The impact of divorce laws on the equilibrium in the marriage market

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Abstract

Does unilateral divorce affect the gains from marriage and who marries whom? Exploiting variation in the timing of adoption of new divorce laws across the US states, I show that unilateral divorce increases assortative matching among newlyweds. To understand the mechanisms and welfare effects, I specify and estimate a novel life cycle equilibrium model of marriage, labor supply, consumption, and divorce under the baseline mutual consent divorce regime. Solving the model under unilateral divorce I find that, consistent with the data, assortative matching and the likelihood of remaining single increase. Moreover, the gains from marriage decrease. Effects are largely due to changes in marital choices when risk sharing and cooperation opportunities within marriage decrease, which highlights the importance of considering equilibrium effects when conducting evaluation of policies affecting families.

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1 Introduction

This paper investigates how divorce laws affect household formation: the gains from marriage, who marries, and who marries whom. Between the late 1960s and 2010 all US states adopted a unilateral divorce regime, drastically reducing barriers to separation. Previous work has shown significant effects of unilateral divorce on married couples' behavior, implicitly holding spousal matching patterns fixed. However, when spousal behavior in marriage affects the relative attractiveness of partners, divorce laws also affect the equilibrium in the marriage market. This paper provides the first empirical investigation of the marriage market *equilibrium* effects of this major policy change in the grounds for divorce.

Understanding the total impacts of divorce regulation is important given that divorce is a significant aspect of the married life: over time it is observed that between 30% and 50% of first marriages end in divorce.[1] In this paper, I show that the impacts of changes in divorce laws go beyond the married and divorced. I argue and show that those who enter the marriage market when the unilateral divorce regime is in force will expect to face different incentives and restrictions while married and will react by changing their marital choices, relative to those that marry under the baseline divorce regime. This is reflected in a change in the gains from marriage when unilateral divorce is introduced. This paper, hence, fills an important gap in the discussion of the welfare effects of divorce laws and shows that unilateral divorce may have unintended long run impacts.

The adoption of unilateral divorce has been modeled by economists as a shift in property rights from the spouse who wishes to stay married to the spouse who wishes to divorce. Most of the marriage market literature is embedded in the traditional *transferable utility* Becker-Coase framework under which changes in the distribution of property rights among spouses do not affect marriage decisions and patterns.[2] I start by testing this null hypothesis by exploiting heterogeneity in the timing of adoption of unilateral divorce by the individual states as a source of quasi-experimental variation. I show that unilateral divorce increases assortative matching and the proportion of two earner couples among newlyweds. I also show that more people remain single (evidence first established by Rasul (2006)).

[1]These figures come from the Panel Study of Income Dynamics over the period 1967 to 2010. To produce the divorce probabilities, I follow individuals who are in first marriages from the time of marriage onward.

[2]See Browning, Chiappori, and Weiss (2014) and Chiappori (2017) for excellent overviews of the literature.

To understand the link between barriers to divorce and the equilibrium in the marriage market, I specify an equilibrium model of household formation, labor supply, and divorce over the life cycle. In the model, individuals first enter a heterosexual marriage market and decide whether to get married and (if so) the education of their spouse. After making their marriage choice, single and married individuals enter a household life cycle. Over the course of their life, singles consume private goods, married and divorced individuals consume private and public goods, couples decide whether to divorce, and married women supply labor to the market or to the household. Marriage decisions depend on the anticipated welfare from marriage and divorce. The model departs from the traditional transferable utility structure due to two features: first, consistent with novel evidence I provide in section 4, working spouses whose partners do not work accumulate relatively more human capital during their lifetime, a fact that improves their outside value of divorce; second, as documented in the empirical literature (Del Boca and Flinn (1995) and Flinn (2000)), divorcees cannot sustain cooperation in public goods expenditures (interpreted as children's welfare). The main predictions from the model are that the introduction of unilateral divorce pushes the marriage market equilibrium towards more positive sorting in education and lower welfare, particularly for women.

I estimate the parameters of the structural model using data from households that form and live under the pre-reform *mutual consent* divorce regime. The model reproduces the observed matching patterns, frequency of household specialization, and divorce probabilities accurately.

Using the estimates, I then simulate the introduction of unilateral divorce and solve for the new equilibrium. I find three main equilibrium effects. First, assortative matching on education increases among those who marry. Second, people, particularly educated women, are more likely to remain single. Third, the gains from marriage decrease for the least and the most educated individuals. The effects are largest for the most educated women. The model is externally validated since the equilibrium effects produced by my simulations lie close to or within the range of equilibrium effects observed in the data.

These results suggest that unilateral divorce may have unintended *long run* consequences that had been previously overlooked. First, unilateral divorce may have contributed to the rise in income inequality across households by leading to an equilibrium with higher spousal homogamy in education (Greenwood, Guner, Kocharkov, and Santos, 2016).[3] Second, my

[3] Greenwood, Guner, Kocharkov, and Santos (2016) find a strong positive trend in the degree of assorta-

results suggest that marital welfare decreases for couples formed *after* the adoption of unilateral divorce. Previous papers conclude that unilateral divorce improved the wellbeing of some groups of individuals *already married* at the time of the adoption (see, for example, Stevenson and Wolfers (2006) and Voena (2015)). The welfare analysis in my paper, on the contrary, explicitly takes into account that new generations entering the marriage market *after* the reform in divorce laws may face different market conditions and different associated levels of welfare.[4]

This paper contributes to various strands in the literature. First, by focusing on the long run effects of divorce laws on the types of couples that form, I extend the literature that studies how divorce and other family laws impact the behavior of *already formed* couples (Voena (2015), Bayot and Voena (2015), Fernández and Wong (2011), Stevenson (2007), Oreffice (2007), Chiappori, Fortin, and Lacroix (2002)). I do this by embedding a collective life cycle model of household behavior into an equilibrium model of household formation that allows me to quantify the overall welfare in the marriage market for different education groups. In analyzing these longer run impacts, I build on the contributions by Guvenen and Rendall (2015) and Fernández and Wong (2017). Guvenen and Rendall (2015) allow for the education choice of individuals before entering the marriage market to endogenously respond to changes in divorce laws and quantify the insurance value of education against divorce following the introduction of unilateral divorce. Moreover, Fernández and Wong (2017) analyze the welfare effects of introducing unilateral divorce allowing for endogenous selection into marriage. Like their papers, the welfare effects in my paper are derived from comparing the marriage market outcomes of individuals who entered the marriage market and lived their whole lives under a unilateral divorce regime to the outcomes of individuals in the baseline mutual consent divorce regime. Unlike their papers, in my work I explicitly model a competitive marriage market where the intrahousehold allocation of resources is endogenously determined at the time of marriage as an equilibrium market price. Another important point of departure is that my model allows for spouses to make investments in marital specific capital, which endogenously affect the individuals' outside value of divorce and the probability of divorce. This approach allows me to analyze the impact of introducing unilateral divorce on matching patterns (when the education composition of the

tiveness in the marriage market between 1960 and 2005 and estimate that income inequality across households would be significantly reduced if the levels of assortative matching had stayed constant at the 1960 levels.

[4] The important remark that the welfare effects of a policy change crucially depend on whether we estimate them on the group of *already formed* couples or on the group of "unborn" couples to be formed in the new regime is highlighted by Chiappori, Iyigun, Lafortune, and Weiss (2016) in a different context.

population is held fixed), on the investing behavior of spouses within marriage, and on the relative bargaining power of spouses in the marriage market.

In addition, by embedding a collective life cycle model of household behavior into an equilibrium framework, I also extend the literature that empirically quantifies marital welfare. The seminal contribution by Choo and Siow (2006) and the recent extension to a multi-market environment by Chiappori, Salanié, and Weiss (2017) develop an empirical model of the marriage market to estimate the gains from marriage. Importantly, these papers rely exclusively on observed matching patterns for identification and estimation.[5] In my framework, the measures of marital welfare are derived not only from the observed marriage patterns, but also from the observed labor supply and divorce behavior of couples in equilibrium.

I am not the first to extend the literature by combining an equilibrium model of marriage with the collective model of household behavior. I build on the recent contribution by Chiappori, Dias, and Meghir (2018), which develops a unified framework to study pre-marital investment in education, household formation, and household behavior after marriage. Although I take education as exogenous, I otherwise extend their model in several dimensions. The framework I develop allows couples to divorce, relaxes the assumption that spouses can commit to an initial allocation of resources within the marriage,[6] and considers the possibility of non cooperative behavior among ex spouses.

By incorporating these new elements, I depart from the *transferable utility* structure and work, instead, in an *imperfectly transferable utility* (ITU) environment. In the ITU framework, the allocation of marital welfare among spouses is jointly determined with the value of the total welfare to be allocated. This has a practical implication in terms of estimation. On the one hand, I follow the standard approach first developed by Choo and Siow (2006) and model the decision of whether to marry and to whom as a discrete choice problem that I take to the data. However, in the ITU framework, the parameters of the life cycle behavior of couples cannot be estimated separately from the spousal allocation of welfare that clears the marriage market. To estimate the model, therefore, I apply the empirical framework developed by Galichon, Kominers, and Weber (2016) and previously applied by Gayle and Shephard

[5] For a recent review of the literature on econometric methods to take matching models to the data, see Chiappori and Salanié (2016).

[6] In doing so I still assume that couples act efficiently. An alternative model of household behavior, developed by Lundberg and Pollak (1993), is one in which couples act in a non cooperative way.

(2019) that extends the discrete choice techniques to an ITU environment. Importantly, in my empirical strategy, identification of matching patterns obtains from observed marital decisions and observed households' life cycle labor supply and divorce decisions. Despite the empirical challenge, allowing for divorce in equilibrium models of household formation and behavior is a research priority, considering that the probability of divorce for married women reach levels between 30% and 45% depending on the education of their partner.

Lastly, the framework built in this paper is a contribution in itself as it combines an equilibrium model of household formation and a life cycle collective household model with the endogenous option of match dissolution. Under unilateral divorce, the model resembles a model of risk sharing with limited commitment à la Ligon, Thomas, and Worrall (2000) but within an equilibrium framework. This makes the model suitable for application in the study of the formation and evolution of risk sharing networks in contexts of limited commitment.

The paper is organized as follows. Section 2 presents some facts and novel evidence on the impact of divorce laws on family formation and behavior. Section 3 introduces and solves the model. Section 4 discusses estimates and identification of the model under the baseline *mutual consent* divorce regime. Section 5 conducts the counterfactual impact evaluation of introducing unilateral divorce on the marriage market and presents evidence that externally validates the model. Finally, section 6 concludes.

2 Empirical evidence

Do divorce laws affect marriage patterns and the behavior of couples? This question can be answered directly from the data. To do so, I exploit panel variation in the timing of adoption of unilateral divorce (see table F.1 in Voena (2015) and figure A1 in appendix A) as a source of quasi-experimental variation in the right to divorce (a strategy that has been widely exploited in the literature).[7]

Before the 1960s, most states enforced the *mutual consent* divorce regime (henceforth MCD).

[7] Gruber (2004) was one of the first papers to address the concern that states that adopt earlier are different from states that adopt later in fundamental characteristics correlated with outcomes. He reviews the legal literature and concludes that the main motivation for states to pass UD was to ease the state's legal and financial burdens of lengthy divorce cases. Figure A2 in appendix A shows that there is no geographical correlation in adoption. For example, two very similar states like California and New York adopted in significantly different times: while California was the first state to adopt in 1970, New York was the last state to adopt in 2010.

Under MCD, individuals in couples have the right to remain married and if one of the parties wishes to divorce, a mutual agreement must be reached or spousal wrongdoing (such as domestic violence or adultery) must be proved. Economists model the MCD regime as implying a redistribution of resources *in divorce* that favors the spouse who wishes to continue the marriage, as this spouse must be *bribed into accepting the divorce*. Starting in 1970, states began adopting the *unilateral divorce* regime (henceforth UD), under which any spouse has the right to seek a divorce without fault grounds or the consent of their partner. Hence, under UD the distribution of resources *within marriage* favors the spouse who wishes to divorce, as this spouse needs to be *bribed into staying married*.

The null hypothesis is that the change in property rights implied by the introduction of UD does not affect marriage rates, who marries whom, marital investments, or divorce rates. This is the so called *Becker-Coase* theorem that relies on the key assumption that both utility in marriage and in divorce are fully transferable (Chiappori, Iyigun, and Weiss, 2015). Transferable utility means that the way in which spouses share the value produced by their marriage does not affect that value. Under transferable utility, therefore, we can always find a redistribution of resources within the household that neutralizes the effects of changes in property rights, leaving decisions unchanged.

However, both the predictions and assumptions of the theorem have been rejected by the data. In the next two subsections I review and present novel reduced form evidence that UD affects marriage patterns and investments within the marriage.

2.1 UD increases assortativeness in education

The *Becker-Coase* prediction that divorce laws do not affect marital choices was first rejected by Rasul (2006), who shows that more individuals choose to remain single under UD relative to MCD. I contribute to this argument by presenting novel evidence that UD also affects matching patterns.

I estimate the following model for a newlywed couple m, at time t, and state g:

$$\begin{aligned} Educ^{w}_{mtg} &= \beta_0 + \beta_1 UD_{tg} + \beta_2 Educ^{h}_{mtg} \times UD_{tg} + \\ &+\beta_3(t) \times Educ^{h}_{mtg} + \beta_4(g) \times Educ^{h}_{mtg} + \beta_5(g) \times t + \delta_t + \delta_g + \epsilon_{mtg} \end{aligned} \tag{1}$$

$Educ^w$ and $Educ^h$ denote wife's and husband's years of education at the time of marriage (respectively); UD takes value one when UD is in place and zero when MCD is in place; δ_t are time dummies that control for general trends in female education and δ_g are state dummies that control for permanent differences in female education across states. Identification is driven by states that shifted from MCD to UD. A positive relationship between $Educ^w$ and $Educ^h$ (allowed to vary by state and time in the specification) indicates positive assortative matching on education. Coefficient β_2 measures the extent to which UD changes these sorting patterns.

The data comes from the Current Population Survey (henceforth, CPS) for years the 1965 to 1992 and the Panel Study of Income Dynamics (henceforth, PSID) for the years 1968 to 1992. I restrict attention to newlyweds in order to avoid selection bias due to divorce or adjustments in education after UD is introduced.[8] Table 1 shows the estimation results. The row labeled *"$Educ^h$ (avg β_3, β_4)"* shows the average (across states and years) association between husband's and wife's education at the time of marriage. The row labeled *"$Educ^h \times UD$"* reports the additional increment in the spousal correlation in *Educ* due to the introduction of UD. Columns (2) and (4) additionally include a state-specific linear trend. Columns (1) and (2) show the estimates using the CPS data and columns (3) and (4) show the results using the PSID data. Because education is top-coded at 18 years in both data sets, I restrict attention to households where the head is at most 25 years old.[9]

The average of the estimates of β_3 and β_4 are very similar in both data sets and evidence strong positive assortative matching in education: every additional year of education for a husband signifies marrying a wife with around an extra half a year of education.[10] On top of this, for young newlyweds in UD states, there is an additional increment in assortativeness in education in between 15% and 22% of the main average husband's education effect, relative to young newlyweds in MCD states. The results are significant with p-values between 0.048 and

[8]Newlyweds are couples formed within two years of the survey year.

[9]Moreover, showing results by the age of the household is informative when matching is multidimensional and some spousal traits change their market value with age. For example, if females are valued by both their fertility and wealth, education might be an important dimension of attractiveness among the most fertile young individuals, as it signals earnings ability. But for older newlyweds for whom higher education comes at the cost of lower fertility (Low, 2014), other dimensions of human capital might be more important traits in the marriage market. The results are similar for all newlyweds, although less precise. When the model is estimated for category of education (a variable included in the PSID that specifies education categories including professional degrees) the results remain valid for the whole sample of newlyweds. In appendix B I estimate model (1) for parental education and pre-marital labor income (two dimensions of human capital that may not be traded off against youth or fertility) on the whole sample of newlyweds and the results are verified.

[10]These main effects are also highly significant (tests not reported).

Table 1: Unilateral divorce and assortativeness in education for newlyweds

	Dependent variable: $Educ^w$			
	CPS data		PSID data	
	(1)	(2)	(3)	(4)
$Educ^h \times UD$ (β_2)	0.0842*	0.0899**	0.1228**	0.1119*
	(0.0452)	(0.0458)	(0.0609)	(0.0620)
$Educ^h$ (avg β_3, β_4)	0.5415	0.5339	0.5439	0.4305
Linear trend ($\beta_5(g) \times t$)	No	Yes	No	Yes
Observations	11841	11841	3440	3440

Notes: The sample consists of all newlyweds (couples married within two years of the survey year) in their first marriage where the household head is at most 25 years old. $Educ^w$ and $Educ^h$ refers to years of completed education for husband and wife, respectively. CPS stands for *Current Population Survey* and PSID stands for *Panel Study of Income Dynamics*. Columns (1) and (2) use data from the Annual Social and Economic and the June supplements of the CPS for the years $t = \{1965, 1967, 1977, ..., 1992\}$. Columns (4) and (5) use data from the PSID for the years $t = \{1968, ..., 1992\}$. All specifications include year and state dummies. Standard errors clustered at the state level are in parentheses. **Significant at the 0.05 level. *Significant at the 0.10 level.

0.077 (all standard errors are clustered at the state level).

In order to ensure that β_2 captures the increment in sorting in education due to the introduction of unilateral divorce, I perform two robustness checks. First, my conclusions are unchanged when controlling for contemporaneous changes in property division laws, confirming that the increment in sorting is attributable to changes in the grounds for divorce. Second, I verify that β_2 indeed captures changes in the correlation in spousal education, but not changes in the relative variance of female and male education across divorce regimes (a concern raised by Gihleb and Lang (2016) and Eika, Mogstad, and Zafar (Forthcoming) when analyzing general trends in assortative matching over time). I estimate the reverse of specification (1) that has husband's education in the left hand side and wife's education in all the right hand side variables that include an education covariate. If the relative variance of education across the genders stays constant, we should see similar estimates of the effect of UD on the correlation in spousal education in both specifications (Gihleb and Lang, 2016). Results are show in table A1 in appendix B. In effect, I cannot reject the null hypothesis that coefficient β_2 in the reverse specification is equal to the analogous coefficient in specification (1).

Finally, I provide additional evidence that UD affected matching patterns in appendix B. In tables A2 and A3, I show that newlyweds in UD states match more assortatively in other measures of human capital at the time of marriage, namely, parental education and pre-marital labor income.

2.2 Household specialization: a noncontractible marital investment

The *Becker-Coase* assumption that utility is fully transferable in marriage and divorce has been widely contested in the literature. Notable papers have argued and shown that divorce property rights matter for certain types of noncontractible marital investments that are controlled by one of the spouses and that may yield returns in the future, possibly after divorce (Wickelgren (2009), Stevenson (2007), Peters (1986), Parkman (1992), Zelder (1993)). Examples of these are joint investments in child quality, in one of the spouses' career capital, or in professional degrees. In fact, Stevenson (2007) provides evidence that newlyweds in UD states are less likely to support *their spouses'* accumulation of human capital and more likely to increase their *own* human capital, relative to newlyweds in MCD states.

Complementing the evidence provided by Stevenson (2007), I use CPS data to show that newlyweds in UD states show lower rates of household specialization. I focus on the incidence of households with stay-at-home wives because the frequency of stay-at-home husbands is too low.[11] There are 64% specializing households in the baseline MCD states, a fraction that decreases by 0.09 percentage points (14% decrease) when UD is introduced (the effect is significant at the 5% level, clustering standard errors at the state level).

When wives specialize in home production, two effects may be important. On the one hand, specialization may allow husbands to increase their opportunities to accumulate human capital, therefore increasing their lifetime earnings. For example, faced with a reduced time constraint in the household, workers with stay-at-home spouses can work longer hours, travel for work more often, or geographically reallocate more easily relative to workers with working spouses. On the other hand, specialization comes at the cost of decrease in women experience in the labor market, which may reduce wives' earnings. In section 4 I estimate the earnings processes of women and men and find empirical support for these two effects of household specialization.

The evidence that couples formed under UD engage less in spousal support in one partner's career development suggests that career capital is difficult to verify by third parties and allocate in divorce.[12] While under MCD the spouses can reach an agreement on sharing the

[11] Out of the total amount of specializing households in the PSID and the CPS data, 93% and 99%, respectively, have a stay-at-home wife - working husband combination.

[12] The discussion in the legal literature of whether to consider *professional degrees* as marital assets to be split upon divorce provides for a good classical example of the difficulties courts phase when aiming to allocate the returns to human capital marital investments upon divorce (Sharton, 1990).

future returns to noncontractible marital investments in order to successfully divorce, under UD anyone can walk away from the relationship with the proceeds, holding their ex spouse up. This restriction in the ability of ex spouses to share the returns from investments jointly raised during the marriage when UD is in place signifies a failure of the transferable utility assumption that implies that the divorce regime may affect the investment behavior during marriage.

2.3 Taking stock

All in all, the evidence suggests that divorce laws affect marriage patterns and noncontractible investments. To unravel the underlying mechanisms and welfare effects, in the next section I develop and solve a novel framework of marriage with endogenous dissolution and marital specific capital accumulation.

3 A life cycle model of marriage, marital investments, and divorce under two divorce regimes

The economy is populated by a continuum of females $f \in \mathcal{X}$ of mass $\mu_{\mathcal{X}}$ and a continuum of males $m \in \mathcal{Y}$ of mass $\mu_{\mathcal{Y}}$. Individuals $i \in \{f, m\}$ are distinguished by their discrete level of exogenous education level that can be *high school degree* (hs), *some college* (sc), or *college degree or higher* ($c+$): $s_i \in \mathcal{S} = \{hs, sc, c+\}$. The mass of females of type s_f is denoted by μ_{s_f} and the mass of males of type s_m is denoted μ_{s_m}.

Agents live for $T + 1$ periods, grouped in two stages: matching and household life. At the time of household formation, individuals observe the divorce regime $\mathcal{D} \in \{MCD, UD\}$ and expect it to persist. Figure 1 illustrates the life cycle of inidividuals.

Allocations and flow utilities In the matching stage at period $t = 0$ individuals meet in a *one-shot* marriage market and face the alternatives of marrying someone of the opposite sex and education $s \in \mathcal{S}$ or remaining single. There are 15 *types* of households that could form in this stage: nine *types* of couples ($\{hs, sc, c+\}^2$), three *types* of single females, and three *types* of single males.

Individuals who marry move on to a life cycle where, every period from 1 to T, they consume

Figure 1: The life cycle of individual $i \in \{f, m\}$ type s_i

Stage:	*Matching*	*Household life*
t:	0	1, 2, ..., T
Allocations:	*Marry* $s_j \in \mathcal{S}$	$c_{ft}, c_{mt}, q_t, k_t, D_t, \tau_t$
	or single	c_{it}
Resources:		
(married)		$w_{ft}(K_t) \times [1 - k_t] + w_{mt}(K_t)$
(single)		w_{it}
(divorced female)		$w_{ft}(K_t) + \tau_t$
(divorced male)		$w_{mt}(K_t) - \tau_t$

private goods $(c_f, c_m) \in R_+^2$, public goods $q \in R_+$, allocate wife's labor supply, $k \in \{0, 1\}$, to housework ($k = 1$) or work in the labor market ($k = 0$), decide whether to divorce, $D \in \{0, 1\}$, and decide on a child support transfer τ (only in case of divorce).

Every period, married individuals enjoy their allocation according to flow utilities

$$u_f^M(c_{ft}, q_t, k_t) = ln[q_t(c_{ft} + \alpha^{s_f s_m} k_t)] + \theta_{(fm)t} \quad \text{and}$$
$$u_m^M(c_{mt}, q_t) = ln[q_t c_{mt}] + \theta_{(fm)t}$$

for wives and husbands, respectively. Parameter α^{s_f, s_m} is a preference for "stay-at-home wife" that depends on the education composition of the couple and is proportional to the market price of female education, $W(s_f)$:

$$\alpha^{s_f, s_m} \quad = \quad \psi^{s_f, s_m} W(s_f), \quad \textit{with} \quad \psi^{s_f, s_m} \geq 0$$

Parameter θ_{fm} is a couple specific match quality that initiates after period one and evolves as a random walk that starts at value $\overline{\theta}^{s_f s_m}$:

$$\theta_t = \theta_{t-1} + \epsilon_t,$$

where $\epsilon_t \sim N(0, \sigma_\theta^2)$ and $\theta_1 = \overline{\theta}^{s_f s_m} + \epsilon_1$. Note that the mean match quality is type-of-couple specific. This captures, for example, the fact that two individuals of the same education may be more compatible than two individuals of different education.

If a couple divorces, ex spouses continue to consume public goods, but the wife controls expenditures on q. The public good has the interpretation of children that remain under the full custody of the mother after divorce. Ex spouses are linked by their choice of a *child support* transfer $\tau \geq 0$ from the non custodial ex husband to the custodial ex wife.[13] Divorced females and males derive utility from private and public consumption. Females' flow utility is:

$$u_f^D(c_{ft}, q_t) = ln[c_{ft}q_t]$$

Because males do not hold custody of the public goods, they have a reduced marginal willingness to pay for it. Their flow utility is:

$$u_m^D(c_{mt}, q_t) = ln[c_{mt}q_t^{\gamma}], \text{ with } \gamma < 1$$

Remarriage is not explicitly modeled but rather, captured in a *reduced form* fashion as part of the value of divorce.

Individuals who never marry (the singles) are assumed to only consume private goods that they enjoy according to flow utility function

$$u_i^{\emptyset}(c_{it}) = ln[c_{it}] + \overline{\theta}^{s_i}$$

where $\overline{\theta}^{s_i}$ is a mean taste from singlehood. Note that in order to enjoy public goods, an individual must marry.

Resources The behavior of individuals influences the resources available to them. While married, couples pool the labor market earnings of wife, w_f, and husband, w_m. Consistent with evidence that will be presented in the estimation section 4, both the earnings of wives and of husbands at time t depend on the wife's experience in the household, $K_t = \sum_{r=1}^{t-1} k_r$ (where recall that $k \in \{0, 1\}$ denotes housework supply). In allocating female time out of work, the couple faces a novel trade off: on the one hand, wives who stay at home do not have earnings in the present and earn less in the future; on the other hand, the earnings of husbands increase if their wife stays at home. Hence, the total resources of married couples, $w_{ft}(K_t) \times [1 - k_t] + w_{mt}(K_t)$, depend on the past and present labor behavior of the wife.

