0.0263)	(0.0285)	(0.0285)	(0.0316)	(0.0316)	(0.0328)	(0.0328)
2005 * Catalonia	1.247***	2.465**	3.524**	3.578**	0.0392	0.0402	0.0570	0.0569	0.0536	0.0557	0.0670	0.0672
	(0.369)	(1.121)	(1.549)	(1.514)	(0.0432)	(0.0434)	(0.0448)	(0.0448)	(0.0422)	(0.0425)	(0.0430)	(0.0430)
2006 * Catalonia	0.986***	2.081**	2.737**	3.034***	0.0646*	0.0648*	0.0834**	0.0852**	0.0709*	0.0723**	0.0857**	0.0881**
	(0.273)	(0.967)	(1.230)	(1.127)	(0.0379)	(0.0380)	(0.0399)	(0.0399)	(0.0363)	(0.0361)	(0.0379)	(0.0380)
2007 * Catalonia	1.080***	2.294**	2.964**	3.111**	0.0658***	0.0674***	0.0856***	0.0858***	0.0712***	0.0737***	0.0872***	0.0878***
	(0.243)	(1.136)	(1.362)	(1.254)	(0.0215)	(0.0214)	(0.0247)	(0.0248)	(0.0226)	(0.0223)	(0.0264)	(0.0264)
2008 * Catalonia	1.102***	2.347**	2.711**	2.696**	0.0710***	0.0731***	0.0827***	0.0826***	0.0825***	0.0854***	0.0945***	0.0947***
	(0.219)	(1.179)	(1.278)	(1.147)	(0.0209)	(0.0211)	(0.0238)	(0.0237)	(0.0201)	(0.0202)	(0.0238)	(0.0237)
2009 * Catalonia	1.184***	2.441*	2.887**	3.024**	0.0880***	0.0899***	0.113***	0.113***	0.104***	0.107***	0.125***	0.125***
	(0.245)	(1.305)	(1.396)	(1.201)	(0.0228)	(0.0232)	(0.0274)	(0.0273)	(0.0212)	(0.0217)	(0.0273)	(0.0273)
2010 * Catalonia	1.207***	1.966*	2.672**	3.002***	0.0537*	0.0553*	0.0806**	0.0810**	0.0708***	0.0726***	0.0922***	0.0929***
	(0.251)	(1.040)	(1.302)	(1.135)	(0.0316)	(0.0315)	(0.0369)	(0.0370)	(0.0267)	(0.0267)	(0.0335)	(0.0336)
2011 * Catalonia	2.188***	3.926**	4.707***	4.674***	0.151***	0.153***	0.183***	0.182***	0.178***	0.181***	0.204***	0.202***
	(0.591)	(1.656)	(1.800)	(1.658)	(0.0266)	(0.0267)	(0.0350)	(0.0351)	(0.0285)	(0.0289)	(0.0374)	(0.0374)
2012 * Catalonia	2.302***	3.920**	5.323**	5.561**	0.179***	0.181***	0.202***	0.202***	0.194***	0.197***	0.210***	0.210***
	(0.519)	(1.568)	(2.294)	(2.251)	(0.0256)	(0.0259)	(0.0337)	(0.0339)	(0.0256)	(0.0258)	(0.0344)	(0.0346)
2013 * Catalonia	1.946***	3.562**	4.599**	4.701**	0.152***	0.154***	0.170***	0.171***	0.177***	0.180***	0.190***	0.190***
