

## Yours, Mine, and Ours: Do Divorce Laws Affect the Intertemporal Behavior of Married Couples?<sup>†</sup>

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*This paper examines how divorce laws affect couples' intertemporal choices and well-being. Exploiting panel variation in US laws, I estimate the parameters of a model of household decision-making. Household survey data indicate that the introduction of unilateral divorce in states that imposed an equal division of property is associated with higher household savings and lower female employment, implying a distortion in household assets accumulation and a transfer toward wives whose share in household resources is smaller than the one of their husband. When spouses share consumption equally, separate property or prenuptial agreements can reduce distortions and increase equity. (JEL D13, D14, D91, J12, J16, K36)*

This paper examines how property rights within marriage regulated by divorce laws influence the intertemporal behavior and the well-being of married couples. During the 1970s and 1980s, most US couples entered a legal system which allows each spouse to obtain divorce without the consent of the other one and to keep a fraction of the marital assets, independently of who holds the formal title to the property (Golden 1983). This study explores the impact of the introduction of these regimes, namely unilateral divorce and equitable distribution, on the intertemporal behavior of couples. It also analyzes how the current divorce legal system affects the private consumption insurance opportunities available to couples and the well-being of married and divorced women, who are often believed to face more negative consequences of divorce compared to men (e.g., Weitzman 1985; Peterson 1996).

To understand the welfare implications of the divorce law reforms, I build a dynamic model of household decision-making that captures the key aspects of these

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laws. The model indicates that the impact of divorce laws crucially depends on how spouses allocate resources (consumption, leisure, assets) while married. A spouse with a sufficiently low share of marital resources benefits from an equal division of property upon divorce, especially if (s)he can obtain divorce without the consent of the other party.

To uncover the parameters of the intra-household allocation of resources, I examine the changes in household savings and wives' employment status in response to the reforms. In particular, I exploit the variation in US divorce laws over time and across states using data from the Panel Study of Income Dynamics and from the National Longitudinal Survey of Young and Mature Women, to examine the behavior of the couples who got married *before* these reforms and experienced the new regimes while already married. Two main facts emerge from this data. First, the introduction of unilateral divorce in states where property is divided equally leads to higher accumulation of assets compared to states where property is not divided by the courts, but rather assigned to the spouse who holds the title to the property. Second, when unilateral divorce is introduced in states where property is divided equally, the women who are already married become less likely to work, while no significant change is observed in states that do not impose an equal division of property. Analysis of additional cross-sectional time use surveys between 1965 and 1993 suggests that the decrease in the labor supply of women was associated with an increase in the amount of leisure time they enjoyed.

These estimates are consistent with the hypothesis that unilateral divorce results in a lack of commitment within marriage and in a reallocation of resources between husband and wife. The mechanism is the following: property division laws affect each spouse's divorce allocation. When a spouse can divorce unilaterally, the divorce allocations may affect the intra-household allocations during marriage, as spouses can credibly exercise the threat of divorce. This channel does not operate when divorcing requires the consent of both spouses.

The estimates from the survey data provide the information necessary to identify the parameters of intra-household allocation in the dynamic model. I use the estimated structural parameters to compute the welfare effects of the reforms and to perform counterfactual experiments, which examine who benefits and who loses from alternative legal regimes and from prenuptial agreements, and how such regimes affect consumption insurance within the household.

The dynamic model, estimated by indirect inference, replicates the responses of assets accumulation and female employment when the wife's share of household resources in marriage before the reforms is sufficiently low compared to her husband's share, i.e., if wives' Pareto weight in the household planning problem is lower than their husbands' Pareto weight. In particular, for couples married before the reforms, I estimate wives' Pareto weight to be equal to 40 percent of their husbands' weight. When mutual consent divorce is in place, such a weight determines the ratio of the marginal utilities of spouses' consumption. After unilateral divorce is introduced, that ratio shifts when spouses' participation constraints become binding.

The estimates indicate that women in the sample have a lower share of the couples' assets relative to their husband. Hence, they benefit from the laws that impose an equal division of property upon divorce. My simulation suggests that these women obtain a larger share of household assets at the time of divorce in

community property states (where assets are divided equally) than in a title-based states (where assets are assigned to the spouse who holds the title to the property, reflecting the intra-household allocations). Equal division of property alters the allocation of resources in divorce compared to the intra-household allocation during marriage. Unilateral divorce allows the divorce allocation to influence the marriage one, by allowing spouses to credibly exercise their outside option. Then, women obtain, on average, more consumption and leisure also during marriage relative to the allocation in mutual consent divorce. A more equal distribution of consumption in marriage follows from the equal distribution of property in divorce.

The model indicates that asset accumulation during marriage increases because spouses' individual incentives to save are distorted by the reforms. Because mandated equal division of property does not reflect the allocation of resources within marriage, such regime results in the equivalent of a tax on savings for the spouse with larger Pareto weight, and a subsidy for the other spouse. For sufficiently low values in the wives' Pareto weight, the model also replicates the decline in female employment that follows the reforms.

I use the estimates of the parameters of the dynamic model to examine the implications of the current property division rules for spouses' well-being. Given the estimates of the intra-household allocation parameters, my simulations suggest that, as intended by the policymakers who promoted it, the equal division of property granted more assets to women in the 1970s and 1980s compared to a title-based property allocation. While such a system benefits women with a low share in household resources, it may prevent those with a Pareto weight close to their husband's weight from smoothing the marginal utility of their consumption upon divorce. When women consume as much as their husband in marriage, but have lower permanent income, they may be better off in a separate property regime or signing a prenuptial agreement, as they may need to accumulate more savings to smooth the marginal utility of their consumption in case of divorce. Community property may preclude women from doing so, leaving them even more exposed to the consumption insurance costs of marriage dissolution.

The contribution of this paper is threefold. First, I develop and estimate a dynamic model that explicitly incorporates mutual consent versus unilateral divorce regimes and property division laws. In a dynamic setting, the introduction of unilateral divorce results in limited commitment. Intra-household reallocation in favor of wives, due to limited commitment, provides a straightforward explanation for the reduction in their likelihood of employment that is observed in survey data when unilateral divorce is introduced in community property states. As indicated by the counterfactual simulations, this finding supports the evidence on the presence of limited commitment in intra-household decision-making, which reduces the opportunities to share income risk within the household (Mazzocco 2007; Mazzocco, Ruiz, and Yamaguchi 2007).

Second, this paper documents and explains the empirical relationship between changes in divorce laws (unilateral divorce and property division rules) and the saving behavior of married couples, adding to the literature that examines how unilateral divorce affects household outcomes, such as labor supply (Gray 1998; Stevenson 2008), children's welfare (Gruber 2004), the divorce rate (Friedberg 1998; Wolfers 2006), household specialization (Stevenson 2007), and domestic

violence (Stevenson and Wolfers 2007). In addition to the unilateral divorce reform, I document and exploit the variation in the introduction of equitable distribution over the course of the 1970s and 1980s. To isolate such a relationship from selection and sorting in the labor market, I examine a sample of couples that married before these reforms. Using panel household data, I show that asset accumulation and female employment respond to divorce law reforms in a way that is consistent with the predictions of the model. Understanding why the divorce laws affect the incentives to save and invest may have important policy implications, given the frequency of divorce in the United States and the fact that divorce laws are subject to continuous changes through the actions of courts and lawmakers. For example, in the summer of 2010, the state of New York approved no-fault unilateral divorce. Other states have introduced or consider introducing covenant marriages, which require the consent of both spouses to be broken.<sup>1</sup> Little is known about how or why the intertemporal behavior during marriage may respond to such reforms. Today, judges, legal authors, and lawyers primarily rely on anecdotal evidence and personal experience when evaluating property division (Turner 2005).

Third, this study illustrates the implications of the current US property division laws on couples' welfare and shows that mandating an equal division of property can sometimes result in the opposite of what policymakers intend when they promote the removal of separate property. Divorce can generate significant economic costs, such as direct legal costs and relocation costs, and loss of economies of scale and risk-sharing opportunities. It can be especially costly for the spouse with lower permanent income, who can no longer benefit from sharing resources within marriage. Because there is no market insurance for divorce, self-insurance plays a central role in consumption smoothing. This paper investigates how different ways of dividing property at the time of divorce can affect the ability of secondary earners to use savings to smooth consumption in divorce. Recently, some legal scholars have suggested that in order to insure the consumption of secondary earners, all household property should be divided, including assets acquired *before* marriage (Motro 2008). Others have instead suggested that even joint bank accounts should be banned to encourage spouses to manage their resources separately and let women have "a purse of their own" (Mahle 2006). This study shows that an unobservable parameter, which governs wives' consumption share in marriage, has crucial implications for the debate over the benefits of alternative allocations of property rights inside the household. For a relevant set of values of this parameter (for instance, when husband and wife share consumption equally), mandated equal division of property assigns to secondary earners a *lower* share of household assets compared to a regime in which spouses can retain their own property or can jointly choose a division rule at the time of marriage. Thus, current property division rules may be inadequate to protect many secondary earners from a drop in consumption at divorce.

<sup>1</sup> Louisiana was the first state to approve covenant marriages in 1997, followed by Arizona and Arkansas.

## I. US Divorce Laws: Overview and Literature Review

Widespread and fundamental changes to state divorce laws occurred between the late 1960s and the 1980s. Across states and over time, spouses were allowed to divorce without the consent of the other party, and property division rules were modified to promote an equitable distribution of assets.

### A. *Grounds for Divorce*

Over the decades of analysis, the legal regimes governing the grounds for divorce in the United States can be described as mutual consent regimes and unilateral divorce regimes. Prior to the 1960s, state regulation allowed divorce only under mutual consent, which permits divorce when both husband and wife agree to it or based on fault grounds, such as adultery or domestic violence. The late 1960s brought about the start of the so-called “unilateral divorce revolution,” which allows one party to obtain divorce without the consent of the other. From 1970 to 1990, the number of states allowing unilateral divorce grew from 3 to 35, with considerable variation over time (see online Appendix Table F1).

A contentious literature has attempted to establish whether the surge in divorce rates that occurred in the 1970s was caused by unilateral divorce.<sup>2</sup> Making divorce easier may also affect allocations within marriage, which could explain part of the decline in female suicide rates and domestic violence associated with the reforms (Stevenson and Wolfers 2006). However, research on how unilateral divorce affects the labor supply in the long run of women is not conclusive (cf. Gray 1998, Stevenson 2008).

Both an increase in the risk of divorce and a change in intra-household allocations due to divorce law reforms may affect household intertemporal behavior. Yet, there is little research on this subject. Stevenson (2007) finds that the introduction of unilateral divorce negatively affects the propensity to undertake marriage-specific investments, such as supporting a spouse through school, or buying a house, depending on the asset division regime.

### B. *Property Division Laws*

Property division regimes over the period of analysis can be broadly classified into three main systems:

- (i) *Title-based regimes*, in which assets are allocated according to the title of ownership;

<sup>2</sup>By the Coase theorem, the change from mutual consent divorce to unilateral divorce should not affect the probability of divorce since the efficient outcome would prevail (Becker 1991). The assumptions underlying the Becker-Coase have been examined in the literature (Chiappori, Iyigun, and Weiss 2007 and Fella, Manzini, and Mariotti 2004). The empirical literature is vast and contentious: in cross-sectional analysis, unilateral divorce states did not exhibit higher divorce rates (Peters 1992). Also, the empirical association between unilateral divorce and higher divorce rates in the state-level panel data (Friedberg 1998) may be driven by preexisting trends in divorce rates (Wolfers 2006), apart from a short-term impact, which suggests that unilateral divorce increased the probability of divorce for couples that were already married (Mechoulam 2006). The difference between short-term and long-term effects may be driven by changes in the likelihood of marriage (Rasul 2004) and in the type of matches that arise in the marriage market.

- (ii) *Community property regimes*, in which marital assets and debts are divided equally between the spouses, under the presumption that they are jointly owned;
- (iii) *Equitable distribution regimes*, in which courts have discretion in dividing marital assets in order to achieve equity. This process may result in equal division or in a division that favors either the spouse who contributed the most to the purchase of the asset or the one in higher financial need.

At the turn of the twentieth century, property division based on the formal title to the property was the dominant legal regime, with the exception of eight states, primarily those with a French or Spanish historical legacy, such as Louisiana, New Mexico, or California, which had community property regimes. Over the course of the century, and in particular following the federal Uniform Marriage and Divorce Act (UMDA) of 1970, title-based states shifted toward equitable distribution (Golden 1983; Turner 1998).<sup>3</sup> The UMDA, which was intended to favor secondary earners in divorce settlements, created the legal grounds for the introduction of equitable distribution in all states: in 1989, Mississippi was the last title-based state to transition into equitable distribution (American Bar Association 1977–2005).<sup>4</sup> In online Appendix A, I illustrate how the timing of the transition from title-based regime into equitable distribution is uncorrelated with pre-reform proxies for the economic condition of women in each state.

