Yours, Mine and Ours:
Do Divorce Laws Affect the Intertemporal Behavior of Married Couples?

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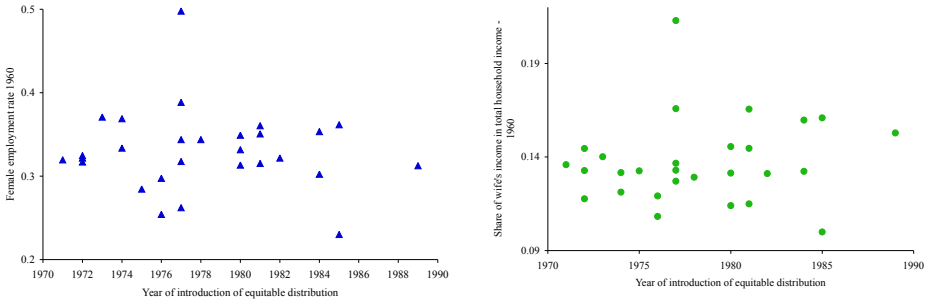
ONLINE APPENDIX

Appendix A: Timing of the property division law reforms

Although a large body of economic literature has documented and exploited the exogeneity of the introduction of unilateral divorce with respect to household economic behavior (among others, Gruber 2004, Stevenson 2007, Gray 1998), no research has shown how the timing of introduction of equitable distribution may be correlated with state-level and state-level trends. Specifically, I find no correlation between the timing of the legal changes and the share of women employed in the labor market and their income before the reforms (Figure A.1).[1]

[1] I regress: $(\text{year of reform-1967})_s = \alpha + \beta \text{Female employment rate in } 1960_s + \epsilon_{1s}$, the coefficient for β is -8.79 (p-value 0.640) while $\hat{\alpha} = 14.12$ (p-value 0.031).
I also regress (graph not shown but available upon request) $(\text{year of reform-1967})_s = \gamma + \delta(\text{Female employment rate in 1960-Female employment rate in } 1950)_s + \epsilon_{2s}$, the coefficient for δ is -1.417 (p-value 0.979) while $\hat{\gamma} = 11.311$ (p-value 0.007).
Finally, from $(\text{year of reform-1967})_s = \zeta + \eta(\text{Share of wives' income in } 1960)_s + \epsilon_{3s}$, the coefficient for η is -26.67 (p-value 0.515) while $\hat{\zeta} = 7.555$ (p-value 0.190).

Figure A.1: **Timing of the introduction of equitable distribution and state characteristics**



(a) Female employment rate in 1960

(b) Share of wives' income in total household income in 1960

Notes: Data is the 1% sample of 1950 and 1960 U.S. Censuses. Sources: Ruggles Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. 2010. *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable database]. Minneapolis: University of Minnesota.

Appendix B: Solution method

The problem of the female divorcee has three state variables: A^W, h^W and the offer labor income y^W and two choice variables, c^W and P^W. The model is solved by backward induction (Adda and Cooper 2003) under the terminal condition that $A^W_{T+1} = 0$ for a discrete vector of possible values for A^W_t. The solution leads to a sequence of values $V^{WD}_t(A^W_t, y^W_t, h^W_t)$ that represent the wife's valuation of the divorce. For the male divorcee, the problem is identical with the exception that the working is not a choice variable.[2]

The married couple's problem has eleven state variables: spouses' assets level A^j, the wife's human capital h^W, spouses' preferences for marriage ξ^j, the income level for each spouse y^j_t, the spouses' renegotiation parameters M^j_t and the divorce laws vector $\mathbf{\Omega}_t$ (which represents two state variables: grounds for divorce law and property division rule). The household takes the divorce laws $\mathbf{\Omega}_t$ as given and assumes that they are going to persist in time:

[2]If remarriage occurs, the problem is again solved by backward induction under the same zero-assets terminal condition.

changes in $\mathbf{\Omega}_t$ are thus unanticipated and exogenous to household behavior.[3] The problem is again solved numerically by backward induction with the terminal condition $A^j_{T+1} = 0$.[4]