[13] The model feature that transfer τ is a choice can be easily modified to having, instead, a fixed exogenous transfer to capture, for example, court mandated alimony payments. I opt for specifying τ as a choice to accord with the empirical evidence presented by Del Boca and Flinn (1995) and Flinn (2000) who show that divorcees do not perfectly comply with child support court orders.

Ex spouses' resources in every period consist of individual labor earnings after child support transfers. Note that during divorce ex husbands continue to enjoy the returns to the years they were married to a stay-at-home wife. Similarly, during divorce, ex wives continue to be penalized for their reduced experience in the labor market if they were stay-at-home wives.

Single individuals live off their labor earnings, w_i.

To capture the fact that individuals that live alone lose economies of scale in private consumption relative to individuals in couples, I assume that only a fraction of total expenditures in private consumption translate into consumption units for singles and divorced. Letting x_t be total expenditures in private consumption, the consumption units of single and divorced individuals amount to $c_{it} = \rho x_t$.

Two sources of imperfectly transferable utility This model lacks a transferable utility structure. A necessary condition for transferable utility is that couples act cooperatively *both* in marriage and in divorce (Chiappori, Iyigun, and Weiss, 2015). However, there are two sources of noncooperative behavior in the model.

First, I follow the related literature and model divorcees as playing a non cooperative game (Del Boca and Flinn (1995), Flinn (2000), Weiss and Willis (1985), Weiss and Willis (1993), Chiappori, Iyigun, and Weiss (2015), Guvenen and Rendall (2015)). By default, divorcees play a Stackelberg game where the ex wife takes a child support transfer as given and chooses how to allocate her resources into expenditures in private consumption and the public good. The ex husband, in turn, takes the ex wife's expenditures on the public good as given and decides on a child support transfer. This non cooperative game between ex spouses usually leads to inefficient levels of expenditure on the public good and frictions in sharing utility. Importantly, I assume that under the MCD regime, divorcees are able to cooperate in making the efficient consumption and child support decisions for the first period of divorce.

The second source of imperfect transferability comes from the accumulation of human capital within the marriage that yields returns in the future (possibly after divorce). When the couple stops cooperation after divorce, the spouse who received the investments during marriage may not find it optimal to compensate the ex spouse who contributed to make the investments. This may imply a departure from efficient marital investments. While under MCD the divorce settlement period allows couples to cooperate in sharing the future returns to marital noncontractible investments, no contract occurs under UD.

These two sets of restrictions in transfers of value upon divorce imply that the way value is shared affects behavior in marriage and, therefore, the total value generated by couples.

The benefits from marriage I assume that couples cooperate within marriage and that the only threat to cooperation is divorce (Voena (2015), Chiappori, Fortin, and Lacroix (2002)). This rules out the case that married couples stop cooperation even while married (Lundberg and Pollak (1993), Bayot and Voena (2015)).

All in all, in this model, marriage has four main benefits: economies of scale in private consumption, consumption of public goods, spousal support in the accumulation of human capital, and risk sharing from income pooling.

Next, I introduce formally the economic problem of agents in the two life cycle stages.

3.1 Alternatives in the marriage market

At time $t = 0$, females and males meet in a marriage market, where each will decide whether to remain single or the education of a partner to marry. Formally, an alternative in the marriage market is denoted by $s \in \mathcal{S}_0$, where $\mathcal{S}_0$ is the set of alternatives,

$$\mathcal{S}_0 = \emptyset \cup \mathcal{S} = \{\emptyset, hs, sc, c+\},$$

and $s = \emptyset$ denotes the alternative of remaining single.

Females and males within an education type have heterogeneous tastes for each alternative $s \in \mathcal{S}_0$. The total value from choosing s for female f of type s_f is denoted by $U_f^{s_f s}$ and consists of the sum of two components:

$$U_f^{s_f s} = \overline{U}_{\mathcal{X}}^{s_f s} + \beta_f^{s_f s}$$

The first term, $\overline{U}_{\mathcal{X}}^{s_f s}$, is common to all females joining the same type of household, (s_f, s). The second term, $\beta_f^{s_f s}$ is an idiosyncratic taste deviation from that mean value, assumed to follow a standard Type I distribution.[14]

Analogously, the total value from choosing s for male m of type s_m is:

$$U_m^{s s_m} = \overline{U}_{\mathcal{Y}}^{s s_m} + \beta_m^{s s_m}$$

[14]Note, importantly, that $\beta_f^{s_f s}$ only depends on the type of the couple, but not on the identity of the potential partner (Choo and Siow (2006), Chiappori, Dias, and Meghir (2018), Chiappori, Salanié, and Weiss (2017)).

For couples, $\overline{U}$ has the interpretation of a utility price that each individual is allocated at the moment of marriage. Interestingly, in this model, the common components $\overline{U}$ are endogenously determined by the decisions and allocation of resources among individuals over their life cycle. I describe these intertemporal problems next.

3.2 Intertemporal behavior of households under two divorce regimes

After the matching stage, the household life starts. Every period in the household life stage individual i is subject to earnings shocks, ε_{it}. Moreover, every period married individuals in couple (f, m) are subject to a common idiosyncratic match quality shock, $\theta_{(f,m)t}$. Importantly, the stream of shocks $\{\varepsilon_{it}\}_{t\geq 1}$ and $\{\theta_{(f,m)t}\}_{t\geq 1}$ are not observed at the time of marriage.

3.2.1 Singles

Singles spend all their labor market earnings on private consumption. Let $u_i(c_{it})$ denote the per period valuation that individual i derives from quantity c_{it}. The value of never marrying, $\overline{U}^{\emptyset} \in \{\overline{U}_{\mathcal{X}}^{s\emptyset}, \overline{U}_{\mathcal{Y}}^{\emptyset s}\}$, is:

$$\overline{U}^{\emptyset} = E_0 \sum_{t=1}^{T} \delta^{t-1} u_i(\rho w_{it}(\varepsilon_{it}))$$

where the expectation is taken from the moment of household formation $(t = 0)$ with respect to the stream of earnings shocks and δ is the discount factor. Because singles do not make life cycle decisions in this model, the value of singlehood is exogenous.

3.2.2 Potential couples

When they arrive at the marriage market, individuals take as given the mean utilities that any potential partner of the opposite sex requires in order to get married. For example, all males type s_m observe the vector of female utility prices $\{\overline{U}_{\mathcal{X}}^{ss_m}\}_{s\in\mathcal{S}}$. Similarly, all females type s_f observe the vector of male utility prices $\{\overline{U}_{\mathcal{Y}}^{s_f s}\}_{s\in\mathcal{S}}$. In this sense, individuals in the marriage market are *utility price takers* and the marriage market is *competitive*.

At the time of marriage, potential spouses commit to delivering these mean utility prices posted in the marriage market by choosing an intertemporal contingent allocation of consumption, female housework supply, divorce, and child support transfers.

The allocation is contingent on the vector of state variables. At the beginning of each period, the couple draws values for the earnings and the match quality shocks and observes the history of female housework supply. Moreover, the couple also observes the beginning of period female weight in household welfare, $\lambda_t^{s_f s_m}$, which depends on the type of the couple but in general will differ across couples of the same type. A vector of realizations of these variables is an element ω_t of the couple's state space at time t, Ω_t:

$$\omega_t = \{\lambda_t^{s_f s_m}, K_t, \varepsilon_{ft}, \varepsilon_{mt}, \theta_{(f,m)t}\} \in \Omega_t$$

Let $a_t(\omega_t)$ denote an allocation at time t and state ω_t,

$$a_t(\omega_t) \quad = \quad \Big\{c_{ft}(\omega_t), c_{mt}(\omega_t), q_t(\omega_t), k_t(\omega_t), D_t(\omega_t), \tau_t(\omega_t)\Big\} \in \mathcal{A}_t = \Big\{R_+^3 \times \{0,1\}^2 \times R_+\Big\}$$

and let $a = \{\{a_t(\omega_t)\}_{\omega_t \in \Omega_t}\}_{t=1}^T$ be a contingent-upon-ω intertemporal plan.

A couple type (s_f, s_m) chooses a to maximize the expected total lifetime utility of the husband subject to the wife's achieving an expected lifetime welfare of at least her *posted* utility price, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, and to a set of budget and incentive compatibility constraints.

Formally, let $u_i^M(a_t(\omega))$ and $u_i^D(a_t(\omega))$ denote the per period valuation that individual i derives from the period-state allocation $a_t(\omega_t)$ in marriage and in divorce, respectively.[15] The couple allocates prices $\overline{U}_{\mathcal{X}}^{s_f s_m}$ and $\overline{U}_{\mathcal{Y}}^{s_f s_m}$ by solving the following Pareto problem:

[15] I suppress the time index in ω to ease notation.

$$
\begin{aligned}
\overline{U}_{\mathcal{Y}}^{s_f s_m} = \max_{a\in\{\mathcal{A}_t\}_{t=1}^T} \quad & E_0 \sum_{t=1}^{T} \delta^{t-1}\Big\{(1-D_t)u_m^M(a_t(\omega)) + D_t u_m^D(a_t(\omega))\Big\} \qquad (2)\\
s.t. \quad [pc_f(\lambda_0^{s_f s_m})]: \quad & E_0 \sum_{t=1}^{T} \delta^{t-1}\Big\{(1-D_t)u_f^M(a_t(\omega)) + D_t u_f^D(a_t(\omega))\Big\} \geq \overline{U}_{\mathcal{X}}^{s_f s_m}\\
\forall \omega, r>0: D_r = 0: \quad [bc^M]: \quad & c_{fr} + c_{mr} + q_r = w_{fr}(s_f)\times[1-k_r] + w_{mr}(s_m)\\
[ic_i^M(UD)]: \quad & E_r \sum_{t=0}^{T-r} \delta^t u_i^M(a_{r+t}(\omega)) \geq E_r \sum_{t=0}^{T-r} \delta^t u_i^D(a_{r+t}(\omega)), \quad \forall i \in \{f,m\}\\
\forall \omega, r>1: D_r = 1: \quad [bc^D]: \quad & \begin{cases} x_{fr} + q_r = w_{fr}(s_f) + \tau_r; \quad x_{mr} = w_{mr}(s_m) - \tau_r \\ c_{ir} = \rho x_{ir}, \quad \forall i \in \{f,m\} \end{cases}\\
[ic_i^D(MCD)]: \quad & E_r \sum_{t=0}^{T-r} \delta^t u_i^D(a_{r+t}(\omega)) \geq E_r \sum_{t=0}^{T-r} \delta^t u_i^M(a_{r+t}(\omega)), \quad \forall i \in \{f,m\}\\
\forall \omega, r>0: \quad [dr(\mathcal{D})]: \quad & \begin{cases} D_r = 1 \Leftrightarrow \exists a_{r+t}: [ic_i^D(\mathcal{D})] \textit{ satisfied}, \quad \mathcal{D} = MCD \\ D_r = 0 \Leftrightarrow \exists a_{r+t}: [ic_i^M(\mathcal{D})] \textit{ satisfied}, \quad \mathcal{D} = UD \end{cases}
\end{aligned}
$$

Problem (2) specifies a collective household problem with the alternative of divorce and limited commitment under two divorce regimes.[16] The objective function is the expected lifetime utility of the husband, that includes the husband's valuation in period-states of marriage and of divorce.

The first constraint in the couple's problem, $[pc_f]$, is the participation constraint of the wife at the time of marriage. This constraint restricts plan a to give the wife a lifetime expected welfare of at least her posted price $\overline{U}_{\mathcal{X}}^{s_f s_m}$ in the sub-market for couple type (s_f, s_m). The expected lifetime utility of the wife consists of the value she obtains within marriage and in divorce. The multiplier of the $[pc_f]$ is the couple-type specific $\lambda_0^{s_f s_m}$, which represents the weight in female expected utility from the perspective of time zero (the Pareto weight of the problem).

The next two sets of constraints, $[bc^M]$ and $[ic_i^M]$ are relevant in all state-periods where the couple continues the marriage ($D = 0$). The budget constraint in marriage, $[bc^M]$, indicates that total expenditures in private and public goods do not exceed the sum of spouses' earnings.

[16]The collective problem is similar to that in Mazzocco (2007) but with two important differences. First, the value of divorce is endogenous. Therefore, second, the Pareto problem of the couple at the time of marriage must specify the problem of the household in the event of a divorce.

The next constraints, $[ic_i^M]$, are the individuals' incentive compatibility constraints in marriage. They indicate that at any state and period where the couple stays married, the expected value of staying married exceeds the value of divorcing, for both spouses. Importantly, $[ic_i^M]$ constraints only play a role when the divorce regime is one of UD. This is because under UD, the marriage can only continue if both spouses prefer their allocation in marriage to their allocation in divorce (while under MCD marriage continues by default, without the need for incentive compatibility constraints in marriage). One way that spouses can achieve mutual consent for staying married is by revising, every period, the intra-household distribution of resources among spouses (Mazzocco (2007), Voena (2015), and Bronson (2015)). This reallocation of resources within the household implies that, at those periods in which the $[ic_i^M]$ constraint of one of the partners binds (that is, the partner is tempted to leave), the lifetime utility of the tempted spouse gains more weight in the couple's problem.

The last two sets of constraints, $[bc^D]$ and $[ic_i^D]$ are relevant in all state-periods where the couple divorces ($D = 1$). The budget constraint in divorce for the ex wife indicates that her expenditures in private and public goods (x_f and q, respectively) do not exceed her earnings plus the amount of child support transfers. For the ex husband, his expenditures on private goods (x_m) must not exceed his earnings net of child support transfers.

The next constraints, $[ic_i^D]$, are the individuals' incentive compatibility constraints in divorce. These constraints indicate that at any state and period where the couple divorces, the expected value of divorcing exceeds the value of staying married, for both spouses. Importantly, constraints $[ic_i^D]$ only play a role if the divorce regime is one of MCD. This is because under MCD, the couple can only divorce if both ex spouses prefer their allocation in divorce to their allocation in marriage (while under UD spouses can divorce with no such restriction). One way that spouses can achieve a mutual consent for divorce is by negotiating over a divorce settlement at the time of divorce. In this paper, I assume that divorcees agree on a divorce settlement by engaging in an initial period of cooperation after divorce (when they efficiently decide on the ex spouses' expenditures in private and public goods, and on child support transfers) and play a non cooperative game thereafter.

The last set of constraints, $[dr(\mathcal{D})]$, indicate the rules for divorce under each divorce regime. If the regime is MCD, marriage continues by default at the allocation that solves problem

(2) and divorce occurs only if there exists an allocation *in divorce* such that divorce is the mutually preferred action (as reflected by the satisfaction of $[ic_i^D]$ constraints). This allocation will generally imply a transfer of property *in divorce* from the spouse who wishes to divorce to the spouse who would choose to stay married in the absence of any such transfer. There may be infinite transfers that satisfy $[ic_i^D]$. Therefore, when solving the model, I follow the literature and restrict this transfer to be the minimum needed to sustain divorce (Mazzocco (2007), Voena (2015), and Bronson (2015)).

If the regime is UD, divorce occurs by default at the allocation that solves problem (2) unless there exists an allocation of resources *within marriage* that makes the continuation of the marriage the mutually preferred action (as reflected by the satisfaction of $[ic_i^M]$ constraints). This allocation will generally imply a transfer of property *in marriage* from the spouse who wishes to stay married to the spouse who would choose to divorce in the absence of any such transfer. Once again, there may be infinite transfers that satisfy $[ic_i^M]$, so I restrict transfers to be the minimum needed to sustain marriage (Mazzocco (2007), Voena (2015), and Bronson (2015)). These transfers that occur within marriage under UD effectively mean that every period t the couple revises the weight in the expected utility of the wife from t onward, therefore updating the Pareto weight in marriage.

A contingent intertemporal plan a that solves problem (2) prescribes not only allocations in marriage, but also allocations in divorce. At first sight it may seem unreasonable that ex spouses continue to act according to plan a. However, this is taken into account at the moment of deciding on a: the couple simply anticipates that ex spouses would play a Stackelberg game in divorce (with possibly an initial period of cooperation) and incorporates the resulting optimal choices in the plan. The same is, of course, true for the allocations in marriage. All in all, plan a is *incentive compatible* in the sense that it is individually optimal at every period-state.

3.3 The equilibrium in the marriage market

How do individuals make their marital choices in this model? From males' perspective, the value of the couple's problem (2) defines the ex ante Pareto frontier from the time of marriage:

$$\varphi^{s_f s_m} = \overline{U}_{\mathcal{Y}}^{s_f s_m}(\overline{U}_{\mathcal{X}}^{s_f s_m}, \mathcal{D}).$$

That is, $\varphi^{s_f s_m}$ informs males type s_m of the value from marrying woman s_f after paying her posted price $\overline{U}_{\mathcal{X}}^{s_f s_m}$. Additionally, males s_m know the value from not marrying, $\overline{U}_{\mathcal{Y}}^{\emptyset s}$. Finally, before making their marital decision, males draw their vector of all taste shocks, $\{\beta_m^{s s_m}\}_{s\in\mathcal{S}_0}$.

The marital choice problem of males consists of choosing the type of wife that, at the given utility prices and revealed shocks, maximizes their marital value:

$$s \in \mathcal{S}_0 = \arg\max\Big\{\overline{U}_{\mathcal{Y}}^{\emptyset s_m} + \beta_m^{\emptyset s_m}, \overline{U}_{\mathcal{Y}}^{hs s_m} + \beta_m^{hs s_m}, \overline{U}_{\mathcal{Y}}^{sc s_m} + \beta_m^{sc s_m}, \overline{U}_{\mathcal{Y}}^{c+ s_m} + \beta_m^{c+ s_m}\Big\} \tag{3}$$

Females on the other side of the market solve an analogous partner choice problem.[17]

Consider a given matrix of female types and male types market prices,

$$\Upsilon = \left\{\left(\overline{U}_{\mathcal{X}}^{s_f s_m}, \overline{U}_{\mathcal{Y}}^{s_f s_m}\right)\right\}_{(s_f,s_m)\in\mathcal{S}^2}$$

Let $\mu_{s_f\rightarrow s_m}(\Upsilon)$ denote the mass of s_f females that, at prices Υ, choose to marry type s_m males. Let $\mu_{s_f\leftarrow s_m}(\Upsilon)$ denote the mass of s_m males that, at prices Υ, choose to marry type s_f females.[18] An equilibrium in the marriage market is a set of couples and a matrix of prices such that *for all types of couples*, the mass of females that want to form that type of couple equals the mass of males that want to form that type of couple. Formally:

Definition 1 *A competitive equilibrium in the marriage market is*

1. *a matrix of utility prices for females' and males' types, Υ, and*
2. *an assignment of female types to males types, $\mu : \mathcal{S} \rightarrow \mathcal{S}$, such that for all $s_f \in \mathcal{S}$ and all $s_m \in \mathcal{S}$ the market for all types of couples clears:*
$$\mu_{s_f\rightarrow s_m}(\Upsilon) = \mu_{s_f\leftarrow s_m}(\Upsilon), \quad \forall (s_f, s_m) \in \mathcal{S}^2, \text{ and}$$
3. *the measure of individuals in the marriage market equals the sum of married and single individuals:*

[17] Note that females can similarly anticipate the value of their marriage market alternatives given male prices by solving the analogous to problem (2) when the objective function is female lifetime utility subject to a male participation constraint. In other words, standard assumptions on utility functions imply that function φ can be inverted:

$$(\varphi^{s_f s_m})^{-1} = \overline{U}_{\mathcal{X}}^{s_f s_m}(\overline{U}_{\mathcal{Y}}^{s_f s_m}, \mathcal{D}).$$

Together with knowledge of their value from never marrying and marital taste shocks, females can similarly solve their analogous to problem (3).

[18] I borrow the arrow notation ($\rightarrow$ for supply and $\leftarrow$ for demand) from Hatfield, Kominers, Nichifor, Ostrovsky, and Westkamp (2013).

$$\mu_{s_f} = \mu_{s_f \to \emptyset} + \sum_{s_m \in \mathcal{S}} \mu_{s_f \to s_m}(\Upsilon), \quad \forall s_f \in \mathcal{S}$$
$$\mu_{s_m} = \mu_{\emptyset \leftarrow s_m} + \sum_{s_f \in \mathcal{S}} \mu_{s_f \leftarrow s_m}(\Upsilon), \quad \forall s_m \in \mathcal{S}$$

Interestingly, the set of utility prices that captures the value of marital alternatives, Υ, is endogenously determined by market clearing conditions in the marriage market. If there is, say, an excess demand for females type s_f from males type s_m the utility that s_m males must deliver to s_f females, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, will increase. Under the new utility prices, however, the decisions that solve problem (2) may be different, so males type s_m will revise their partner choices at the new prices, therefore affecting the demand for s_f types. The vector Υ and optimal choices a iterate until market clearing is satisfied for all types of couples.

The structure of utilities introduced at the beginning of this section satisfy the sufficient conditions for existence of equilibria in Gayle and Shephard (2019). Hence, a marriage market equilibrium exists under both divorce regimes. In appendix E, I describe a fixed point algorithm used to solve for the market clearing Pareto weights, which adapt those proposed by Gayle and Shephard (2019) and Galichon, Kominers, and Weber (2016) to my setting.

Note that in this model divorce laws are not neutral. On the contrary, different divorce laws result in different solutions of the intertemporal problem of households (2). For example, under UD, the distribution of resources within the marriage varies across period-states to guarantee satisfaction of the incentive compatibility constraints in marriage, while under MCD no such variation takes place. Moreover, while under UD the individual values of divorce are derived from the allocations that ex spouses would choose without cooperating, under the MCD regime the individual values of divorce are derived from the allocations that ex spouses would choose if they could act cooperatively for one period. As a result of divorce laws affecting the solution to problem (2), the value of partner alternatives (which in turn determine the relative value of singlehood) change across divorce regimes. The divorce regime, therefore, affects the value of the partner choice problem of males (3) and the analogous problem of females, ultimately influencing the equilibrium in the marriage market.

3.4 Underlying effects and mechanisms

What is the effect of a shift from MCD to UD as predicted by the model? Because of its stochastic structure, this model does not have an analytic solution and one must rely on numerical methods to solve the model for different parameter values.[19] Details of the solution are in appendix D. In this subsection, I provide an intuition of the main effects.

Characterization of equilibria in terms of which female types marry which male types is not straightforward, as the model exhibits an *imperfectly transferable utility* (ITU) structure, in either divorce regime. Legros and Newman (2007) derive sufficient conditions for positive assortative matching in ITU models, but the presence of marital taste shifters in my model may imply that their result breaks down. There are features of the model, however, that suggest directions in terms of sorting patterns.

In this model, the introduction of UD increases assortativeness in the marriage market. On the one hand, complementarity in flow utilities between expenditures in q and c makes high types attract each other. On the other hand, complementarity between expenditures in q and wife time out of work, k, makes high type males attracted to low type females, who have the lowest opportunity cost of leisure. By having a stay-at-home wife, males accumulate more human capital, which makes their outside value of divorce more attractive. On the contrary, by accumulating experience in home production, females suffer a depreciation in their human capital, which makes their outside option from marriage less valuable. The introduction of unilateral divorce, therefore, may deter females from spending time out of work, decreasing the attraction of opposites.

In terms of welfare effects of introducing UD, results are ambiguous. Fix marriage market prices, first. On the one hand, people under UD enjoy higher freedom to divorce, which may increase their welfare. However, this higher flexibility comes at the cost of less risk sharing within the marriage: under UD, individuals are not only subject to shocks to their own earnings but also to shocks to their partners' earnings that may trigger a welfare reducing reallocation of consumption between spouses. Which of these two opposing forces dominate will determine if the total value generated by marriages under UD increase or decrease, relative to MCD.

[19] In Reynoso (2017) I introduce a stylized version of this model that has a much simpler stochastic structure with a closed form solution under both divorce regimes. In that paper, I characterize equilibria matching patterns in both MCD and UD regimes and I derive the conditions for key parameters such that UD gives rise to an equilibrium with stronger assortative matching, as predicted by the data (section 2 of this paper).

On top of this, the changes in behavior induced by UD will trigger imbalances in the marriage market that will induce utility prices to change.

These forces interact with the marital taste shocks that are unobserved to researchers. Therefore, the characterization of equilibria under both divorce regimes and the impact evaluation of the policy change are a matter of empirical investigation. I turn to this in the following sections 4 and 5.

4 Estimation

The estimation of the structural model proceeds in two steps. In a first step, I specify empirical models for female and male earnings that are directly identified from the data and estimate those earnings equations outside of the structural model. Moreover, in this first step, I set the values of those parameters that are not identified from the data at levels estimated previously in the literature. In a second step, I estimate the remaining parameters inside of the model and discuss the features of the data and the model that identify those parameters.

4.1 Parameters estimated outside of the model

Pre-set parameters. Table 2 outlines the parameters of the model that I input based on values obtained from the literature, their values, and the source for this information.

I set the ex husband's weight on the public good, γ, to 0.7, a value that is at the intersection of the various estimates found in the related studies.[20] Moreover, I set the consumption scale for single headed households to the McClements scale of 0.61. I compute the ratio of the number of individuals of education s_i by gender to the number of females from the PSID. This allows me to have a common denominator in the calculation of choice probabilities for both females and males. Each decision period t in the model corresponds to three years in the data indexed by the age interval of the household (effectively the age of the *head* of the household). I consider $T = 10$ age intervals: $\{\leq 25, [26-28], [29-30], ..., \geq 50\}$.[21]

[20] The specification of female and male utilities in my model is different from those in Del Boca and Flinn (1995), Flinn (2000), and Weiss and Willis (1993). Consequently, the estimates for γ obtained in this literature cannot be directly applied to my setting. I choose 0.7 to match the average relative willingness to pay for the public good by the husband that is implied by the estimates in the literature. I do sensitivity analysis by varying the value of γ and results are robust. Unfortunately, the available data is insufficient to estimate this parameter outside of the model, as I would need to observe transfers among divorcees.

[21] These two decisions were made to ease the computational burden of the empirical exercises.

Table 2: Pre-set parameters

Parameter	Definition	Value	Source
γ	Ex husband's weight on q	0.7	Del Boca and Flinn (1995), Flinn (2000), and Weiss and Willis (1993)
δ	Discount factor	0.98	Voena (2015)
ρ	Consumption scale	0.61	McClements scale*
$\frac{\mu_{s_f}}{\mu_f}$	Female education measures	$\{0.56, 0.32, 0.12\}$	PSID
$\frac{\mu_{s_m}}{\mu_f}$	Male education measures	$\{0.54, 0.30, 0.12\}$	PSID
T	Length of life cycle	10	-
t	Decision period	3	-

Notes: *Anyaegbu (2010).