From a theoretical perspective, the literature suggests that property division rules may influence both the accumulation of assets (Dnes 1998; Aura 2007) and marriage formation (Chiappori, Iyigun, and Weiss 2008). While the reforms in property division rules have not been the subject of empirical analysis, their cross-sectional variation has been used as a distribution factor in intra-household bargaining (Chiappori, Fortin, and Lacroix 2002) and appears to influence the way unilateral divorce affects female labor supply (see Gray 1998).

## II. The Model

To identify the channels through which divorce laws affect household behavior and welfare, I develop a dynamic model of household choice in which spouses jointly decide how much to save, how to allocate consumption, and whether or not to work. This model takes household formation as given, and hence is meant to examine the impact of divorce law reform on couples that are already married.

Two individuals, husband  $H$  and wife  $W$ , are married at time 1 and live until time  $T$ . In every period from time 1 to  $T$ , they jointly choose how much to save, how to allocate private consumption between one another, and whether to stay together or

<sup>3</sup>These legal reforms were salient to US households. For instance, between June and July 1980, when equitable distribution was introduced in New York state, seven articles were published in *The New York Times* regarding this legal change. Between 1974 and 1990, 80 articles from the *New York Times* had either “marital property” or “divorce and dissolution” as their focus (<http://www.lexisnexis.com>).

<sup>4</sup>These reforms can be seen as a further expansion in the property rights of women after the long process of rights acquisition that commenced in the middle of the nineteenth century and granted women control over their property and earnings (Geddes and Lueck 2002; Doepke and Tertilt 2009; Fernández 2014).



divorce. Between time 1 and time  $T - R$ , the household also makes decisions about the wife's labor market participation. Husbands always work until they retire. From time  $T - R + 1$  to  $T$ , spouses are retired.

### A. Preferences

Both husband and wife derive utility from own consumption  $c^j$  and disutility from own labor force participation  $P^j$  for  $j = H, W$ . Preferences are separable across periods of time and states of the world.

Each spouse has a subjective taste for marriage parameter  $\xi_t^j$ , which evolves over time. This parameter reflects the spouses' affection for one another and their attachment to marriage based on other idiosyncratic factors (e.g., fear of the social stigma associated with divorce, concerns about the well-being of the children).

Period utilities take the form

$$u_{married}^j = u(c_t^j, P_t^j) + \xi_t^j \quad u_{divorced}^j = u(c_t^j, P_t^j).$$

The taste shocks follow a random walk stochastic process, which captures the persistence in the taste for the current marriage,

$$\xi_t^j = \xi_{t-1}^j + \epsilon_t^j, \quad \xi_1^j = \epsilon_1, \quad \text{where } \epsilon_t^j \text{ is distributed as } N(0, \sigma^2) \text{ for } j = W, H.$$

The utility function  $u(c, P)$  is constant relative risk aversion (CRRA) and is separable in consumption and participation in the labor market:

$$u(c, P) = \frac{c^{1-\gamma}}{1-\gamma} - \psi P, \quad \text{with } \gamma \geq 0 \text{ and } \psi > 0.$$

### B. Economies of Scale and Children

Spouses benefit from economies of scale in consumption: for a given level of household expenditure  $x$ , spouses' consumption depends on the household inverse production function

$$x = F(c^H, c^W) e(k) = [(c^H)^\rho + (c^W)^\rho]^{\frac{1}{\rho}} e(k),$$

where  $e(k)$  is an equivalence scale that allows for the consumption of the children in the household. With  $\rho \geq 1$ , this functional form implies that a couple is able to consume more than what it could consume if spouses were living separately, holding expenditure fixed. The magnitude of economies of scale in the household depends on the consumption gap between spouses.<sup>5</sup>

Childbirth occurs at predetermined ages of the parents and fertility is exogenous. Previous literature has indicated that the introduction of unilateral divorce did not

<sup>5</sup> It is straightforward to show that, with this functional form, if one spouse does not consume anything, there are no economies of scale. Economies of scale are maximized when spouses consume the same amount.

seem to have an impact on marital fertility, but it affected the selection into marriage (cf. Alesina and Giuliano 2007). Because the sample only includes couples married before the reforms, this selection mechanism does not influence my analysis.

### C. Income Over the Life Cycle

Each spouse's labor income ( $y^j$  for  $j = H, W$ ) depends on her human capital ( $h^j$ ) and on her permanent income ( $z^j$ ):

$$\ln(y_t^j) = \ln(h_t^j) + z_t^j.$$

Spouses experience permanent income shocks, which follow a random walk process:

$$(1) \quad z_t^j = z_{t-1}^j + \zeta_t^j \quad \text{and} \quad z_1^j = \zeta_1^j,$$

in which  $\zeta_t^j$  is i.i.d. as  $N(0, \sigma_{\zeta}^2)$  and is correlated between spouses.

Human capital is accumulated through labor force participation. The law of motion for each spouse's human capital  $h^j$  is

$$\ln(h_t^j) = \ln(h_{t-1}^j) - \delta \cdot (1 - P_{t-1}^j) + (\lambda_0^j + \lambda_1^j \cdot t) \cdot P_{t-1}^j.$$

If a woman participated in the previous period, her human capital increases at a rate  $\lambda_0^W + \lambda_1^W t$ . If she did not, her human capital depreciates at a rate of  $\delta$ . If a woman works, the household faces child care expenses  $d^k$ . Since men always work until they retire,  $P_t^H = 1, \forall t$ . At the end of period  $T - R$ , spouses retire and receive a share of their preretirement income in every subsequent period.

### D. Budget Constraints

In marriage, the budget constraints depend on the property division regime. The general form of the budget constraint is

$$(2) \quad A_{t+1} - (1 + r) \cdot A_t + x_t = y_t^H + (y_t^W - d_t^k) \cdot P_t^W.$$

In a title-based regime, spouses save in separate "accounts"  $A^H$  and  $A^W$  that have the same market rate of return  $r$ . Thus,  $A_t = A_t^H + A_t^W$ . If divorce were not an option, spouses would be indifferent between the two accounts. Since divorce is possible, in each period spouses decide what fraction of household assets to allocate the husband and the wife. Upon divorce, each spouse retains her own assets.

In equitable distribution and community property states, assets are treated as jointly owned upon divorce; thus, spouses save jointly.

After divorce, spouses live off their individual income and assets. They both contribute to the consumption of their children as a fraction of their own consumption (which captures the cost of child custody and of child support), according to the



equivalence scale  $e(k)$ , and they share child care expenses. The budget constraint becomes

$$(3) \quad A_{t+1}^j - (1 + r) \cdot A_t^j + c_t^j \cdot e(k_t) = \left( y_t^j - \frac{d_t^k}{2} \right) \cdot P_t^j \quad j = H, W.$$

Each spouse's level of assets in that first year depends on the property division regime. Upon divorce, wealth is divided according to the state's property division law, unless spouses reach an agreement on an alternative division:

- (i) in a title-based system, spouses maintain their own "account"  $A^j$ ;
- (ii) in community property, assets are divided equally;
- (iii) in equitable distribution, assets are divided but spouses are ex ante uncertain about exact shares. This captures the fact that "the essential feature of equitable distribution is the absence of fixed rules for the division of property" (Brake 1982) and that, under this regime, between one-half and two-thirds of the property is usually assigned to the spouse with the highest earnings (Woodhouse and Fetherling 2006). Hence, equitable distribution differs from the other regimes both in the expected value of the share of property assigned to each spouse and because the allocation of property itself is uncertain.

At the time of marriage, spouses cannot commit to dividing property differently from that dictated by the law in case of divorce. This assumption reflects the fact that prenuptial agreements were rarely enforced before the mid-1980s and remain infrequent today (Mahar 2003). I discuss the welfare implications of prenuptial agreements in a counterfactual simulation exercise in Section V.<sup>6</sup>

### E. Problem of the Divorcee

I now characterize the value of being divorced, given state variables  $\omega$ . In this problem,  $\omega_t = \{A_t^H, A_t^W, z_t^H, z_t^W, \xi_t^H, \xi_t^W, h_t^W, \Omega_t\}$  where  $\Omega_t$  represents the vector of divorce laws at time  $t$ .

In each period  $t$ , a divorcee has an exogenous probability  $\pi_t^{j\Omega}$  of remarrying another person. The probability of remarriage depends on gender, age, and the divorce law regime. If remarriage occurs, it is an absorbing state and the problem is analogous to the one of a married couple with no possibility of divorce and no shocks in the taste for marriage.<sup>7</sup> In each period, the divorcee chooses consumption,

<sup>6</sup>Prenuptial agreements were likely to only have a minor incidence, because they were not consistently enforced until the 1983 Uniform Premarital Agreements Act.

<sup>7</sup>The value of being remarried is  $V_t^{jR}(\omega_t) = u(c_t^{jR}, p_t^{jR}) + \beta E[V_{t+1}^R(\omega_{t+1} | \omega_t)]$  for  $j = H, W$ , from the solution to the problem  $V_t^R(\omega_t) = \max_{c_t^{HR}, c_t^{WR}, p_t^{WR}} u(c_t^{HR}, p_t^{HR}) + (1 - \theta)u(c_t^{WR}, p_t^{WR}) + \beta E[V_{t+1}^R(\omega_{t+1} | \omega_t)]$  subject to the budget constraints.

savings, and whether or not to work (if she is a woman). Thus, the value of being divorced and not remarrying at time  $t$  is

$$V_t^{jD}(\omega_t) = \max_{c_t^j, p_t^j, A_{t+1}^j} u(c_t^j, p_t^j) + \beta \left\{ \pi_{t+1}^{j\Omega} E[V_{t+1}^{jR}(\omega_{t+1} | \omega_t)] \right. \\ \left. + (1 - \pi_{t+1}^{j\Omega}) E[V_{t+1}^{jD}(\omega_{t+1} | \omega_t)] \right\}$$

s.t. budget constraint in divorce (3), for  $j = H, W$ .

The value  $V_t^{jDR}$  denotes the expected value of entering period  $t$  as a divorcee given state variables  $\omega_t$ :  $V_t^{jDR} = \pi_t^{j\Omega} V_t^{jR}(\omega_t) + (1 - \pi_t^{j\Omega}) V_t^{jD}(\omega_t)$ .

The budget constraint depends on the property division regime at the time of divorce.

#### F. Household Planning Problem

The couple's planning problem depends on the current divorce law regime. In mutual consent divorce, the couple remains married unless *both* spouses want to divorce; in unilateral divorce, the couple divorces even if *just one* spouse wants to divorce. The household solves a constrained Pareto problem, in which the husband's Pareto weight is indicated by  $\theta$  and the wife's weight by  $1 - \theta$ .<sup>8</sup> The parameter  $\theta$  is determined exogenously.<sup>9</sup>

Define  $\mathbf{q}_t = \{c_t^H, c_t^W, P_t^H, A_{t+1}^H, A_{t+1}^W, D_t\}$  the vector of variables over which the household maximizes, in which  $D_t$  represents the divorce decision at time  $t$ .

*Mutual Consent Regime.*—In the mutual consent divorce regime, state variables are  $\omega_t = \{A_t^H, A_t^W, z_t^H, z_t^W, \xi_t^H, \xi_t^W, h_t^W, \Omega_t\}$ , where  $D_t$  equals 1 if divorce occurs and 0 otherwise. A couple that enters period  $t$  as married solves

$$V_t(\omega_t) = \max_{\mathbf{q}_t} (1 - D_t) \left\{ \theta u(c_t^H, P_t^H; \xi_t^H) + (1 - \theta) u(c_t^W, P_t^W; \xi_t^W) \right. \\ \left. + \beta E[V_{t+1}(\omega_{t+1} | \omega_t)] \right\} \\ + D_t \left\{ \theta \left[ u(c_t^H, P_t^H) + \beta E[V_{t+1}^{HDR}(\omega_{t+1} | \omega_t)] \right] \right. \\ \left. + (1 - \theta) \left[ u(c_t^W, P_t^W) + \beta E[V_{t+1}^{WDR}(\omega_{t+1} | \omega_t)] \right] \right\}$$

<sup>8</sup>This formulation is a special case of the collective model with nonparticipation, examined in Blundell et al. (2007), extended to a dynamic framework and subject to constraints that are imposed by the divorce option.