I describe the problem of the couple in the last period T, when spouses are retired. The couple solves:

$$\begin{aligned} max_{c^H_T, c^W_T, A^H_{T+1}, A^W_{T+1}} \quad & (\theta + M^H_T)\ u(c^H_T; \xi^H_T) + (1 - \theta + M^W_T)\ u(c^W_T; \xi^W_T) \\ & \text{s.t. budget constraint in marriage} \\ & A^j_{T+1} \geq 0 \qquad\qquad j = H, W. \end{aligned}$$

Define $V^{jM}_T(\boldsymbol{\omega}_T) = u(c^{*j}_T; \xi^j_T)$ at the optimal values of c_T and A_{T+1} (where $A^j_{T+1} = 0$) given the solution of the Pareto problem for state variables $\boldsymbol{\omega}_T$. For each regime, there are three possible cases:

Mutual consent divorce

1. if $V^{jM}_T(\boldsymbol{\omega}_T) \geq V^{jD}_T(\boldsymbol{\omega}_T)$ for both $j = H, W$, then $V^j_T(\boldsymbol{\omega}_T) = V^{jM}_T(\boldsymbol{\omega}_T)$ and the couple remains married.

2. if $V^{jM}_T(\boldsymbol{\omega}_T) < V^{jD}_T(\boldsymbol{\omega}_T)$ for both $j = H, W$, then $V^j_T = V^{jD}_T(\boldsymbol{\omega}_T)$ and the couple divorces.

3. $V^{jM}_T(\boldsymbol{\omega}_T) < V^{jD}_T(\boldsymbol{\omega}_T)$ and $V^{iM}_T(\boldsymbol{\omega}_T) \geq V^{iD}_T(\boldsymbol{\omega}_T)$ for $j = H, W$, $i = H, W$ and $i \neq j$.

In the third case, the allocation of assets shifts. The spouse who wants to divorce (j) can persuade the other by offering her (him) a larger fraction of the household assets than that dictated by the law. I will call this share $\kappa \in [0, 1]$. Assume the spouse who wants to remain married is the husband; then, the household finds $\kappa_T \in [0, 1]$ where the husband's share of assets becomes $\kappa_T(A^H_T + A^H_T)$ such that: $V^{HD}_T(\boldsymbol{\omega}_T, \kappa_T) = V^{HM}_T(\boldsymbol{\omega}_T)$.

After this reallocation, consider the following two possible cases:

[3] Divorce laws impose restrictions on the state variables. In community property, $A^H_t = A^W_t \quad \forall t$ and in equitable distribution $(1 - \alpha)A^H_t = \alpha A^W_t \quad \forall t$. In mutual consent divorce, $M^j_t = 0 \quad \forall t$ and $j = H, W$.

[4] To obtain the numerical solution I discretize assets A, human capital h^W, income y^j_t and taste shocks ξ^j_t. I solve the value function for a subset of the vector of discrete values of A and then use a linear interpolation method to evaluate the continuation values. The random walk processes are discretized into Markov chains (Adda and Cooper 2003).

1. if $V_T^{WM}(\boldsymbol{\omega}_T, \kappa_T) < V_T^{WD}$, then $V_T^j = V_T^{jD}$ and the couple divorces.

2. if $V_T^{WM}(\boldsymbol{\omega}_T, \kappa_T) \geq V_T^{WD}$, then $V_T^j = V_T^{jM}(\boldsymbol{\omega}_T, \kappa_T)$ and the couple remains married.

Unilateral divorce

1. if $V_T^{jM}(\boldsymbol{\omega}_T) \geq V_T^{jD}(\boldsymbol{\omega}_T)$ for both $j = H, W$, then $V_T^j(\boldsymbol{\omega}_T) = V_T^{jM}(\boldsymbol{\omega}_T)$ and the couple remains married.

2. if $V_T^{jM}(\boldsymbol{\omega}_T) < V_T^{jD}(\boldsymbol{\omega}_T)$ for both $j = H, W$, then $V_T^j = V_T^{jD}(\boldsymbol{\omega}_T)$ and the couple divorces.