	(0.413)	(1.542)	(1.996)	(1.903)	(0.0245)	(0.0247)	(0.0290)	(0.0290)	(0.0214)	(0.0216)	(0.0266)	(0.0267)
2014 * Catalonia	2.191***	3.764**	4.116**	4.087***	0.172***	0.174***	0.194***	0.194***	0.205***	0.208***	0.222***	0.222***
	(0.486)	(1.638)	(1.669)	(1.481)	(0.0301)	(0.0305)	(0.0350)	(0.0349)	(0.0251)	(0.0261)	(0.0317)	(0.0317)
2015 * Catalonia	1.864***	3.538**	4.449**	4.515***	0.149***	0.152***	0.176***	0.176***	0.172***	0.176***	0.191***	0.190***
	(0.458)	(1.480)	(1.783)	(1.653)	(0.0213)	(0.0215)	(0.0286)	(0.0287)	(0.0217)	(0.0213)	(0.0281)	(0.0283)
2016 * Catalonia	2.069***	3.781**	4.821**	4.873***	0.142***	0.144***	0.167***	0.167***	0.164***	0.167***	0.180***	0.180***
	(0.539)	(1.476)	(1.890)	(1.804)	(0.0202)	(0.0204)	(0.0259)	(0.0260)	(0.0214)	(0.0212)	(0.0268)	(0.0270)
Catalonia	1.926***	-0.541	-1.266	-0.890	0.0996***	0.0930***	0.0857***	0.0864***	0.100***	0.0909***	0.0869***	0.0875***
	(0.309)	(1.526)	(1.837)	(1.746)	(0.0113)	(0.0117)	(0.0145)	(0.0144)	(0.0120)	(0.0124)	(0.0152)	(0.0150)
Post-2005 reform	0.240	-2.353	-0.368	0.667	0.0696***	0.0687***	0.0555*	0.0578*	0.0611***	0.0543***	0.0383	0.0410
	(0.228)	(1.617)	(1.729)	(1.272)	(0.0172)	(0.0176)	(0.0318)	(0.0317)	(0.0182)	(0.0174)	(0.0351)	(0.0352)
Post-1993 Catalan Civil Code reform	-0.00899	0.752	1.403	1.435	-0.00928	-0.00878	-0.00684	-0.00675	-0.00698	-0.00547	-0.00759	-0.00712
	(0.181)	(0.707)	(1.151)	(1.096)	(0.00701)	(0.00688)	(0.0112)	(0.0113)	(0.00719)	(0.00662)	(0.0122)	(0.0122)
Municipality and year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Share of male population		✓	✓	✓		✓	✓	✓		✓	✓	✓
Municipality/province population		✓	✓	✓		✓	✓	✓		✓	✓	✓
Marriage rate by residence		✓	✓	✓								
Unemployment rate by gender			✓	✓			✓	✓			✓	✓
GDP share within region			✓	✓			✓	✓			✓	✓
Barcelona (city) omitted				✓				✓				✓
Observations	4825	2846	2846	2819	2846	2846	2846	2819	2843	2843	2843	2816
Number of clusters	221	137	137	136	137	137	137	136	137	137	137	136