<sup>9</sup>For computational tractability, each marital cohort has one value of  $\theta$ , which is exogenously determined (e.g., Del Boca and Flinn 2012). The values of the Pareto weights may be the ones that allow the marriage market to clear (Choo, Seitz, and Siow 2008) or can result from intra-household bargaining at the time of marriage based on noncooperative threat points (Lundberg and Pollak 1993).

$$\begin{aligned} \text{s.t.} \quad & \text{budget constraint in marriage (2)} && \} \text{ if } D_t = 0 \\ & \text{budget constraints in divorce (3) for } j = H, W && \} \\ & A_t^H + A_t^W = A_t && \} \text{ if } D_t = 1, \end{aligned}$$

where the following participation constraints are satisfied whenever  $D_t = 1$  and  $D_{t-1} = 0$ :

$$u(c_t^H, P_t^H) + \beta E[V_{t+1}^{HDR}(\omega_{t+1} | \omega_t)] > V_t^{HM}(\omega_t),$$

$$u(c_t^W, P_t^W) + \beta E[V_{t+1}^{WDR}(\omega_{t+1} | \omega_t)] > V_t^{WM}(\omega_t).$$

Given a sequence of consumption, female labor participation, and marital status choices  $\forall \omega_t \{c_t^{*H}(\omega_t), c_t^{*W}(\omega_t), P_t^{*W}(\omega_t), D_t^*(\omega_t)\}_{t=1}^T$ , each spouses' value of marriage is equal to

$$V_t^{jM}(\omega_t) = u(c_t^{*j}(\omega_t), P_t^{*j}(\omega_t); \xi_t^j) + \beta E[V_{t+1}^j(\omega_{t+1} | \omega_t)].$$

The continuation value is defined recursively based on the values in the terminal period  $\forall \omega_T$

$$V_T^j(\omega_T) = (1 - D_T^*)V_T^{jM} + D_T^*V_T^{jD}(\omega_T),$$

where  $V_T^{jM} = u(c_T^{*j}(\omega_T), P_T^{*j}(\omega_T); \xi_T^j)$ .

In the remaining periods  $t = 1, \dots, T - 1$ ,

$$V_{t+1}^j(\omega_{t+1}) = (1 - D_t^*)V_{t+1}^{jM}(\omega_{t+1}) + D_t^*V_{t+1}^{jD}(\omega_{t+1})$$

for  $j = H, W$  and  $\forall \omega_t$ . Then, the continuation value for the marriage problem  $V_{t+1}(\omega_{t+1})$  is given by the weighted sum of each spouse's continuation values,

$$V_{t+1}(\omega_{t+1}) = \theta V_{t+1}^H(\omega_{t+1}) + (1 - \theta) V_{t+1}^W(\omega_{t+1})$$

for  $t = 1, \dots, T$ .

Note that, after divorce, former spouses make separate decisions and have separate budget constraints. When married, the couple weighs each spouse's continuation value, which corresponds to the value of divorce when  $D_{t+1} = 1$ , by the Pareto weights  $\{\theta, 1 - \theta\}$ .

As long as the couple remains married, the allocation corresponds to the intertemporal Pareto-efficient allocation. This assumption rules out the possibility of not cooperating while married. At each time  $t$ , the couple divorces if and only if a *feasible* allocation of resources can be found such that both spouses prefer the divorce allocation  $V_t^{jD}$  described in Section IIE to the optimal marriage allocation  $V_t^{jM}$ . If the constraint of one spouse binds (i.e., if spouses disagree about whether to divorce, given the default property division rule), the allocation of assets upon divorce shifts to ensure that a larger fraction of the household assets are assigned to

the spouse with the binding constraint, to make her indifferent between remaining married and divorcing (Becker 1991).

*Unilateral Divorce Regime.*—In a unilateral divorce state, the couple maximizes the weighted sum of spouses' utilities in marriage under the constraint that *both* spouses must prefer the marriage allocation to the value of being divorced. Because the marriage allocation has to satisfy these participation constraints, the solution may depart from the Pareto optimal allocation and hence within-period Pareto weights will also enter the vector of state variables. State variables are  $\omega_t = \{A_t^H, A_t^W, y_t^H, y_t^W, \xi_t^H, \xi_t^W, h_t^W, \Omega_t, \tilde{\theta}_t^H, \tilde{\theta}_t^W\}$ .

The couple solves

$$\begin{aligned} V_t(\omega_t) = \max_{q_t} & (1 - D_t) \left\{ \tilde{\theta}_t^H u(c_t^H, P_t^H; \xi_t^H) + \tilde{\theta}_t^W u(c_t^W, P_t^W; \xi_t^W) \right. \\ & \left. + \beta E[V_{t+1}(\omega_{t+1} | \omega_t)] \right\} \\ & + D_t \left\{ \tilde{\theta}_t^H \left[ u(c_t^H, P_t^H) + \beta E[V_{t+1}^{HDR}(\omega_{t+1} | \omega_t)] \right] \right. \\ & \left. + \tilde{\theta}_t^W \left[ u(c_t^W, P_t^W) + \beta E[V_{t+1}^{WDR}(\omega_{t+1} | \omega_t)] \right] \right\} \end{aligned}$$

$$\left. \begin{aligned} \text{s.t. budget constraint in marriage (2)} \\ \tilde{\theta}_{t+1}^H &= \tilde{\theta}_t^H + \mu_t^H \quad \text{and} \quad \tilde{\theta}_1^H = \theta \\ \tilde{\theta}_{t+1}^W &= \tilde{\theta}_t^W + \mu_t^W \quad \text{and} \quad \tilde{\theta}_1^W = (1 - \theta) \end{aligned} \right\} \text{if } D_t = 0$$

$$\left. \begin{aligned} \text{budget constraints in divorce (3) for } j = H, W \\ A_t^H + A_t^W = A_t \end{aligned} \right\} \text{if } D_t = 1.$$

The parameters  $\tilde{\theta}_{t+1}^j = \tilde{\theta}_t^j + \mu_t^j$  for  $j = H, W$  and  $t = 1, \dots, T - 1$  ensure that the following participation constraints are always satisfied in marriage (whenever  $D_t = 0$ ):

$$\begin{aligned} u(c_t^H, P_t^H; \xi_t^H) + \beta E[V_{t+1}^H(\omega_{t+1} | \omega_t)] &\geq V_t^{HD}(\omega_t) \\ u(c_t^W, P_t^W; \xi_t^W) + \beta E[V_{t+1}^W(\omega_{t+1} | \omega_t)] &\geq V_t^{WD}(\omega_t). \end{aligned}$$

Note that  $\mu_t^j$  is the Lagrange multiplier associated with each spouse's sequential participation constraint (Marcet and Marimon 2011; Messner, Pavoni, and Sleet 2012).

Like in the mutual consent case, given a sequence of consumption, female labor participation and marital status choices  $\forall \omega_t \{c_t^{*H}(\omega_t), c_t^{*W}(\omega_t), P_t^{*W}(\omega_t), D_t^*(\omega_t)\}_{t=1}^T$ , each spouses' value of marriage is equal to

$$V_t^{jM}(\omega_t) = u(c_t^{*j}(\omega_t), P_t^{*j}(\omega_t); \xi_t^j) + \beta E[V_{t+1}^j(\omega_{t+1} | \omega_t)].$$

The continuation value is defined recursively based on the values in the terminal period  $\forall \omega_T$

$$V_T^j(\omega_t) = (1 - D_T^*)V_T^{jM} + D_T^*V_T^{jD}(\omega_t),$$

where  $V_T^{jM} = u(c_T^{*j}(\omega_t), P_T^{*j}(\omega_t); \xi_T^j)$ , and

$$V_T(\omega_t) = \tilde{\theta}_T^H V_T^H(\omega_t) + \tilde{\theta}_T^W V_T^W(\omega_t).$$

In the remaining periods  $t = 1, \dots, T - 1$ ,

$$V_{t+1}^j(\omega_{t+1}) = (1 - D_t^*)V_{t+1}^{jM}(\omega_{t+1}) + D_t^*V_{t+1}^{jD}(\omega_{t+1})$$

for  $j = H, W$  and  $\forall \omega_t$ .

In each period, the couple remains married if and only if *both spouses* prefer the marriage allocation to the divorce one. If the participation constraint of one spouse binds, (s)he obtains a larger fraction of the couple's resources than the one dictated by the ex ante Pareto efficient household planning problem: the ratio of spouses' marginal utilities of consumption shifts, as described in the literature on risk-sharing with lack of commitment (Kocherlakota 1996), to satisfy the participation constraints.

For instance, if the wife's participation constraint binds (i.e., given the solution to the unconstrained problem, the husband wants to remain married while the wife wants to divorce), the ratio of marginal utilities of consumption shifts in her favor. This allocation corresponds to the solution to a Pareto problem in which spouses' weights are  $(\tilde{\theta}_t^H + \mu_t^H)$  and  $(\tilde{\theta}_t^W + \mu_t^W)$ . If such an allocation is not feasible, i.e., if any allocation that satisfies both spouses' participation constraints violates the household's intertemporal budget constraint, then divorce occurs. Online Appendix B provides a detailed description of the solution algorithm adopted.

The household model with unilateral divorce is similar to a model of risk-sharing with limited commitment (e.g., Ligon, Thomas, and Worrall 2000), which has been applied to models of intra-household allocation (Ligon 2002; Mazzocco 2007; Mazzocco, Ruiz, and Yamaguchi 2007; Gallipoli and Turner 2011). However, a crucial distinction has to be made with respect to a village risk-sharing model. Here, risk-sharing opportunities are not the only benefit of marriage: the marital surplus is also characterized by economies of scale (governed by the parameter  $\rho$ ) and by the time- and spouse-specific taste for marriage  $\xi_t^j$ . Hence, marriage could be sustained even in the absence of risk-sharing opportunities (for instance, in the absence of uncertainty in income or when spouses' income shocks are perfectly correlated), as long as the realization of the preference shock and the economies of scale are sufficiently large. Moreover, in case of negative shocks to the taste for marriage, divorce can occur even in the presence of future potentially beneficial risk-sharing opportunities and economies of scale, as long as the taste for marriage of at least one spouse ( $\xi_t^j$ ) or both is sufficiently low to eliminate any expected surplus from marriage, so that there exists no  $\{\tilde{\theta}_t^H + \mu_t^H, \tilde{\theta}_t^W + \mu_t^W\}$  that would satisfy the household's intertemporal budget constraint and both the husband's and the wife's participation constraints simultaneously. Hence, taste shocks ensure that, in some

cases, spouses choose to end the marriage rather than adjusting the Pareto weights to allow for future risk-sharing.

### G. Divorce Laws and Household Outcomes

The model has implications for three observable elements of household behavior: divorce, assets accumulation, and female labor supply. These implications derive from both the direct effect of each law and the interaction effects between grounds for divorce and property division laws.

Because utility is not perfectly transferable, in this model unilateral divorce increases the likelihood of divorce for couples that are already married.<sup>10</sup> In addition, it changes the terms of intra-household allocation for the couples who remain married. The first-order conditions of the problem under a mutual consent regime imply that the intra-household allocation is fully determined by the Pareto weights

$$\frac{u_c(c_t^H, P_t^H)}{u_c(c_t^W, P_t^W)} = \frac{1 - \theta}{\theta}$$

for all periods and states of nature. Once unilateral divorce is introduced, the ratio of the marginal utilities of consumption shifts as soon as a one spouse's participation constraints become binding

$$\frac{u_c(c_t^H, P_t^H)}{u_c(c_t^W, P_t^W)} = \frac{\tilde{\theta}_t^W + \mu_t^W}{\tilde{\theta}_t^H + \mu_t^H},$$

(Kochelakota 1996).

Then, property division laws only affect decision-making if divorce can be obtained unilaterally, as the consumption share shifts in favor of the spouse who would get more resources in divorce than in the initial intra-household allocation governed by  $\theta$ . Equal division of property increases the likelihood that the participation constraints become binding for the spouse with a smaller share in household resources, as it improves the outside option  $V_t^{jD}$  relative to the initial intra-household allocation.

This interaction mechanism affects couples that are already married, while changes in divorce laws may also independently affect the types of couples that arise from the marriage market and the terms by which these new marriages form. For example, the new matches that form under equitable distribution may differ from those that would have formed under a title-based system if the distortions that equitable distribution imposes depend on the difference between spouses' permanent income and human capital. Also, conditional on a match having formed, the Pareto weight  $\theta$  may differ from the one that would have arisen before a reform. This model does not capture the effect of the reforms on the marriage market, and hence the empirical analysis focuses on couples that have already formed. Yet, unilateral divorce will subject newly-formed couples to the same limited commitment

<sup>10</sup>This implication is based on Chiappori, Iyigun, and Weiss (2007) and is consistent with the short-run effects of unilateral divorce in Wolfers (2006).



mechanism which is captured by this model. Also, conditional on a match taking place and a Pareto weight arising in different regimes, the model described in this paper can be used to examine the savings, labor supply, and divorce choices of these couples.