Male earnings I estimate the following model of male earnings for man m, of education s_m, of age t, in state g

$$\begin{aligned} lnw_{mtg} &= lnW(s_m) + a_1(s_m)t + a_2(s_m)t^2 + a_3(s_m)K_{mt} + b(s_m)'X_{mtg} + \\ &+ \delta_t(s_m) + \delta_g(s_m) + \varepsilon_{mtg} + e_{mtg} \end{aligned} \tag{4}$$

where $W(s_m)$ denotes the market price of male education level s_m; K is the number of years that the man was married to a stay-at-home wife; X is a vector of covariates described bellow; and δ_t and δ_g are time and state fixed effects. The stochastic term is the sum of permanent income and measurement error.

Identification of $a_3(s_m)$, the returns to being married to a stay-at-home wife, is challenged by the the endogeneity of wife housework supply in model (4). For example, nonlabor income (such as husband's earnings) affects women's labor supply. To address this endogeneity concern, I instrument female housework supply using excluded changes in policies ruling division of property upon divorce. I estimate model (4) using a two step approach.

In a first step, I build on Voena (2015) and predict the probability that a woman specializes in household labor at a certain period t based on time and state variation in laws regulating how couples split assets in the event of a divorce. As I show in appendix C.1, division of property upon divorce significantly affect women's labor force participation. The intuition is that when property upon divorce improves for women, women are more likely to reduce their hours of work in the market.

In a second step, I take the predicted values of female household specialization and construct a measure of the predicted number of years each male has been married to a stay-at-home wife, which provides an exogenous measure of K in model (4). I use PSID data that allows me to track the marital history of men. I estimate male earnings using data from all married and divorced men that I observe from the time of marriage (who have a value of K equal to the total number of predicted years of wives' housework up to the last year of marriage) and from all singles (who have a value of K predicted to equal zero).

The identifying assumption is that divorce laws are excluded from the model of male earnings. That is, laws that favor women's share of assets upon divorce only affect male earnings through changes in wives' specialization in the household. A potential threat to the exclusion restriction is that laws that improve women's bargaining position within the household also deteriorate men's relative bargaining position inducing men to work longer hours and, therefore, to earn more. To mitigate this concern, I focus of hourly wages.[22] Another potential threat to identification is that laws that induce women to increase time at home produce such a significant reduction in the labor supply that men earnings increase in the new equilibrium. However, to the extent that these equilibrium effects take time to realize, I am able to isolate the effect of immediate changes in wives' support. It is worth mentioning at this point that I perform robustness checks when I input the effects estimated in model (4) in the structural model, and I conclude that the main results of the paper remain unchanged for values of parameters that lie within a reasonable set defined based on the sign of potential biases.

I present the details of the two step estimation of model (4) including a thorough description of the instrument, the first and second steps, and the sample selection in appendix C.1.

All in all, appendix table A5 shows that consistent with the hypothesis that household specialization implies a transfer from the supporting wife to the working husband, the effects of having a stay-at-home partner on earnings are positive and significant. The largest effects are observed in the groups of men with some college. The results indicate that an additional year of marriage to a non working wife increases male hourly wages by 1.5% for the least educated and over 3.5% for men who attended some college. All effects are significant at the 1% or 5%

[22] More generally, men may change their human capital investments when their wives' outside options improve. Although this is an important concern, it is not clear how it would bias the estimates. On the one hand, some men may increase investments in their own human capital to regain bargaining power, biasing estimates up. On the other hand, some men may lose incentives to improve their human capital to avoid being held up by their ex-wives appropriation of assets in the event of a divorce, biasing estimates down.

level (all standard errors are clustered at the state level).

Female earnings I estimate the returns to female experience in the labor market within the following model (5) of female earnings

$$lnw_{ft} = lnW(s_f) + a_1(s_f)Exper_t + a_2(s_f)Exper_t^2 + b(s_f)'X_{ftg} + \delta_t(s_f) + \delta_g(s_f) + \varepsilon_{ftg} + e_{ftg} \quad (5)$$

where $W(s_f)$ denotes the market price of female education level s_f; $Exper_t$ is the number of years that the female worked in the labor market up to period t; X is a vector of covariates described bellow; and δ_t and δ_g and time and state fixed effects. The stochastic term is the sum of permanent income and measurement error.

There are two challenges to the identification of the returns to experience: the endogeneity of experience and the censoring of wage offers by the women's endogenous participation decisions. I address both concerns by a two-step control function approach. In a first step, I estimate a model for participation and a model for experience using changes in divorce laws and female age as sources of variation in women's labor force participation that are excluded from a model of earnings. I then predict the residuals from the first step regressions. In a second step, I estimate model (5) for female earnings including the estimated residuals from the first step as explanatory variables in order to control for unobserved factors driving both participation or experience and earnings. Details of the two-step estimation are provided in appendix C.2.

Model (5) is estimated with PSID data that allows me to track the history of women labor force participation. To this end, I restrict attention to all women in the PSID that I observe from the age of 30 or before.

Estimates are shown in appendix table A8. Experience shows a concave profile. The first period in the labor market increases female earnings by between 7% and 11.5%. This return decreases with each additional year of experience. For the lowest educated, the returns to experience are positive until 15 years in the labor market, a figure that contrasts the profile of the college plus educated females that enjoy positive returns to experience until 30 years in the labor market. All effects are significant at the 1% level (all standard errors are clustered at the state level).

Stochastic processes of earnings. To estimate the *stochastic component* of earnings, specifically, the variance of permanent income, I follow Meghir and Pistaferri (2004). Let the stochastic term in models (4) and (5) be denoted by $\widetilde{u}_{it} = \varepsilon_{it} + e_{it}$ (the sum of permanent income and measurement error). The variance of permanent income is identified by the moment

$$\sigma^2_{\xi_i} = E[\Delta\widetilde{u}_{it}(\Delta\widetilde{u}_{it} + 2 \times \Delta\widetilde{u}_{t-1} + 2 \times \Delta\widetilde{u}_{it-2})].$$

I estimate $\sigma^2_{\xi_i}$ with the sample analog of that moment condition.[23] The results indicate that female earnings are more volatile than male's, with the variance of shocks estimated at $\widehat{\sigma}^{2^{\mathcal{X}}}_{\xi} = 0.1035$ and $\widehat{\sigma}^{2^{\mathcal{Y}}}_{\xi} = 0.0739$, respectively. These estimates are close to those obtained by Voena (2015) (0.074 and 0.042, respectively). My estimates are higher, however, probably due to the fact that I use a younger sample of individuals.[24]

4.2 Internally estimated parameters and heuristics for identification

After inputting the estimates obtained outside of the model, I then internally estimate the remaining 33 structural parameters: nine preferences for stay-at-home wife, $\{\psi^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; nine standard deviations of the match quality process of couples, $\{\sigma_\theta^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; and 15 mean match quality components, $\{\bar{\theta}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, $\{\bar{\theta}^{s_f \emptyset}\}_{s_f\in\mathcal{S}}$, $\{\bar{\theta}^{\emptyset s_m}\}_{s_m\in\mathcal{S}}$. Moreover, I compute the nine female Pareto weights, $\{\lambda^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, that clear all sub marriage markets.

4.2.1 Data and sample

The data source is the Panel Study of Income Dynamics (PSID). Panel data is needed to keep track of the history of wives' labor supply. Two sample selection decisions are worth mentioning. First, I restrict attention to the years 1968 to 1992, for which there is a codification of the timing of introduction of unilateral divorce for each US state from previous papers (see Voena (2015)). Second, I select households that I observe forming. In the case of couples, I consider first marriages from the year of marriage that I observe from the Marriage History PSID supplement. In the case of singles, I follow Chiappori, Salanié, and Weiss (2017) and consider only never married individuals that are still single by the age of 40. In appendix F I

[23] I use the same samples as in the estimation of the corresponding deterministic part of earnings. In the case of females, I account for selection following Low, Meghir, Pistaferri, and Voena (2017).

[24] Recall that to keep track of female labor market experience, I restrict attention to females that I observe in the panel from age 30 or younger and to males that I observe from the moment of household formation.

provide the details of sample selection and how I identify and follow households.[25] Lastly, and importantly, I select data from households that form and spend the whole sample period in states under the pre-reform *mutual consent* divorce regime (15 states). Mutual consent states provide a promising laboratory for the performance of the counterfactual exercise of simulating the introduction of unilateral divorce. In sum, the sample used for the internal estimation consists of an unbalanced panel of 2682 households (2037 couples, 364 single females, and 281 single males), adding up to 35114 observations.[26]

4.2.2 Identification

Identification of the structural parameters relies on the tight relationship between each parameter and the behavior of individuals in the model, which is also observed in the data. Crucially, each parameter affects individuals' choices over marital alternatives and their life cycle behavior. I construct 66 moments that aggregate individual choices as a function parameters and that can be measured in the data: the frequency of singles by education (6 moments), the frequency of each type of couple (18 moments),[27] the pooled fraction (over the whole period of marriage) of stay-at-home wives within each couple type (9 moments), the fraction of stay-at-home wives by female education and age of the household (12 moments),[28] the probability of divorce for each couple type (9 moments), and the female divorce probability by education and age of the household (12 moments).

The choice of moments is heavily driven by the role of each parameter in the model. First, all parameters are related to the mean values of marital alternatives, $\overline{U}_{\mathcal{X}}^{s_f s}$ and $\overline{U}_{\mathcal{Y}}^{s s_m}$, producing variation in matching patterns. For example, consider an increment in the preference for a stay-at-home wife in couple type (s_f, s_m), ψ^{s_f,s_m}. A higher wife's taste for leisure increases the value of marriage for both spouses. This makes all females type s_f relatively more attracted

[25]The PSID presents a challenge when following married couples if the couple divorces: there is heterogeneity in how (and if) the two ex spouses are followed. For example, in some cases following a divorce, the original household stops being observed and one or two new households appear in the data. This poses the risk of double counting divorce or considering a second marriage as a first one. To avoid this, I link every household to the original household, which allows me to keep track of the root of split off households.

[26]I consider all marriages formed in the time frame as part of the same generation. Unfortunately, the sample size for some types of couples is too small to allow me to do an analysis for many generations.

[27]The model generates this moment for the nine types of couples from both the choices of females and the choices of males.

[28]To generate these moments, I divide the 10 periods of the household life into four intervals: the first two periods, periods three and four, periods five and six, and periods seven to ten. These intervals correspond to age intervals of the head of the household in the data.

to s_m males and vice versa, increasing the proportion of (s_f, s_m) type of couples. Similarly, an increment in the mean match quality value for couple (s_f, s_m), $\overline{\theta}^{s_f s_m}$, leads to an increment in the number of individuals choosing to form these types of couples. On the contrary, conditional on the mean match quality, a higher quality variance for couple type (s_f, s_m), $\sigma_\theta^{s_f s_m}$, implies more states where the value of marriage is low, reducing the proportion of couples of this type. Similarly, a higher taste for remaining single, $\overline{\theta}^{s_f \emptyset}$ or $\overline{\theta}^{s_m \emptyset}$, makes individuals relatively less attracted to partners of all education types, reducing the number of all types of marriages and increasing the frequency of singles.

A potential threat to identification is that different combinations of the parameters may give rise to the same matching patterns (Chiappori and Salanié, 2016). In my empirical strategy, however, this threat is eliminated because the structural parameters of the model are also disciplined by the life cycle behavior of households.

First, the preference for leisure, $\psi^{s_f s_m}$, is obviously linked to the labor supply behavior of women: the higher this preference term, the higher the frequency of wives specializing in home production. This parameter is also constrained by the divorce probabilities, because a higher value from leisure increases the total *flow* utility in marriage for both spouses, making divorce less attractive. Second, and similarly, the mean and variance of the match quality process of couples is governed by the divorce decision: while a higher mean quality value makes the flow utility higher, reducing the likelihood of divorce, a higher variance of the match quality has the opposite effect. Lastly, all parameters are constrained by market clearing conditions in all types of couples. The model produces the demand and supply of women within each couple type from the choices of women and from the choices of men. At any given set of parameters, these two model moments need not coincide, so Pareto weights and the model parameters will shift until a) there is no excess demand in any couple type and b) the distribution of marriages across couple types replicates the one observed in the data. Note that Pareto weights create important heterogeneity in how spouses value the particular type of couple to which they belong.

As an illustration, in figures A3 and A4 in appendix G I perform a simulation exercise to show the sensitivity of moments to model parameters. The figures plot the response of selected moments when only one parameter varies and the rest is fixed at the estimated levels (estimation results described below). Figure A3 depicts the relationship between the frequency of nonworking wives in each type of couple and the couple-type specific preference for stay-at-home wife, $\psi^{s_f s_m}$. Each line plots the response for one type of couple when only the parameter for that type of couple moves. The graph reveals that in the model the frequency of stay-at-home wives increases with $\psi^{s_f s_m}$. Moreover, the higher the education of the wife, the higher the value of $\psi^{s_f s_m}$ that induces women out of the labor force. The analogue figure A4 plots the relationship between the probability of divorce for each type of couple and the couple-type specific mean match quality, $\overline{\theta}^{s_f s_m}$. The figure reveals that the probability of divorce is decreasing in match quality and that the value of the match quality that implies a zero likelihood of divorce is lower the higher the education of the spouses.

All in all, the equilibrium model is identified by using the combination of matching patterns and life cycle labor supply and divorce behavior of couples to discipline parameter values.

4.2.3 The method of simulated moments

To estimate the 33 parameters, I apply the method of simulated moments (McFadden (1989), Pakes and Pollard (1989)). For any vector of structural parameters, I simulate the model to produce the vector of 66 moments outlined above, mom_{sim}, that have a data counterpart, mom_{data}. I then use a global search algorithm to look for the values of parameters that minimize the distance between simulated and observed moments, subject to market clearing in all sub-marriage markets.

Formally, let any vector of the 33 structural parameters be denoted by Π. Let $\Lambda = \left\{\lambda_0^{s_f s_m}\right\}_{(s_f,s_m)\in\mathcal{S}^2}$ be a matrix of female Pareto weights for all types of couples.[29] I choose the vector $\hat{\Pi}$ and the associated matrix of market clearing Pareto weights, $\Lambda(\hat{\Pi})$ such that

$$
\begin{aligned}
[\hat{\Pi},\Lambda(\hat{\Pi})] = \arg\min_{\Pi,\Lambda} \quad & [mom_{sim}(\Pi,\Lambda) - mom_{data}]'\mathcal{V}[mom_{sim}(\Pi,\Lambda) - mom_{data}] \\
s.t. \quad & \forall(s_f,s_m) : \mu_{s_f\rightarrow s_m}(\Pi,\Lambda) = \mu_{s_f\leftarrow s_m}(\Pi,\Lambda)
\end{aligned}
\tag{6}
$$

where $\mathcal{V}$ is a positive semi definite weighting matrix specified as the inverse of the diagonal of the covariance matrix of the data.

[29] Note that there is a one-to-one relationship between the vector of marriage market prices Υ (defined in section 3) and the multiplier of restriction $[pc_f]$ in problem (2). Throughout the paper, I normalize the weights in females' and males' expected utilities in problem (2) to sum to one. That is, the female Pareto weight in couple type (s_f,s_m) is $\lambda^{s_f s_m} = \dfrac{\lambda_0^{s_f s_m}}{1+\lambda_0^{s_f s_m}}$ and the corresponding weight for males is $1-\lambda^{s_f s_m}$.

Note that for each set of structural parameters, Π, one can solve for the market clearing Pareto weights by applying the algorithm described in appendix E. However, as Adda and Cooper (2000) and Gayle and Shephard (2019) remark, it is extremely time consuming to solve for equilibria at all points considered within the search procedure over the parameter space. Furthermore, for those parameter values such that the moments simulated from the model do not match their data counterparts, solving for equilibria is futile. In practice, therefore, I treat the Pareto weights as an additional set of parameters to be "estimated" and the market clearing conditions as an additional set of moments to be matched to the data (Su and Judd (2012)). This strategy of using equilibrium relationships to discipline parameters and endogenous variables was previously applied by Adda and Cooper (2000) and Gayle and Shephard (2019).

4.3 Estimation results

Table 3 reports sample sizes used in estimation, the values of the parameters that solve problem (6), standard errors, and the moments each estimate is most sensitive to. Each row corresponds to a household type. Couples are denoted (s_f, s_m) and singles are denoted by their education level, where s_f and s_m denote female and male education types, respectively. Standard errors (denoted *s.e.* in the table) are calculated using the usual sandwich matrix.[30] Finally, to get a better picture of which moments are most important to explain the estimates, I follow Andrews, Gentzkow, and Shapiro (2017) and Gayle and Shephard (2019) and analyze the sensitivity of estimates to estimation moments.[31] In columns labeled *Moments* in table 3 I report the two moments with the highest absolute sensitivity in the estimation of the corresponding parameter. The sets *hw* refers to stay-at-home wife frequencies, *mp* to matching patterns or singlehood frequencies, and *dp* to divorce probabilities, all of which are measured at the type of household level (indicated in superscripts).

[30]The variance matrix of estimator vector (6) is $Var = \left[D_m'\mathcal{V}D_m\right]^{-1}D_m'\mathcal{V}C\mathcal{V}'D_m\left[D_m'\mathcal{V}D_m\right]^{-1}$, where D_m is the 33×66 matrix of the partial derivative of moment conditions with respect to each parameter at $\Pi = \hat{\Pi}$ and C is the covariance matrix of the data moments.

[31]I compute $|Sensitivity| = |-\left[D_m'\mathcal{V}D_m\right]^{-1}D_m'\mathcal{V}|$ as defined by Andrews, Gentzkow, and Shapiro (2017).

Table 3: Internally estimated parameters and main sensitivity moments

Household type	Sample size		S-a-h wife preference ($\psi^{s_f s_m}$)			Mean match quality ($\bar{\theta}^{s_f s_m}$)			Variance match quality ($\sigma^{2 s_f s_m}$)		
	Hhs. (1)	Obs. (2)	Est. (3)	s.e. (4)	Moments (5)	Est. (6)	s.e. (7)	Moments (8)	Est. (9)	s.e. (10)	Moments (11)
Couples (s_f,s_m)											
(hs,hs)	847	11401	1.34	0.03	hw^{hshs}, dp^{hshs}	5.37	0.52	dp^{hshs}, mp^{scc+}	80.53	5.60	mp^{scc+}, mp^{c+hs}
(hs,sc)	277	3541	0.83	0.07	hw^{hssc}, mp^{scc+}	4.93	0.47	mp^{scc+}, mp^{c+hs}	81.01	3.53	dp^{hssc}, dp^{scsc}
(hs,c+)	28	315	0.26	1.15	hw^{hsc+}, mp^{scc+}	5.28	0.06	mp^{scc+}, mp^{c+hs}	21.19	1.69	mp^{hsc+}, mp^{scc+}
(sc,hs)	259	3296	1.08	0.06	hw^{schs}, mp^{scc+}	5.82	0.30	mp^{scc+}, mp^{c+hs}	44.56	4.40	mp^{scc+}, mp^{c+hs}
(sc,sc)	287	3594	0.49	0.06	hw^{scsc}, mp^{scc+}	5.52	0.37	mp^{scc+}, mp^{c+hs}	51.22	2.38	mp^{scc+}, mp^{c+hs}
(sc,c+)	89	1182	0.03	0.36	hw^{scc+}, mp^{scc+}	5.31	0.12	mp^{scc+}, mp^{c+hs}	30.37	1.07	dp^{scc+}, mp^{c+hs}
(c+,hs)	36	466	1.05	0.07	hw^{c+hs}, mp^{c+hs}	4.46	0.05	mp^{scc+}, mp^{c+hs}	22.06	22.30	dp^{c+hs}, mp^{c+hs}
(c+,sc)	82	1052	0.71	0.07	hw^{c+sc}, mp^{c+hs}	4.41	0.09	mp^{scc+}, mp^{c+hs}	30.65	9.31	mp^{c+hs}, mp^{c+sc}
(c+,c+)	132	1635	0.58	0.12	hw^{c+c+}, mp^{c+hs}	4.55	0.07	dp^{c+c+}, mp^{c+c+}	17.50	44.56	mp^{c+hs}, mp^{scc+}
Single females (s_f)											
hs	203	1832	n.a.			152.36	7.00	mp^{scc+}, mp^{c+hs}	n.a.		
sc	122	1151	n.a.			151.39	7.40	mp^{scc+}, mp^{c+hs}	n.a.		
c+	39	470	n.a.			140.96	2.94	mp^{c+hs}, mp^{scc+}	n.a.		
Single males (s_m)											
hs	162	935	n.a.			147.00	3.73	mp^{scc+}, mp^{c+hs}	n.a.		
sc	81	627	n.a.			146.00	3.49	mp^{scc+}, mp^{c+hs}	n.a.		
c+	38	330	n.a.			146.47	16.31	mp^{c+hs}, mp^{c+c+}	n.a.		

Notes: s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). *Hhs.* denotes the number of households in estimation. *Obs.* denotes the number of observations used in estimation. *"S-a-h"* stands for *"Stay-at-home"*. *Est.* denotes the parameter estimates; *s.e.* the standard error calculated as explained in section 4.2; and *Moments* to the two most sensitive sets of moments in estimation, identified as explained in section 4.3. The set of moments (measured at the type-of-couple level) are presented in order of importance and are *hw* (stay-at-home wife frequencies), *mp* (matching patterns or singlehood frequencies), and *dp* (divorce probabilities). *n.a.* indicates that the parameter is not relevant for the group in the row.

Overall, the estimates have the expected relative magnitudes and are most sensitive to the expected set of moments. Columns (3) to (5) show results for the mean taste for *stay-at-home* wife. Recall that, in the model, there are two benefits of having a stay-at-home wife: female utility from leisure and male accumulation of human capital. Interestingly, the estimates of $\psi^{s_f s_m}$ are highest for households with hs males and and lowest for households with $c+$ males. Intuitively, when the man is of high education the household gains the most from having a stay-at-home wife in terms of male accumulation of human capital. Therefore, even a low preference for female leisure would induce wives out of the labor force. In general, moreover, households with less educated women have a higher taste for leisure. The sensitivity analysis confirms the expectation that the frequency of stay-at-home wives in the data is the most important set of moments in estimation.

The spousal common match quality and preferences for singlehood are shown in columns (6) to (8). The couple mean match quality is lowest for couples with $c+$ wives, reflecting a distaste for marriages where the wife is of the highest education relative to the husband. Moreover, hs and sc women need a higher taste for remaining single than men of the same education, to reproduce the fraction of singles in the data, probably due to the fact that women are in slight excess supply in the data. As expected, these estimates are most sensitive to matching patterns in the data.

Finally, the variance of the match quality shown in columns (9) to (11) captures the volatility of the marriage quality. The estimates indicate that, in couples with $c+$ spouses, the match quality of the period stays the closest to the mean match quality relative to other types of couples. This result reveals that couples with the highest educated spouses have the most stable marriages. Reassuringly, the observed divorce probabilities and matching patterns are the most important moments driving these estimates.

What do these estimates imply about the equilibrium produced by the model? Table 4 shows the female Pareto weights in the equilibrium under mutual consent divorce when the parameters of the model are set at the estimated levels. The rows label the education of the wife, s_f, and the columns label the education of the husband, s_m. Each cell displays the equilibrium female Pareto weight in couple (s_f, s_m). The female Pareto weight is increasing in female education, reflecting the fact that education is valuable in the marriage market. Moreover, the female

Pareto weight increases when a woman "marries down": for females to be willing to marry a lower educated husband, they must be compensated with a higher share of household resources. It is worth noting that both the magnitudes and patterns of these Pareto weights resemble those obtained by Gayle and Shephard (2019) also using US data.

Table 4: Female Pareto weights under MCD

Educ.		s_m **hs**	**sc**	**c+**
	hs	0.49	0.41	0.36
s_f	**sc**	0.63	0.55	0.40
	c+	0.65	0.55	0.41

Notes: MCD stands for *mutual consent divorce*. *Educ.* indicates individuals' education types, s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). Each cell shows the female Pareto weight for couple (s_f, s_m) in the equilibrium under MCD where model parameters are set at the estimated levels.

As explained, the estimates and resulting equilibrium Pareto weights are obtained by minimizing the distance between model generated and observed moments. Tables 5 and 6 show the model fit in terms of marriage frequencies, matching patterns, and couples' female labor supply and divorce behavior.

In both tables, *Data* refers to the observed moment, *[95% CI]* to the bootstrapped confidence interval of the observed moment, and *Model* to the moment simulated by the model under the mutual consent equilibrium female Pareto weights when the parameters are set at the estimated levels. The model does remarkably well. The most important feature to notice is that the estimates of the parameters in the life cycle of households and the implied Pareto weights reflect equilibrium in the marriage market as produced by the model. To see this, firstly note in table 6 that the model simulated with the estimates reproduces the fraction of singles by education exactly. Secondly, note the three columns under the label *Matching patterns* in table 5. These columns display the observed and simulated fraction of couples relative to the amount of households with women. The model produces the supply side (from female choices) and the demand side (from male choices) of these frequencies. The second column shows the supply side. Overall, at the estimated parameters and implied Pareto weights simulated female choices accurately reproduce the observed composition of households. Importantly, the third column shows that supply equals demand in all sub-marriage markets, indicating that the model

Table 5: Target moments in estimation: couples' behavior

Couple type (s_f,s_m)	Matching patterns: Data [95% CI]	Matching patterns: Model female choices	Matching patterns: Model Δ to males'	Stay-at-home wife: Data [95% CI]	Stay-at-home wife: Model	Divorce probability: Data [95% CI]	Divorce probability: Model
(hs,hs)	0.35 [0.34;0.37]	0.35	0.00	0.34 [0.31;0.37]	0.34	0.44 [0.42;0.47]	0.46
(hs,sc)	0.12 [0.11;0.13]	0.11	0.00	0.29 [0.24;0.34]	0.28	0.40 [0.35;0.45]	0.47
(hs,c+)	0.01 [0.01;0.02]	0.01	0.00	0.12 [0.03;0.23]	0.16	0.18 [0.06;0.30]	0.16
(sc,hs)	0.11 [0.10;0.12]	0.11	0.00	0.17 [0.13;0.21]	0.16	0.37 [0.33;0.42]	0.33
(sc,sc)	0.12 [0.11;0.13]	0.12	0.00	0.09 [0.06;0.13]	0.09	0.37 [0.32;0.41]	0.36
(sc,c+)	0.04 [0.03;0.04]	0.04	0.00	0.08 [0.03;0.13]	0.09	0.26 [0.18;0.34]	0.22
(c+,hs)	0.01 [0.01;0.02]	0.02	0.00	0.09 [0.03;0.18]	0.22	0.22 [0.11;0.34]	0.22
(c+,sc)	0.03 [0.03;0.04]	0.03	0.00	0.07 [0.02;0.12]	0.07	0.28 [0.20;0.37]	0.30
(c+,c+)	0.06 [0.05;0.06]	0.05	0.00	0.07 [0.03;0.10]	0.07	0.08 [0.04;0.12]	0.08

Notes: s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). Couple type (s_f, s_m) indicates a marriage between a female of education s_f and a male of education s_m. Columns labeled *Data* show the indicated moment calculated from the sample of selected households in the Panel Study of Income Dynamics (see sections 4.2.1 and 4.2 for details on sample selection). *[95% CI]* shows bootstrapped 95% confidence intervals of data moments. Columns labeled *Model* show the same moments calculated on the sample simulated from the model. Δ stands for *distance*.

produces a marriage market in equilibrium at the parameter estimates.