Standard errors in parentheses, clustered by municipality

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.C.1: Dynamic Difference-in-Differences Estimates

3.D Parallel Pre-Trends Checks

	Number of marital contracts per 1,000 persons			
	(1)	(2)	(3)	(4)
1990*Catalonia	-0.0397	-0.498	-0.712	-0.688*
	(0.0930)	(0.438)	(0.436)	(0.384)
1991*Catalonia	-0.191	0.391	0.700	0.613
	(0.270)	(0.389)	(0.629)	(0.646)
1993*Catalonia	-0.0532	-1.472	-2.041	-1.977
	(0.240)	(1.403)	(1.657)	(1.420)
1994*Catalonia	-0.310	-0.938	-0.928	-0.925
	(0.315)	(1.230)	(1.120)	(0.794)
1995*Catalonia	-0.0971	-0.754	-0.995	-1.067
	(0.213)	(1.132)	(1.198)	(0.996)
1996*Catalonia	-0.419	-0.515	0.0329	-0.0691
	(0.332)	(0.640)	(1.053)	(1.118)
1997*Catalonia	0.0162	0.110	0.651	0.647
	(0.121)	(0.120)	(0.650)	(0.679)
1999*Catalonia	-0.217	0.0840	0.132	0.139
	(0.164)	(0.128)	(0.163)	(0.177)
2000*Catalonia	0.552***	1.003***	1.386***	1.346***
	(0.176)	(0.249)	(0.490)	(0.508)
2001*Catalonia	0.880***	1.710***	2.701**	2.803**
	(0.259)	(0.529)	(1.196)	(1.208)
2002*Catalonia	1.429***	2.528***	3.237***	3.217***
	(0.358)	(0.740)	(1.094)	(1.075)
2003*Catalonia	1.395***	2.092***	2.868***	2.972***
	(0.331)	(0.591)	(0.977)	(0.994)
2004*Catalonia	1.133***	2.235***	3.028***	2.954***
	(0.354)	(0.627)	(0.896)	(0.917)
2005*Catalonia	1.103***	1.914***	3.097**	3.129**
	(0.348)	(0.681)	(1.286)	(1.366)
2006*Catalonia	0.841***	1.531***	2.269**	2.547***
	(0.263)	(0.479)	(0.887)	(0.902)
2007*Catalonia	0.936***	1.743***	2.488***	2.616***
	(0.232)	(0.576)	(0.949)	(0.988)
2008*Catalonia	0.958***	1.795***	2.198***	2.166**
	(0.215)	(0.608)	(0.813)	(0.852)
2009*Catalonia	1.040***	1.888**	2.367***	2.487***
	(0.245)	(0.724)	(0.868)	(0.823)
2010*Catalonia	1.062***	1.417***	2.169***	2.481***
	(0.249)	(0.503)	(0.828)	(0.797)
2011*Catalonia	2.044***	3.379***	4.213***	4.162***
	(0.578)	(1.119)	(1.342)	(1.336)
2012*Catalonia	2.158***	3.374***	4.940**	5.154**
	(0.509)	(1.013)	(2.027)	(2.106)
2013*Catalonia	1.802***	3.010***	4.193**	4.273**
	(0.407)	(0.966)	(1.655)	(1.696)
2014*Catalonia	2.046***	3.210***	3.623***	3.577***
	(0.489)	(1.052)	(1.168)	(1.120)
2015*Catalonia	1.720***	2.986***	4.033***	4.078***
	(0.442)	(0.918)	(1.407)	(1.403)
2016*Catalonia	1.924***	3.228***	4.427***	4.456***
	(0.521)	(0.936)	(1.584)	(1.610)
Catalonia	2.008***	-0.691	-1.623	-1.212
	(0.313)	(1.688)	(2.213)	(2.144)
Municipality and year fixed effects	✓	✓	✓	✓
Post-2005 reform	✓	✓	✓	✓
1993 Catalan Civil Code reform	✓	✓	✓	✓
Marriage rate by residence		✓	✓	✓
Municipality/province population		✓	✓	✓
Share of male population		✓	✓	✓
Unemployment rate by gender			✓	✓
GDP share within region			✓	✓
Barcelona (city) omitted				✓
Observations	4825	2846	2846	2819
Number of clusters	221	137	137	136

Standard errors in parentheses, clustered by municipality

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.D.1: Parallel Pre-Trends Check, Contracts per 1,000 Persons