In this model, divorce laws affect assets accumulation in two ways. First, they regulate the fraction of household's total assets each spouse can access upon divorce. Second, they influence the amount of *total* savings that a household accumulates. In a title-based property division regime, the household can decide what share of the couple's assets to allocate to each spouse. To allow spouses to smooth consumption upon divorce, each spouse's assets is increasing in her Pareto weight and thus in her share of consumption in marriage. In equitable distribution and community property states, households can only choose the *total* amount of savings and courts decide spouses' shares. Thus, only a spouse with a relatively low Pareto weight will benefit from equal division of property compared to a title-based regime (see Figure 4). In mutual consent, the impact of property division laws is attenuated by the fact that spouses may renegotiate the divorce settlements if one spouse does not want to consent to divorcing, while in unilateral divorce property division laws directly affect all divorce settlements, and are more likely to influence household behavior.

By altering the distribution of assets in case of divorce, divorce laws also influence the incentives to save during marriage. Relative to a title-based regime, equal division of property imposed by courts alters the expected returns on savings. In marriage, each spouse's share of household consumption is increasing in her Pareto weight. Thus, an equal division of assets acts as a tax on savings for the spouse who consumes more in the marriage (the one with the higher Pareto weight) and as a subsidy for the other. Similarly to a change in the market return on assets or to a tax on savings, such a decrease has a substitution effect (consumption is cheaper at time  $t$  than at time  $t + 1$ , which may decrease savings) and an income effect (for a net saver, resources available at time  $t + 1$  are lower, which may increase savings). More risk-averse households would respond to equal division of property in unilateral divorce by accumulating more savings, while a less risk-averse one would respond by accumulating fewer assets (this is the *interaction* effect). Moreover, if divorce imposes upfront costs, independently of the property regime, an increase in the likelihood of divorce may lead households to save more (Cubeddu and Ríos-Rull 1997; González and Özcan 2013) independently of the way property is divided (this is the *main* effect of unilateral divorce).

Turning to female labor supply, if women have fewer resources upon divorce than in marriage (e.g., if they benefit from a share of the husbands' income during marriage), they have an incentive to work to accumulate human capital when facing an increase in the risk of divorce (as verified in Johnson and Skinner 1986). However, the more favorable to women the property regime is, the weaker this channel would be, since tangible assets already provide women with insurance in case of divorce.<sup>11</sup>

<sup>11</sup>This model does not consider alimony. Alimony in this context would imply a reduction in the scope for self-insurance for women and an increase in women's bargaining power in marriage when unilateral divorce is allowed. Data on alimony payments show that these were generally infrequent transfers. For instance, in the National Longitudinal Survey of Young and Mature Women only 10 percent of divorced women ever report receiving alimony between 1977 and 1999, for a median payment is \$4,000 real 2008 dollars, approximately 15 percent of the divorcee's household income. Child support is usually a larger transfer from the noncustodial parent to the

In addition, a woman's likelihood of employment  $P_t^W = 1$  is *decreasing* in her Pareto weight  $1 - \theta$  in mutual consent divorce and in  $\frac{\hat{\theta}_t^W + \mu_t^W}{\hat{\theta}_t^H + \mu_t^H}$  in unilateral divorce.

By increasing a woman's value of divorce, divorce laws that favor women may lead to an increase in their share in household resources and hence to a reduction in her likelihood of employment.

### III. Data and Empirical Analysis of the Reforms

In this section, I illustrate how panel variation in US divorce laws is correlated with a number of changes in the economic behavior of households. According to the dynamic model described above, the effect of divorce laws' reforms on wealth accumulation and on female labor supply is closely tied to the structural parameters of the model. In this section, I will examine these two outcome variables. Online Appendix D provides more evidence on time allocated to housework and leisure by women. Such variables are not included in the model but appear to also respond to changes in divorce laws, in a way that is consistent with a change in intra-household allocations.

#### A. The Data

I use data from the Panel Study of Income Dynamics (PSID), the National Longitudinal Survey of Mature Women, and the National Longitudinal Survey of Young Women (NLS-MW and NLS-YW). These surveys provide longitudinal information on US households from the end of the 1960s until the 2000s. In this paper, I use 26 waves of the PSID (between 1968 and 1993), 19 waves of NLS-MW (between 1967 and 1999), and 20 waves of NLS-YW (between 1968 and 1999).

The PSID provides key information on labor force participation. I use data until the 1993 wave, after which several questions were significantly modified in the survey. The NLS-MW and the NLS-YW provide uniquely rich data on household wealth. These surveys are part of the Original Cohorts of the National Longitudinal Surveys. The NLS-MW was administered from 1967 to 2003 on an initial sample of 5,083 women who were between 30 and 44 years of age in 1967. The NLS-YW was administered from 1967 to 2003 to an initial sample of 5,159 women who were between 14 and 24 years of age in 1968. These surveys provide rich data on household asset holdings, which is not available in other longitudinal surveys from the 1970s and 1980s. Since the NLS does not disclose state identifiers, I matched women to their state of residence using the geographical variables provided in the surveys.<sup>12</sup>

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parent who is granted custody of the children. Del Boca and Flinn (1995) examine a sample of divorce cases in Wisconsin between 1980 and 1982, where the average child support transfer is about 20 percent of the father's income.

<sup>12</sup>The variables that I use to match women to their state of residence are the size of the labor market in the 1960 decennial census in the area of residence, an index of the demand for female labor in the area of residence and the census division of residence. A similar approach is used in Powers (1998) on the NLS-YM. I thank Jeff Gray for providing the Primary Sampling Unit-state matches. Since this information is only available for the waves between 1967 and 1971, I can only identify the state of residence for those survey respondents who did not move to another

TABLE 1—SUMMARY STATISTICS

	Observations	Mean	Median	Standard deviation
PSID				
Age (women)	44,799	40	41	11.2
Number of children	44,799	1.7	1	1.69
Years since marriage	39,815	19	17	11.5
Woman is employed	44,799	0.58	1	0.49
NLSW				
Age	15,399	40	40	10
Number of children	15,399	2	2	1.79
Years since marriage	12,022	21	21	10
Assets (1990 dollars)	15,399	70,573	32,658	136,870

Notes: Summary statistics from Panel Study of Income Dynamics (1968–1993) and National Longitudinal Surveys of Young and Mature Women (1967–1999). Pooled samples of women married before divorce law reforms. NLSW sample restricted to couples with nonmissing asset data.

Since the model takes household formation as exogenous, the empirical analysis only considers couples in their first marriage who got married before the introduction of unilateral divorce in their state, before changes to divorce laws occurred. Still, if property division laws affect the type of couples that are formed, the composition of marriages may differ across states with property laws that were not the subject of reforms in ways that are not captured by the model.

The PSID provides detailed longitudinal information on female employment and divorce. Table 1 summarizes characteristics of the pooled sample of the 3,858 women I analyze. Average female employment in the sample is 54 percent.

In the NLSW, the women I analyze are slightly older than those in the PSID sample due to the sampling age of the initial cohort. Data on wealth is collected for a subset of years, leaving us with assets information for 4,538 couples.<sup>13</sup> Assets include real estate, financial assets, and business assets. Table 1 reports the average and median characteristics of this sample. Household assets average almost \$70,000 and income averages approximately \$38,000, both in real 1990 dollars. Asset holdings peak when women are 64 at a mean level of \$127,000 real 1990 dollars. Seventeen percent of households in the pooled sample hold zero or negative total assets at a point in time.

### B. Empirical Analysis

I exploit the variation in divorce laws across states and over time, as summarized in online Appendix Table F1. Unilateral divorce was introduced at different points in time in 33 states between 1967 and 1992. In the same period, all 27 states that had a title-based property division system adopted equitable distribution. The sources of variation that I use are the introduction of unilateral divorce in different preexisting

state after 1971. Thus, I match 10,086 women out of 10,242 at least once in the sample, but for a total of 2,856 women, the state of residence eventually becomes unavailable once they report having moved.

<sup>13</sup>In the NLS-MW assets are recorded in 1967, 1971, 1972, 1977, 1982, 1987, 1989, 1995, 1997, and 1999. For NLS-YW, assets are available on for survey years 1968, 1971–1973, 1978, 1983, 1988, 1993, 1995, 1997, and 1999.

property regimes (primarily community property and title-based regimes) and the adoption of equitable distribution under different legal grounds for divorce (mutual consent and unilateral divorce).

Variation in divorce laws is concentrated among the following cases, for household in our regression samples:

- (i) households which experience the introduction of unilateral divorce while in a title-based regime (490 households in the NLSW, 218 households in the PSID), while in a community property regime (675 households in the NLSW, 438 households in the PSID);
- (ii) households which experience the introduction of equitable distribution in mutual consent states (1,901 households in the NLSW, 1,435 households in the PSID) or in unilateral divorce states (402 households in the NLSW, 200 households in the PSID);
- (iii) households that experience the introduction of both equitable distribution and unilateral divorce in the same year (238 households in the NLSW, 137 households in the PSID).

Other combinations of legal changes affected only a small number of households. A few households experienced the transition into unilateral divorce as equitable distribution states (91 households in the NLSW, 158 households in the PSID). Finally, only a few households entered a community property regime during the sample period, since Wisconsin was the only state that changed from an equitable distribution to a community property regime in 1986. These observations are insufficient to provide accurate data for such a quasi-experiment; thus, they will not be used for causal interpretation.

*Household Wealth.*—To examine the impact of divorce laws on couples' accumulation of assets, I estimate the following equation for household  $i$  in state  $s$  and in year  $t$ :

$$\begin{aligned}
 (4) \quad assets_{i,s,t} = & \beta_1(Unilateral \cdot ComProp_{s,t}) + \beta_2(Unilateral \cdot Title_{s,t}) \\
 & + \beta_3(Unilateral \cdot EqDistr_{s,t}) + \beta_4 ComProp_{s,t} \\
 & + \beta_5 EqDistr_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + c_s + \epsilon_{i,s,t}.
 \end{aligned}$$

The dependent variable *assets* represents the total net assets of a married couple, reported in real 1990 dollars. Assets are measured in levels, to include households with net debt (negative assets).<sup>14</sup> The vector  $\mathbf{Z}$  contains a set of controls for spouses'

<sup>14</sup> Because this analysis is conducted on a sample of married samples, I consider the possibility that the results may be driven by nonrandom attrition due to different characteristics of divorcing couples across legal regimes. I use inverse probability weighting to ensure that this is not the case (online Appendix C).

age, years since marriage and family structure;  $\delta_t$  denote year fixed effects;  $c_s$  state fixed effects and  $f_i$  household fixed effects.<sup>15</sup>

I consider a vector of property division and grounds for divorce regimes, in which the excluded category is a title-based mutual consent system:

- (i) Coefficient  $\beta_1$  (*Unilateral* · *ComProp*) captures the effect of introducing unilateral divorce relative to a mutual consent regime in community property states.
- (ii) Coefficient  $\beta_2$  (*Unilateral* · *Title*) captures the effect of introducing unilateral divorce relative to a mutual consent regime in a title-based system.
- (iii) Coefficient  $\beta_3$  (*Unilateral* · *EqDistr*) captures both the effect of introducing unilateral divorce relative to a mutual consent regime in equitable distribution states (primarily, based on the number of observations) and of introducing equitable distribution in unilateral divorce states relative to a title-based system.
- (iv) Coefficient  $\beta_4$  (*ComProp*) measures the average difference in assets between title-based and community property states in mutual consent regimes. Since its estimation is not based on quasi-experimental variation, it has no plausible causal interpretation.<sup>16</sup>
- (v) Coefficient  $\beta_5$  (*EqDistr*) measures the average difference in wealth due to the introduction of equitable distribution in mutual consent regimes.

Table 2 reports the results of the estimation of equation (4) using fixed-effect OLS regressions for different specifications. Column 1 is the baseline specification, which includes age dummies for the wife, year fixed-effects and individual fixed effects as controls. Column 2 controls for dummies for the number of children in the household. Column 3 adds state fixed effects. Column 4 also includes a fourth degree polynomial in the years of marriage, which is missing for some couples. Online Appendix C presents a set of robustness checks on these results.

The coefficient  $\beta_1$ , which represents the effect of unilateral divorce in community property states, is equal to 12,159 (column 1, significant at 5 percent). In contrast, coefficient  $\beta_2$  is equal to −5,959 real dollars and not statistically significant.<sup>17</sup> The effect of the transition from title-based regimes to equitable distribution in unilateral divorce ( $\beta_3$ ) and in mutual consent ( $\beta_5$ ) are both generally not statistically

<sup>15</sup> Because I restrict the sample to couples married before the reforms, it is important to control for life-cycle effects and for the duration of the marriage, to avoid mechanically attributing the impact of this feature of the sample to changes in divorce laws.