3. $V_T^{jM}(\boldsymbol{\omega}_T) < V_T^{jD}(\boldsymbol{\omega}_T)$ and $V_T^{jM}(\boldsymbol{\omega}_T) \geq V_T^{jD}(\boldsymbol{\omega}_T)$ for $j = H, W$, $i = H, W$ and $i \neq j$.

In case **3**, the allocation shifts. Assume the spouse who wants to divorce is the husband; then, I find μ_T^H such that solving:

$$\begin{aligned} max_{c_T^H, c_T^W, A_T^H, A_T^W} \quad & (\theta + M_T^H + \mu_T^H)\ u(c_1^H; \xi_T^H) + (1 - \theta + M_T^W)\ u(c_T^W; \xi_T^W) \\ \text{s.t.} \quad & \text{budget constraint} \\ & A_{T+1}^j \geq 0 \qquad\qquad j = H, W. \end{aligned}$$

leads to $V_T^{HM}(\boldsymbol{\omega}_T, \mu_T^H) = V_T^{HD}(\boldsymbol{\omega}_T)$.

c) **Third step** Consider the following two possible cases, which depends on how the other spouse responds to the reallocation:

1. if $V_T^{WM}(\boldsymbol{\omega}_T, \mu_T^H) \geq V_T^{WD}$, then $V_T^j = V_T^{jM}(\boldsymbol{\omega}_T, \mu_T^H)$ for $j = H, W$: the couple remains married.

2. if $V_T^{WM}(\boldsymbol{\omega}_T, \mu_T^H) < V_T^{WD}$, then $V_T^j = V_T^{jD}$ for $j = H, W$: the couple divorces.

Once the continuation values have been defined, for an arbitrary period t the allocation in marriage follows an analogous algorithm.

Appendix C: Robustness checks

In this Appendix, I present a series of robustness checks to the results described in section 3. First, I show that the results on both assets and female

employment are not driven by changes in the two largest community property states (California and Texas: Table F.2, columns 1, 2, 5 and 6). Second, I show that results are not driven by non-random attrition due to different likelihood of divorce between groups of states. In particular, remember that each main equation is estimated based on a sample of married couples. To address this concern on the assets regression, I use Inverse Probability Weighting (IPW, Wooldridge 2010) and re-weight observations based on the inverse of their likelihood to be included in the sample, i.e. the likelihood of remaining married (Table F.2, column 7).[5]

Appendix D: Additional evidence on time use

To examine how changes in divorce laws affected the time use of American couples, I use data from the Americans' Use of Time Surveys (1965), the Time Use in Economics and Social Account Survey (1975) and the National Human Activity Pattern Survey (1992-1994), based on the sample examined in Aguiar and Hurst (2007) for which state identifiers are available.[6]

I focus on five outcome variables. The variable *work hours* refers to the sum of the weekly hours devoted to work and work-related activities and to commuting. *Housework* measures time devoted to cleaning, doing laundry and ironing. *Home production* refers to the sum of weekly hours devoted to housework, meals preparation, home and car maintenance, care of garden and pets. The outcome variables *Leisure 1-3* refer to the sum of weekly hours devoted to leisure activities and are classified by Aguiar and Hurst (2007) in the following way. *Leisure 1* includes all activities such as sports, watching TV, gardening, reading, traveling for leisure and so on. *Leisure 2* adds time devoted to sleeping, eating and personal care. Finally, *Leisure 3* also includes time devoted to caring for children.[7]

[5]The standard errors do not account for first-stage estimation. Ignoring the first stage in the computation of the standard errors leads to a *conservative* estimate of the variance-covariance matrix: adjusting for the first stage would lead to smaller standard errors (Wooldridge 2010).

[6]For a detailed description of the sources of data, refer to Aguiar and Hurst (2007), p. 974.

[7]I use the same data as in Aguiar and Hurst (2007) for which state identifies are available. I thank the authors for making their data available at `http://www.markaguiar.com/papers/timeuse_data/datapage.html`.