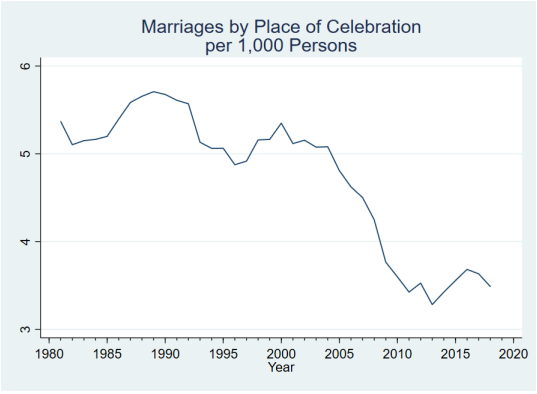
	Number of marital contracts per marriages							
	by place of residence				by place of celebration			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1990*Catalonia	-0.00445	-0.000850	-0.00802	-0.00795	0.00197	0.00356	-0.000791	-0.000851
	(0.00943)	(0.0103)	(0.0107)	(0.0107)	(0.0123)	(0.0128)	(0.0136)	(0.0136)
1991*Catalonia	0.00812	0.00891	0.00380	0.00377	0.0140	0.0157	0.0117	0.0117
	(0.0125)	(0.0130)	(0.0140)	(0.0140)	(0.0176)	(0.0179)	(0.0190)	(0.0190)
1993*Catalonia	0.0223	0.0202	0.0126	0.0128	0.0274	0.0237	0.0227	0.0221
	(0.0165)	(0.0182)	(0.0198)	(0.0197)	(0.0213)	(0.0237)	(0.0257)	(0.0252)
1994*Catalonia	0.0429***	0.0423**	0.0296	0.0298	0.0430**	0.0414*	0.0337	0.0333
	(0.0159)	(0.0179)	(0.0187)	(0.0184)	(0.0199)	(0.0227)	(0.0236)	(0.0230)
1995*Catalonia	0.0377**	0.0369**	0.0316*	0.0316**	0.0406**	0.0391*	0.0345*	0.0337*
	(0.0146)	(0.0160)	(0.0160)	(0.0158)	(0.0183)	(0.0203)	(0.0205)	(0.0200)
1996*Catalonia	0.0223	0.0204	0.00346	0.00346	0.0222	0.0207	0.00719	0.00702
	(0.0173)	(0.0174)	(0.0228)	(0.0229)	(0.0218)	(0.0220)	(0.0269)	(0.0270)
1997*Catalonia	0.0112	0.0104	0.00455	0.00465	0.0150	0.0144	0.00765	0.00768
	(0.0149)	(0.0149)	(0.0178)	(0.0178)	(0.0176)	(0.0176)	(0.0204)	(0.0205)
1999*Catalonia	0.0166	0.0170	0.0138	0.0138	0.0199	0.0201	0.0181	0.0181
	(0.0121)	(0.0122)	(0.0124)	(0.0124)	(0.0163)	(0.0164)	(0.0166)	(0.0166)
2000*Catalonia	0.0644***	0.0658***	0.0652***	0.0653***	0.0781***	0.0791***	0.0780***	0.0782***
	(0.0127)	(0.0128)	(0.0139)	(0.0140)	(0.0165)	(0.0165)	(0.0172)	(0.0173)
2001*Catalonia	0.0900***	0.0925***	0.0988***	0.0993***	0.105***	0.107***	0.108***	0.109***
	(0.0188)	(0.0187)	(0.0213)	(0.0214)	(0.0217)	(0.0215)	(0.0243)	(0.0244)
2002*Catalonia	0.109***	0.111***	0.121***	0.121***	0.130***	0.132***	0.136***	0.137***
	(0.0193)	(0.0195)	(0.0212)	(0.0213)	(0.0229)	(0.0230)	(0.0246)	(0.0247)
2003*Catalonia	0.108***	0.109***	0.121***	0.121***	0.138***	0.139***	0.146***	0.147***
	(0.0166)	(0.0166)	(0.0199)	(0.0201)	(0.0194)	(0.0194)	(0.0224)	(0.0226)
2004*Catalonia	0.0866***	0.0880***	0.0978***	0.0981***	0.0967***	0.0985***	0.105***	0.105***
	(0.0283)	(0.0284)	(0.0294)	(0.0295)	(0.0354)	(0.0353)	(0.0354)	(0.0355)
2005*Catalonia	0.0614	0.0614	0.0694	0.0695	0.0777	0.0784	0.0835*	0.0834*
	(0.0453)	(0.0453)	(0.0467)	(0.0468)	(0.0476)	(0.0476)	(0.0482)	(0.0483)