<sup>16</sup> The coefficient would be identified by households that change state of residence. As explained above, changes in the state of residence are not measured after 1971. Furthermore, only Wisconsin introduced community property in this sample period (1986), following the introduction of unilateral divorce.

<sup>17</sup> Similar findings are confirmed from estimating equation (4) using median regressions (without individual fixed effects), as shown in the online Appendix. However, the coefficients estimated using median regression are substantially smaller than those obtained from the OLS, suggesting that wealthy households exhibit a greater response to the reforms.

TABLE 2—HOUSEHOLD ASSETS AND FEMALE EMPLOYMENT: FIXED EFFECTS REGRESSIONS

Variables	Assets NLSW (1)	Assets NLSW (2)	Assets NLSW (3)	Assets NLSW (4)	Employed PSID (5)	Employed PSID (6)	Employed PSID (7)	Employed PSID (8)
Uni × ComProp	12,159 (5,542)	11,682 (5,313)	11,502 (5,338)	16,867 (4,639)	−0.0377 (0.0158)	−0.0389 (0.0168)	−0.0575 (0.0168)	−0.0488 (0.0171)
Uni × Title	−5,959 (6,737)	−5,853 (6,788)	−5,472 (6,883)	−3,300 (7,279)	−0.0234 (0.0273)	−0.0215 (0.0258)	−0.0230 (0.0252)	−0.0123 (0.0302)
Uni × EqDistr	8,614 (8,786)	9,346 (8,275)	9,444 (8,461)	12,652 (8,445)	−0.0279 (0.0294)	−0.0263 (0.0301)	−0.0265 (0.0372)	−0.0298 (0.0400)
ComProp	13,944 (14,520)	14,387 (14,699)	69,175 (14,250)	−52,723 (44,727)	0.0340 (0.0272)	0.0382 (0.0255)	0.151 (0.0544)	0.167 (0.0559)
EqDistr	−13,898 (9,166)	−14,687 (8,876)	−14,833 (8,938)	−17,576 (10,733)	0.00191 (0.0173)	0.00282 (0.0174)	0.00267 (0.0173)	0.00811 (0.0178)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Children dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes
State fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Polyn yrs. married	No	No	No	Yes	No	No	No	Yes
Observations	15,399	15,399	15,399	12,022	44,808	44,808	44,808	39,824
Individual fixed effects	4,538	4,538	4,538	3,516	3,437	3,437	3,437	2,607

Notes: Columns 1–4: Data from the NLS of young and mature women. Sample of couples married before legal reforms. Dependent variable is real total household net assets. Columns 5–8: linear probability models. Data from the PSID. Sample of couples married before legal reforms. Dependent variable is female employment status. Excluded category for divorce laws: title-based mutual consent regime. Standard errors in parentheses, clustered at the state level.

significant. Figure 1, panel A, illustrates the dynamic impact of unilateral divorce in community property states obtained from estimating, on the sample of households for which  $Com.Pr. = 1$ :

$$\begin{aligned}
 assets_{i,s,t} = & \beta_{pre} \text{Uni within 3 yrs}_{s,t} + \sum_{\tau=0(3)}^{12+} \beta_{\tau} \text{Uni for } \tau \text{ to } (\tau + 2) \text{ yrs}_{s,t} \\
 & + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + c_s + \epsilon_{i,s,t},
 \end{aligned}$$

where  $Uni.within\ 3\ yrs$  is equal to 1 when household  $i$  in year  $t$  will experience the introduction of unilateral divorce within the subsequent 3 years and 0 otherwise, while  $Uni.for\ \tau\ to\ (\tau + 2)\ yrs$  equals 1 if unilateral divorce has been introduced in the past  $\tau$  to  $\tau + 2$  years and 0 otherwise. The figure shows no increase in assets for the first six years since the reform nor for  $\beta_{pre}$ , and then a smooth raise in the accumulated assets over time.

The finding that households who live in community property and equitable distribution states modify their asset accumulation behavior in the presence of unilateral divorce, while no effect is observed in title-based states, is consistent with the hypothesis that the distribution of resources in divorce at baseline does not match the one in marriage in such states, leading to a change in the returns on savings once unilateral divorce is introduced in community property states. However, changes in total savings alone do not tell us *which* spouse obtains more resources in marriage. To gain an insight on that question, I turn to female employment.

*Employment of Married Women.*—The likelihood of employment of married women may be affected by divorce laws, depending on the distribution of Pareto



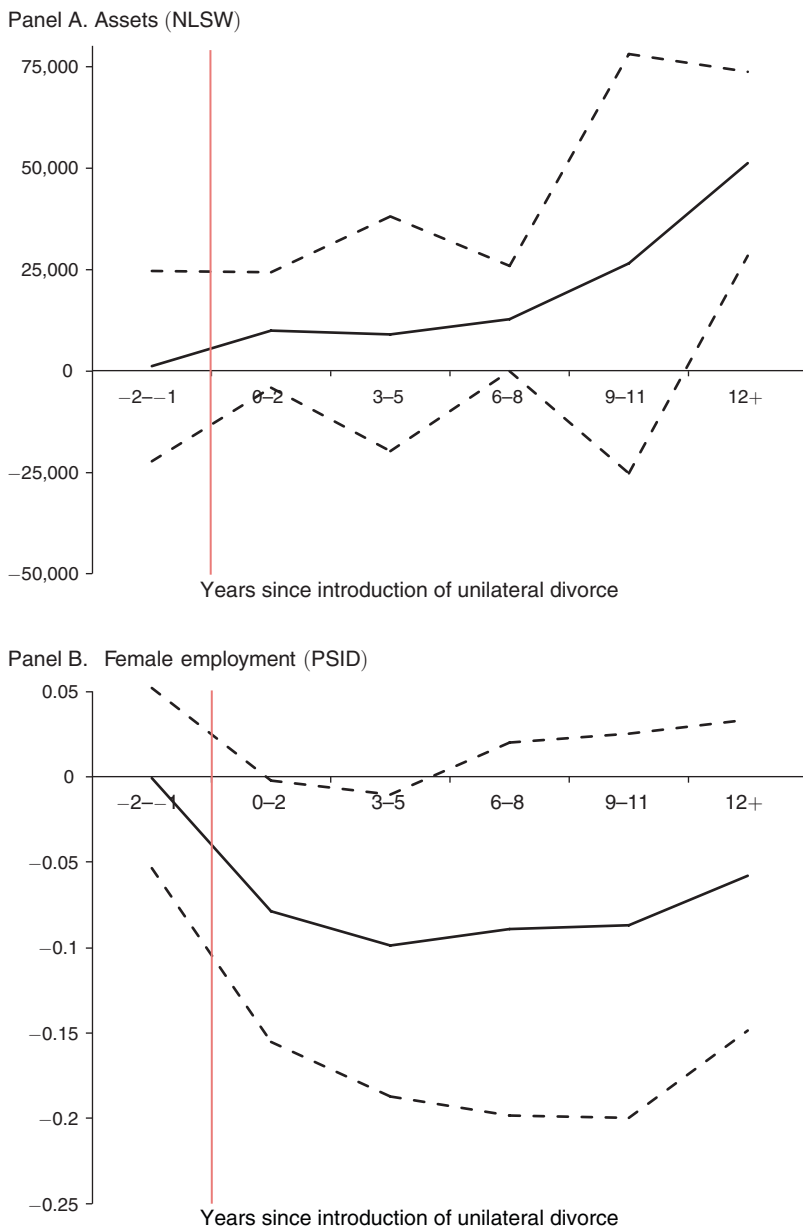


FIGURE 1. DYNAMIC RESPONSE OF ASSETS ACCUMULATION AND FEMALE EMPLOYMENT TO THE INTRODUCTION OF UNILATERAL DIVORCE IN COMMUNITY PROPERTY STATES

Notes: Coefficients  $\beta$  and 95 percent confidence intervals are obtained from estimating  $y_{i,s,t} = \beta_{pre} Uni.within 3 yrs_{s,t} + \sum_{\tau=0(3)}^{12+} \beta_{\tau} Uni. for \tau to (\tau + 2) yrs_{s,t} + \gamma' Z_{i,t} + \delta_t + f_i + c_s + \epsilon_{i,s,t}$ . Panel A is estimated from NLSW data, panel B from PSID data. Standard errors clustered at the state level.

weights. To examine the impact of the legal regime on the female labor supply, I estimate the following equation using a linear probability model with fixed effects:

$$\begin{aligned}
 (5) \quad P(\text{employment}_{i,s,t} = 1) = & \beta_1(\text{Unilateral} \cdot \text{ComProp}_{s,t}) \\
 & + \beta_2(\text{Unilateral} \cdot \text{Title}_{s,t}) \\
 & + \beta_3(\text{Unilateral} \cdot \text{EqDistr}_{s,t}) + \beta_4 \text{ComProp}_{s,t} \\
 & + \beta_5 \text{EqDistr}_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + c_s,
 \end{aligned}$$

where *employment* is equal to 1 if the woman is employed and to 0 otherwise. This equation is analogous to equation (4). Coefficient  $\beta_1$  and  $\beta_2$  are meant to capture the effect of the introduction of unilateral divorce in community property states and title-based states respectively, relative to the mutual consent divorce regime. Coefficient  $\beta_3$  identifies both the effect of the introduction of unilateral divorce in equitable distribution states and of equitable distribution in unilateral divorce states, relative to the mutual consent title-based system. Coefficient  $\beta_4$  is not identified by any source of exogenous variation. Finally, coefficient  $\beta_5$  captures the impact of introducing equitable distribution while in a mutual consent regime.

The results of estimating equation (5) suggests that unilateral divorce has no statistically significant impact on female employment in title-based and equitable distribution states. However, in community property states women's employment declines by 4 percentage points when unilateral divorce is introduced; the effect is statistically significant at the 1 percent level (Table 2). This finding is robust to controlling for the number of children in the household (columns 6, 7, and 8), for state fixed effects (columns 7 and 8) and for the time elapsed since marriage (column 8). Online Appendix C illustrates a set of robustness checks.

Figure 1, panel B, illustrates the dynamic impact of unilateral divorce in community property states obtained from estimating, on the sample of households that satisfy *Com.Pr.* = 1:

$$\begin{aligned}
 P(\text{employment}_{i,s,t} = 1) = & \beta_{pre} \text{Uni within 3 yrs}_{s,t} \\
 & + \sum_{\tau=0(3)}^{12+} \beta_{\tau} \text{Uni for } \tau \text{ to } (\tau + 2) \text{ yrs}_{s,t} + \gamma' \mathbf{Z}_{i,t} \\
 & + \delta_t + f_i + c_s,
 \end{aligned}$$

where *Uni. within 3 yrs*<sub>s,t</sub> which is equal to 1 when household *i* in year *t* will experience the introduction of unilateral divorce within the subsequent three years. The figure shows no significant coefficient for  $\beta_{pre}$ , and then an immediate drop in employment which fades out over time.

This findings suggests that unilateral divorce may have increased women's share of resources within marriage in those states where women receive 50 percent of household assets upon divorce. As a result, women become less likely to work. This finding supports the hypothesis that women's Pareto weight is low enough

compared to their husband's weight, so that unilateral divorce with equal division of property *improves* their condition with respect to the baseline intra-household allocation. First, women benefit from the post-reform intra-household allocation thanks to the more favorable divorce outside option compared to the initial marriage allocation. Second, the additional assets awarded by courts reduce women's need for accumulation of human capital as self-insurance against the risk of loss of consumption in the event of a divorce. Both channels contribute to reducing women's employment.

This result is broadly consistent with that described by Chiappori, Fortin, and Lacroix (2002), who examine the labor supply of a cross-sectional sample of couples in the PSID and find that female labor supply is lower in community property states than in other states. While they focus on cross-sectional variation in property division rules as a distribution factor in a static model, without examining the impact of introducing unilateral divorce, the variation exploited in this study allows us to identify the interaction effects of property division laws and grounds for divorce laws, since I observe both the introduction of unilateral divorce in community property or title-based states and the introduction of equitable distribution in mutual consent and unilateral divorce states. The model suggests that these interaction effects are crucial to interpret the impact of changes in divorce laws for couples married before the reforms: as the model implies, the presence of unilateral divorce allows the divorce allocation to affect the one in marriage, while the intra-household allocation of couples who live in a mutual-consent regime is not affected by a change in property division rules. Such a mechanism can only operate in a dynamic model like the one developed in this paper, while previous models that have used divorce laws as a distribution factor, like Chiappori, Fortin, and Lacroix (2002), are based on a static collective model. In particular, a dynamic model with limited commitment like the one developed in this model provides a microeconomic foundation for why divorce laws act as a distribution factor in a static collective model.