The model also replicates accurately the frequency of stay-at-home wives and divorce probabilities. Both in the data and the model, the frequencies of non working wives are highest in couples with high school females and lowest for couples with college plus females. The probability of divorce is highest for couples with low educated spouses both in the data and the model. In the model, this arises from the fact that couples with low educated spouses have a lower match quality and/or a higher standard deviation of the match quality.

Table 6: Target moments in estimation: fraction of singles by education

Educ.	Females		Males	
	Data [95% CI]	Model	Data [95% CI]	Model
hs	0.15 [0.13;0.17]	0.15	0.12 [0.11;0.14]	0.12
sc	0.16 [0.14;0.18]	0.16	0.11 [0.09;0.13]	0.11
c+	0.13 [0.10;0.17]	0.13	0.13 [0.10;0.16]	0.13

Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). Columns labeled *Data* show the fraction of singles calculated from the sample of selected households in the Panel Study of Income Dynamics (see sections 4.2.1 and 4.2 for details on sample selection). *[95% CI]* shows bootstrapped 95% confidence intervals of the observed fractions. Columns labeled *Model* show the fraction of singles simulated from the model.

Appendix H additionally shows the model fit to the life cycle behavior of women, by education. The model is able to reproduce the frequencies and timing of female housework supply: high school women have the highest frequency of out of work over the life cycle, followed by some college women. Both high school and some college women enjoy more leisure early in their life cycle and increase their labor supply later on. Women with a college degree or higher show the lowest likelihood of staying at home but they increase their leisure as they get older. For all education groups, the model underestimates the frequency of stay-at-home wives in the last period. The model is less effective at reflecting the timing of divorce for women. Most notably, the model implies that almost no divorces occur in the first two periods while, in the data, most divorces occur in these early stages. This is due to the fact that couples in the model do not divorce in the first period. But recall that a period in the model is associated with three years in the data, and although no couple is observed to divorce the year of the wedding, some divorces occur in the second and third year of marriage.

To sum up, the model is able to accurately reproduce the observed equilibrium in the marriage market under the baseline mutual consent divorce regime. This makes the model suitable for performing counterfactual policy experiments. In the next section, I analyze the impact of introducing unilateral divorce on the equilibrium in the marriage market.

5 The equilibrium effects of introducing UD

In this section I simulate the adoption of unilateral divorce when the baseline MCD regime is in place, and analyze the equilibrium effects. To do so, I start from the equilibrium of the model under MCD (that, as shown, accurately replicates the observed marriage market). Throughout this counterfactual exercise, I keep several model ingredients constant. First, I fix the population vectors, that is, the total amount of females and males, and the fraction of them in each education type. Second, I fix the parameters from the life cycle of households at the levels estimated under MCD (shown in table 3). Third, I keep the distribution of taste shifters for marital alternatives, $\beta_f^{s_f s}$ and $\beta_m^{s s_m}$, unchanged. In this environment, I expose individuals at the time of marriage with a change in the grounds for divorce and in the relationship among ex spouses: divorce does not require the consent of the partner and ex spouses stop cooperation from the first period of divorce. Finally, I solve for the marriage market equilibrium in the new UD regime. By keeping fixed the population and education distributions, this exercise tells us what are the equilibrium effects of making divorce easier in the marriage market before we allow individuals to revisit their pre-marital investment decisions.

The details of the algorithm used to solve for the equilibrium under UD are presented in appendix E. The algorithm contains three main procedures. The first procedure consists of computing the mean values of partner alternatives, $\left\{(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda_0^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda_0^{s_f s_m}))\right\}_{(s_f,s_m)\in\mathcal{S}^2}$, given any set of female Pareto weights for each couple *type*, $\Lambda = \{\lambda_0^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$. To do this, for any given $\lambda_0^{s_f s_m}$, I solve the life cycle problem of households under the unilateral divorce regime using the set of estimated parameters $\widehat{\Pi}$. Note that the value of singlehood does not depend on $\lambda_0^{s_f s_m}$ and is constant across divorce regimes. The second procedure of the algorithm consists of using the values of marital alternatives to solve the individuals' partner choice problems (3) and construct the resulting aggregate supply and demand of females in each couple type. Finally, the third procedure repeats the first and second procedures searching over the matrix of Pareto weights until all markets for couple types clear.[32]

Table 7 shows the counterfactual equilibria female Pareto weights along with the change

[32]Recall from section 3 that, under unilateral divorce, couples are unable to commit to a *constant* sharing rule within the marriage: the weight on the lifetime utility of the female will evolve over the time-states spectrum to guarantee satisfaction of the incentive compatibility for both spouses at every period-state. However, couples can exactly anticipate the update in their Pareto weight at any state and period if they know such Pareto weight. Therefore, to find equilibria under unilateral divorce, it is sufficient to solve for the *initial* Pareto weight that determines the initial allocation of resources within the couple.

relative to baseline. The rows label the education of the wife, s_f, and the columns label the education of the husband, s_m. Each cell displays the UD equilibrium female Pareto weight in couple (s_f, s_m) along with percentage points changes relative to MCD in parentheses.

Table 7: Female Pareto weights under UD and percentage points change relative to MCD

Educ.		s_m **hs**	**sc**	**c+**
s_f	**hs**	0.42 (-0.14)	0.34 (-0.17)	0.34 (-0.06)
	sc	0.60 (-0.05)	0.50 (-0.09)	0.37 (-0.08)
	c+	0.54 (-0.17)	0.39 (-0.29)	0.35 (-0.15)

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. *Educ.* indicates individuals' education types, s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). Each cell shows the female Pareto weight of for couple (s_f, s_m) in the equilibrium under UD, where model parameters are set at estimated levels. Changes relative to MCD shown in parentheses.

It is evident from the table that the introduction of unilateral divorce reduces the initial female share of household resources in all types of couples. Women with college degrees or higher suffer the most, their Pareto weight being reduced in between 15% and 30% of their baseline weight. The least educated women are the next most affected. The change in Pareto weights occurs because when we introduce unilateral divorce when the *baseline* Pareto weights are in place, too many men choose to remain single, generating an excess supply of women in all sub-marriage markets. To induce men to marry, the share of total marital welfare allocated to married women must decrease.

Explaining what drives these initial imbalances and the subsequent forces towards market clearing is not straightforward. Recall that in this *imperfectly transferable utility* framework, Pareto weights and individual welfare are jointly determined. On the one hand, the expected lifetime utility of spouses *is determined by* the Pareto weights that affect the female participation constraint in the intertemporal problem of couples. On the other hand, the expected lifetime utility of individuals *determines* the Pareto weights through the market clearing conditions in all sub-marriage markets. Hence, the picture of the change in equilibria across regimes is incomplete without a portray of the changes in the *equilibrium* life cycle behavior of couples, marriage probabilities, sorting patterns, and gains from marriage. The following sub sections characterize the baseline and counterfactual equilibria in these dimensions. Importantly, because I do not use data from UD states in estimation, marital choices under UD are untargeted moments against which we can externally validate the model when UD is in place.

5.1 *Equilibrium* life cycle behavior

The UD is characterized by a reduction in barriers to dissolution. However, whether divorce probabilities increase or not depends on the parameters of the model, as Chiappori, Iyigun, and Weiss (2015) demonstrate. In this model, and at the parameters and Pareto weights consistent with the MCD regime equilibrium, couples divorce more when unilateral divorce is introduced.

Table 8 shows the fraction of couples, within each couple type, that divorces at some point in their lifetime. The rows label the education of the wife, s_f, and the columns label the education of the husband, s_m. Each cell displays the UD equilibrium divorce probability in couple (s_f, s_m) along with the change in probability relative to MCD in parentheses.

In the new divorce regime, the probability of dissolution increases for all types of couples. The patterns of divorce are replicated across regimes: couples with low educated spouses exhibit the highest rates of marriage turnover in both regimes.[33] However, the largest *increments* in the frequency of divorces are observed in couples with college plus wives, who nevertheless continue to have the lowest divorce likelihood.[34]

Table 8: Divorce probability in the UD equilibrium and change in probability relative to MCD

Educ.		s_m		
		hs	**sc**	**c+**
s_f	**hs**	0.50 (0.04)	0.50 (0.04)	0.22 (0.07)
	sc	0.40 (0.08)	0.45 (0.09)	0.33 (0.11)
	c+	0.38 (0.16)	0.44 (0.14)	0.28 (0.20)

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. *Educ.* indicates individuals' education types, s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). The difference between the divorce probability under UD and MCD is shown in parentheses.

In terms of household specialization, model predictions are also ambiguous. Recall that when women specialize in home production the earnings of husbands increase (which improves men's outside value of divorce) but female earnings decrease (which deteriorates women's value of divorce). Suppose that we *keep Pareto weights fixed* at the equilibrium under MCD and in-

[33] This is consistent with the argument and empirical evidence in Newman and Olivetti (2015) and Neeman, Newman, and Olivetti (2008).

[34] The effects are extremely high for couples type $(c+, c+)$, which increase their probability of divorce by more than three times. I explore if this is due to numerical approximation. Recall that under UD the default state is divorce. When participation constraints in marriage are binding, couples revise the Pareto weight, looking for a share that makes marriage profitable for both. In the simulation of the model, I use a grid of 20 points to search over updates of the Pareto weight, which may lead me to "skip" ranges of the revised Pareto weight where the marriage would continue, hence leading to excessive divorce. However, when I refine the grid to 100 points, results are unchanged.

troduce UD. In such *partial equilibrium* context, women will tend to increase their labor supply to reduce the likelihood of marriage dissolution. But this decrease in female housework supply affects the value of marriage and of marrying a partner of type $s \in \mathcal{S}$, leading to imbalances of supply and demand in the markets for couple types. As a result, prices will adjust to restore equilibrium. But if we let marriage market prices to adjust in this imperfectly transferable utility environment, labor supply decisions may be revised. What ends up happening in equilibrium depends on the parameters of the model (a result I show in Reynoso (2017) within a much simpler stylized model). In this model, in the new equilibrium, female labor supply is not significantly affected when unilateral divorce is introduced. Interestingly, even though under unilateral divorce all women accrue a lower share of household resources (at least initially, as evidenced by the drop in the female Pareto weights), wives are to some extent "compensated" by sustaining their baseline leisure levels.

5.2 Matching and sorting

As discussed, changes in marital behavior affect the relative attractiveness of partners. This section investigates how these can, in turn, lead to changes in marriage probabilities and sorting in the marriage market.

First, recall that the value of remaining single is the same across divorce regimes. Hence, changes in the relative attractiveness of singlehood will depend on how the value of different potential partners vary.

Second, changes in female household labor supply may lead to changes in sorting, conditional on marrying. Educated males are particularly attracted to low educated women that specialize in home production because the opportunity cost of being out of work is the least and the impact on male earnings is the highest. By deterring the willingness of females to supply household labor, unilateral divorce may decrease the attraction of opposites leading to higher positive assortative matching. I formally prove this claim in the model developed in Reynoso (2017).

Lastly, lower barriers to divorce may lead to changes in sorting patterns through at least two channels. Firstly, *indirectly* by inducing changes in female labor supply. Secondly, directly by affecting the probability of divorce. Indeed, the data suggests that the most educated individuals divorce more if they "marry down". By marrying each other, the most educated can reduce the likelihood of divorce. Hence, in a regime like unilateral divorce, where the risk of divorce is higher, the top educated may find each other more attractive, leading to higher correlation in spousal education.[35]

I next present evidence that the introduction of UD effectively leads to more positive sorting in the marriage market. Table 9 shows the fraction of households by the education composition of spouses under UD and the percent change relative to MCD in parenthesis.

In the equilibrium under the unilateral divorce regime, high school and college plus graduates are more likely to remain single relative to the equilibrium under the mutual consent regime. The largest effect is observed for the most educated women, who increase their likelihood of not marrying by almost 23% (which corresponds to three percentage points) when they marry in a world where divorce is easier.

Table 9: Equilibrium marital sorting patterns under UD and percent change relative to MCD

Men's education	**Women's education**			
	hs	**sc**	**c+**	**∅**
hs	0.34 (-2.65)	0.11 (0.11)	0.02 (13.55)	0.07 (5.55)
sc	0.12 (2.84)	0.12 (4.41)	0.03 (-20.52)	0.03 (-0.55)
c+	0.01 (1.79)	0.03 (-8.50)	0.06 (2.31)	0.02 (18.37)
∅	0.09 (7.08)	0.05 (-4.46)	0.02 (22.73)	

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. Education types are high school (hs), some college (sc), and college degree or higher (c+). ∅ denotes the alternative of remaining single. Cells show the UD equilibrium fraction of households with an s_f wife and an s_m husband or the fraction of women and men within each education group that remain single. The values in parenthesis show the percent difference in these fractions across regimes $(UD - MCD)/MCD * 100$.

Another noticeable impact of unilateral divorce is that high school graduates are more likely to "marry up" and that individuals with a college or higher degree are less likely to "marry down" (although the most educated increase their likelihood of marrying partners of the lowest education type).

To study how assortativeness in education changes across divorce regimes I analyze how those who marry change their partner type choice across regimes. This is shown in table A9 in appendix I. The left panel shows female choices while the right panel shows male choices. The rows label the alternative in the marriage market (an education type for a partner or

[35]Note that even when my results indicate that marriages among the highest educated individuals experience the highest increment in divorce probabilities following the introduction of UD, couple type $(c+, c+)$ exhibits the second lowest probability of divorce under UD.

the option of remaining single). Each cell displays the UD equilibrium choice probability of individual s_i for alternative s, along with the change in probability relative to MCD in parentheses. In both divorce regimes individuals who marry are more likely to marry someone of their same education, reflecting positive assortative matching. With the exception of high school graduates, the frequency of married individuals with partners of their same education increases after the introduction of unilateral divorce. This effect is highest for college educated females that increase their probability of marrying a college educated male by 6% (over 3 percentage points).

Overall, the results imply that the correlation in wives' and husbands' education increases by 10.28% under unilateral divorce, relative to mutual consent.

5.3 External validation of the model

This section provides three pieces of validation for the equilibrium effects of UD found in this paper.

First, recall that the model was estimated under the baseline MCD and the equilibrium effects of UD were investigated by counterfactually shocking newlyweds with the new divorce regime. Therefore, the effects of UD on new marriages and already married couples are untargeted moments in my estimation that are produced by the model and that can be compared to those observed in the data.

Panel A in table 10 shows the equilibrium effects of UD as predicted by the model (in column labeled *Model*) and as observed in the data (in column labeled *Data/Literature*). Column *Source* indicates the study that produced the observed effects.

First, the results from the model indicate that assortative matching in education among those who marry increase by 10.23% following the introduction of UD. This figure is close to the observed difference-in-differences effect presented in section 2 that lies between 15% and 23%, providing an out-of-sample validation of the fit of the model under the counterfactual unilateral divorce regime. Second, the model successfully reproduces the decrease in marriage rates caused by UD that were documented by Rasul (2006). While my model predicts a reduction in 1% on the fraction of married households, Rasul (2006) reduced form analysis finds a larger 3.6% reduction in marriage rates. Part of the difference may be due to underlying

Table 10: Model untargeted moments or parameters and data analogues

Moment/ parameter	Model	Data/Literature	Source
Panel A: Equilibrium effects of UD			
Assortative matching	10%	[15%, 22%]	PSID and CPS (section 2)
Marriage rates	-1%	-3.6%	Rasul (2006)
Panel B: Impact of UD for already married couples			
Employment of *married women*	$0.011^{\dagger}$	[-0.027, -0.034]† $0.006^{\dagger}$	Voena (2015) Gray (1998)
newlywed women	0.021	[0.015; 0.028]	Stevenson (2007)
Divorced	0.04	[0.01; 0.013] [0.008; 0.01]	Gruber (2004) Wolfers (2006)
Panel C: Equilibrium under full commitment			
Female Pareto weight	$\lambda \in [0.36; 0.65]$	0.3	Voena (2015)
	$\lambda^{hs} \in [0.36; 0.49]$	$\lambda^{hs} \in [0.27; 0.50]$	Gayle and Shephard (2019)
	$\lambda^{sc} \in [0.40; 0.63]$	$\lambda^{sc} \in [0.33; 0.51]$	
	$\lambda^{c+} \in [0.41; 0.65]$	$\lambda^{c+} \in [0.43; 0.62]$	

Notes: All model-generated and data-generated effects are statistically significant unless otherwise indicated by †not statistically significant. UD stands for *unilateral divorce*. *Model* refers to the effects of UD found in my paper. *Data/Literature* refers to effects found by me directly in the data or found in the previous literature.

trends in marriage rates in the data that persist after the introduction of UD and that are assumed away in the simulation of my model.

The second piece of external validation of the model comes from comparing the effect of UD for *already married* couples as implied by my model against the effects found in the data. To shock the already married couples within my model, I start by setting the parameters of the model to the values estimated under MCD. I then simulate couples of all types getting married under MCD and experiencing a shift to UD at a certain point in their lifetime. To produce a simulated data set of households, I simulate as many households of each type and age at introduction of UD to replicate the fractions observed in the PSID data.

Panel B in table 10 shows that my model does a very good job in reproducing the observed effects of UD for already married couples. Just as in the evidence presented by Voena (2015) and Gray (1998), the introduction of UD in my model does not have a significant effect on the probability that a married woman is employed. The evidence in that literature, instead, shows that the effect of UD on wives' employment depend on the rules of distribution of assets upon divorce, a variation not included in my model. My model also reproduces very well the increment in *newlywed* wives employment documented by Stevenson (2007). In my model, married women who experience UD very early in their lifecycle increase their likelihood of employment by 2.1 percentage points, compared to the reduced form effects documented by Stevenson (2007) that lie between 1.5 and 2.8 percentage points. Moreover, my model does a good job in reproducing the increment in the probability of being divorced as caused by UD. The effect of UD on the likelihood of being divorce is estimated in between 0.08 and 1.3 percentage points in the reduced form analysis by Wolfers (2006) and Gruber (2004), and in 4 percentage points by my model.

Finally, the third piece of external validation for my model comes from comparing the equilibrium Pareto weights implied by my model under MCD to estimates in comparable studies in the literature. Panel C in table 10 shows the overall range of women Pareto weights, λ, and the range by female education, λ^{s_f}, as implied by my model. The overall range of $[0.36; 0.65]$ implied by my model is close to the value estimated by Voena (2015) who does not consider differences in the types of couples by education and estimates a unique value for the female Pareto weight. Considering that there are many more low educated wives in the data, the average female Pareto weight implied by my model is close to Voena's estimate of 0.3. Furthermore, the Pareto weights by education of females produced by my model are remarkably close to the ranges implied by the full commitment model by Gayle and Shephard (2019).

5.4 Welfare analysis

The external empirical validation of the predicted equilibrium effects of introducing UD sets the grounds for performing a welfare analysis of the change in divorce laws. This section proposes different measures of welfare that are produced by the model but unobserved in the data and investigates how the wellbeing of different *newlywed* groups is affected by the introduction of UD, relative to those who marry under MCD.

Even though the welfare measures are unobservable in the data, they are tightly linked to the behavior of individuals in the marriage market that is both produced by the model and observed in the data. Importantly, welfare measures depend on marital choices. The model allows us to derive the probability of observing an individual of education s married to an individual of education s' in closed form (see appendix J for derivation details). For example, the choice probability of a female type s_f to marry a male type s_m is:

$$p_{s_f \to s_m} = \frac{\mu_{s_f \to s_m}(\Lambda)}{\mu_{s_f}}$$

With these probabilities, and the associated lifetime values of each alternative, I construct various welfare measures: the social welfare and the gains from marriage (which are analyzed in the next subsection) and the marital returns to education and the total marital welfare (which are analyzed in appendix J).

Relative to the baseline MCD regime, UD introduces two main changes that may imply opposite welfare effects. On the one hand, the UD regime increases flexibility as it grants individuals the freedom to seek a divorce with minimal restrictions. On the other hand, this flexibility comes at the cost of lower spousal commitment, which reduces the risk sharing motive for marriage as the allocation of resources within marriage shifts at every period and state according to the endogenous movement of the outside option of divorce. Additionally, these two changes occur in an equilibrium environment in which both who marries whom and how spouses allocate the joint lifetime welfare among them change after the introduction of UD.

5.4.1 Social welfare

To understand whether higher flexibility or lower commitment dominate the welfare effects, I start by analyzing how the *social* welfare compares across divorce regimes. The social welfare associated with divorce regime $\mathcal{D}$ is calculated as the weighted sum of the total expected lifetime utility across individuals:[36]

$$\textit{Social Welfare } (\mathcal{D}) = \sum_{s_f} \sum_{s_j} \frac{\mu_{s_f \to s_j}}{\mu_f} \overline{U}_{\mathcal{X}}^{s_f s_j} + \sum_{s_m} \sum_{s_{j'}} \frac{\mu_{s_{j'} \leftarrow s_m}}{\mu_m} \overline{U}_{\mathcal{Y}}^{s_{j'} s_m}$$

That is, the social welfare is the sum of the values from the different marital alternatives for males and females (including the value of remaining single) weighted by the proportion of

[36]Note that the following expression can be equivalently written as

$$\textit{Social Welfare } (\mathcal{D}) = \sum_{s_f} \frac{\mu_{s_f}}{\mu_f} \sum_{s_j} p_{s_f \to s_j} U^{s_f s_j} + \sum_{s_m} \frac{\mu_{s_m}}{\mu_m} \sum_{s_{j'}} p_{s_{j'} \leftarrow s_m} U^{s_{j'} s_m}$$

that uses the choice probabilities.

females or males choosing the said alternative. According to my estimation and simulation, the social welfare decreases by 0.025% (from a baseline level of 474.27 in expected utility units), suggesting that the reduction in spousal commitment dominates. The decrease is larger for males, a fact that may be explained by the higher probability of divorce in the unilateral divorce regime that leave males with a distance effect from public goods.

5.4.2 The gains from marriage

Another interesting dimension of welfare when analyzing family policies are the *gains from marriage*, that is, the expected benefit of marrying on top of remaining single. Changes in the gains from marriage across divorce regimes inform us how the new policy distorts the marriage market relative to the status-quo. From a policy perspective, we are interested in anticipating these distortions *before* the new generation arrives at the affected marriage market.

Formally, the gain from marriage for females of education s_f is the expected extra value obtained on top of their value of singlehood, *before* their marital taste shocks realize. For example, the gains from marriage (GM) for a woman type s_f who has not drawn her taste shocks yes is the expected value of marrying each possible male type on top of her value of never marrying:

$$GM(s_f, \mathcal{D}) = \sum_{s_j} p_{s_f \to s_j} (\overline{U}_{\mathcal{X}}^{s_f s_j} - \overline{U}_{\mathcal{X}}^{s_f \emptyset})$$

Figure 2 shows the gains from marriage for women in the left panel and the gains from marriage for men in the right panel. In both panels, the first three bars correspond to the model estimated under MCD and the last three bars to the model simulated under UD. Each bar corresponds to the education level indicated in bold below. The height of bars (indicated above the bars) represents expected utility units. Finally, the bottom row labeled $\%c$ displays the percent of private lifetime consumption that a woman or man of the indicated education is willing to pay to be indifferent between the UD and the MCD regimes.[37]

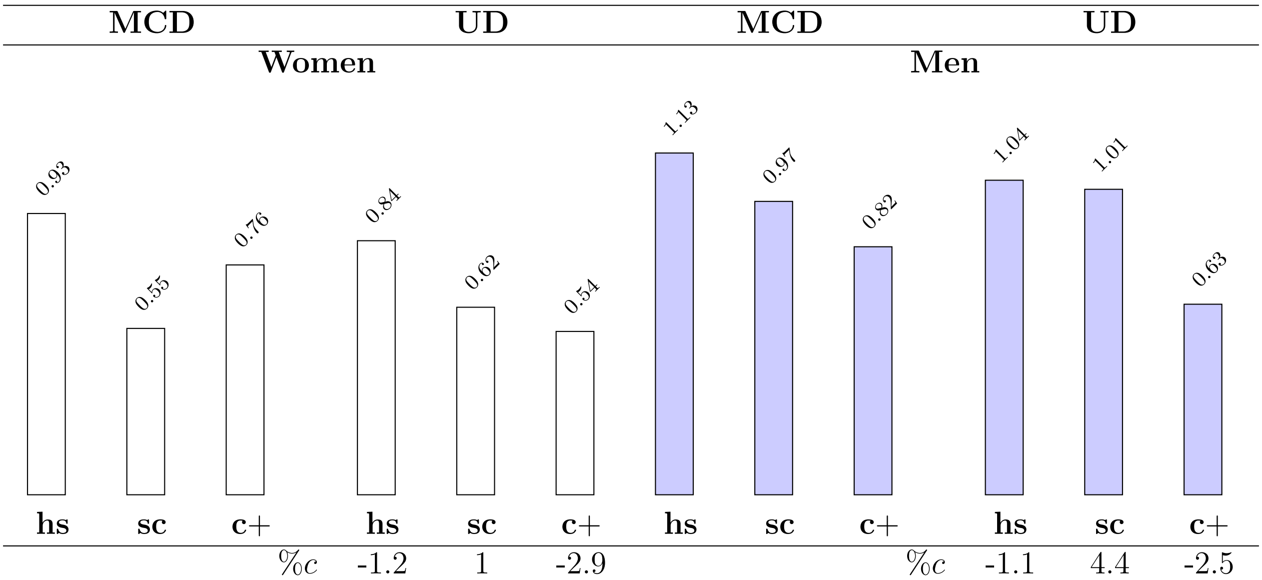
A first pattern to notice is that under both divorce regimes, and for both women and

[37] This percent is calculated as $100 \times \pi$, where π is the amount that solves the following equation:

$$\overline{U}^{s_f s_m}(c, MCD) = \overline{U}^{s_f s_m}(c(1-\pi), UD)$$

where $\overline{U}^{s_f s_m}(c, \mathcal{D})$ reflects the expected lifetime (indirect) utility from consumption c in the equilibrium under divorce regime $\mathcal{D}$.