For each of these outcome variables, I estimate the following equation:

$$\begin{aligned} y_{i,s,t} = {} & \beta_1(Unilateral \cdot Com.Prop_{s,t} + \beta_2(Unilateral \cdot Title_{s,t}) \\ & + \beta_3(Unilateral \cdot Eq.Distr_{s,t}) + \beta_4 Com.Prop._{s,t} + \beta_5 Eq.Distr._{s,t} \\ & + \boldsymbol{\gamma}' \boldsymbol{Z}_{i,t} + \delta_t + c_s + \epsilon_{i,s,t}. \end{aligned} \tag{1}$$

where vector Z contains a set of controls for person i's age, education and number of children, δ_t denote year fixed effects and c_s state fixed effects. Because information of marital status is not available for 1993, I examine all women between the ages of 23 and 64, irrespectively of their marital status.

Appendix table F.3 reports the outcomes of estimating equation 1 on the outcome variable described above. Consistently with the evidence from the PSID, data on time use indicates that the introduction of unilateral divorce in community property states is associated with a decline in the weekly hours worked by women (table F.3, column 1, significant at the 1 percent level) and small and not statistically significant increases in the amount of time devoted to housework, home production and childcare, especially for women with children below age 5 (table F.3, columns 2 to 5). Overall, unilateral divorce in community property states leads to an increase in the time women devote to leisure of 6.2 to 8.5 hours per week (table F.3, columns 6 and 7, significant at the 5 percent level, and column 8 at the 1 percent level).

In addition, the introduction of unilateral divorce in title-based states is not associated with statistically significant changes in the outcome variables.

Appendix E: Identification of spouses' income processes

Parameters λ_0^H and λ_1^H, which represent men's income gains from experience, are estimated using the PSID income dataset for all working men under the age of 65:[8]

$$\Delta ln(y_t^H) = \lambda_0^H + \lambda_1^H \cdot t + \Delta u_t$$

Define unexplained growth of log-earnings as:

$$\Delta u_t^j = z_{t-1}^j + \zeta_t^j - z_{t-1}^j + \epsilon_t^j - \epsilon_{t-1}^j = \zeta_t^j + \epsilon_t^j - \epsilon_{t-1}^j \tag{2}$$

for j=H,W.

[8] See Meghir and Pistaferri (2004) and Low, Meghir and Pistaferri (2010) for examples of the estimation of men's income process parameters.

The variance of the husband's permanent income shocks is identified by the moment

$$E[\Delta u_t^H(\Delta u_t^H + \Delta u_{t-1}^H + \Delta u_{t+1}^H)] = \sigma_\zeta^{2H}.$$

Identification of the income process parameters for women requires accounting for the selection of women into employment. Assume that a wife participates in the labor market ($P_t^W = 1$) if $Z_t'\delta + N_t'\gamma + \eta_t > 0$, where N_t are exogenous variables excluded from the earnings equation and Z_t are variables which also appear in the earnings equations. In the dynamic model, N_t are divorce laws, Z_t is a vector of age and past experience and η_t are unobserved shocks to the taste for marriage and to productivity.

Assume that the income shocks of husbands and wives are correlated. Income shocks and participation shocks in each period are distributed as a multivariate normal which is serially uncorrelated:

$$\begin{pmatrix} \zeta_t^H \\ \zeta_t^W \\ \eta_t \end{pmatrix} \textit{is distributed } MVN \left(\mathbf{0}, \begin{pmatrix} \sigma^2_{\zeta^H} & & \\ \sigma_{\zeta^H\zeta^W} & \sigma^2_{\zeta^W} & \\ \sigma_{\zeta^H\eta} & \sigma_{\zeta^W\eta} & 1 \end{pmatrix} \right)$$