Interpreting the decline in female employment as a shift in intra-household allocation in favor of women is common in the literature on collective labor supply (for instance, Chiappori, Fortin, and Lacroix 2002 and Lise and Seitz 2011). This interpretation requires that, if the utility cost of housework is as high as the utility cost of market work, women do not entirely substitute market work with home production.

The model predicts that women with young children who are no longer working will devote more time to caring for children. In online Appendix D, I examine data on time use from the Use of Time Survey (1965), the Time Use in Economics and Social Account Survey (1975), and the National Human Activity Pattern Survey (1992–1994). The data indicates that married women who are not employed devote twice as many hours to home production, on average, than women who are employed (28.2 versus 14.5 average weekly hours). Yet, they also enjoy 12 more hours of leisure per week (42.8 versus 31.1 average weekly hours). Consistently with the model, we also observe mothers of small children who are not employed devoting on average four more hours to child care compared to employed mothers, while still enjoying eight more hours of leisure time (36 versus 28 weekly hours of leisure, using a definition of leisure from Aguiar and Hurst 2007 that does not include time spent caring for children, as described in online Appendix D).

I use these datasets to document that the decline in female employment that we observe when unilateral divorce is introduced in states with an equal division of property regime is associated with a net *increase* in their leisure time, while only a small and statistically insignificant increase in home production, housework, and child care are observed. The increase in the amount of leisure time enjoyed by women reinforces the hypothesis that the decline in female employment may be due to an increase in women's weight in intra-households' decision-making, and hence an increase in their relative well-being.

#### IV. Structural Estimation

Divorce law reforms have two main effects on the outcomes analyzed in Section III. The presence of both community property (or equitable distribution, to a lesser extent) *and* of unilateral divorce is associated with more assets and lower female employment than when mutual consent divorce is in place. These changes are not observed when unilateral divorce is introduced in title-based states.

I exploit these facts to estimate the key structural parameters of the model, using indirect inference:

- (i) the Pareto weight of the husband  $\theta$ ,
- (ii) the standard deviation of the shocks to the taste for marriage  $\sigma$ ,
- (iii) the utility cost of working  $\psi$ .

In a first stage, I estimate the parameters of the income process using moments of spouses' joint income distribution from the PSID (a two-step procedure makes the estimation computationally tractable, Gourinchas and Parker 2002 and De Nardi, French, and Jones 2010). To account for the selection of women into the workforce, I exploit variation in divorce laws across states and over time as variables that, in the model, affect women's decision to work but that are otherwise excluded from the offer wage growth equation. Hence, the primary source of exogenous variation that I use to identify the structural model is also exploited to identify the parameters of the income process. The parameters estimated in this first step are the variance and covariance of spouses' permanent income shocks ( $\sigma_{\zeta^H}^2$ ,  $\sigma_{\zeta^W}^2$ , and  $\sigma_{\zeta^H\zeta^W}$ ), the returns to labor market experience for each spouse ( $\lambda_0^j$  and  $\lambda_1^j$ ), the depreciation rate of the human capital of women ( $\delta$ ), and the gender gap in offer wage at the beginning of the spouses' career  $\left(\frac{y_1^W}{y_1^H}\right)$ .

I also fix a set of preset parameters, as described in Table 3, to simulate the model and estimate the remaining structural parameters  $\sigma, \psi, \theta$ .

##### A. Spouses' Income Processes

The spouses' income processes parameters allow the model to account for spouses' incentives to share income risk and for spouses' wage difference over

TABLE 3—PRESET PARAMETERS OF THE MODEL

Parameter	Value	Reference
Initial age	23	
Years in each period	3	
Age at death	82	
Retirement age	65	
Economies of scale in couple ( $\rho$ )	1.4023	McClements scale
Economies of scale for children ( $e(k)$ )		McClements scale
RRA ( $\gamma$ )	1.5	Attanasio et al. (2008)
Market returns on assets ( $r$ )	0.03	
Discount factor ( $\beta$ )	0.98	Attanasio et al. (2008)
Retirement income	1992 Soc. Sec. rules	Casanova (2010)
W's age at childbearing	26 and 29	PSID
Child care costs ( $g^k$ )		Attanasio et al. (2008)
Remarriage probabilities $\pi_t^{\beta\Omega}$		PSID
Cost of divorce ( $CD$ )		Rosen law firm fee calculator

the life cycle. I estimate the parameters using nonlinear least squares (Table 4). Identification of such parameters is described in detail in online Appendix E. The estimated gender ratio of offer wages for married and divorcees between ages 23 and 25 is 59 percent.<sup>18</sup> Third, based on the estimated variances, the income of women is more variable than that of men. Finally, the estimates reveal a *positive* covariance in the shocks to the permanent wage of the husband and the wife (the implied correlation is 0.13).

### B. Preset Parameters

A group of parameters of the model are set to values drawn from the literature. Table 3 presents the preset parameters. To limit the computation complexity of the problem, I set each period to correspond to three years of life. Spouses have the same life cycle: they are 23 years old at time 1; they retire at age 62 (end of period 13), and die with certainty at age 79 (end of period 18).

I calibrate the economies of scale parameter  $\rho$  to match the McClements scale, according to which a person living alone spends 61 percent of what a childless couple spends to consume the same amount. Such a scale is an intermediate value for the magnitude of economies of scale in the family estimated in the literature (Fernández-Villaverde and Krueger 2007). This calibration leads to a parameter

<sup>18</sup>My estimates for the returns to labor market experience for women  $\lambda_0^W$  is larger than others reported in the literature (Eckstein and Wolpin 1989; Attanasio, Low, and Sanchez-Marcos 2008); however, the profile of women's wages is more concave ( $\lambda_1^W$  is smaller than in the literature). Such estimates imply that the average yearly returns to experience over 30 years of career is 2.5 percent, compared to 2 percent calibrated in Attanasio, Low, and Sanchez-Marcos (2008). Olivetti (2006) estimates the returns to a year of full-time work in a 3 percent to 5 percent range. The estimate for the depreciation rate  $\delta$  is equal to 8 percent, close to the 7.4 percent calibrated in Attanasio, Low, and Sanchez-Marcos (2008).

TABLE 4—PARAMETERS OF THE INCOME PROCESS

Parameter	Symbol	Estimate	Standard error
$W$ 's returns to experience (constant)	$\lambda_0^W$	0.083	(0.014)
$W$ 's returns to experience (age)	$\lambda_1^W$	−0.004	(0.001)
$W$ 's human capital depreciation	$\delta$	0.080	(0.043)
$H$ 's returns to experience (constant)	$\lambda_0^H$	0.055	(0.0027)
$H$ 's returns to experience (age)	$\lambda_1^H$	−0.0066	(0.0004)
Offer wage gender gap	$\frac{y_1^W}{y_1^H}$	0.59	(0.0365)
Variance of $W$ 's income shock	$\sigma_{\zeta^W}^2$	0.074	(0.006)
Variance of $H$ 's income shock	$\sigma_{\zeta^H}^2$	0.042	(0.001)
Covariance of $H$ 's and $W$ 's income shocks	$\sigma_{\zeta^H\zeta^W}$	0.007	(0.002)

Notes: Income process parameters estimated by nonlinear least squares using PSID data of couples married before divorce law reforms and of divorcees. Standard errors in parentheses computed by bootstrap to account for first-stage estimation errors.

value of  $\rho = 1.4023$ .<sup>19</sup> The McClements scale is also used to calculate the consumption of the children as a fraction of their parents' consumption.<sup>20</sup>

The relative risk aversion parameter  $\gamma$  is set to 1.5 (e.g., Attanasio, Low, and Sanchez-Marcos 2008). I set the annual market rate of return on assets  $r$  to 3 percent and the annual discount factor  $\beta$  to 0.98.

### C. Indirect Inference

I use indirect inference (Gourieroux, Monfort, and Renault 1993) to estimate the key parameters of the model, exploiting the variation provided by the divorce law reforms as the primary source of identification.

First, I solve the dynamic model under mutual consent divorce for vectors of possible values of structural parameters  $\Pi = (\sigma \ \psi \ \theta)'$ , given the realizations of the income and taste shocks. Couples are assumed to have no assets at the time of marriage (age 23). I simulate income and taste shocks and use the policy functions to obtain the corresponding profiles of pre-reform household assets, female labor participation, and marital status before retirement.

Second, I compute profiles when the introduction of unilateral divorce happens at various stages of the life cycle. I again simulate the post-reform behavior of household assets, female labor participation, and divorce, at ages that match those observed in PSID data. The underlying assumption is that couples do not change their state of residence in response to or in anticipation of divorce law reforms. This hypothesis appears especially plausible if one considers that most states in

<sup>19</sup> Based on the McClements scale,  $0.61x = c^j$ . Under the assumption that spouses have identical consumption levels, the household inverse production function becomes  $x = 2^{1/2}c^j$ . Thus  $\rho = \frac{\log(2)}{\log\left(\frac{1}{0.61}\right)} = 1.4023$ .

<sup>20</sup> A couple with a child aged 0–1 consumes 109 percent of what a childless couple consumes. The additional fraction is 18 percent for each child between 2 and 4 years; 21 percent between 5 and 7 years; 23 percent between 8 and 10; 25 percent between 11 and 12; 27 percent between 13 and 15; and 38 percent between 16 and 18 years.



the United States have relatively long residency requirements before spouses can divorce in the state where they live.

I estimate the same auxiliary model on the simulated data and obtain a vector of auxiliary parameters  $\phi_{\text{sim}}(\Pi)$ . The optimal choice of  $\hat{\Pi}$  minimizes the distance between the auxiliary parameters estimated on the actual data and the auxiliary parameters estimated on the simulated data. I choose  $\hat{\Pi} = (\hat{\sigma}_\epsilon^2 \hat{\psi} \hat{\theta})'$  such that

$$(6) \quad \hat{\Pi} = \arg \min_{\Pi} (\hat{\phi}_{\text{data}} - \phi_{\text{sim}}(\Pi)) \mathbf{G} (\hat{\phi}_{\text{data}} - \phi_{\text{sim}}(\Pi))',$$

where  $\mathbf{G}$  is a symmetric and positive semi-definite weighting matrix.<sup>21</sup>

The auxiliary model includes the two difference-in-differences estimators for the introduction of unilateral divorce in different states at different points in time. To ease the computation and focus on the states that show the sharpest responses, I estimate the parameters on the sample of couples living in community property states.

The auxiliary parameters are  $\{\phi_1, \phi_2, \phi_3, \phi_4\}$  from the following model:

- (i) The relative change in household assets when unilateral divorce is introduced,

$$(7) \quad \text{assets}_{i,s,t} = \beta \text{Unilateral}_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + v_{1,i,s,t}$$

$$\phi_1 = \frac{\beta}{\text{average assets}},$$

where  $\hat{\phi}_{1,\text{data}} = 13.54\%$ ;

- (ii) The response of female participation when unilateral divorce is introduced,

$$(8) \quad \text{employment}_{i,s,t} = \phi_2 \text{Unilateral}_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + v_{2,i,s,t},$$

where  $\hat{\phi}_{2,\text{data}} = -6.93$  percentage points;

- (iii) The average female participation rate in mutual consent regimes of the pooled sample of women between 23 and 50 years old (to avoid the confounding effect of retirement),

$$(9) \quad \text{employment}_{i,s,t} = \phi_3 + v_{3,i,s,t},$$

where  $\hat{\phi}_{3,\text{data}} = 55.97$  percent;

- (iv) The average divorce rate in mutual consent regimes of the pooled sample of couples in which women are between 23 and 64 years old,

$$(10) \quad \text{ever divorced}_{i,s} = \phi_4 + v_{4,i,s},$$

<sup>21</sup>In this exercise,  $G$  is set to be equal to the inverse of the estimated variance-covariance matrix of the parameters of the auxiliary model.

where  $\hat{\phi}_{4,data} = 19.44$  percent.

Equations (7) and (8) are analogous to the reduced-form equations (4) and (5) from Section III, estimated on the subsample of households living in community property states.<sup>22</sup>

#### D. Identification

The choice of the auxiliary parameters allows for a rather transparent identification of the structural parameters of the model. All parameters of the auxiliary model contribute to the estimation of the structural parameters. In some cases, the theoretical link between a structural parameter and an auxiliary parameter is strong and crucial for identification.