2006*Catalonia	0.0869**	0.0861**	0.0964**	0.0982**	0.0951**	0.0951**	0.103**	0.105**
	(0.0412)	(0.0412)	(0.0422)	(0.0424)	(0.0430)	(0.0429)	(0.0436)	(0.0437)
2007*Catalonia	0.0881***	0.0887***	0.0985***	0.0988***	0.0954***	0.0965***	0.104***	0.104***
	(0.0264)	(0.0263)	(0.0283)	(0.0284)	(0.0308)	(0.0306)	(0.0327)	(0.0328)
2008*Catalonia	0.0933***	0.0944***	0.0956***	0.0957***	0.107***	0.108***	0.112***	0.111***
	(0.0230)	(0.0230)	(0.0258)	(0.0259)	(0.0262)	(0.0261)	(0.0290)	(0.0291)
2009*Catalonia	0.110***	0.111***	0.126***	0.127***	0.128***	0.129***	0.142***	0.142***
	(0.0255)	(0.0255)	(0.0277)	(0.0278)	(0.0274)	(0.0274)	(0.0301)	(0.0302)
2010*Catalonia	0.0757**	0.0764**	0.0934**	0.0940**	0.0948***	0.0952***	0.109***	0.109***
	(0.0348)	(0.0348)	(0.0382)	(0.0384)	(0.0333)	(0.0332)	(0.0372)	(0.0374)
2011*Catalonia	0.173***	0.174***	0.195***	0.195***	0.202***	0.204***	0.220***	0.218***
	(0.0294)	(0.0294)	(0.0353)	(0.0356)	(0.0341)	(0.0340)	(0.0396)	(0.0399)
2012*Catalonia	0.201***	0.202***	0.214***	0.215***	0.218***	0.220***	0.226***	0.226***
	(0.0281)	(0.0280)	(0.0343)	(0.0346)	(0.0316)	(0.0315)	(0.0382)	(0.0386)
2013*Catalonia	0.174***	0.175***	0.183***	0.184***	0.201***	0.203***	0.206***	0.206***
	(0.0271)	(0.0271)	(0.0303)	(0.0304)	(0.0285)	(0.0283)	(0.0316)	(0.0318)
2014*Catalonia	0.195***	0.195***	0.207***	0.208***	0.230***	0.231***	0.239***	0.239***
	(0.0312)	(0.0312)	(0.0337)	(0.0339)	(0.0295)	(0.0295)	(0.0324)	(0.0325)
2015*Catalonia	0.172***	0.173***	0.189***	0.189***	0.196***	0.198***	0.207***	0.206***
	(0.0236)	(0.0236)	(0.0281)	(0.0283)	(0.0286)	(0.0284)	(0.0320)	(0.0322)
2016*Catalonia	0.164***	0.165***	0.180***	0.180***	0.188***	0.190***	0.197***	0.196***
	(0.0224)	(0.0224)	(0.0263)	(0.0265)	(0.0278)	(0.0277)	(0.0311)	(0.0313)
Catalonia	0.101***	0.0928***	0.0899***	0.0906***	0.0976***	0.0869***	0.0864***	0.0869***
	(0.0130)	(0.0130)	(0.0167)	(0.0168)	(0.0145)	(0.0145)	(0.0182)	(0.0182)
Municipality and year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Post-2005 reform	✓	✓	✓	✓	✓	✓	✓	✓
1993 Catalan Civil Code reform	✓	✓	✓	✓	✓	✓	✓	✓
Municipality/province population		✓	✓	✓		✓	✓	✓
Share of male population		✓	✓	✓		✓	✓	✓
Unemployment rate by gender			✓	✓			✓	✓
GDP share within region			✓	✓			✓	✓
Barcelona (city) omitted				✓				✓
Observations	2846	2846	2846	2819	2843	2843	2843	2816
Number of clusters	137	137	137	136	137	137	137	136