Figure 2: Gains from marriage by gender, education, and divorce regime



Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. Bold labels below bars indicate individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). The bars depict the gains from marriage for the corresponding gender-education group under MCD or UD regime. The gains from marriage are computed as the additional expected lifetime utility of the group on top of the group's value of remaining single (formally derived in section J). $\%c$ indicates the percent of private consumption that a female or male of the indicated education is willing to pay to be indifferent between the UD and the MCD regimes.

men, the gains from marriage are positive for all education groups and highest for the lowest educated. Recall that, in this model, singles do not save and do not enjoy public goods. Hence, it is sensible that the least educated group will benefit the most from the opportunity to pool risk and consume public goods that marriage grants them.

A second feature to notice is that after the introduction of unilateral divorce, the profit from getting married decreases for the least and the most educated, but increases for individuals with some college education. The reduction is most sizable for women with a college degree or higher, who would be willing to give up almost 3% of lifetime consumption in order to maintain the mutual consent regime.

Interestingly, even when in the new equilibrium the college plus group has a lower probability of "marrying down", the gains from marriage decrease when spousal commitment decreases.

5.4.3 Understanding welfare effects

It is evident from the welfare measures presented that welfare changes across divorce regimes are tightly linked to the implied changes in marital choices. For example, reductions in the gains from marriage are reflected by increments in the frequency of singles. The fact that model-predicted changes in marital choices following UD are externally validated by the reduced form evidence presented in section 2 gives us confidence in the interpretation of the welfare effects discovered in this section. There are four main conclusions from the welfare analysis.

First, the introduction of unilateral divorce decreases social welfare for *newly formed* couples. On the one hand, this result may seem not surprising given that UD implies lower spousal commitment. On the other hand, an interesting puzzle arises: if social welfare decreases following the introduction of UD, who voted for UD? This puzzle is resolved if we consider the possibility that the group with the right to vote for a policy change is not the only group affected by the policy. In an equilibrium framework, there is certainly a key distinction between the welfare effect of a policy change for *already formed* couples (who are part of the marriage market at the time of the vote) and for "unborn" couples to be formed in the future (who were *not* in the marriage market at the time of the vote). This is an important point emphasized by Chiappori, Iyigun, Lafortune, and Weiss (2016) in a different context.[38] Previous welfare analyses have effectively found welfare improvements of UD for married couples, particularly for married women who increase their bargaining power in marriage (Voena, 2015) and have more freedom to leave low quality marriages (Stevenson and Wolfers, 2006). My paper, on the contrary, restricts the welfare analysis to couples formed *after* the policy change. The conclusion that social welfare decreases for this group reflects the existence of *unintended* consequences of UD: while for already formed couples the flexibility of divorce may have boosted wellbeing, new generations entering the marriage market under the new regime face different market conditions that imply lower levels of wellbeing.

Second, the introduction of UD has non monotonic effects, increasing the gains from marriage for the individuals with some college education and reducing the gains from marriage for the least and the most educated. The non monotonicity in the effects result from the combination of the various equilibrium forces. For example, in this model where savings are assumed away, marriage is the only source of insurance against income shocks. However, the introduction of UD reduces risk pooling within marriage, decreasing marital value for all types of couples. The negative effects from lower risk sharing are particularly important for the lowest educated, who lose welfare under unilateral divorce in spite of ending up matching with higher educated partners. Another important result is that divorce probabilities under UD are increased for all

[38] Chiappori, Iyigun, Lafortune, and Weiss (2016) study changes in alimony laws for cohabiting couples in Canada.

types of couples relative to the baseline regime. Recall that divorce harms both women and men because ex spouses deviate from the efficient expenditure in public goods, women have the burden of making expenditures in the public good, and men suffer a distance effect due to being the non custodial parents. As discussed in section 5.1, the *increment* in divorce is particularly important for the $c+$ educated. Hence, in spite of being better matched under unilateral divorce, the value of marriage decreases due to the higher incidence of divorce, dominating the welfare effects for this group. On the contrary, for the middle educated, the positive effects of increased homogamy dominates resulting in positive welfare changes.

The third conclusion from the welfare analysis is that the introduction of unilateral divorce seems to be most detrimental for women, particularly the least and the most educated. These groups show the highest drops in both the gains from marriage and the marital welfare. This conclusion is in line with Fernández and Wong (2017), who also find that unilateral divorce is mostly harmful for poorer women.[39]

The fourth conclusion is that the introduction of unilateral divorce causes the gains from marriage to decrease for the highest educated women. To put this result in context, Chiappori, Salanié, and Weiss (2017) estimate the evolution of the gains from marriage using US data from individuals born between 1943 and 1972 (hence overlapping the period of analysis in my paper). They find that the female marital returns to education have been positive and *increasing* over time, specially for women with professional degrees. My analysis to some extent complements theirs in that I study the change in marital returns to education due to a particular policy change. However, there is a more fundamental distinction between my paper and theirs. The framework in Chiappori, Salanié, and Weiss (2017) does not include a household behavior model, which obviously excludes the possibility of divorce. The welfare measures in Chiappori, Salanié, and Weiss (2017) are identified and quantified exclusively from variation in matching patterns. On the contrary, in an equilibrium framework that incorporates the collective decision process of the household (as the one developed in my paper) the marital returns to education not only depend on who marries whom but also on how married couples

[39]However, their results suggest that women in the two top quintiles of the skill distribution would vote for unilateral divorce, whereas in my paper, the most educated females are doing worse in such a regime. Aside from the fact that there is no obvious map between female skills in their paper and female education levels in my paper, another key distinction between the two frameworks is the consideration of public goods in marriage and divorce. Recall that in divorce, couples cannot cooperate in setting the efficient levels of public goods. My results, therefore, suggest that the efficiency loses are mostly harmful for the highest educated females, who may benefit the most from the complementarity between private and public expenditures.

would behave in equilibrium. Within my environment, therefore, it is possible to observe both highly educated women marrying "better" male types and the gains from marriage decreasing with female education, due to "the ups and downs" of the married life. In the present paper, the consideration of divorce seems to be of particular importance.

6 Conclusion

This paper quantifies the marriage market *equilibrium* effects of reducing barriers to divorce. I find sizable equilibrium effects. First, the correlation in spousal education increases and marriage rates decrease, matching observed out-of-sample reduced form evidence. Second, the gains from marriage, computed as the expected excess value of marrying a partner of a certain education over the value of remaining single, increase for the some college educated but decreases for the least and the most educated individuals.

The novel framework I develop embeds a collective life cycle model of the family into an equilibrium matching model of household formation. My model significantly extends previous papers in empirically relevant dimensions. The unprecedented features of the model include allowing for spousal support in accumulation of human capital within the marriage, endogenous divorce, and renegotiation of spousal allocations, in an equilibrium framework.

The model successfully reproduces the equilibrium effects of UD that are directly observed in the data and, therefore, validate the model predictions. Importantly, the model reproduces the observed decrease in marriage rates following the introduction of UD that was previously documented in the literature (Rasul, 2006). Moreover, the model reproduces the novel finding I present in section 2 that, among those who marry, UD causes assortativeness in education to go up. The out-of-sample validation for these equilibrium effects allows for a transparent interpretation of the welfare effects discovered in this paper.

Apart from extending the related literature in empirically relevant directions, perhaps the main contribution of this paper is to highlight the previously overlooked consequences of reducing barriers to divorce. This paper shows that unilateral divorce may have contributed to the observed significant increments in income inequality across households by raising spousal assortativeness in education. According to my estimates, unilateral divorce was responsible for between 50% and 60% of the total increment in assortativeness quantified by Greenwood, Guner, Kocharkov, and Santos (2016), which in turn increases inequality across households. Understanding the mechanisms that link divorce laws to changes in equilibrium patterns and marital welfare is a priority for the design of policies that aim at improving social welfare. This paper suggests that distortions in marital investments and in the expenditure on children in divorce account for most of the equilibrium effects of adopting unilateral divorce. Hence, policies that restore efficiency in married women' labor supply and investment in children of divorced parents may counteract the equilibrium effects of limited spousal commitment. More broadly, this study highlights the importance of considering the marriage market equilibrium effects of policies affecting the family and prompts an agenda to investigate the effectiveness of policies and commitment devices that generate welfare improvements within the unilateral divorce environment.

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Appendix A History of US divorce laws

Figure A1 shows the percent of the 50 US states and DC that had adopted unilateral (UD) divorce by selected years (based on Voena (2015), table F.1).

Figure A1: Fraction of US states and D.C. adopting unilateral divorce, by year

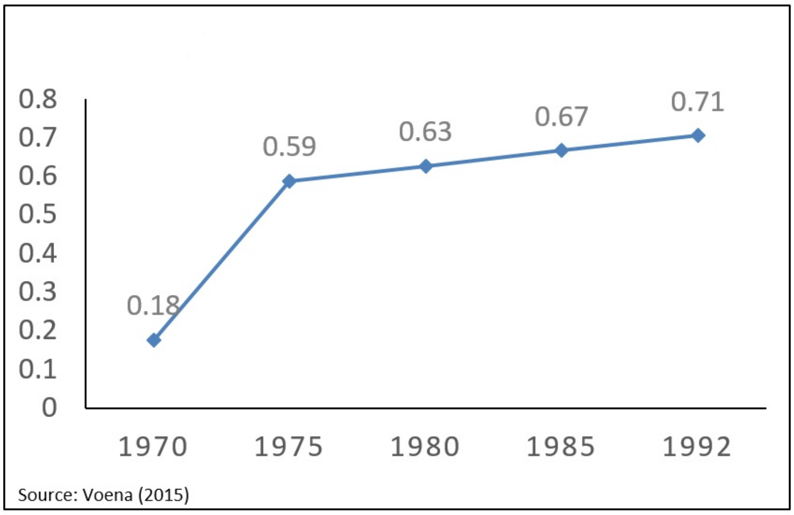
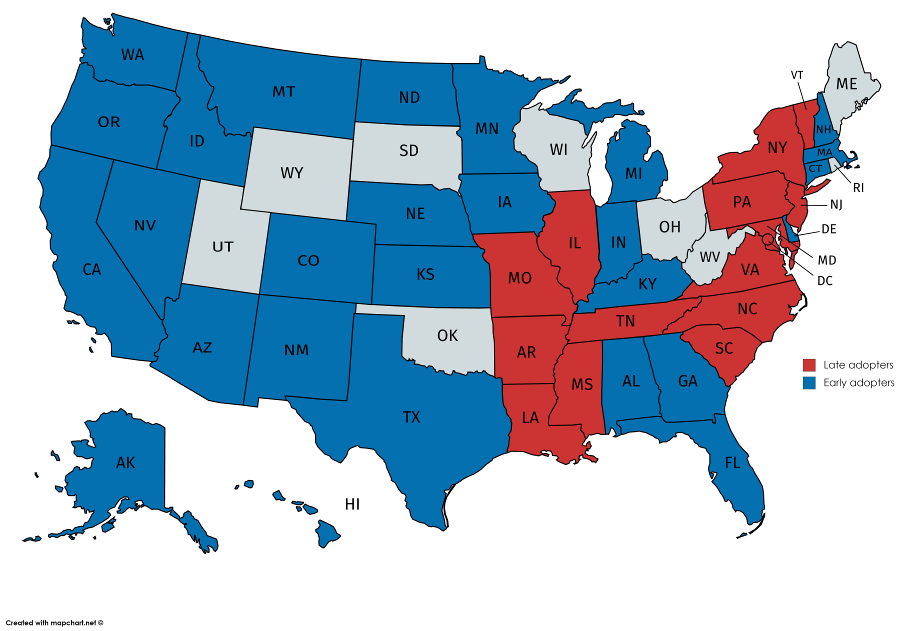


Figure A2 shows the geographical distribution of states according to whether they are early adopters of UD (that is, adopted before 1975) or late adopters (that is, adopted after 1992).

Figure A2: States that adopted UD earliest (before 1975) and latest (after 1992)



Appendix B More evidence on the impact of unilateral divorce on assortative matching

B.1 The reverse regression to model (1)

In this section address the concern that changes in the relative variance across states may confound the changes in the spousal correlation in education captured by β_2. Gihleb and Lang (2016) and Eika, Mogstad, and Zafar (Forthcoming) study changes in sorting over time, while I study changes in sorting across divorce regimes. I address their statistical argument because it is directly applicable to my context. Both papers point out that the main effect of husband's education on wife's education in a specification like (1) is the product of the correlation coefficient between female and male education variables and the relative variance of wife's education to husband's education: $corr(Educ^w, Educ^h) \times \frac{Var(Educ^w)}{Var(Educ^h)}$. Hence, changes in the effect of husband's education on wife's education may reflect differences in the relative variance across divorce regimes. As a check, they suggest regressing the reverse specification:

$$\begin{aligned} Educ^h_{mtg} &= \alpha + \beta_1 UD_{tg} + \beta_2 Educ^w_{mtg} \times UD_{tg} + \\ &+\beta_3(t) \times Educ^w_{mtg} + \beta_4(g) \times Educ^w_{mtg} + \beta_5(g) \times t + \delta_t + \delta_g + \epsilon_{mtg} \end{aligned} \tag{7}$$

If the relative variance is constant across regimes, coefficients β_2 in both the main and the reverse regressions will have the same magnitudes and sign.

The table A1 shows the estimation results of the reversed model. The estimates of β_2 in each specification (1) to (4) are similar in magnitude and significance across tables 1 and A1. The results with PSID data in the reversed specification are less precise, although the effect in specification (4) is marginally significant (the p-value is 0.11).

I perform a formal test of the statistical equality of coefficients within each specification and across original and reversed equations and cannot reject the null hypothesis that coefficients are equal (the p-values of the four tests range between 0.5163 and 0.8342).

Table A1: Unilateral divorce and assortativeness in education for newlyweds

	Dependent variable: $Educ^h$			
	CPS data		PSID data	
	(1)	(2)	(3)	(4)
$Educ^w \times UD$ (β_2)	0.1162**	0.1037**	0.0923	0.1163
	(0.0509)	(0.0486)	(0.0735)	(0.0723)
$Educ^w$ (avg β_3, β_4)	0.5343	0.5487	0.5036	0.5812
Linear trend ($\beta_5(g) \times t$)	No	Yes	No	Yes
Observations	11841	11841	3440	3440

Notes: The sample consists of all newlyweds (couples married within two years of the survey year) in their first marriage where the household head is at most 25 years old. $Educ^w$ and $Educ^h$ refers to years of completed education for husband and wife, respectively. CPS stands for *Current Population Survey* and PSID stands for *Panel Study of Income Dynamics*. Columns (1) and (2) use data from the Annual Social and Economic and the June supplements of the CPS for the years $t = \{1965, 1967, 1977, ..., 1992\}$. Columns (4) and (5) use data from the PSID for the years $t = \{1968, ..., 1992\}$. All specifications include year and state dummies. Standard errors clustered at the state level are in parentheses. **Significant at the 0.05 level.

B.2 Divorce laws and sorting in other measures of human capital at the time of marriage

This section presents evidences complementing the analysis performed in section 2. In tables A2 and A3 I present the results from estimating the following model for newlywed couple m, time t, and state g:

$$
\begin{aligned}
HK^w_{mtg} \quad = \quad & \alpha + \beta_1 UD_{tg} + \beta_2 HK^h_{mtg} \times UD_{tg} + \\
& + \beta_3(t) \times HK^h_{mtg} + \beta_4(g) \times HK^h_{mtg} + \beta_5(g) \times t + \delta_t + \delta_g + \epsilon_{mtg}
\end{aligned}
$$

Table A2 shows the results from estimating model (1) when the HK of husband and wife is measured by the education of their fathers and table A3 when HK is measured as pre-marital labor income. Both tables use data from all newlyweds in the PSID, data set where these measures of HK are available. In both tables, specifications in columns (1) and (2) include a constant main effect of husband's human capital, while specifications (3) and (4) allow for this main effect to vary by state and year. Columns (2) and (4) additionally include a state-specific linear trend.

FatherCollege in table A2 is a dummy variable taking value one if the individual's father attended some college. The effects are only detected when the main effects are constant. On average, husbands that have a father who attended college are 5% more likely to marry a wife with a some-college-educated father. Getting married in a UD state more than doubles this probability, evidencing an increment in assortativeness in this dimension of human capital.

Finally, *pre-marital LaborIncome* in table A3 captures the annual labor earnings of individuals the year previous to the year of marriage. The effects of UD on assortativeness in this dimension of human capital are detected when the main effect varies by state and year. On average, a husband earning an extra dollar in the labor market marries a wife earning over a half dollar more in the labor market. Marrying in a UD state increases this association in pre-marital earnings in between 27% and 38%. These results are consistent with those found by Liu (2018).

Table A2: Unilateral divorce and assortativeness in permanent ability for newlyweds

	Dependent variable: $FatherCollege^w$			
	(1)	(2)	(3)	(4)
$FatherCollege^h \times UD$ (γ)	0.1161**	0.1157**	0.1303	0.0996
	(0.0478)	(0.0472)	(0.1470)	(0.1542)
$FatherCollege^h$ (avg β_3, β_4)	0.0483	0.0472	-0.0044	0.18
$FatherCollege^h$ by g and t	No	No	Yes	Yes
Linear trend ($\beta_5(g) \times t$)	No	Yes	No	Yes
Observations	5032	5032	5032	5032

Notes: The sample consists of all newlyweds (couples married within two years of the survey year) in their first marriage. $FatherCollege^w$ and $FatherCollege^h$ are two dummy variables that take value one if the husband's or wife's father (respectively) attended some college. All specifications use data from the PSID for the years $t = \{1968, ..., 1992\}$. In specifications (1) and (2) the main effect of $FatherCollege^h$ is constant across states and years, while in specifications (3) and (4) that main effect is allowed to vary by state and year. All specifications include year and state dummies. Standard errors clustered at the state level are in parentheses. **Significant at the 0.05 level.

Table A3: Unilateral divorce and assortativeness in permanent ability for newlyweds

	Dependent variable: *Pre-marital* $LaborIncome^w$			
	(1)	(2)	(3)	(4)
Pre-marital $LaborIncome^h \times UD$ (γ)	-0.0350	-0.0319	0.1924***	0.2067***
	(0.0631)	(0.0737)	(0.0474)	(0.0445)
Pre-marital $LaborIncome^h$ (avg β_3, β_4)	0.3640	0.3449	0.5026	0.7636
Pre-marital $LaborIncome^h$ by g and t	No	No	Yes	Yes
Linear trend ($\beta_5(g) \times t$)	No	Yes	No	Yes
Observations	2691	2691	2691	2691

Notes: The sample consists of all newlyweds (couples married within two years of the survey year) in their first marriage. *Pre-marital* $LaborIncome^w$ and *Pre-marital* $LaborIncome^h$ refer to the annual labor earnings the year previous to the wedding. All specifications use data from the PSID for the years $t = \{1968, ..., 1992\}$. In specifications (1) and (2) the main effect of *Pre-marital* $LaborIncome^h$ is constant across states and years, while in specifications (3) and (4) that main effect is allowed to vary by state and year. All specifications include year and state dummies. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level.

Appendix C Estimation of earnings processes

C.1 Male earnings

I estimate the following model of male earnings for male m, of education s_m, of age t, in state g

$$\begin{aligned} lnw_{mtg} &= lnW(s_m) + a_1(s_m)t + a_2(s_m)t^2 + a_3(s_m)K_{mt} + b(s_m)'X_{mtg} + \\ &\quad + \delta_t(s_m) + \delta_g(s_m) + \varepsilon_{mtg} + e_{mtg} \end{aligned} \tag{8}$$

where $W(s_m)$ denotes the market price of male education level s_m; K is the number of years that the male was married to a stay-at-home wife; X is a vector of covariates described bellow; and δ_t and δ_g and time and state fixed effects. The stochastic term is the sum of permanent income and measurement error.

Identification of $a_3(s_m)$, the returns to being married to a stay-at-home wife, is challenged by the the endogeneity of wife housework supply in model (8). For example, nonlabor income (such as husband's earnings) affects female labor supply. To address this endogeneity concern, I instrument female housework supply using excluded changes in policies ruling division of property upon divorce. I estimate model (8) using a two step approach described below.

C.1.1 First step: predicting the history of stay-at-home wife

In a first step, I build on the empirical analysis by Voena (2015) and predict the probability that a female specializes in household labor using panel variation in property division laws upon divorce as a source of exogenous shifters in female labor market attachment.[40] Together with the introduction of UD, in the sample period, most states adopt a legal regime that allows spouses to keep a fraction of marital assets in the event of a divorce (regardless of who holds the formal title). These are the *community property* or *equitable distribution of property* regimes.[41] One of the main findings by Voena (2015) is that when UD is introduced in such

[40] While Voena focuses on female labor supply in the market, I focus on female *household* labor supply.

[41] There are three division of property regimes. The *Community Property* is the regime where marital property is divided equally among ex spouses upon divorce; The *Title Based regime*, is the regime where marital property is assigned to the spouse who holds the formal title upon divorce; finally, the *Equitable Distribution regime*, is the regime where courts have discretion in deciding on the fraction of marital property to assign to each partner upon divorce. See the online appendix in Voena (2015) for a description of the type of regime and year of adoption at the state level.

states, female labor supply decreases significantly.[42] In my context, therefore, these changes in property division laws should cause females to specialize more in home production.

I estimate the following participation model for female f of education s, at time t, in state g:

$$k_{ftg} = \alpha(s_f) + \overline{\beta}(s_f)' Z_{ftg} + \overline{\gamma}(s_f)' X_{ft} + \delta_t(s_f) + \delta_g(s_m) + \eta_{ftg} \tag{9}$$

The education levels considered are *high school*, *some college*, and *college degree or higher*. The dependent variable, k, takes value one if the woman supplies zero hours of work in the labor market. Z is the vector of policy regimes capturing the interaction between grounds for divorce and property division upon divorce. X is a set of control variables capturing family composition, marital status, and duration of marriage. Finally, δ_t and δ_g are a set of year and state fixed effects that control for trends in female labor supply and state-specific environments affecting female participation.

I estimate model (9) using all single, married, and divorced women in the PSID data, for the period 1968 to 1992.[43] Table A4 shows the estimation results. Women that live in *community property* states that introduce unilateral divorce (row labeled $UD \times ComProp$) are 6% and 12% more likely to specialize in household labor relative to women in community property states under the baseline mutual consent regime. The effects are significant at the 5% and 1% level (standard errors are clustered at the state level). These results are consistent with the analysis by Voena (2015) and suggest that the interaction between grounds for divorce and division of property significantly affects female labor supply.

[42]This finding supports the hypothesis that the adoption of UD results in a redistribution of resources among spouses *in marriage*. Voena shows that since married females typically accrue a lower share of marital resources, equalizing the distribution of property upon divorce to that of their husband's increases female bargaining power in marriage, which leads to higher leisure.

[43]Note that changes in divorce laws may affect the labor supply behavior of single women by changing their career investments before entering the marriage market, or their marital decisions.

Table A4: Divorce laws and female housework supply

	Dependent variable: stay-at-home-female					
	(1)	(2)	(3)	(4)	(5)	(6)
Educ.	High school		Some college		College +	
$UD \times ComProp$	0.0653***	0.0623***	0.0799***	0.0747***	0.1205***	0.1033**
	(0.0234)	(0.0214)	(0.0227)	(0.0231)	(0.0427)	(0.0409)
$UD \times Title$	0.0219	0.0213	0.0321	0.0179	0.0478	0.0419
	(0.0201)	(0.0262)	(0.0470)	(0.0368)	(0.0408)	(0.0396)
$UD \times EqDistr$	0.0196	0.0108	0.0231	0.0090	0.0601**	0.0466
	(0.0218)	(0.0246)	(0.0274)	(0.0238)	(0.0282)	(0.0322)
$ComProp$	-0.0182	-0.0450	-0.0282	-0.0590*	0.0346	0.0599
	(0.0318)	(0.0353)	(0.0279)	(0.0312)	(0.0524)	(0.0583)
$EqDistr$	0.0030	0.0083	-0.0081	-0.0081	0.0017	0.0128
	(0.0163)	(0.0176)	(0.0189)	(0.0199)	(0.0284)	(0.0284)
Age	No	Yes	No	Yes	No	Yes
Married	No	Yes	No	Yes	No	Yes
Duration	No	Yes	No	Yes	No	Yes
Family size	No	Yes	No	Yes	No	Yes
Observations	75780	75744	36062	36052	13816	13815

Notes: The dependent variable is *stay-at-home-female*, a dummy that takes value one if the female supplies zero hours of work to the labor market. *Educ.* refers to the highest education level achieved by the female. *UD* stands for *unilateral divorce*, a variable that takes value one when unilateral divorce is in place. *ComProp* stands for *Community Property regime*, a dummy that takes value one if the observation corresponds to a state where marital property is divided equally among ex spouses upon divorce; *Title* stands for *Title Based regime*, a dummy that takes value one if the observation corresponds to a state where marital property is assigned to the spouse who holds the formal title upon divorce; *EqDistr* stands for *Equitable Distribution regimes*, a dummy that takes value one if the observation corresponds to a state where courts have discretion in deciding on the fraction of marital property to assign to each partner upon divorce. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *Married* is a dummy variable that takes value one if the individual is married. *Duration* is a count variable capturing the number of years an individual has been married. All regressions include state and year fixed effects. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level. *Significant at the 0.10 level.

C.1.2 Second step: male earnings regressions

In a second step, I take the predicted values of female household specialization from model (9), $\hat{k}$, and construct a measure of the predicted number of years each man has been married to a stay-at-home wife, which provides an exogenous measure of K in model (8):

$$\hat{K}_t = \sum_{r=0}^{t-1} \hat{k}_r$$

Using the first stage estimates, I estimate the effect of wife's experience in the household on male earnings.[44]

[44] Throughout the paper, all measures of earnings refer to real earnings with 1990 as the base year.

The education levels considered are *high school*, *some college*, and *college degree or higher*. To estimate model (8) I select the appropriate set of males, taking into account two features. First, because I need to observe the *history* of wives' labor supply for each male, I restrict attention to married and divorced males that I *observe getting married*. Married and divorced men have a predicted value of K equal to the stock of predicted wives' housework, $\hat{k}$, up to the last year of marriage. In addition, I include all single men (who have a predicted value of K equal to zero). Second, because of the structure of the PSID, some males leave the panel if they get divorced. To avoid selection bias due to this fact, I restrict the analysis to the so called *sample* males, who keep being interviewed after any change in household composition.[45]

Regression estimates of model (8) are shown in tables A5 and A6 for male hourly wages and annual earnings, respectively. It is worth mentioning that second stage regressions include the same set of control variables X considered in the first stage regressions, including marital status, the duration of marriage, family size, partner education and age, and state and time fixed effects. The excluded instruments are the vector Z of divorce laws indicators.[46]

[45]Sample individuals in the PSID are individuals that were either interviewed in the first 1968 sample or their dependents. Note, importantly, that spouses of dependents of sample members that are not otherwise related to sample members are *non-sample* members that stop being interviewed if the couple divorces.