Define $\alpha_t = -Z_t'\delta - M_t'\gamma$. I estimate the probability of female participation in the labor market as

$$P(P^W = 1) = P(\eta_t > -Z_t'\delta - N_t'\gamma) = P(\eta_t > \alpha_t)$$

using a probit model. Then:

$$\begin{aligned} E[\Delta log\, y_t^W | P_t^W = 1, P_{t-1}^W = 1] &= \lambda_0^W + \lambda_1^W \cdot t + E(\Delta u_t^W | P_t^W = 1, P_{t-1}^W = 1) \\ &= \lambda_0^W + \lambda_1^W \cdot t + \sigma_{\Delta u\eta}\left[\frac{\phi(\alpha_t)}{1-\Phi(\alpha_t)} + \frac{\phi(\alpha_{t-1})}{1-\Phi(\alpha_{t-1})}\right] \end{aligned} \tag{3}$$

The parameters of the income process are the solutions to the system:

$$E[\Delta u_t^W | P_t^W = 1, P_{t-1}^W = 1] = \sigma_{\zeta^W \eta} \frac{\phi(\alpha_t)}{1 - \Phi(\alpha_t)} \tag{4}$$

$$\begin{aligned} E[\Delta u_t^W (\Delta u_t^W + \Delta u_{t-1}^W + \Delta u_{t+1}^W) | P_t^W = 1, P_{t-1}^W = 1, P_{t+1}^W = 1, P_{t-2}^W = 1] \\ = \sigma_{\zeta^W}^2 + \sigma_{\zeta^W \eta}^2 \frac{\phi(\alpha_t)}{1 - \Phi(\alpha_t)} \alpha_t \end{aligned} \tag{5}$$

$$E[\Delta u_t^H | P_t^W = 1, P_{t-1}^W = 1] = \sigma_{\zeta^H \eta} \frac{\phi(\alpha_t)}{1 - \Phi(\alpha_t)}$$

$$E[\Delta u_t^W \Delta u_t^H | P_t^W = 1, P_{t-1}^W = 1] = \sigma_{\zeta^H \zeta^W} + \sigma_{\zeta^H \eta} \sigma_{\zeta^W \eta} \frac{\phi(\alpha_t)}{1 - \Phi(\alpha_t)} \alpha_t \tag{6}$$

$$E[log\, y_t^W - log\, y_{t-2}^W | P_t^W = 1, P_{t-2}^W = 1] = \sigma_{\Delta^2 u \eta} \left[\frac{\phi(\alpha_t)}{1 - \Phi(\alpha_t)} + \frac{\phi(\alpha_{t-2})}{1 - \Phi(\alpha_{t-2})} \right].$$

Appendix F: Tables

Table F.1: **Divorce law reforms in the sample period**

State	Unilateral divorce	Equitable distribution	State	Unilateral divorce	Equitable distribution
Alabama	1971	1984	Montana	1973	1976
Alaska	pre-1967	pre-1967	Nebraska	1972	1972
Arizona	1973	community property	Nevada	1967	community property
Arkansas	no	1977	New Hampshire	1971	1977
California	1970	community property	New Jersey	no	1974
Colorado	1972	1972	New Mexico	pre-1967	community property
Connecticut	1973	1973	New York	no	1980
Delaware	1968	pre-1967	North Carolina	no	1981
District of Columbia	no	1977	North Dakota	1971	pre-1967
Florida	1971	1980	Ohio	1992	1981
Georgia	1973	1984	Oklahoma	pre-1967	1975
Hawaii	1972	pre-1967	Oregon	1971	1971
Idaho	1971	community property	Pennsylvania	no	1980
Illinois	no	1977	Rhode Island	1975	1981
Indiana	1973	pre-1967	South Carolina	no	1985
Iowa	1970	pre-1967	South Dakota	1985	pre-1967
Kansas	1969	pre-1967	Tennessee	no	pre-1967
Kentucky	1972	1976	Texas	1970	community property
Louisiana	no	community property	Utah	1987	pre-1967
Maine	1973	1972	Vermont	no	pre-1967
Maryland	no	1978	Virginia	no	1982
Massachusetts	1975	1974	Washington	1973	community property
Michigan	1972	pre-1967	West Virginia	1984	1985
Minnesota	1974	pre-1967	Wisconsin	1978	community property (1986)
Mississippi	no	1989	Wyoming	1977	pre-1967
Missouri	no	1977			

Notes: Data from FLQ 1977-2005, Rasul (2003), Gruber (2004), Golden (1983), and state-level sources.