Standard errors in parentheses, clustered by municipality

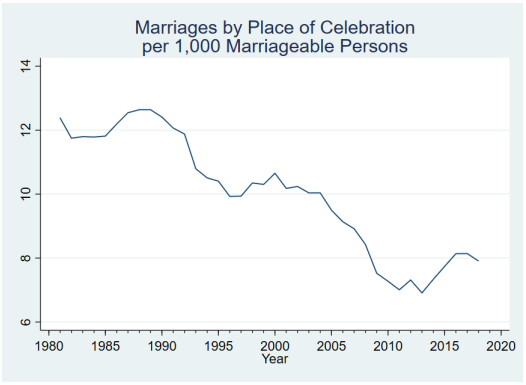
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.D.2: Parallel Pre-Trends Check, Contracts per Marriages

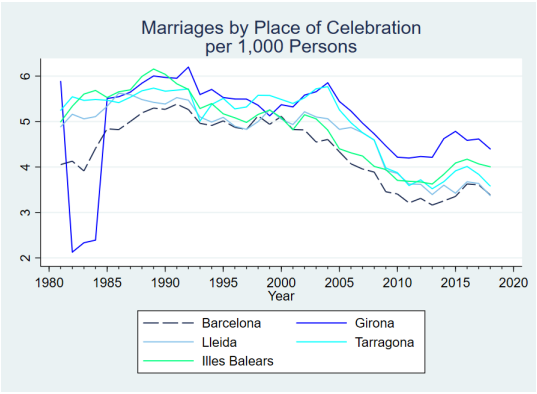
3.E Additional Figures



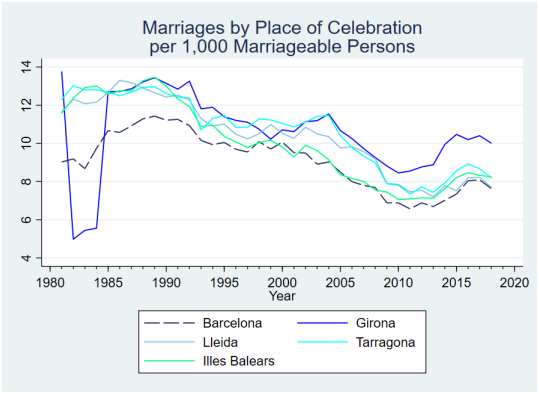
(a) National



(b) National

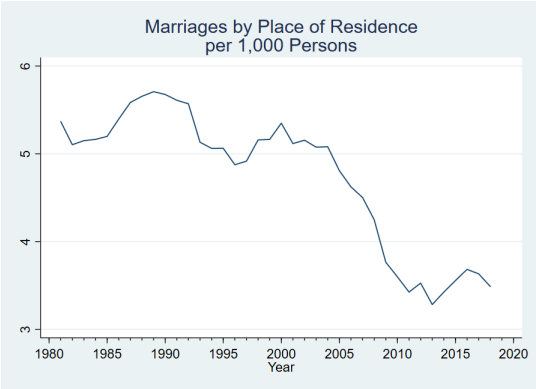


(c) Catalonia and the Balearic Islands

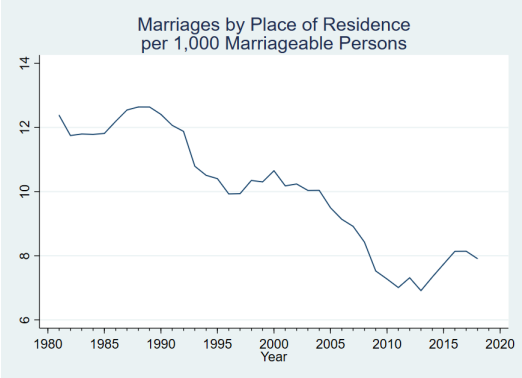


(d) Catalonia and the Balearic Islands

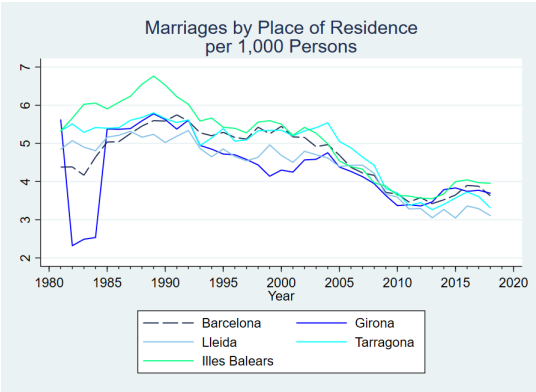
Figure 3.E.1: Marriage Rate by Place of Celebration



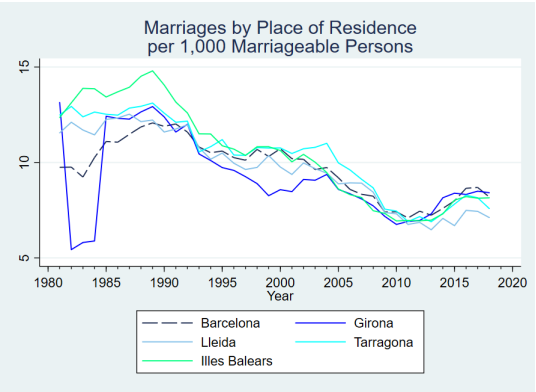
(a) National



(b) National



(c) Catalonia and the Balearic Islands



(d) Catalonia and the Balearic Islands

Figure 3.E.2: Marriage Rate Place of Residence