[46]Although I do not account for male participation in the labor market, I check and confirm that variation in property rights do not affect males' participation, supporting the exclusion restriction assumed in this exercise.

Table A5: The impact of stay-at-home wife capital on *ln* hourly wages of males

	(1)	(2)	(3)	(4)	(5)	(6)
Educ.	High school		Some college		College +	
$\widehat{K}$	0.0356***	0.0157**	0.0415***	0.0360***	0.0292***	0.0252**
	(0.0056)	(0.0062)	(0.0056)	(0.0074)	(0.0092)	(0.0105)
Age	0.0851***	0.0768***	0.1411***	0.1254***	0.2399***	0.2202***
	(0.0182)	(0.0209)	(0.0257)	(0.0275)	(0.0399)	(0.0463)
Age^2	-0.0073***	-0.0058***	-0.0096***	-0.0080***	-0.0175***	-0.0157***
	(0.0016)	(0.0019)	(0.0028)	(0.0028)	(0.0042)	(0.0047)
Constant	1.5693***	1.5244***	2.0773***	2.0365***	2.0974***	2.1354***
	(0.0579)	(0.0635)	(0.0976)	(0.1032)	(0.1007)	(0.1249)
Married	No	Yes	No	Yes	No	Yes
Duration	No	Yes	No	Yes	No	Yes
Family size	No	Yes	No	Yes	No	Yes
Wife's age & educ	No	Yes	No	Yes	No	Yes
Observations	12559	12559	8875	8875	5072	5072

Notes: The dependent variable is the natural logarithm of real hourly wages (in 1990 prices). *Educ.* refers to the highest education level achieved by the male. $\widehat{K}$ is the predicted number of years (from the first step estimation in table A4) that the male was married to a stay-at-home female. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *Married* is a dummy variable that takes value one if the individual is married. *Duration* is a count variable capturing the number of years an individual has been married. All regressions include state and year fixed effects. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level.

Table A6: The impact of stay-at-home wife capital on *ln* annual earnings of males

	(1)	(2)	(3)	(4)	(5)	(6)
Educ.	High school		Some college		College +	
$\widehat{K}$	0.0673***	0.0395***	0.0715***	0.0533***	0.0457***	0.0331**
	(0.0068)	(0.0099)	(0.0072)	(0.0115)	(0.0099)	(0.0127)
Age	0.1593***	0.1643***	0.2122***	0.1993***	0.3745***	0.3596***
	(0.0287)	(0.0325)	(0.0299)	(0.0353)	(0.0472)	(0.0545)
Age^2	-0.0177***	-0.0168***	-0.0186***	-0.0168***	-0.0303***	-0.0282***
	(0.0029)	(0.0031)	(0.0034)	(0.0038)	(0.0049)	(0.0053)
Constant	9.0153***	8.9016***	9.4863***	9.3820***	9.1137***	9.1166***
	(0.0984)	(0.1057)	(0.1398)	(0.1438)	(0.1665)	(0.1729)
Married	No	Yes	No	Yes	No	Yes
Duration	No	Yes	No	Yes	No	Yes
Family size	No	Yes	No	Yes	No	Yes
Wife's age & educ	No	Yes	No	Yes	No	Yes
Observations	12563	12563	8876	8876	5073	5073

Notes: The dependent variable is the natural logarithm of real annual wages (in 1990 prices). *Educ.* refers to the highest education level achieved by the male. $\widehat{K}$ is the predicted number of years (from the first step estimation in table A4) that the male was married to a stay-at-home female. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *Married* is a dummy variable that takes value one if the individual is married. *Duration* is a count variable capturing the number of years an individual has been married. All regressions include state and year fixed effects. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level.

C.2 Female earnings

This section describes in detail the empirical strategy to estimate the returns to female experience in the labor market within the following model of female earnings :

$$lnw_{ft} = lnW(s_f) + a_1(s_f)Exper_t + a_2(s_f)Exper_t^2 + b(s_f)'X_{ftg} + \delta_t(s_f) + \delta_g(s_f) + \varepsilon_{ftg} + e_{ftg} \quad (10)$$

where $W(s_f)$ denotes the market price of female education level s_f; $Exper_t$ is the number of years that the female worked in the labor market up to period t; X is a vector of covariates described bellow; and δ_t and δ_g and time and state fixed effects. The stochastic term is the sum of permanent income and measurement error. Coefficient a_1 measures the return to the first year in the labor market and coefficient a_2 measures the variation of the return to experience as labor market participation accumulates.

Women who choose to participate in the labor market may be different from women who choose to stay at home in unobservable characteristics that may also explain female wages. This poses two challenges to the identification of the returns to experience in specification (10). First, experience is endogenous in a model of female earnings.[47] Second, the distribution of wage offers is censored by the decision to participate (Heckman, 1979). For these reasons, first, I include covariates in the model that control for some of the unobserved heterogeneity. In specification (10), vector X includes indicators for *marital status* and *family size*. Moreover, δ_t captures year fixed effects that control for aggregate trends in wages and δ_g are state fixed effects that control for permanent differences in female wages across states of residence. Second, I use a two-step control function approach. In a first step, I estimate a model for participation and a model for experience using changes in divorce laws and female age as sources of variation in female labor force participation that are excluded from a model of earnings. I then predict the residuals from the first step regressions. In a second step, I estimate model (10) for female earnings including the estimated residuals from the first step in order to account for unobserved factors driving both participation or experience and earnings. I describe and analyze the results from the two-step estimation next.

To estimate the model (10), I restrict attention to all females in the PSID that I observe from the age of 30 or before.

First step

In a first step, I estimate the following models of participation in the labor market (specified as not specializing in home production, $1-k$) and for experience in the labor market ($Exper$, the sum of $1-k$ up to period $t-1$) for female f of education s at time t in state g:

$$\begin{cases} (1-k_{ftg}) = \alpha^p(s) + \overline{\beta}^p(s)' Z_{ftg} + \overline{\gamma}^p(s)' X_{ftg} + \delta_t^p + \delta_g^p + \eta_{ftg}^p \\ Exper_{ftg} = \alpha^e(s) + \overline{\beta}^e(s)' Z_{ftg}^l + \overline{\gamma}^e(s)' X_{ftg} + \delta_t^e + \delta_g^e + \eta_{ftg}^e \end{cases}$$

where Z is a vector of female age and the same set of policy regimes capturing the interaction between grounds for divorce and property division upon divorce used in the first stage of the estimation of male earnings; Z^l is a vector of female age and a set of policy variables that capture the number of years the policy regimes where in place; and X is a set of control

[47] For example, high ability females may both have a stronger preference for developing their career (which drives their decision to participate) and face higher wage offers.

variables including marital status and family size. For consistency with the structural model presented in section 3, I specify *age* as a categorical variable that captures 15 intervals of individuals' age: $Age = \{< 23, [23-25], [26-28], ..., \geq 62\}$. The estimation of the model for female participation in the labor market is exactly analogous to the estimation of the first step in the estimation of male wages shown in table A4 (except that the dependent variable in the participation equation is $1-k$, instead of k). The results for the model of female experience are presented in table A7. The main predictor of experience is age, that presents a concave profile.[48]

Table A7: Regression model of female experience in the labor market

	(1) High school	(2) Some college	(3) College +
Age	1.4406***	1.8656***	2.2619***
	(0.0607)	(0.0664)	(0.1584)
Age^2	-0.0518***	-0.0530***	-0.0519**
	(0.0072)	(0.0103)	(0.0195)
Years UD	-0.0086	0.0432*	0.0194
	(0.0270)	(0.0221)	(0.0168)
Years UD × *ComProp*	-0.0027	-0.0083	0.0033
	(0.0273)	(0.0223)	(0.0154)
Married	Yes	Yes	Yes
Family size	Yes	Yes	Yes
Observations	38514	25376	10099

Notes: The dependent variable is *Exper*, a count variable that captures the female's experience in the labor market. For a given period t, $Exper_t$ is constructed as the sum up to period $t-1$ of $1-k_t$, a dummy that takes value one if the female supplies strictly positive hours of work to the labor market. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *UD* stands for *unilateral divorce*, a variable that takes value one when unilateral divorce is in place. *ComProp* stands for *Community Property regime*, a dummy that takes value one if the observation corresponds to a state where marital property is divided equally among ex spouses upon divorce. *Years UD* and *Years UD* × *ComProp* capture the number of years that the *UD* regime was in place in non community property states and in community property states, respectively. ***Significant at the 0.01 level. **Significant at the 0.05 level. *Significant at the 0.10 level.

The error terms from these models capture unobservable variables that affect female particiaption and experience in the labor market. In order to control for these sources of unobserved heterogeneity, I obtain the residuals from the models of participation and experience and include

[48]Recall that age captures mostly intervals of three years. The results, hence, indicate that becoming three years older for the youngest women increases their experience in the labor market between 1.44 and 2.26 years, depending on their education. As women get older, this correlation decreases by 0.05 years every three years.

them as covariates in the female earnings regression (10).[49] I turn to this next.

Second step

In the second step I estimate the model for female earnings (10) additionally including the residuals from the first step regressions as control variables. In all specifications I include indicator variables for marital status and family size and state and time fixed effects. The excluded instruments in the female earnings regressions are *age* and the vector of policy variables capturing the interaction between grounds for divorce and division of marital property and the number of years the policies where in place. I restrict attention to all females in the PSID that I observe from the age of 30 or before.

The resulting estimates are in table A8. Experience shows a concave profile. The first period in the labor market increases female earnings by between 7% and 11.5%. This return decreases with each additional year of experience. For the lowest educated, the returns to experience are positive until 15 years in the labor market, a figure that contrasts the profile of the college plus educated females that enjoy positive returns to experience until 30 years in the labor market. All effects are significant at the 1% level (all standard errors are clustered at the state level).

Table A8: Female earnings regressions controlling for labor market participation

	(1)	(2)	(3)
Educ.	High school	Some college	College +
Exper	0.1131***	0.0940***	0.0722***
	(0.0081)	(0.0073)	(0.0089)
Exper^2	-0.0036***	-0.0025***	-0.0012***
	(0.0004)	(0.0003)	(0.0004)
Constant	9.3741***	9.3251***	10.1711***
	(0.1659)	(0.1728)	(0.2255)
Observations	38447	25315	10067
Married	Yes	Yes	Yes
Family size	Yes	Yes	Yes

Notes: The dependent variable is the natural logarithm of real annual wages (in 1990 prices). *Exper* is a count variable that captures the number of years the female supplied strictly positive hours of work to the labor market. All specifications include year and state dummies. All earnings regressions include variables indicating marital status and family size. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level. *Significant at the 0.10 level.

[49]For the participation equation I construct the Mills ratio.

Appendix D Model solution: outline and main forces

In this section I outline the solution of the model. That is, I solve for the equilibrium in the marriage market and the corresponding optimal intertemporal behavior of households. As the standard approach to solving life cycle models goes, I solve the model by backwards induction.

First, I characterize the individual values associated with every possible alternative in the marriage market. One alternative is to remain single: I characterize the value of forming household $(s_f, \emptyset)$ for females type s_f and of forming household $(\emptyset, s_m)$ for males type s_m. This results in values $\overline{U}_{\mathcal{X}}^{s_f\emptyset}$ and $\overline{U}_{\mathcal{Y}}^{\emptyset s_m}$, for all s_f for all s_m individual types (section D.1).

The other set of alternatives are the partner types: I characterize the values of joining couples $\{(s_f, s)\}_{s\in\mathcal{S}}$ for females type s_f and the values of joining couples $\{(s, s_m)\}_{s\in\mathcal{S}}$ for males type s_m. To do this, I solve the intertemporal problem of couples in the household life stage (2) by backwards induction and derive the value of each household member at period one, for any given potential partner price. The values of the different partner type alternatives will depend crucially on the female Pareto weight in each type of couple, $\lambda^{s_f s_m}$. Recall that this object is a function of the multiplier of the female participation constraintat the time of marriage, $[pc_f]$, in problem (2). Therefore, it is directly linked to female given price $\overline{U}_{\mathcal{X}}^{s_f s_m}$. Given a matrix of Pareto weights for all types of couples, $\Lambda = \left\{\lambda^{s_f s_m}\right\}_{(s_f,s_m)\in\mathcal{S}^2}$, the solution of the intertemporal household problem of couples results in values $\left\{\left(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda^{s_f s_m})\right)\right\}_{(s_f,s_m)\in\mathcal{S}^2}$ (section D.2.3).

Second, I solve for the utility prices and configuration of couples that clear the marriage market. To do this, I find the matrix of Pareto weights that is consistent with market clearing in the sub market for all types of couples. The resulting matrix is associated with a pair of females' and males' mean utility prices in each type of couple, corresponding to a point in the type of couple's ex ante Pareto frontier.

D.1 The value of singlehood

The outside option from getting married is to live as a single. From the perspective of the matching stage, the values of not marrying and entering period one as single for a female of type s_f and a male of type s_m are, respectively:

$$\overline{U}^{s_f\emptyset}_{\mathcal{X}} = E_0 \sum_{t=1}^{T} \delta^{t-1} ln[\rho w_{ft}(\varepsilon_{ft})] \quad and \quad \overline{U}^{\emptyset s_m}_{\mathcal{Y}} = E_0 \sum_{t=1}^{T} \delta^{t-1} ln[\rho w_{mt}(\varepsilon_{mt})]$$

D.2 The value of marrying under two divorce regimes

In this subsection I describe how to arrive at an expression for the value of arriving married at period one. In order to do that, I need to: first, specify the value of divorce for females and males at the time of divorce and second, specify the value of marriage at any period t.

At the beginning of each period, the couple draws values for the earnings and the match quality shocks and observes the history of female housework supply. Moreover, the couple also observes the beginning of period female weight in household welfare, $\lambda_t^{s_f s_m}$, which depends on the type of the couple but in general will differ across couples of the same type. A vector of realizations of these variables is an element ω_t of the couple's state space at time t, Ω_t:

$$\omega_t = \{\lambda_t^{s_f s_m}, K_t, \varepsilon_{ft}, \varepsilon_{mt}, \theta_{(f,m)t}\} \in \Omega_t$$

D.2.1 The value of divorce

Let t^D denote the period a couple divorces (where $2 \leq t^D \leq T$). Recall that when the divorce regime is one of MCD the couple allocates resources solving a cooperative problem in divorce the period of divorce and stops cooperation every period after that. Differently, under UD the couple stops cooperation from t^D. I obtain the value of divorce by backwards induction starting from the autarky stage when couples do not cooperate.

The value of autarky at time $t \geq t^D$

In the autarky phase, the problem of the divorced female is to choose how to allocate her income into private consumption and the public good, for any given child support transfer τ:

$$\begin{aligned} v^A_{ft} = \max_{x_{ft}, q_t} \quad & ln[c_{ft} q_t] + \delta E_t v^A_{ft+1} \\ s.t. \quad [BC^D_f]: \quad & x_{ft} + q_t = w_{ft} + \tau_t \\ & c_{ft} = \rho x_{ft} \\ & \tau_t \geq 0 \end{aligned} \tag{11}$$

Because choice variables do not affect the continuation value of problem (11), the solution to this problem is found by solving:

$$\max_{q_t} \quad ln[\rho(\tau_t + w_{ft} - q_t)q_t]$$

The first order conditions imply that the ex wife optimal choice of expenditures in the public good and in her private consumption, for any given transfer from the ex husband, are:

$$q_t(\tau_t) = \frac{w_{ft} + \tau_t}{2} = c_{ft}(\tau_t)$$

Let $q_t^*(\tau_t)$ be the ex wife's choice of expenditure in the couple's public good. In the autarky stage, the ex husband takes the ex wife's decision rule as given and chooses the transfer that maximizes his utility:

$$\begin{aligned} v_{mt}^A = \max_{x_{mt},\tau_t} & \quad ln[c_{mt}(q_t^*(\tau_t))^\gamma] + \delta E v_{mt+1}^A \\ s.t. \quad [BC_m^D]: & \quad x_{mt} = w_{mt} - \tau_t \\ & \quad c_{mt} = \rho x_{mt} \\ & \quad \tau_t \geq 0 \end{aligned} \tag{12}$$

Again, because the current choice of τ does not affect the continuation value of autarky, the interior solution to this problem is found by solving:

$$\max_{\tau_t} \quad ln[\rho(w_{mt} - \tau_t)(\frac{w_{ft} + \tau}{2})^\gamma)]$$

This problem has either an interior or a corner solution:

$$\tau_t = \begin{cases} \dfrac{\gamma w_m - w_f}{1+\gamma} & if\ \tau > 0 \\ 0 & otherwise \end{cases}$$

Let joint divorce resources at period t and state ω_t be denoted by $\mathcal{W}_t^D(\omega_t)$:

$$\mathcal{W}_t^D(\omega_t) = w_{ft}(\omega_t) + w_{mt}(\omega_t)$$

At the last period, T, the values of autarky for the ex wife and the ex husband are, respectively:

$$v_{fT}^{A}(\omega_T) = \begin{cases} ln\Big[\rho\Big(\frac{\gamma}{1+\gamma}\frac{\rho\mathcal{W}_T^D(\omega_T)}{2}\Big)^2\Big] & if\ \tau > 0 \\ ln\Big[\rho\Big(\frac{w_{fT}(\omega_T)}{2}\Big)^2\Big] & otherwise \end{cases}$$

and

$$v_{mT}^{A}(\omega_T) = \begin{cases} ln\Big[\frac{\rho\mathcal{W}_T^D(\omega_T)}{1+\gamma}\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}_T^D(\omega_T)}{2}\Big)^\gamma\Big] & if\ \tau > 0 \\ ln\Big[\rho w_{mT}(\omega_T)\Big(\frac{w_{fT}(\omega_T)}{2}\Big)^\gamma\Big] & otherwise \end{cases}$$

The values at any time $t^D \leq t < T$ have analogous expressions. They are obtained by working backwards from the terminal period.

All in all, the value of autarky at any period after divorce, $\tilde{t} \in \{t^D + 1, ..., T\}$, is

$$v_{f\tilde{t}}^{A}(\omega_{\tilde{t}}) = \begin{cases} ln\Big[\rho\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}_{\tilde{t}}^D(\omega_{\tilde{t}})}{2}\Big)^2\Big] + \delta E\Big[v_{f\tilde{t}+1}^{A}(\omega_{\tilde{t}+1}|\omega_{\tilde{t}})\Big] & if\ \tau > 0 \\ ln\Big[\rho\Big(\frac{w_{f\tilde{t}}(\omega_{\tilde{t}})}{2}\Big)^2\Big] + \delta E\Big[v_{f\tilde{t}+1}^{A}(\omega_{\tilde{t}+1}|\omega_{\tilde{t}})\Big] & otherwise \end{cases} \tag{13}$$

for the ex wife and

$$v_{m\tilde{t}}^{A}(\omega_{\tilde{t}}) = \begin{cases} ln\Big[\rho\frac{\mathcal{W}_{\tilde{t}}^D(\omega_{\tilde{t}})}{1+\gamma}\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}_{\tilde{t}}^D(\omega_{\tilde{t}})}{2}\Big)^\gamma\Big] + \delta E\Big[v_{m\tilde{t}+1}^{A}(\omega_{\tilde{t}+1}|\omega_{\tilde{t}})\Big] & if\ \tau > 0 \\ ln\Big[\rho w_{m\tilde{t}}(\omega_{\tilde{t}})\Big(\frac{w_{f\tilde{t}}(\omega_{\tilde{t}})}{2}\Big)^\gamma\Big] + \delta E\Big[v_{m\tilde{t}+1}^{A}(\omega_{\tilde{t}+1}|\omega_{\tilde{t}})\Big] & otherwise \end{cases} \tag{14}$$

for the ex husband.

The value of a divorce settlement at time t^D

I now describe the individual values of divorce if the couple can achieve cooperation in choosing the efficient levels of public and private consumption in the first period after divorce.

In a mutual consent divorce regime, at the time of divorce the couple negotiates the division of the joint value produced in the cooperative stage. Let the vector of choice variables at time t^D be $a_{t^D} = \{x_{ft^D}, x_{mt^D}, q_{t^D}, \tau_{t^D}\}$ and let $\widetilde{\lambda}$ be any weight in the ex wife utility in divorce. At the time of the divorce settlement, the couple anticipates that they will live in autarky from the next period on and choose a_{t^D} to maximize a weighted sum of utilities:

$$\max_{a_{t^D}} \quad \widetilde{\lambda}\Big(u_f^D(c_{ft^D}, q_{t^D}) + \delta E v^A_{ft^D+1}\Big) + (1-\widetilde{\lambda})\Big(u_m^D(c_{mt^D}, q_{t^D}) + \delta E v^A_{mt^D+1}\Big) \tag{15}$$

$$s.t. \quad [BC_{t^D}]: \begin{cases} x_{ft} + q_t = w_{ft} + \tau_{t^D} \\ x_{mt} = w_{mt} - \tau_{t^D} \\ c_{ir} = \rho x_{ir}, \quad \forall i \in \{f, m\} \end{cases}$$

Because the sharing rule in period t^D does not impact the continuation value of autarky for any of the ex spouses, the allocation of expenditures in private consumption and the public good also solves problem:

$$\max_{\tau_{t^D}, q_{t^D}} \quad \widetilde{\lambda} ln[\rho(w_{ft^D} + \tau_{t^D} - q_{t^D})q_{t^D}] + (1-\widetilde{\lambda}) ln[\rho(w_{mt^D} - \tau_{t^D})q^{\gamma}_{t^D}]$$

The solution to this problem can be found following a two step approach. First, conditional on given levels of total expenditure in private consumption, $\overline{X} = x_f + x_m$, and expenditure in public goods, $\overline{q}$, efficient risk sharing implies that

$$x_{ft^d} = \widetilde{\lambda}\overline{X} \text{ and}$$
$$x_{mt^d} = (1-\widetilde{\lambda})\overline{X}$$

Second, given the total resources divorcees have available in period t^D, $\mathcal{W}^D_{t^D}(\omega_{t^D})$, the couple chooses the efficient level of q_{t^D} and of aggregate expenditures on private consumption X_{t^D} by solving

$$\begin{aligned}
&\max_{q_{t^D}, X_{t^D}} && \widetilde{\lambda} ln[\rho\widetilde{\lambda} X_{t^D} q_{t^D}] + (1-\widetilde{\lambda}) ln[\rho(1-\widetilde{\lambda}) X_{t^D} q^{\gamma}_{t^D}] \\
&\quad s.t. \quad [BC_{t^D}]: && q_{t^D} + X_{t^D} = \mathcal{W}^D_{t^D}(\omega_{t^D}) \\
&\qquad\qquad \Leftrightarrow && \\
&\max_{q_{t^D}} && \widetilde{\lambda} ln[\rho\widetilde{\lambda}(\mathcal{W}^D_{t^D}(\omega_{t^D}) - q_{t^D})q_{t^D}] + (1-\widetilde{\lambda}) ln[\rho(1-\widetilde{\lambda})(\mathcal{W}^D_{t^D}(\omega_{t^D}) - q_{t^D})q^{\gamma}_{t^D}]
\end{aligned}$$

For any given Pareto weight determined in the divorce settlement, $\widetilde{\lambda}$, the efficient choice of q_{t^D} and C_{t^D} are given by:

$$q_{t^D} = \frac{\widetilde{\lambda} + (1-\widetilde{\lambda})\gamma}{1 + \widetilde{\lambda} + (1-\widetilde{\lambda})\gamma} \mathcal{W}^D_t(\omega^D_t)$$

and

$$X_{t^D} = \Big(1 - \frac{\widetilde{\lambda} + (1-\widetilde{\lambda})\gamma}{1 + \widetilde{\lambda} + (1-\widetilde{\lambda})\gamma}\Big)\mathcal{W}_t^D(\omega_t^D)$$

Note that the efficient levels of expenditure in private and public consumption depend on the Pareto weight in divorce, reflecting the fact that the cooperative program in divorce does not satisfy the transferable utility property. This is due to the fact that ex spouses have different valuations in divorce.[50]

Let the proportion of the period resources that are destined to expenditures in the public good as a function of a given Pareto weight in divorce $\widetilde{\lambda}$ be denoted by

$$\kappa(\widetilde{\lambda}, \gamma) = \widetilde{\lambda} + (1-\widetilde{\lambda})\gamma \tag{16}$$

The values of cooperation at the last period for the ex wife and the ex husbands are, respectively,

$$v_{fT}^D(\omega_T) = ln\Big[\rho\widetilde{\lambda}\kappa(\widetilde{\lambda}, \gamma)\Big(\frac{\mathcal{W}_T^D(\omega_T)}{1+\kappa(\widetilde{\lambda}, \gamma)}\Big)^2\Big]$$

and

$$v_{mT}^D(\omega_T) = ln\Big[\rho(1-\widetilde{\lambda})\kappa(\widetilde{\lambda}, \gamma)^\gamma\Big(\frac{\mathcal{W}_T^D(\omega_T)}{1+\kappa(\widetilde{\lambda}, \gamma)}\Big)^{1+\gamma}\Big]$$

Working backwards and noting that the choices made in the cooperative period do not affect the values of autarky, the value of a divorce settlement at any time t are, for the ex wife and the ex husband, respectively,

$$v_{ft}^D(\omega_t) = ln\Big[\rho\widetilde{\lambda}\kappa(\widetilde{\lambda}, \gamma)\Big(\frac{\mathcal{W}_t^D(\omega_t)}{1+\kappa(\widetilde{\lambda}, \gamma)}\Big)^2\Big] + \delta E\Big[v_{ft+1}^A(\omega_{t+1}|\omega_t)\Big] \tag{17}$$

and

$$v_{mt}^D(\omega_t) = ln\Big[\rho(1-\widetilde{\lambda})\kappa(\widetilde{\lambda}, \gamma)^\gamma\Big(\frac{\mathcal{W}_t^D(\omega_t)}{1+\kappa(\widetilde{\lambda}, \gamma)}\Big)^{1+\gamma}\Big] + \delta E\Big[v_{mt+1}^A(\omega_{t+1}|\omega_t)\Big] \tag{18}$$

[50] Identical preferences of individuals is necessary for TU to hold in divorce (Chiappori, Iyigun, and Weiss, 2015)

Summing up: the value of divorce under two divorce regimes

All in all, the value of divorce for the ex spouses depends on the divorce regime.