Table F.2: **Household Assets and Female Employment: Robustness Checks**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	NLSW	NLSW	NLSW	NLSW	PSID	PSID	PSID
VARIABLES	assets	assets	assets	assets	employment	employment	employment
	OLS	OLS	median reg	IPW	linear prob	linear prob	linear prob
Uni*Com.Pr.	16,160	21,003	6,446	18,533	-0.0602	-0.0474	-0.0528
	(9,399)	(5,435)	(3,700)	(5,225)	(0.0166)	(0.0186)	(0.0184)
Uni*Title	-1,543	-3,638	-688.6	-3,244	-0.0124	-0.0161	-0.00878
	(6,147)	(7,473)	(4,066)	(7,778)	(0.0303)	(0.0309)	(0.0249)
Uni*Eq.Distr.	12,428	12,481	6,948	16,573	-0.0264	-0.0287	-0.0100
	(8,078)	(8,497)	(3,573)	(10,238)	(0.0399)	(0.0402)	(0.0349)
Com. Pr.	-159,848	-52,857	18,355	-30,632	0.196	0.159	0.155
	(71,382)	(51,035)	(6,865)	(23,652)	(0.0557)	(0.0631)	(0.0470)
Eq. Distr.	-6,303	-18,914	-5,014	-19,501	0.00784	0.00628	-0.00289
	(7,259)	(11,486)	(2,601)	(12,367)	(0.0179)	(0.0175)	(0.0174)
Year f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Children dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Polyn yrs. married	Yes	Yes	Yes	Yes	Yes	Yes	No
Exclude CA	Yes	No	No	No	Yes	No	No
Exclude TX	No	Yes	No	No	No	Yes	No
Include non-married	No	No	No	No	No	No	Yes
Observations	10,725	11,431	12,022	12,022	37,025	38,001	51,067
Individual f.e.	3,158	3,351	-	3,516	2,469	2,519	3,522
Standard errors in parentheses, clustered at the state level							

Notes: Columns 1-4: Data from the NLS of Young and Mature Women. Dependent variable is real total family net assets. Columns 5-7: 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.

Table F.3: **Women's time use: OLS regressions**

VARIABLES	(1) work hours	(2) house-work	(3) home prod.	(4) child care	(5) child care	(6) leisure 1	(7) leisure 2	(8) leisure 3
Uni*Com.Pr.	-11.44	0.568	0.619	1.285	3.350	6.226	7.216	8.502
	(3.117)	(1.245)	(1.708)	(1.046)	(5.040)	(2.552)	(3.118)	(2.764)
Uni*Title	3.989	-1.441	-0.307	0.789	0.999	-5.182	-1.218	-0.429
	(3.892)	(1.910)	(2.828)	(1.049)	(3.983)	(3.305)	(4.002)	(3.606)
Uni*Eq.Distr.	-2.288	-0.221	-0.603	0.298	-1.531	2.599	2.080	2.377
	(2.632)	(1.326)	(1.963)	(0.721)	(2.046)	(1.449)	(1.811)	(1.557)
Com.Pr.	-5.382	-4.664	-4.091	0.388	-6.869	4.082	1.168	1.556
	(3.104)	(0.995)	(1.917)	(1.270)	(6.103)	(2.287)	(2.731)	(2.754)
Eq.Distr.	-0.105	-0.981	-0.388	-0.212	-2.379	0.216	0.329	0.117
	(2.438)	(1.043)	(1.678)	(0.553)	(2.219)	(1.254)	(1.699)	(1.789)
Condition on having small child	No	No	No	No	Yes	No	No	No
Year f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Children dummy	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Education dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,826	4,826	4,826	4,826	717	4,826	4,826	4,826
Standard errors in parentheses, clustered at the state level								

Notes: Data from pooled cross-sectional time use surveys from Aguiar and Hurst (2007) for years 1965, 1975 and 1993. Excluded category for divorce laws: title-based mutual consent regime.