The response of wives' likelihood of employment to changes in such laws provides the information to identify the parameter  $\theta$ . Such a moment is decreasing in the Pareto weight of men for values of  $\theta$  that are sufficiently large, namely larger than the husbands' relative share in household permanent income (and therefore at least larger than  $\frac{1}{2}$ ). If the wife's Pareto weight is not substantially smaller than the Pareto weight of the husband compared to the relative permanent incomes, the introduction of unilateral divorce in community property has little effect on her labor supply; such an effect would be positive, in that case, because women may want to accumulate human capital in case divorce occurs. On the contrary, for values of  $\theta$  sufficiently larger than  $\frac{1}{2}$  (i.e., when the husband has more decision power) the participation of women drops following the introduction of unilateral divorce. The introduction of unilateral divorce leads to a transfer of resources (consumption of goods and leisure) from the husband to the wife, because the divorce outside options are more favorable to women with respect to their share of resources in marriage at baseline. It follows that the estimated value of  $\theta$  will need to be sufficiently larger than  $\frac{1}{2}$  to match an auxiliary parameter  $\phi_2 = -6.93$  percentage points (Figure 2, panels A and B).

The primary role of the utility cost of participation ( $\psi$ ) in the model is determining a woman's labor market participation decision. Since, *ceteris paribus*, a woman is more likely to participate in the labor market the lower her utility cost of working, the average female employment rate provides information to estimate the disutility from working parameter  $\psi$  (Figure 2, panel C). Similarly, the standard deviation of the preference shock parameter ( $\sigma$ ) influences the likelihood of divorce. For low values of  $\sigma$ , divorce is an unlikely phenomenon, since few spouses receive negative shocks  $\xi^j$  sufficiently high to counteract the benefits of marriage that derive from the economies of scale. As  $\sigma$  increases, the likelihood that a spouse would prefer divorce increases. Therefore, identification of the parameter  $\sigma$  stems from the average divorce rate in mutual consent states (Figure 2, panel D).

<sup>22</sup>For example, the asset equation  $assets_{i,t} = \beta_1(Unilateral \cdot Com.Prop.)_{s,t} + \beta_2(Unilateral \cdot Title_{s,t}) + \beta_3(Unilateral \cdot Eq.Distr_{s,t}) + \beta_4 Eq.Distr_{s,t} + \beta_5 Com.Prop_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + \epsilon_{i,t}$  when  $Com.Prop_s = 1$  becomes  $assets_{i,t} = \beta Unilateral_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + v_{i,t}$ .

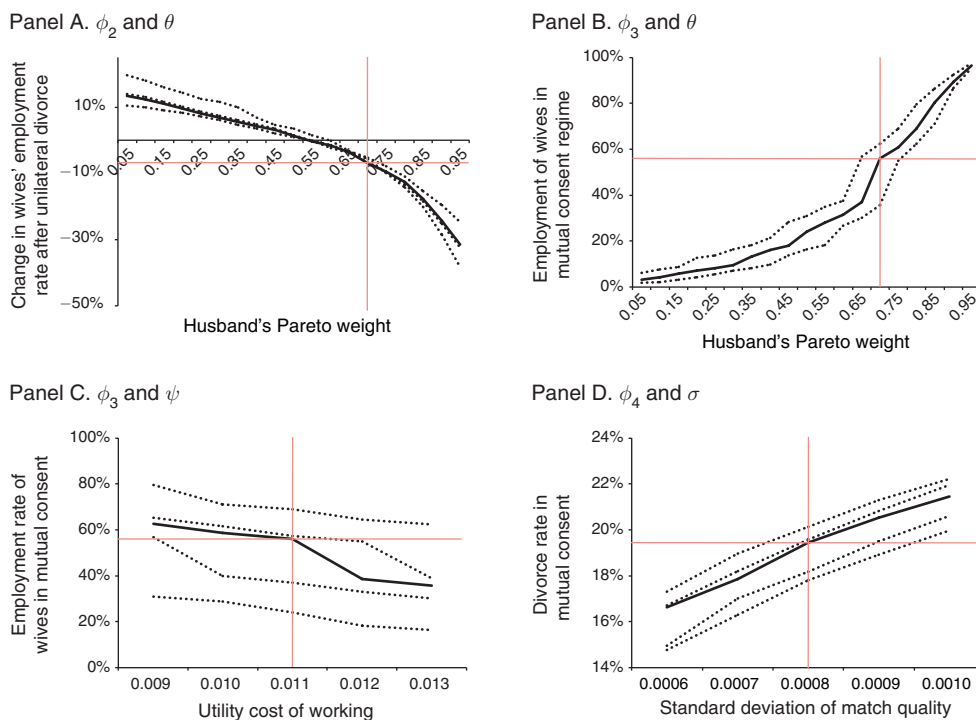


FIGURE 2. IDENTIFICATION OF THE PARAMETERS

*Notes:* Relationship between a parameter of the structural model and a parameter of the auxiliary model obtained by simulation. The solid line is computed using the other estimated parameters. The dotted lines are computed using random values of the other structural parameters.

### E. Results

Table 5 reports the solution to problem (6). When unilateral divorce is introduced in the sample, women's weight in household decision is 40 percent of their husband's weight ( $\theta = 0.7$ ). The estimated disutility of working is equal to 0.0107 (0.0036 annually) and the estimated standard deviation of preference shocks is equal to 0.0008. These estimates correspond to a baseline participation rate of 56.03 percent, which decreases by 6.86 percentage points after the introduction of unilateral divorce (Table 5). The increase in assets after the reform is equal to 13.43 percent in the simulations. Finally, the baseline divorce probability in the estimated model is equal to 19.44 percent, like in the data.

Examining moments in the data that were not targeted in the estimation allows us to evaluate the goodness-of-fit of the model. Like in the data, in simulations from the model the accumulation of assets (relative to average asset level across households) responds slowly to unilateral divorce, while the probability of female employment exhibits a sharp drop. The dynamic coefficients on the regressions of both savings and labor market participation are economically and statistically comparable to the ones calculated on the actual data (Figure 3).

TABLE 5—ESTIMATED STRUCTURAL PARAMETERS AND MATCH OF THE AUXILIARY MODEL

Parameter	Symbol	Estimate	Standard error
Standard deviation of preference shocks	$\sigma$	0.0008	0.0004
Disutility from labor market participation	$\psi$	0.0107	0.0025
Husbands' Pareto weight	$\theta$	0.7	0.0155
Auxiliary model parameter	Symbol	Target	Simulated
Effect of uni. divorce on savings in CP	$\phi_1$	13.54 percent	13.43 percent
Effect of uni. divorce on participation in CP	$\phi_2$	−6.93 pcpt	−6.86 pcpt
Baseline participation rate in CP	$\phi_3$	55.97 percent	56.03 percent
Baseline divorce probability in CP	$\phi_4$	19.44 percent	19.44 percent

Notes: Parameters of the dynamic model  $\{\sigma, \psi, \theta\}$  estimated by indirect inference. The parameters of the auxiliary model are  $\{\phi_1, \phi_2, \phi_3, \phi_4\}$ .

In addition, by simulating the model for title-based and equitable distribution regimes, we find that divorce law reform leads to changes in saving and female employment across these other regimes that are close to the ones in the data. In particular, the introduction of unilateral divorce is associated with a 1 percent decline in savings and a 3 percentage points decline in the likelihood of female employment in title-based regimes. Both estimates lie within the 95 percent confidence interval of the empirical changes estimated in Table 2. The interaction between unilateral divorce and equitable distribution, that captures changes in both regimes, is associated with a 13 percent increase in savings and a 6 percentage points decline in female employment, again within the 95 percent confidence interval of the empirical changes.

To validate the income process estimation, I compare the outcome of the selection of women into employment that we observe in the data to the one generated by the model based on the separately estimated income process. I examine the share of total labor income earned by working wives in the household, which is a crucial parameter, as it is highly correlated with the relative resources available to women in case of divorce. In the data from the PSID, such a ratio is equal to 32 percent. In the simulations of the estimated model, it is equal to 28 percent.

## V. Welfare and Counterfactual Analysis

Having estimated the structural model, and in particular the intra-household allocation parameters, I can now examine the welfare of the households that were married before the reforms and their behavior under different legal scenarios.

### A. Intra-Household Allocations and Unilateral Divorce Reform

Simulations of the dynamic model allow us to interpret the change in female labor supply and savings that we observe in the data when unilateral divorce is introduced in community property states. In the sample period, the introduction of unilateral divorce *increases* wives' average share of resources within the marriage in states that imposed an equal division of property. The simulation indicates that in mutual consent, the share of household expenditures that goes to the wife implied

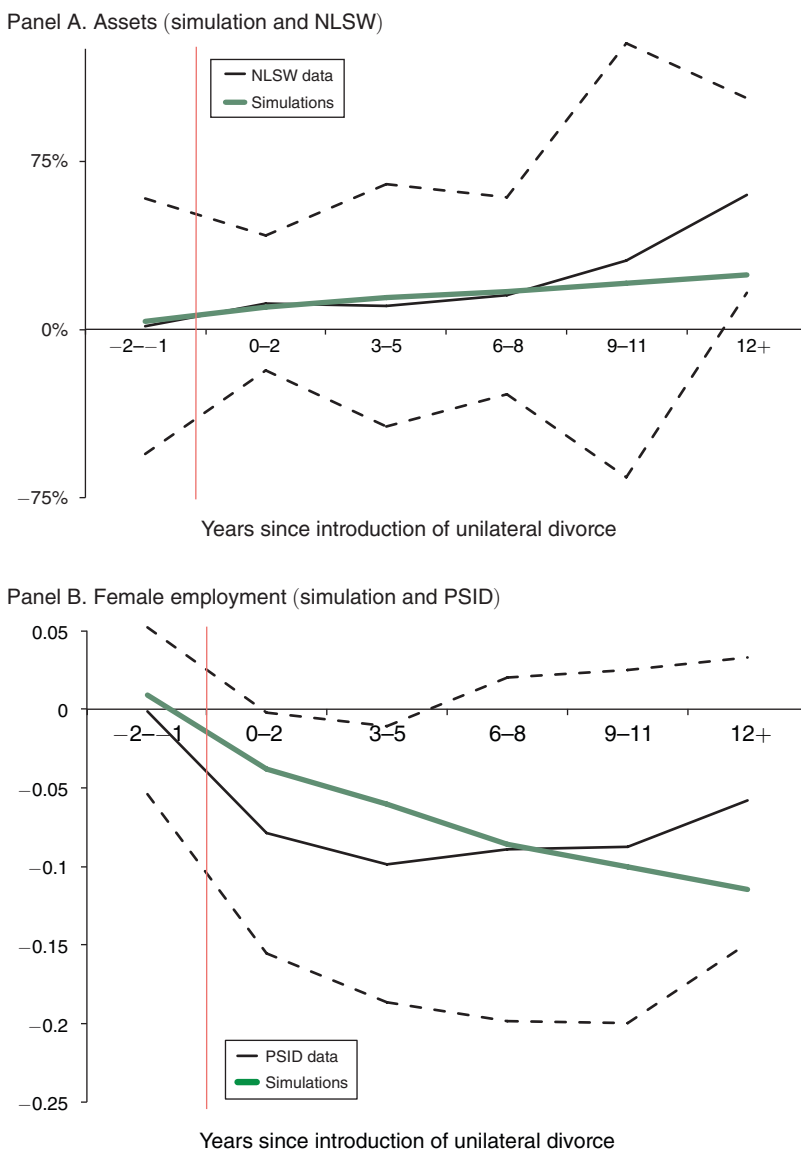


FIGURE 3. DYNAMIC RESPONSE OF ASSETS ACCUMULATION AND FEMALE EMPLOYMENT IN THE SIMULATIONS AND IN THE DATA

Notes: Estimates and 95 percent confidence intervals are obtained from estimating  $y_{i,s,t} = \sum_{\tau=0(3)}^{12+} \beta_{\tau} \text{Uni. for } \tau$  to  $(\tau + 2) \text{yrs}_{s,t} + \gamma' \mathbf{Z}_{i,t} + \delta_t + f_i + c_s + \epsilon_{i,s,t}$ . Panel A is estimated from NLSW data as the ratio between the coefficients  $\beta_{\tau}$  and average household assets, panel B from PSID data. Standard errors clustered at the state level.

by  $\theta = 0.7$  is equal to 39 percent.<sup>23</sup> After unilateral divorce is introduced, wives' average share of resources increases to 41 percent, combined with a decline in the likelihood of working by 6.86 percentage points. Such changes are driven by the fact that in over 19 percent of households wives have binding participation constraints

<sup>23</sup> Using time use and wages data from the PSID in a static framework, Knowles (2013) calibrates a share of 34 percent in 1970. Similarly, Lise and Seitz (2011) estimate a conditional sharing rule of 0.4 in UK survey data.