[**Mutual consent divorce**] If the regime is one of MCD, spouses cooperate in the first period of divorce and live in autarky for the rest of their lifetime. Hence, individual values are the expected discounted values derived from the efficient divorce settlement at time t^D plus the autarky continuation values. These values are derived by evaluating expressions (17) and (18) at time t^D. ■

[**Unilateral divorce**] If the regime is one of UD, spouses cannot sustain cooperation and live in autarky from period t^D onward. The values of divorcing at time t^D for wife and husband are, respectively, derived from expressions (13) and (14) when $\tilde{t} = t^D$: $v^A_{ft^D}(\omega_{t^D})$ and $v^A_{mt^D}(\omega_{t^D})$. ■

An important takeaway from the relationship between divorcees is that divorce entails losses of efficiency that may be most harmful to women.[51] First, because of the complementarity between expenditures in public goods and expenditures in private goods, women will invest in the public good even in the absence of child support transfers. Moreover, note that the efficient level of the public good reached in the cooperative phase depends on the female Pareto weight, while the level reached in autarky does not. All else equal, the higher the weight on the female utility in divorce, the higher the discrepancy between the cooperative and the autarky expenditures in public goods. Depending on the parameters of the model, these two features may imply that the inefficiency loses associated with divorce may be most costly to females with higher shares of household resources. Because only under the mutual consent regime do couples cooperate for one period, these loses of efficiency are a driver of the effects of introducing unilateral divorce when mutual consent is in place.

D.2.2 The value of *staying* married

In this subsection I derive the value of continuing the marriage at any period $t \geq 1$ in which the couple arrives married.

Let $\widetilde{a}_t = \{c_{ft}, c_{mt}, q_t, k_t\}$ be the decisions that a couple makes if the marriage continues in

[51] My modeling of divorcees implies that divorced women bear a disproportionate cost of divorce relative to their ex husbands, a feature previously incorporated in the models by Guvenen and Rendall (2015) and Fernández and Wong (2011).

period t. Let λ_t be the weight in females' expected utility from the perspective of period t. The individual values of staying married in t and entering period $t+1$ as married are derived by solving the following Pareto problem in marriage:

$$\begin{aligned} \max_{\widetilde{a}_t} \quad & \lambda_t\Big(u_f^M(c_{ft}, q_t, k_t) + \delta E v_{ft+1}\Big) + (1-\lambda_t)\Big(u_m^M(c_{mt}, q_t) + \delta E v_{mt+1}\Big) \\ s.t. \quad & [BC_t^M] : c_{ft} + c_{mt} + q_t = w_{ft}(1-k_{ft}) + w_{mt} \end{aligned} \tag{19}$$

where v_{ft+1} and v_{mt+1} in the continuation values denote the value of *arriving* married at period $t+1$ for females and males, respectively (this value will be solved for in the next section).

In this model, the only decision variable that influences the lifetime resources of the couple is female labor supply that affects female future earnings through experience and male future earnings through the spousal support effect. Hence, the solution to the couple's problem *if the marriage continues*, problem (19), can be found following a *three stage formulation* as described by Chiappori and Mazzocco (2015). Let λ_t be any given wife's Pareto weight at time t (not necessarily the one consistent with the equilibrium in the marriage market).

The first stage corresponds to the *intrahousehold allocation stage*, where the couple fixes the level of private and public consumption at any level $(\overline{C_t}, \overline{q_t})$ and decides how to allocate aggregate private consumption among spouses. The first order conditions imply that

$$\begin{aligned} c_{ft} &= \lambda_t \overline{C_t} - (1-\lambda_t)\alpha k_t \text{ and} \\ c_{mt} &= (1-\lambda_t)\overline{C_t} + (1-\lambda_t)\alpha k_t \end{aligned}$$

The second stage in the solution of problem (19) corresponds to the *resource allocation stage*. Given a fixed amount of lifetime resources allocated to period t and state ω_t,

$$\mathcal{W}_t(\omega_t, k_t) = \alpha_t k_t + w_{ft}(\omega_t)(1-k_t) + w_{mt}(\omega_t),$$

the couple decides on the efficient levels of private and public expenditures by solving

$$\begin{aligned} \max_{q_t, C_t} \quad & \lambda_t ln[q_t(\lambda_t C_t - (1-\lambda_t)\alpha k_t)] + (1-\lambda_t) ln[q_t((1-\lambda_t)C_t + (1-\lambda_t)\alpha k_t)] \\ s.t. \quad & [BC_t] : \ q_t + C_t = w_{ft}(1-k_t) + w_{mt} \end{aligned}$$

Since this program satisfies the transferable utility property, its solution is found by solving:

$$\max_{q_t} \quad q_t(\mathcal{W}_t(\omega_t) - q_t)$$

which implies that the efficient choice of q_t and C_t are given by:

$$q_t = \frac{\mathcal{W}_t(\omega_t)}{2}$$

and

$$C_t = \frac{w_{ft}(1-k_t) + w_{mt} - \alpha k_t}{2}$$

By the intrahousehold allocation first order conditions,

$$c_{ft} = \lambda_t \frac{\mathcal{W}_t(\omega_t)}{2} - \alpha k_t \text{ and}$$
$$c_{mt} = (1-\lambda_t)\frac{\mathcal{W}_t(\omega_t)}{2}$$

Note that the efficient choices of q and C do not depend on the Pareto weights, reflecting the transferable utility property of the program in this stage.

Finally, the last stage in the solution of program (19) corresponds to the *intertemporal stage*, where the couple decides how to allocate lifetime resources to each period. In this model, the only decision variable that changes lifetime and within period resources is female labor supply. The couple jointly chooses female household labor supply, k_t, so as to maximize the weighted sum of spouses' utilities, given the Pareto weight:

$$\begin{aligned} \max_{k_t} \quad & \lambda_t ln\Big[\lambda_t\Big(\frac{\mathcal{W}_t(\omega_t,k_t)}{2}\Big)^2\Big] + (1-\lambda_t)ln\Big[(1-\lambda_t)\Big(\frac{\mathcal{W}_t(\omega_t,k_t)}{2}\Big)^2\Big] \\ & +\delta\Big\{\lambda_t E\Big[v^M_{ft+1}(\omega_{t+1}|\omega_t,k_t)\Big] + (1-\lambda_t)E\Big[v^M_{mt+1}(\omega_{t+1}|\omega_t,k_t)\Big]\Big\} \end{aligned} \tag{20}$$

Let k_t^* be the solution to this problem. The value of staying married and entering next period as married for the wife is:

$$v^M_{ft}(\omega_t) = ln\Big[\lambda_t\Big(\frac{\mathcal{W}_t(\omega_t,k_t^*)}{2}\Big)^2\theta_t\Big] + \delta E\Big[v_{ft+1}(\omega_{t+1}|\omega_t,k_t^*)\Big]$$

Similarly, the analogous value for the husband is:

$$v^M_{mt}(\omega_t) = ln\Big[(1-\lambda_t)\Big(\frac{\mathcal{W}_t(\omega_t,k_t^*)}{2}\Big)^2\theta_t\Big] + \delta E\Big[v_{mt+1}(\omega_{t+1}|\omega_t,k_t^*)\Big]$$

The continuation values of entering the next period as married are defined by solving the problem of couples by backwards induction, considering the possibility of divorce at any period $t > 1$. I derive these values in the next section.

There are a few interesting revelations from these expressions. First, for both females and males, expenditures in private and public goods are complements in the sense that both have to be consumed to enjoy utility. Second, even when only women derive utility from leisure, the female value from leisure is *shared* within the marriage. In effect, the term $\alpha_t k_t$ shows up in the value of staying married for both males and females. This implies that female leisure and public consumption are also complements for both spouses.

To specify the continuation values of arriving married at the next period, it is necessary to account for the divorce decision. I turn to this next.

D.2.3 The value of *arriving* married

In this subsection I derive the value of arriving married at any period $t \geq 1$. A couple that arrives married at any period t also makes a divorce decision by comparing the values of divorce and of staying married. This decision will depend on the divorce regime.

Because the continuation value at any period depends on the current choices of k and D, I solve the model by backwards induction.

Period T

To determine the value of staying married in period T, state ω_T, and any given female Pareto weight λ_T the couple solves:

$$\max_{k_T} \quad \lambda_T ln\Big[\lambda_T\Big(\frac{\mathcal{W}_T(\omega_T, k_T)}{2}\Big)^2\Big] + (1-\lambda_T) ln\Big[(1-\lambda_T)\Big(\frac{\mathcal{W}_T(\omega_T, k_T)}{2}\Big)^2\Big] \tag{21}$$

Let k_T^* be the solution to program (21). The spouses' values of continuing the marriage in period T are (considering also the match quality shock):

$$v_{fT}^M = ln\Big[\lambda_T\Big(\frac{\mathcal{W}_T(\omega_T, k_T^*)}{2}\Big)^2\theta_T\Big] \tag{22}$$

$$v_{mT}^{M} = ln\Big[(1-\lambda_T)\Big(\frac{\mathcal{W}_T(\omega_T, k_T^*)}{2}\Big)^2 \theta_T\Big] \tag{23}$$

To make the divorce decision, the couple compares the values of marriage and the values of divorce. This comparison depends on the divorce regime.

[**Mutual Consent divorce**]

At the moment of divorce, before spouses negotiate over a divorce settlement, the couples takes the Pareto weight in marriage as the default divorce agreement. Hence, the individuals' "pre-settlement" values of divorce in the last period are the values of cooperation in divorce when the ex wife Pareto weight is the Pareto weight in marriage:

$$v_{fT}^{D}(\lambda_T) = ln\Big[\lambda_T\Big(\frac{\kappa(\lambda_T,\gamma)\mathcal{W}_T^D(\omega_T)}{1+\kappa(\lambda_T,\gamma)}\Big)^2\Big] \tag{24}$$

$$v_{mT}^{D}(\lambda_T) = ln\Big[(1-\lambda_T)\Big(\frac{\kappa(\lambda_T,\gamma)\mathcal{W}_T^D(\omega_T)}{1+\kappa(\lambda_T,\gamma)}\Big)^2\Big] \tag{25}$$

where $\kappa(\lambda,\gamma)$ was defined in (16). Given expressions (22) to (25), there are six possible scenarios:

- If $v_{fT}^M > v_{fT}^D(\lambda_T)$ and $v_{mT}^M > v_{mT}^D(\lambda_T)$, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M$ and $v_{mT} = v_{mT}^M$.
- If $v_{fT}^M < v_{fT}^D(\lambda_T)$ and $v_{mT}^M < v_{mT}^D(\lambda_T)$, the couple divorces and the period individual values are $v_{fT} = v_{fT}^D(\lambda_T)$ and $v_{mT} = v_{mT}^D(\lambda_T)$.
- If $v_{fT}^M < v_{fT}^D(\lambda_T)$ and $v_{mT}^M > v_{mT}^D(\lambda_T)$, the couple searches to see if there exists a value of the ex wife Pareto weight in divorce, λ_T^{DS}, such that $v_{fT}^M = v_{fT}^D(\lambda_T^{DS})$ and $v_{mT}^M > v_{mT}^D(\lambda_T^{DS})$. Then, there are two possible scenarios:
  - If such λ_T^{DS} exists, the couple divorces and the period individual values are $v_{fT} = v_{fT}^D(\lambda_T^{DS})$ and $v_{mT} = v_{mT}^D(\lambda_T^{DS})$.
  - If there is no feasible revision of the Pareto weight in divorce, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M$ and $v_{mT} = v_{mT}^M$.
- Finally and analogously, if $v_{fT}^M > v_{fT}^D(\lambda_T)$ and $v_{mT}^M < v_{mT}^D(\lambda_T)$, the couple searches to see if there exists a value of λ_T^{DS} such that $v_{fT}^M > v_{fT}^D(\lambda_T^{DS})$ and $v_{mT}^M = v_{mT}^D(\lambda_T^{DS})$. Then, there

are two possible scenarios:

- If such λ_T^{DS} exists, the couple divorces and the period individual values are $v_{fT} = v_{fT}^D(\lambda_T^{DS})$ and $v_{mT} = v_{mT}^D(\lambda_T^{DS})$.
- If there is no feasible revision of the Pareto weight in divorce, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M$ and $v_{mT} = v_{mT}^M$.

Note that the allocation *within marriage* does not change in any of these scenarios, implying that the weights on the wife's utility, λ_T, remained unchanged. ■

[**Unilateral divorce**]

Note that the values associated to staying married at any female Pareto weight, λ are $v_{fT}^M(\lambda)$ and $v_{mT}^M(\lambda)$. These values are given by evaluating expressions (22) and (23) with weight λ, where k_T^* is the solution to problem (21) when the weight is λ. Suppose the couple arrives at period T married with wife Pareto weight λ_T.

The assumptions of the model when divorce is unilateral imply that divorcees do not go through a cooperative stage. Hence, the value of the divorce if the couple divorces in the last period is the value of autarky. From the solution to the autarky problem it follows that ex spouses values of autarky are:

$$v_{fT}^A(\omega_T) = \begin{cases} ln\Big[\Big(\dfrac{\gamma}{1+\gamma}\dfrac{\rho\mathcal{W}_T^D(\omega_T)}{2}\Big)^2\Big] & \textit{if } \tau > 0 \\ ln\Big[\Big(\dfrac{\rho w_{fT}(\omega_T)}{2}\Big)^2\Big] & \textit{otherwise} \end{cases}$$

and

$$v_{mT}^A(\omega_T) = \begin{cases} ln\Big[\dfrac{\rho\mathcal{W}_T^D(\omega_T)}{1+\gamma}\Big(\dfrac{\gamma}{1+\gamma}\dfrac{\rho\mathcal{W}_T^D(\omega_T)}{2}\Big)^\gamma\Big] & \textit{if } \tau > 0 \\ ln\Big[\rho w_{mT}(\omega_T)\Big(\dfrac{\rho w_{fT}(\omega_T)}{2}\Big)^\gamma\Big] & \textit{otherwise} \end{cases}$$

To make the divorce decision, the couple compares the value of marriage at the period starting Pareto weight, λ_T, against the value of autarky. There are six possible scenarios:

- If $v_{fT}^M(\lambda_T) > v_{fT}^A$ and $v_{mT}^M(\lambda_T) > v_{mT}^A$, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M(\lambda_T)$ and $v_{mT} = v_{mT}^M(\lambda_T)$.
- If $v_{fT}^M(\lambda_T) < v_{fT}^A$ and $v_{mT}^M(\lambda_T) < v_{mT}^A$, the couple divorces and the period individual values are $v_{fT} = v_{fT}^A$ and $v_{mT} = v_{mT}^A$.

- If $v_{fT}^M(\lambda_T) < v_{fT}^A$ and $v_{mT}^M(\lambda_T) > v_{mT}^A$, the couple searches to see if there exists a revision of the Pareto weight in marriage, ν_T, such that $v_{fT}^M(\lambda_T+\nu_T) = v_{fT}^A$ and $v_{mT}^M(\lambda_T+\nu_T) > v_{mT}^A$. Then, there are two possible scenarios:
  - If a ν_T such that $\lambda_T + \nu_T \in (0, 1)$ exists, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M(\lambda_T + \nu_T)$ and $v_{mT} = v_{mT}^M(\lambda_T + \nu_T)$.
  - If there is no feasible revision of the Pareto weight in marriage, the couple divorces and the period individual values are $v_{fT} = v_{fT}^A$ and $v_{mT} = v_{mT}^A$.
- Finally and analogously, if $v_{fT}^M(\lambda_T) > v_{fT}^A$ and $v_{mT}^M(\lambda_T) < v_{mT}^A$, the couple searches to see if there exists a revision of the Pareto weight in marriage, ν_T, such that $v_{fT}^M(\lambda_T + \nu_T) > v_{fT}^A$ and $v_{mT}^M(\lambda_T + \nu_T) = v_{mT}^A$. Then, there are two possible scenarios:
  - If a ν_T such that $\lambda_T + \nu_T \in (0, 1)$ exists, the couple stays married and the period individual values are $v_{fT} = v_{fT}^M(\lambda_T + \nu_T)$ and $v_{mT} = v_{mT}^M(\lambda_T + \nu_T)$.
  - If there is no feasible revision of the Pareto weight in marriage, the couple divorces and the period individual values are $v_{fT} = v_{fT}^A$ and $v_{mT} = v_{mT}^A$.

Note that the allocation *within marriage* changes in some of these scenarios, implying that the weights on the wife's utility, λ_T are revised and set equal to $\lambda_T+\nu_T$, with ν_T possibly equal to zero. ■

All in all, the values of arriving married at the last period T are, for the wife and the husband, respectively:

$$v_{fT}(\omega_T) = (1 - D_T^*)v_{fT}^M(\omega_T) + D_T^* v_{fT}^D(\omega_T)$$
$$v_{mT}(\omega_T) = (1 - D_T^*)v_{mT}^M(\omega_T) + D_T^* v_{mT}^D(\omega_T)$$

Period $T - 1$

From the perspective of the beginning of period T, before shocks realize, the expected value of entering period T married, conditional on the realized state at time $T - 1$ are, respectively,

$$E\Big[v_{fT}(\omega_T|\omega_{T-1})\Big] = E\Big[(1 - D_t^*)v_{fT}^M(\omega_T|\omega_{T-1}) + D_t^* v_{fT}^D(\omega_T|\omega_{T-1})\Big]$$
$$E\Big[v_{mT}(\omega_T|\omega_{T-1})\Big] = E\Big[(1 - D_t^*)v_{mT}^M(\omega_T|\omega_{T-1}) + D_t^* v_{mT}^D(\omega_T|\omega_{T-1})\Big]$$

To determine the value of staying married throughout period $T-1$, the couple chooses k_{T-1} so as to solve problem (20) at period $T - 1$ and at any given female Pareto weight λ_{T-1}. Let

k^*_{T-1} be the couple's choice of female housework supply. The value of continuing the marriage for the wife and the husband is, respectively:

$$v^M_{fT-1}(\omega_{T-1}) = ln\Big[\lambda_{T-1}\Big(\frac{\mathcal{W}_{T-1}(\omega_{T-1}, k^*_{T-1})}{2}\Big)^2\theta_{T-1}\Big] + \delta E\Big[v_{fT}(\omega_T|\omega_{T-1})\Big]$$

$$v^M_{mT-1}(\omega_{T-1}) = ln\Big[(1-\lambda_{T-1})\Big(\frac{\mathcal{W}_{T-1}(\omega_{T-1}, k^*_{T-1})}{2}\Big)^2\theta_{T-1}\Big] + \delta E\Big[v_{mT}(\omega_T|\omega_{T-1})\Big]$$

The values of divorce depend on the divorce regime. Under mutual consent divorce, the values of divorce result from the value of cooperating in divorce in period $T-1$ and living in autarky in period T. These values are obtained from evaluating expressions (17) and (18) at period $T-1$ and any given Pareto weight. Differently, under unilateral divorce the values of divorce are the values of living in autarky from the moment of divorce onward, values obtained by evaluating expressions (13) and (14) at time $T-1$. Note that the continuation values from staying married in $T-1$ are different from the continuation values following divorce in period $T-1$, because divorce is an absorbing state.

To make the divorce decision, the couple follows the same procedure described for period T, comparing the divorce values to the values from marriage. This, again, depends on the divorce regime. Note, again, that when the regime is of mutual consent divorce, the Pareto weight in marriage will not be updated. Hence, the couple will carry the same Pareto weight if marriage continues to the final period, implying that $\lambda_{T-1} = \lambda_T$. On the contrary, if the divorce regime is unilateral divorce, the couple may update their Pareto weight at $T-1$, thus entering period T with Pareto weight $\lambda_T = \lambda_{T-1} + \nu_{T-1}$.

All in all, the values of arriving married at period $T-1$ are, for the wife and the husband, respectively:

$$v_{fT-1}(\omega_{T-1}) = (1 - D^*_{T-1})v^M_{fT-1}(\omega_{T-1}) + D^*_{T-1}v^D_{fT-1}(\omega_{T-1})$$
$$v_{mT-1}(\omega_{T-1}) = (1 - D^*_{T-1})v^M_{mT-1}(\omega_{T-1}) + D^*_{T-1}v^D_{mT-1}(\omega_{T-1})$$

Period $t > 1$

Continuing to working backwards taking into account that the continuation value after marriage differs from the continuation value after divorce, the values of arriving married at any period $t > 1$, state ω_t are:

$$v_{ft}(\omega_t) = (1 - D_t^*)v_{ft}^M(\omega_t) + D_t^* v_{ft}^D(\omega_t)$$
$$v_{mt}(\omega_t) = (1 - D_t^*)v_{mt}^M(\omega_t) + D_t^* v_{mt}^D(\omega_t)$$

Note that while under mutual consent divorce the female Pareto weight in marriage will remain constant, under unilateral divorce it will be updated every period to guarantee satisfaction of the participation constraints in marriage. All in all, the Pareto weight with which the couple *enters* each period t, λ_t, evolves depending on the divorce regime:

$$\lambda_t^{s_f s_m} = \begin{cases} \lambda_0^{s_f s_m} & \textit{if } \mathcal{D}{=}MCD \\ \lambda_{(f,m)t-1} + \nu_{(f,m)t-1} & \textit{if } \mathcal{D}{=}UD \end{cases}$$

Note that the initial Pareto weight taken as given in the marriage market is type-of-couple specific. On the contrary, the update in such weight will in general be specific to each couple given that it depends on the idiosyncratic earnings and match quality shocks that each couple receives.

Period $t = 1$

Finally, the in the first period newlyweds do not divorce, so their value of getting married in the matching stage, at realized state ω_1 are simply the value of staying married and entering period two as married:

$$v_{f1}(\omega_1) = v_{f1}^M(\omega_1)$$
$$v_{m1}(\omega_1) = v_{m1}^M(\omega_1)$$

Note that λ_1 in vector ω_1 is the *initial* female Pareto weight with which the couple arrives at the first period. Because couples do not divorce at $t = 1$, $\lambda_1^{s_f s_m} = \lambda_0^{s_f s_m}$. The life cycle problem is solved for all types of couples. Hence, from the perspective of the time of marriage, the values of forming household (s_f, s_m) for any female of type s_f and any male of type s_m are, respectively:

$$\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda_0^{s_f s_m}) = Ev_{f1}^M(\omega_1|\lambda_0^{s_f s_m})$$
$$\overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda_0^{s_f s_m}) = Ev_{m1}^M(\omega_1|\lambda_0^{s_f s_m})$$

D.3 The marriage market equilibrium

For any matrix of female Pareto weights in all types of couples, $\Lambda = \left\{\lambda_0^{s_f s_m}\right\}_{(s_f,s_m)\in\mathcal{S}^2}$, the solution to the intertemporal household problem of couples results in the mean values that females and males derive from their partner alternatives, $\left\{\left(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda_0^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda_0^{s_f s_m})\right)\right\}_{(s_f,s_m)\in\mathcal{S}^2}$. Anticipating these mean valuations and knowing their value of remaining single ($\overline{U}_{\mathcal{X}}^{s_f\emptyset}$ for females and $\overline{U}_{\mathcal{Y}}^{\emptyset s_m}$ for males) and idiosyncratic taste shocks ($\beta_f^{s_f s}$ and $\beta_m^{s s_m}$), individuals choose whether to get married and (if so) the education of their partner by solving problem (3)- or the analogous for females-. By aggregating females' and males' individual choices within every sub-marriage market, we obtain the supply and demand for females within each type of couple. The model closes by finding the matrix of couple-type *initial* Pareto weights such that all sub markets clear,

$$\Lambda : \mu_{s_f\to s_m}(\lambda_0^{s_f s_m}) = \mu_{s_f\leftarrow s_m}(\lambda_0^{s_f s_m}), \quad \forall(s_f, s_m) \in \mathcal{S}^2$$

and the mass of individuals in the marriage market adds up to the mass of married and single individuals.

Appendix E Numerical algorithm to solve for equilibria

To solve for equilibria in counterfactual exercises, I follow closely the algorithms proposed by Gayle and Shephard (2019) and Galichon, Kominers, and Weber (2016).

1. Propose an initial guess of the measure of females and males that *choose* to be single,

$$\mu_{s_f\to\emptyset} \quad \textit{and} \quad \mu_{\emptyset\leftarrow s_m}$$

2. For each couple type, construct the difference in the supply of s_f females to type s_m males and demand for type s_f by type s_m males, relative to the measure of singles:

   - ▶ For females type s_f supplying in the market for s_m male types, from the expression of the choice probabilities (29) we have that

$$\ln[\mu_{s_f \to s_m}(\Lambda)] - \ln[\mu_{s_f \to \emptyset}(\Lambda)] = \overline{U}_{\mathcal{X}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{X}}^{s_f \emptyset}(\Lambda) \tag{26}$$

- Similarly, for males type s_m demanding in the market for s_f female types, we have that

$$\ln[\mu_{s_f \leftarrow s_m}(\Lambda)] - \ln[\mu_{\emptyset \leftarrow s_m}(\Lambda)] = \overline{U}_{\mathcal{Y}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{Y}}^{\emptyset s_m}(\Lambda) \tag{27}$$

3. For each couple type, take the difference between (26) and (27), and impose the market clearing condition $\mu_{s_f \to s_m}(\Lambda) = \mu_{s_f \leftarrow s_m}(\Lambda)$, leading to a system of equations, $\forall (s_f, s_m) \in \mathcal{S}^2$:

$$\ln[\mu_{\emptyset \leftarrow s_m}(\Lambda)] - \ln[\mu_{s_f \to \emptyset}(\Lambda)] = \overline{U}_{\mathcal{X}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{X}}^{s_f \emptyset}(\Lambda) - \left(\overline{U}_{\mathcal{Y}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{Y}}^{\emptyset s_m}(\Lambda)\right) \tag{28}$$

4. Find the matrix of Pareto weights, Λ^*, that is the root of the system of equations (28).
5. With the matrix Λ^* of Pareto weights, update the measure of single females and males by computing the choice probabilities (29) for remaining single.
6. Repeat steps 1 through 5 until the measure of singles converges. Compute the competitive equilibrium as the matrix Λ when the algorithm stopped and the resulting measures of female types married to male types.

The algorithm above converges to a competitive equilibrium given that the utility functions in my model satisfy the regularity conditions in Gayle and Shephard (2019). Let $u_i^{\mathcal{MS}}$ denote the individual utility functions when the marital status is $\mathcal{MS} = \{\textit{single, married, divorced}\}$ (functional forms presented in section 3). The said regularity conditions are: $u_i^{\mathcal{MS}}$ is increasing and concave in c, q, and k; and $\lim_{c_i \to 0} u_i^{\mathcal{MS}} = \lim_{c_j \to 0} u_j^{\mathcal{MS}} = -\infty$. Gayle and Shephard (2019) show that these conditions are sufficient for existence of the competitive equilibrium, that is, existence of a matrix Λ at which the excess demand is zero for all types of couples (s_f, s_m). These conditions are also shown to be sufficient for the equilibrium to be unique.

Appendix F Sample selection and household identity

Because I must follow households from the moment of marriage, I select only households that I observe being formed, in the following way:

- First, I select female and male single households. These are households headed by individuals who are never observed getting married.
- Second, I select married households that I observe from the moment of household formation.
  - Married households are households headed by a person who is observed married at any point in time.
  - I select married households of sample individuals that are observed getting married, that is, households of sample members who are in the data before their year of first marriage.
  - To increase the sample size, I also include households that I observe from a very young age: households of heads that I observe for the first time when they are less than 23 years old.

It is usually the case that households are identified with the identity of the head of the household. In the PSID this poses a threat. The design of the PSID is such that when households change their composition, non-sample members stop being followed. Hence, when the head of the household is a non-sample member, after a divorce only the spouse is followed and the head of the household id changes to the id of the spouse. To avoid this change in the identity of a household's head, I identify households with the identification number of the sample member. This poses a minor threat in households that have both spouses being sample members. In the data selected as described before, this happens for 135 out of 3786 households in the data. I use the following procedure to follow households over time:

- If household has only one sample member, I use the identification number of the sample member to identify the household.
- When the household has both the head and the spouse as sample members and spouses do not divorce in the time frame, I use the identification number of head of the household to identify the household.

- ► When the household has both the head and the spouse as sample members and spouses are observed to get divorced in the data, I identify all the original household, the split off household of the ex wife, and the split off household of the ex husband with the identification number of the head of the *original* household. Doing this prevents to double count divorce cases or consider a second marriage as a first one.

For estimation, I restrict attention to selected households that form and live under the baseline mutual consent divorce regime. Table 3 in the estimatino section 4 shows the total number of observations that I use in estimation (columns (1) and (2)).

Appendix G Identifying moments: an illustration

Figure A3: Identification of the couple-type specific preference for stay-at-home wife, $\psi^{s_f s_m}$

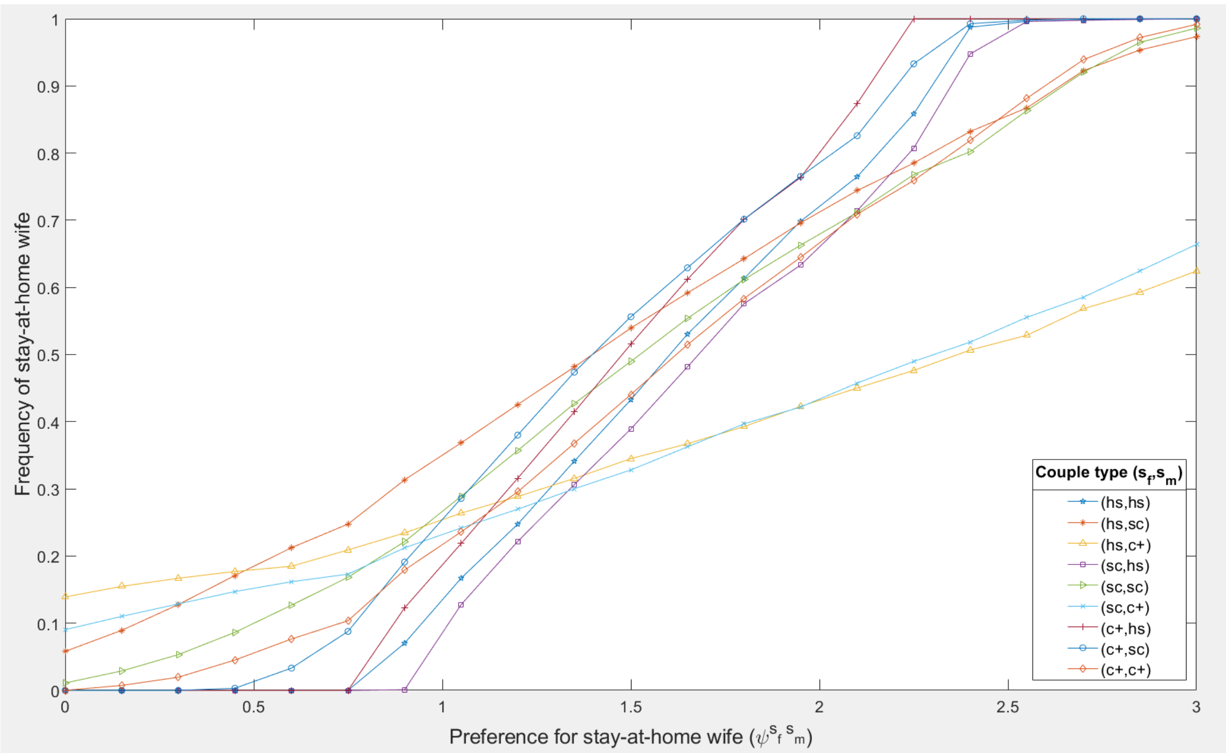
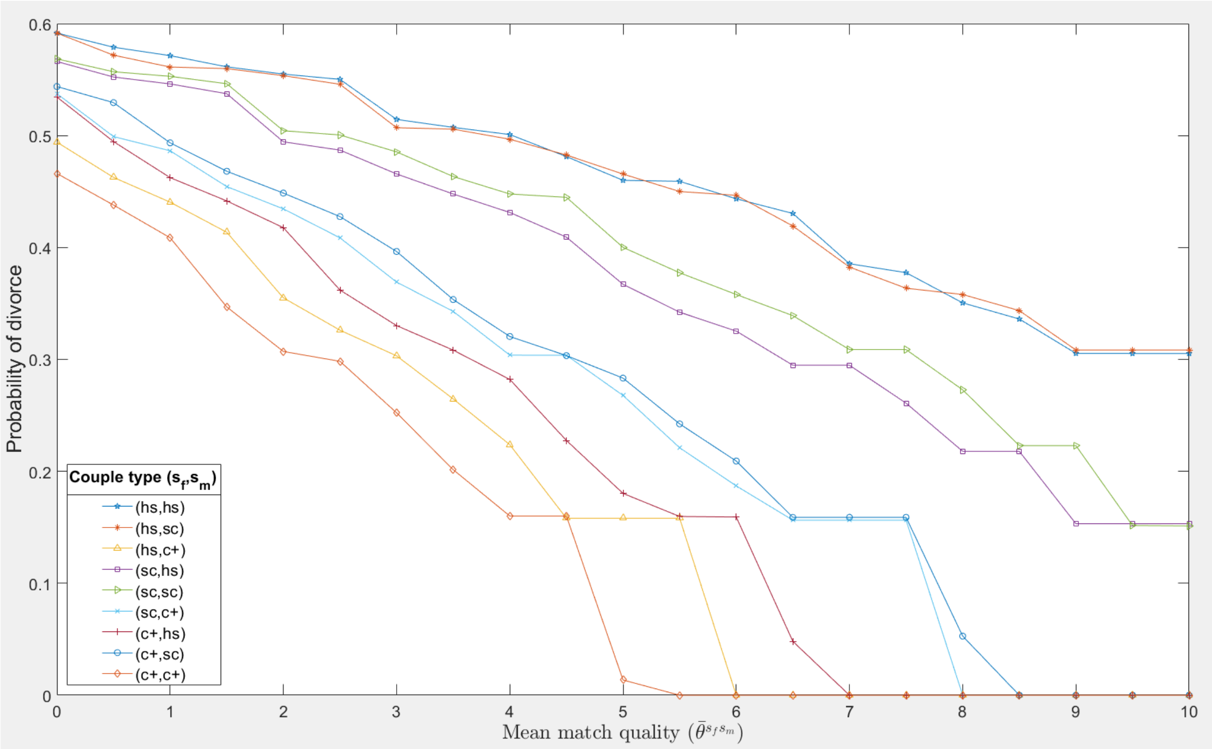


Figure A4: Identification of the couple-type specific mean match quality, $\bar{\theta}^{s_f s_m}$



Appendix H Model fit of life cycle behavior of females

Figure A5: Female housework supply, by education and interval of household age

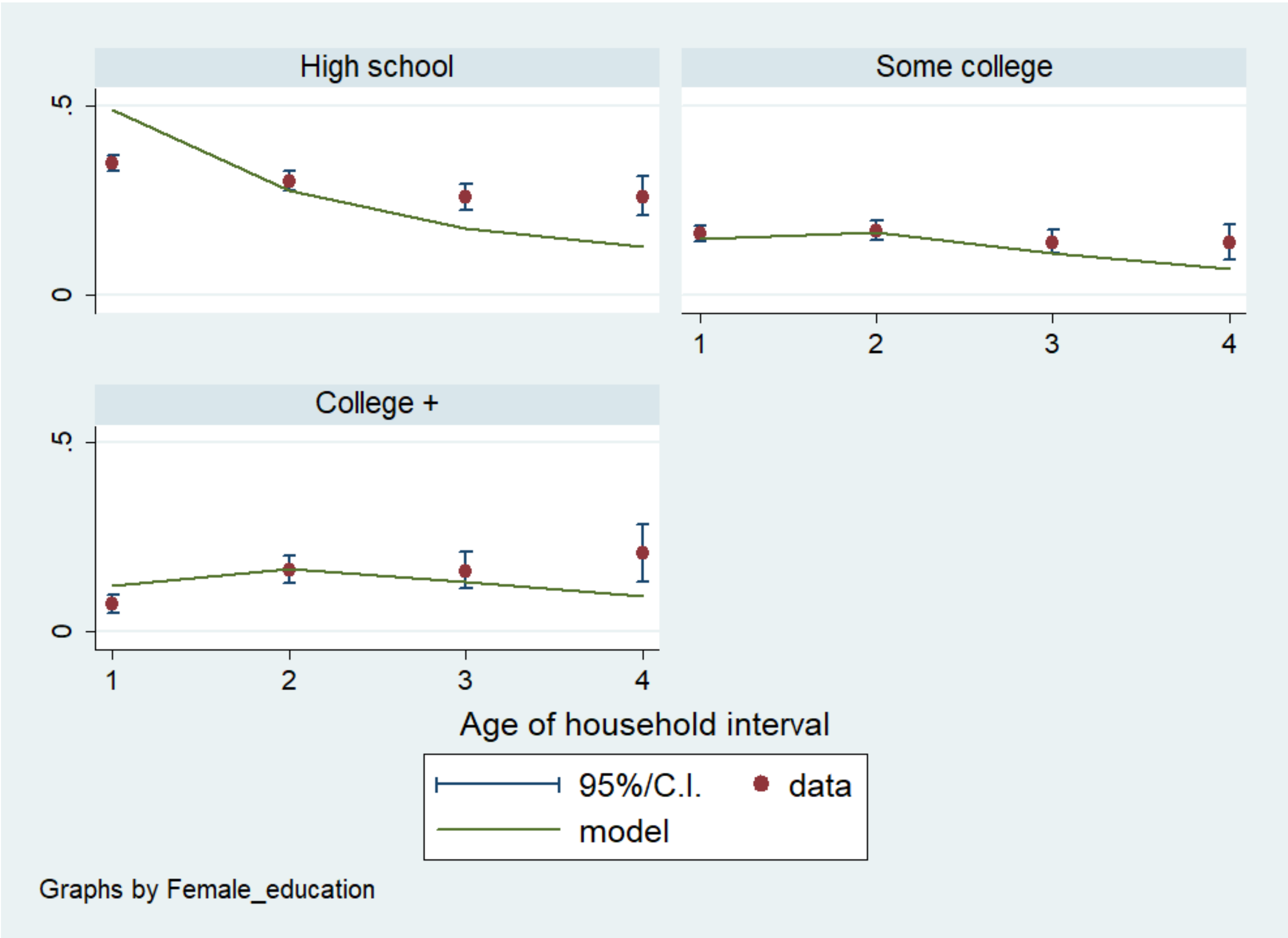
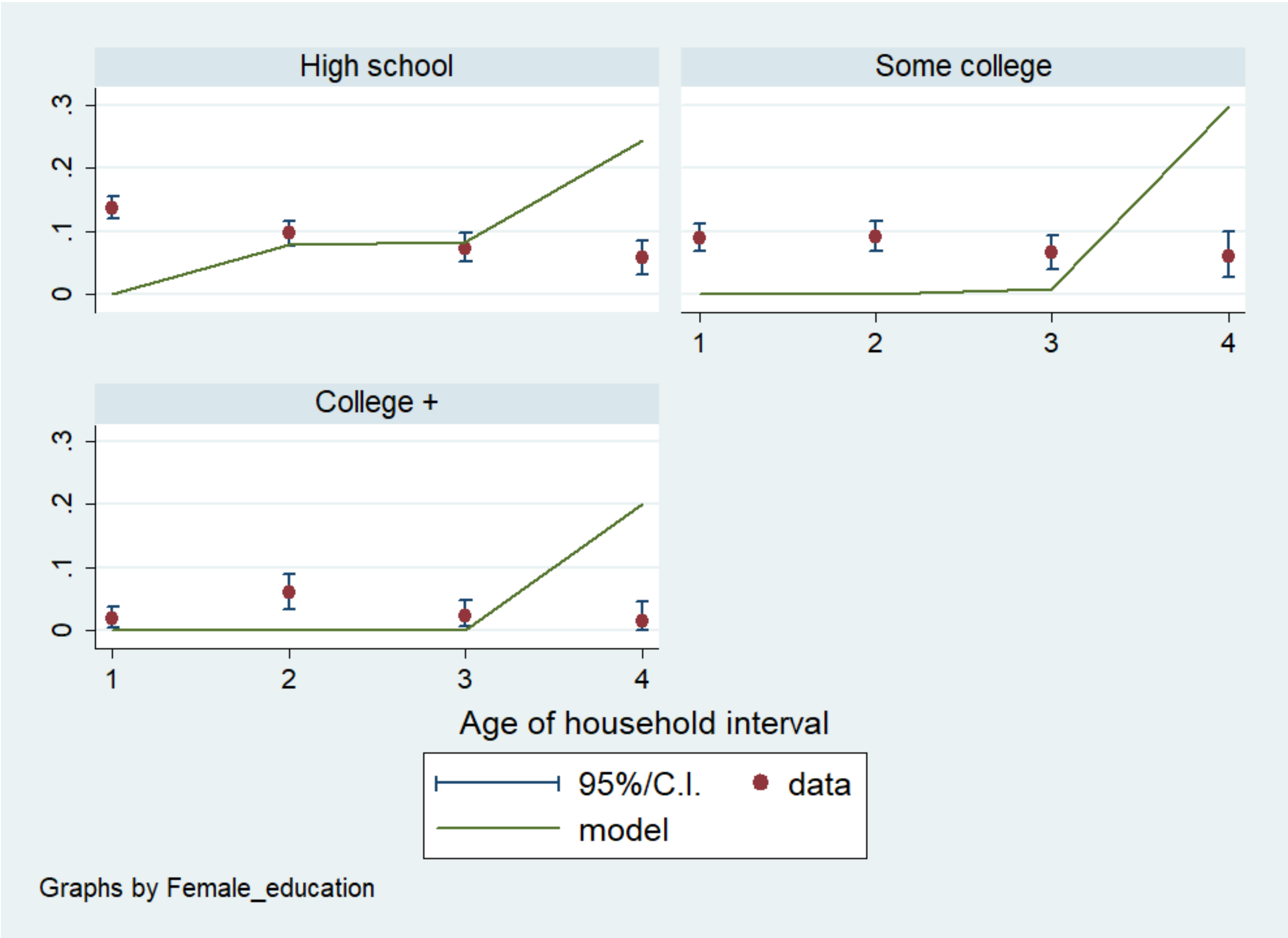


Figure A6: Female divorce probability, by education and interval of household age



Appendix I Sorting patterns conditional on marrying

Table A9: Equilibrium marital sorting patterns under UD and change relative to MCD, by gender and education

Partner's education	**Female education**			**Male education**		
	hs	**sc**	**c+**	**hs**	**sc**	**c+**
hs	0.73 (-0.01)	0.41 (-0.00)	0.18 (0.03)	0.73 (-0.01)	0.44 (0.01)	0.12 (0.01)
sc	0.25 (0.01)	0.47 (0.02)	0.27 (-0.06)	0.23 (0.00)	0.46 (0.02)	0.33 (-0.03)
c+	0.02 (0.00)	0.13 (-0.01)	0.55 (0.03)	0.10 (-0.02)	0.09 (-0.02)	0.55 (0.02)

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. Education types are high school (hs), some college (sc), and college degree or higher (c+). *Partner's education* indicates the education type of the partner. Cells show the UD equilibrium fraction of individuals within each education type *who marry* and choose a partner of education $s \in \{hs, sc, c+\}$. The values in parenthesis show the difference in these fractions across regimes (UD-MCD).

Appendix J Additional analyisis on marital welfare

J.1 Marital choice probabilities

The systematic marital preference is unobserved to researchers. I make the following assumption:

Assumption 1 *β is distributed standard Type I:*

$$\beta^{s_f s_m} \sim TypeI(0,1)$$

At any matrix of female Pareto weights in all types of couples, Λ, the proportion of type s_f females that would choose to marry a type s_m male equals the probability that the vector of marital taste shocks, β, takes values such that s_m is the preferred option for a (random) female of type s_f:

$$\begin{aligned} p_{s_f \to s_m} &= Pr\Big[\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}) + \beta_f^{s_f s_m} > \max_{s \neq s_m}\Big\{\overline{U}_{\mathcal{X}}^{s_f \emptyset} + \beta_f^{s_f \emptyset}, \overline{U}_{\mathcal{X}}^{s_f s}(\lambda^{s_f s}) + \beta_f^{s_f s}\Big\}\Big] \\ &= \frac{exp[\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m})]}{exp[\overline{U}_{\mathcal{X}}^{s_f \emptyset}] + \sum_s exp[\overline{U}_{\mathcal{X}}^{s_f s}(\lambda^{s_f s})]} \times \frac{\mu_{s_f}}{\mu_{s_f}} \qquad (29) \\ &= \frac{\mu_{s_f \to s_m}(\Lambda)}{\mu_{s_f}} \end{aligned}$$

where the second equality results from the Tipe I distribution of β (assumption 1).

For males, the proportion of type s_m males that would choose to marry a type s_f female at the given matrix Λ is analogously derived:

$$p_{s_f \leftarrow s_m} = \frac{\mu_{s_f \leftarrow s_m}(\Lambda)}{\mu_{s_m}}$$

J.2 Additional welfare measures and effects

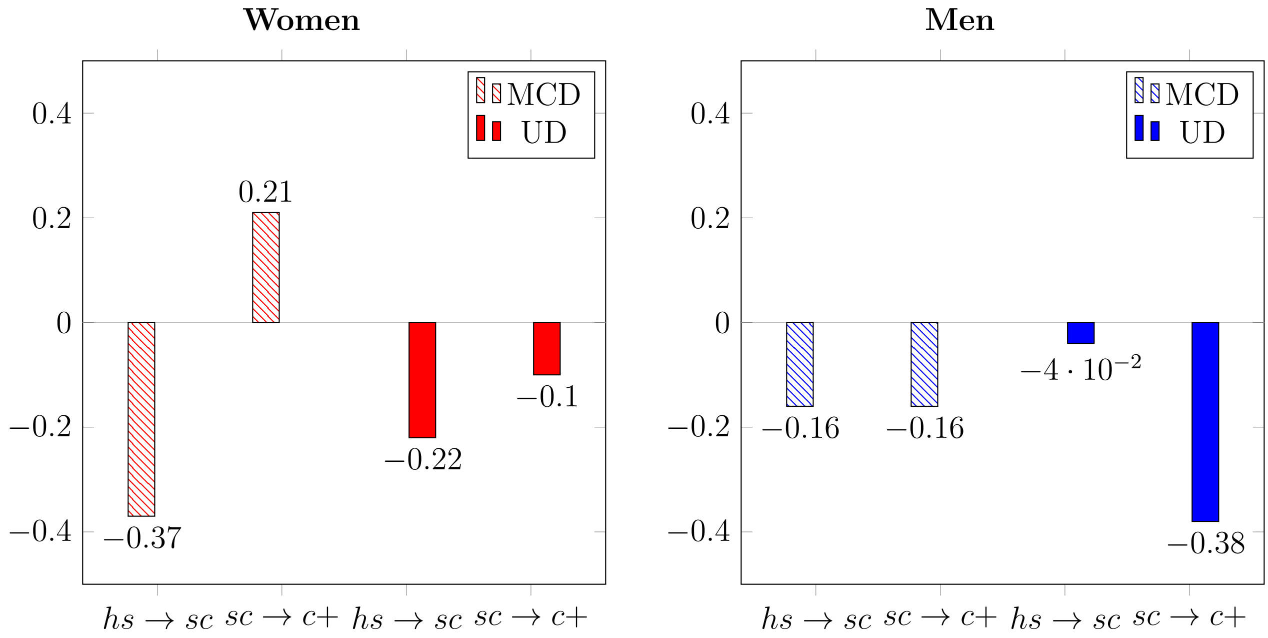
J.2.1 Marital returns to education

The difference in gains from marriage across consecutive education levels is the *marital returns to education* (Chiappori, Iyigun, and Weiss (2009)). For a female type s_f, the marital return to acquiring the next level of education s'_f is:

$$MRE(s_f, \mathcal{D}) = GM(s'_f, \mathcal{D}) - GM(s_f, \mathcal{D})$$

I plot the difference in gains from marriage across education groups in figure A7 for females, in the left panel, and for males, in the right panel. The height of bars is indicated by the figures on top or below bars. The bottom row of each panel indicates the considered change in education, from high school to some college ($hs \rightarrow sc$) and from some college to college plus ($sc \rightarrow c+$). Lastly, striped bars display figures for the estimated mutual consent regime while solid bars indicate figures under the simulated unilateral divorce regime.

Figure A7: Marital returns to education by gender, education, and divorce regime



Notes: the bars plot the change in the gains from marriage that results from increasing the education level to the next consecutive education type, by gender. The gains from marriage are computed as the additional expected lifetime utility of the group on top of the group's value of remaining single (formally derived in section J). Bars labeled $hs \to sc$ indicate the marital returns to education for individuals with at most high school education and bars labeled $sc \to c+$ indicate the marital returns to education for individuals with some college education.

Noticeably, the marital returns to a college plus degree are positive for females under mutual consent divorce and become negative under unilateral divorce. These results imply that the *marital* returns to education decrease for the most educated after the adoption of UD.

J.2.2 Marital welfare

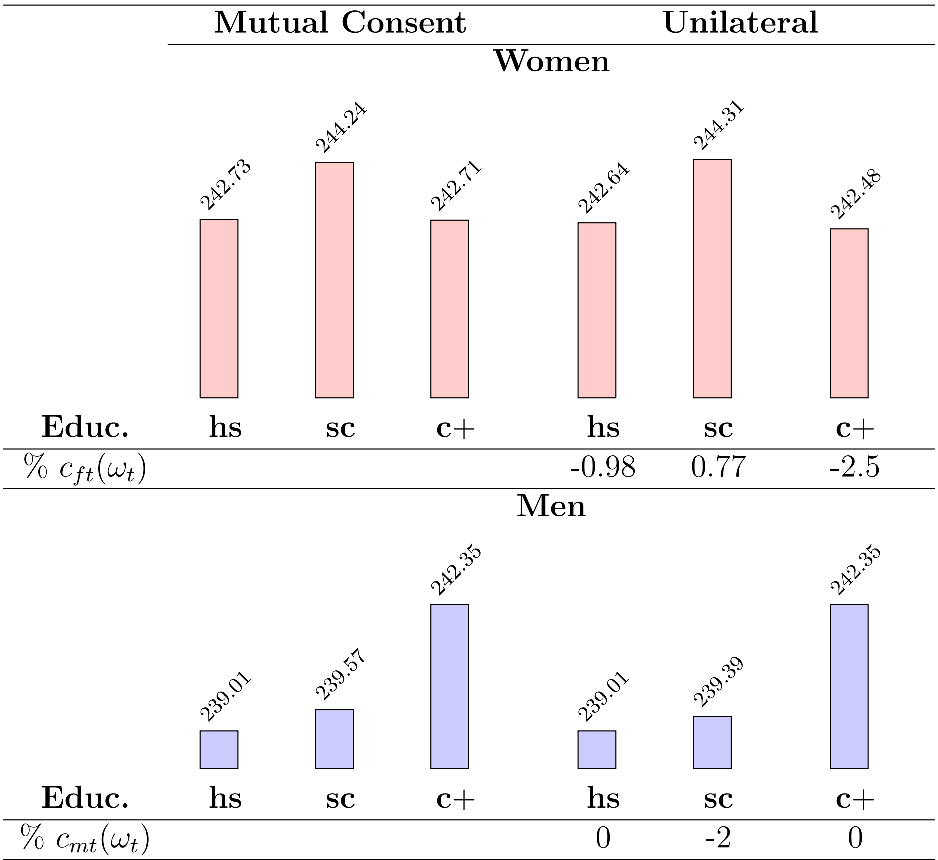
Lastly, the marital welfare is defined as the expected utility from marrying across all possible partner's types, conditional on getting married:

$$Welfare(s_f, \mathcal{D}) = \sum_{s_j} p_{s_f \to s_j | s_j \neq \emptyset} \overline{U}_{\mathcal{X}}^{s_f s_j}$$

This is plotted in figure A8. The figure has the same structure as figure 2 in the main text.

The estimation under mutual consent implies that total marital welfare is highest for women with some college, followed by the lowest educated. The introduction of unilateral divorce increases marital welfare for the some college educated, but decreases marital welfare for the least and the most educated women. For males marital welfare strictly increases with education in both regimes. While high school and college plus males enjoy the same marital welfare under

Figure A8: Marital welfare by gender, education, and divorce regime



Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). The bars depict the marital welfare for the corresponding gender-education group under mutual consent or unilateral divorce regime. The marital welfare is computed as the total expected lifetime utility conditional on getting married (formally derived in section J). % $c_{ft}(\omega_t)$ and % $c_{mt}(\omega_t)$ indicate the percent of private consumption that a female or male (respectively) of the indicated education is willing to pay to be indifferent between the unilateral divorce and the mutual consent divorce regimes.

both divorce regimes, males with some college education see a negative impact of unilateral divorce on the expected utility in marriage.