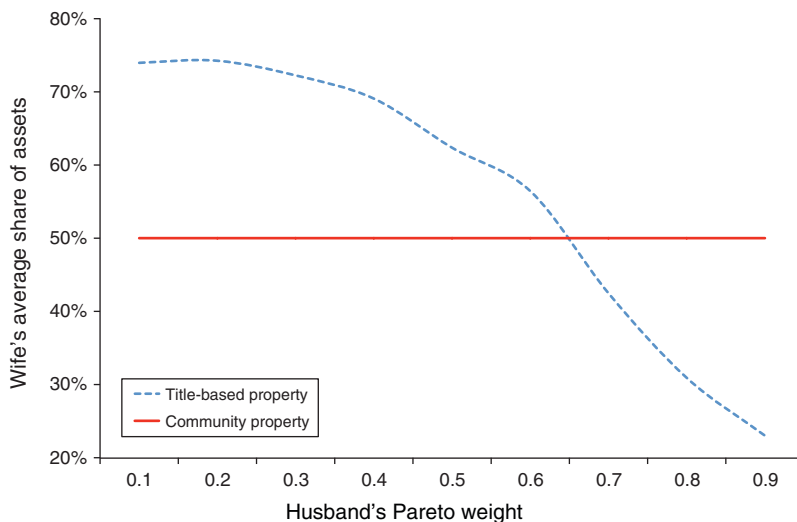


FIGURE 4. PROPERTY DIVISION REGIME AND HUSBAND'S PARETO WEIGHT

Notes: Average share of assets awarded to women aged 23–64 by divorce law regime and Pareto weight of the husbands in simulations from the dynamic model. With the exception of the Pareto weights, all other parameters in the simulation are reported in Tables 3, 4, and 5.

at  $\theta = 0.7$  once unilateral divorce is introduced, and for those women, the average share of consumption moves to 49 percent.

### B. Property Division Regimes and Pareto Weights

Title-based regimes were abandoned in the United States with the intent of increasing the share of savings granted to secondary earners (Turner 1998), who had higher marginal utility of consumption upon divorce. I use the estimated structural parameters to simulate the model and compare the share of household resources awarded to women in community property, in equitable distribution and in title-based regimes. This exercise suggests that community property and equitable distribution grant a larger share of assets to women compared to title-based division: according to the simulation, when  $\theta = 0.7$ , divorced women obtain a 40 percent share in a title-based regime. In community property, women's share of property is 50 percent, and in equitable distribution it is, in expectation, 42 percent. Figure 4 illustrates the relationship between the average fraction of assets granted to women across legal regimes and the Pareto weight distribution in the household, based on simulations from the model. When the Pareto weight of the secondary earner is equal to a half (i.e., when spouses split consumption approximately equally), community property grants a *lower* fraction of assets to the secondary earner compared to what the household would choose under a title-based system, in which women obtain on average 62 percent of household savings. In these cases, community property may lead secondary earners to experience a drop in consumption upon divorce, while still inducing a distortion in the household's intertemporal behavior. For such households, a title-based system may both increase household well-being and ensure that



more resources are assigned to the spouse with lower permanent income, relative to the current property system.

### C. Divorce Laws and Consumption Insurance

The divorce law regimes examined in this paper have important implications for the degree of intra-household risk-sharing and consumption insurance available to couples. Because individual consumption and intra-household consumption insurance among married couples are typically not observed in the data, counterfactual simulations from this model can provide insights about the relationship between divorce laws and consumption insurance. To examine this question, I generate a simulated dataset of individual consumption, marital status and income profile for simulated households over  $t = 1, \dots, T - R$  periods under each one of the six possible combination of divorce law regimes (by grounds for divorce laws and by property division laws) under the preset and the estimated parameters. I then use the simulated data to estimate the below equations for each spouse  $j = H, W$  in household  $i$  at time  $t$ :

$$(11) \quad \Delta \log(c_{it}^j) = \kappa^j + \mu^j \Delta \log(y_{it}^j) + \nu^{ij} \mathbf{X}_{it}^j + \epsilon_{it}^j$$

$$(12) \quad \log(c_{it}^j) = \chi^j + \eta^j \text{Divorced}_{it} + \psi^{ij} \mathbf{X}_{it}^j + \rho_i^j + v_{it}^j,$$

where  $y_{it}^j$  is spouse  $j$ 's earnings or potential earnings and  $\mathbf{X}_{it}^j$  are spouse  $j$ 's age and age squared. The coefficient  $\mu^j$  captures the degree to which spouse  $j$ 's income shocks, which are assumed to be permanent, are transmitted into changes in her or his individual consumption: a value of  $\mu^j$  that is close to 1 indicates a low degree of consumption insurance with respect to income changes, while a value that is close to 0 indicates a high degree of insurance (see Blundell, Pistaferri, and Preston 2008). Equation (11) is estimated maintaining the marriage profile even after divorce, to correct for the differential selection of couples into divorce as a result of different divorce laws. The coefficient  $\eta^j$  measures the average percentage change in consumption after divorce, controlling for individual fixed effects  $\rho_i^j$ . Equation (12) is estimated on the sample of first marriages and divorcees.

Three main facts emerge from this exercise. First, as expected, spouses are better able to insure one another in the presence of mutual consent divorce than in the presence of unilateral divorce (Table 6): in this model, unilateral divorce introduces a limited commitment problem in the marriage, which is associated with a decrease in risk-sharing (Kocherlakota 1996). For example, in a community property regime,  $\mu^H = 0.371$  in a mutual consent regime, and  $\mu^H = 0.390$  in unilateral divorce. This relationship is preserved across property division regimes for men. However, because female labor supply is lower in unilateral divorce, households are less exposed to shocks to women's income, particularly when assets are split equally.

Second, property division rules do not affect risk-sharing in a mutual consent regime, although they affect consumption smoothing through changes in the accumulations of assets. Hence, the coefficients  $\mu^j$  are very similar in mutual consent regimes, and different in unilateral divorce.

TABLE 6—DIVORCE LAWS AND CONSUMPTION INSURANCE AGAINST INCOME SHOCKS

Regimes	Married couples			
	Men		Women	
	Mutual consent	Unilateral divorce	Mutual consent	Unilateral divorce
Title-based	0.372	0.410	0.233	0.207
Community property	0.371	0.390	0.235	0.192
Equitable distribution	0.375	0.384	0.238	0.197

Notes: The table reports the estimates of coefficients  $\mu^j$  obtained from the regressions

$$\Delta \log(c_{it}^H) = \kappa^H + \mu^H \Delta \log(y_{it}^H) + \nu^H \mathbf{X}_{it}^j + e_{it}^H \quad \text{and}$$

$$\Delta \log(c_{it}^W) = \kappa^W + \mu^W \Delta \log(y_{it}^W) + \nu^W \mathbf{X}_{it}^j + e_{it}^W$$

in each legal regime, where  $X_{it}^j$  are spouse  $j$ 's age and age squared. The coefficients are estimated on data obtained from simulating the model using the preset parameters and the estimated parameters for a sample of simulated households. I account for the differential selection of couples out of marriage because of divorce laws by simulating income and consumption profiles using only the policy functions of married couples.

Third, property division rules affect the way divorce affects the consumption of men and women. Generally, because of the loss in economies of scale, divorce is associated with a considerable decrease in consumption (Table 7). However, by distributing assets in a way that is orthogonal to intra-household allocation, community property leads women to experience a smaller decrease in their consumption upon divorce (as low as 25 percent), particularly in mutual consent regimes.

#### D. Reducing the Financial Cost of Prenuptial Agreements

This counterfactual simulation examines couples' willingness to pay to avoid community property in favor of an alternative division rule. Such a rule corresponds to what a couple would choose if they could write a prenuptial agreement without financial costs nor transaction costs nor stigma, and with certainty about its enforcement. In this exercise, such a choice is made holding the Pareto weight at the time of marriage ( $\theta$ ) fixed and allowing for the chosen property division rule to affect the allocation of resources through the limited commitment mechanism. One caveat of this exercise is that the Pareto weight that ultimately arises in the equilibrium marriage market might itself depend on the prenuptial agreement choice, as part of spouses' continuation value. If that is the case, evaluating the implications of prenuptial agreements on spouses' individual well-being would require solving for the Pareto weight in the equilibrium marriage market, which is beyond the scope of this exercise. To partly address this concern within the framework of my model, I compute the *lower bound* of the willingness to pay for a prenuptial agreement over a vector of possible values that the Pareto weight can take given the prenuptial regime.<sup>24</sup>

<sup>24</sup> Under a prenuptial agreement, define  $\alpha^*$  as the share of household assets that is granted to the husband upon divorce by solving  $\alpha^* = \arg \max_{\alpha} E_{y_1, \xi_1}[V_1(\alpha, \theta^{\text{prenup}} | \omega_1)]$ . In community property,  $\alpha = 0.5$  and the Pareto weight is denoted by  $\theta^{\text{CP}}$ . The lower bound on the willingness to pay for  $\alpha^*$  is computed as the lowest dollar amounts  $\mathbf{x}$  among those satisfying the set of equations

$$E_{y_1, \xi_1}[V_1(\alpha^*, \theta^{\text{prenup}} | A_1 = 0)] = E_{y_1, \xi_1}[V_1(\alpha = 0.5, \theta^{\text{CP}} | A_1 = \mathbf{x})]$$

TABLE 7—DIVORCE LAWS AND CONSUMPTION INSURANCE AGAINST DIVORCE

Regimes	Married couples and divorcees			
	Men		Women	
	Mutual consent	Unilateral divorce	Mutual consent	Unilateral divorce
Title-based	−0.512	−0.284	−0.638	−0.706
Community property	−0.482	−0.302	−0.254	−0.306
Equitable distribution	−0.509	−0.323	−0.576	−0.591

Notes: The table reports the estimates of coefficients  $\eta^j$  obtained from the regressions

$$\Delta \log(c_{it}^H) = \chi^H + \eta^H \text{Divorced}_{it} + \psi^H \mathbf{X}_{it}^j + \rho_{it}^H + v_{it}^H \quad \text{and}$$

$$\Delta \log(c_{it}^W) = \chi^W + \eta^W \text{Divorced}_{it} + \psi^W \mathbf{X}_{it}^j + \rho_{it}^W + v_{it}^W$$

in each legal regime, where  $X_{it}^j$  are spouse  $j$ 's age and age squared. The coefficients are estimated using data obtained from simulating the model using the preset parameters and the estimated parameters for a sample of simulated households in their first marriage and in divorce.

For the estimated value of  $\theta^{CP} = 0.7$ , the lower bound on the expected willingness to pay for such an agreement is equal to \$140, which might explain the low take-up of these contracts in the years of the estimation. However, the expected willingness to pay increases the furthest the household is from finding an equal split of assets to be optimal, which occurs when  $\theta^{CP} = 0.65$ .

## VI. Concluding Remarks

In this paper, I show that spouses' individual property rights have a significant effect on couples' intertemporal behavior during marriage: divorce laws that govern the decision to divorce and the division of property influence both the couples' accumulation of assets and the labor supply of married women. In particular, I use data from the PSID and NLSW to estimate household responses to divorce law reforms that occurred in the 1970s and 1980s. My regression results suggest that introducing unilateral divorce in states where assets are divided equally is associated with more assets accumulated compared to title-based regimes. In addition, following the introduction of unilateral divorce in states with equal division of property, the labor force participation of women declines by about 5 percentage points.

To examine the welfare implications of these legal changes, I build a stochastic dynamic model that incorporates features of the US divorce system. I use the regression results from survey data to estimate by indirect inference the key parameters of the model at the time of the divorce law reforms. The structural estimation indicates that, at the time of marriage, women in the sample (women married before the reforms are enacted) have a lower weight in the household planning problem compared to their husbands, and hence a lower share in household resources. Because the introduction of unilateral divorce leads to renegotiating the intra-household allocation based on the divorce threat-points, women's share of intra-household resources increases when assets are divided equally in divorce. This finding explains why we observe a decline in wives' employment after the introduction of unilateral

for the vector of  $\theta^{prenup}$ , which may vary with respect to  $\theta^{CP}$  as a result of the change in the asset division rule (Lafortune et al. 2012).

divorce. Moreover, the increase in the accumulation of assets in community property states is consistent with the presence of an income effect for husbands, who saved to self-insure against the loss of half of their assets to their wives in case of divorce.

The counterfactual exercises suggest that an equal division of property only benefits women who have lower weight compared to their husband in their household's decision, such as the women married before the divorce law reforms that I examine. However, as women gain equality in their marriage, well-defined property rights allow them to be better insured against a drop in consumption at divorce. Despite its centrality in intra-household and policy analysis, we know little about how consumption is allocated in marriage or about where the decision power in marriage stands. The role of women in the economy has changed radically in the past decades (Goldin 2006), but to what extent these changes have affected women's position within marriage and the distribution of resources within the household remains an open question.

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