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

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**Abstract**

Does easier divorce affect who marries whom? I exploit time variation in the adoption of unilateral divorce across the US and show it increases assortative matching among newlyweds. To unravel the underlying mechanisms, I estimate a novel life-cycle equilibrium model of marriage, labor supply, consumption, and divorce under the baseline mutual consent divorce regime. By solving the model under unilateral divorce I find that, consistent with the data, assortative matching increases. Effects are largely due to changes in choices when risk sharing and cooperation within marriage decrease, which highlights the importance of considering equilibrium effects when evaluating family policies.

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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 that drastically reduced barriers to separation. Previous work has found 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 studies the marriage market *equilibrium* effects of this major policy change.

Understanding all of the impacts of divorce regulation is important, given that divorce is a significant aspect of 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 face different incentives and restrictions while married and react by changing their marital choices, relative to those who marry under the baseline divorce regime. This is reflected in a change in the gains from marriage when unilateral divorce is introduced. Hence, this paper 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 between spouses do not affect marriage decisions and patterns.[2] To test this null hypothesis, I exploit quasi-experimental heterogeneity in the timing of the adoption of unilateral divorce by individual states. I show that unilateral divorce increases assortative matching among newlyweds.

To understand the link between barriers to divorce and the equilibrium in the marriage

[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.

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 decide on their labor force participation. 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, working spouses whose partners do not work accumulate relatively more human capital during their lifetime, the value of which may be difficult to share in divorce (Wickelgren (2009); Stevenson (2007); Peters (1986); Parkman (1992); Zelder (1993)); second, as documented in the empirical literature (Del Boca and Flinn (1995); Flinn (2000)), divorcees cannot sustain cooperation in public goods expenditures (interpreted as children's welfare). The main model's predictions are that the introduction of unilateral divorce pushes the marriage market equilibrium toward more positive sorting in education and lower welfare.

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 accurately reproduces the observed matching patterns, frequency of household specialization, and divorce probabilities.

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, household specialization decreases and divorce increases. Third, the gains from marriage decrease for most individuals and particularly for the highest educated women. Allowing couples to divorce unilaterally but with more commitment in marriage or in divorce—features of the mutual consent regime—mitigates these effects. The model is externally validated since the equilibrium effects produced by my simulations are close to or within the range of those observed in the data.

This paper contributes to various strands of the literature. First, by focusing on the *equilibrium* 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 (2014); Stevenson (2007); Oreffice (2007); Chiappori, Fortin, and Lacroix (2002); Mazzocco (2007); Lafortune and Low (Forthcoming)). I do this by embedding a collective life cycle model of household behavior with endogenous dissolution into a static equilibrium model of household formation, which 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 of Guvenen and Rendall (2015) and Fernández and Wong (2017). Guvenen and Rendall (2015) allow 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 while allowing for endogenous selection into marriage. My contributions are, first, to explicitly model a competitive marriage market in which the intra-household allocation of resources is endogenously determined at the time of marriage as an equilibrium market price; second, to allow 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 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 combining an equilibrium model of marriage with the collective model of household behavior, I build on Chiappori, Dias, and Meghir (2018), who develop a unified framework to study premarital 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, and considers the possibility of noncooperative behavior among ex-spouses.[3]

I also extend the literature that empirically quantifies marital welfare—specifically, the seminal contribution of Choo and Siow (2006) and the extension to a multi-market environment by Chiappori, Salanié, and Weiss (2017b), who develop an empirical model

[3]In modeling cooperation within marriage and noncooperation in divorce, my model captures an aspect of the "separate spheres" model by Lundberg and Pollak (1993), in which noncooperation—but within marriage—is the threat point to marital cooperation.

of the marriage market to estimate the gains from marriage. Importantly, these papers rely exclusively on observed matching patterns for identification and estimation.[4] 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.

In my *imperfectly transferable utility* (ITU) framework, the allocation of marital welfare between spouses is jointly determined with the value of the total welfare to be allocated. Consequently, under ITU the parameters of the life cycle behavior of couples cannot be estimated separately from the spousal shares of welfare. To estimate the model, I build on the approach first developed by Choo and Siow (2006) and model the decision whether to marry and whom as a discrete choice problem I take to the data. I apply the extension of discrete choice techniques to ITU environments developed by Galichon, Kominers, and Weber (2019) and previously applied by Gayle and Shephard (2019), by exploiting variation in education supply distributions across US marriage markets. Importantly, I show that my model is identified from observed heterogeneity in education distributions, marital decisions, and households' life cycle labor supply and divorce decisions, across US regions. My empirical framework extends this literature by allowing for divorce in an equilibrium model of household formation and behavior.

My frictionless marriage market model[5] contrasts with stationary search models of marriage.[6] In my framework couples form in a "marketplace" where the welfare distribution between spouses is *endogenously* determined as the vector of utility prices that clears the market—a suitable approach to study how divorce laws affect the equilibrium intra-household allocation. Differently, search models typically must assume an initial value of the allocation of resources.

Lastly, the framework I build in this paper is a contribution in itself because 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,

[4] Chiappori and Salanié (2016) review the literature on empirical approaches to matching models.

[5] Which I build based on Becker (1973); Chiappori, Iyigun, and Weiss (2009); Chiappori, Iyigun, Lafortune, and Weiss (2017a); Choo and Siow (2006); Chiappori, Salanié, and Weiss (2017b).

[6] E.g., Shephard (2019); Mazzocco, Ruiz, and Yamaguchi (2014); Bronson and Mazzocco (2022); Goussé, Jacquemet, and Robin (2017); Greenwood, Guner, Kocharkov, and Santos (2016); Fernández and Wong (2017).

and Worrall (2000) but within an equilibrium framework. This renders 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 novel evidence on the impact of divorce laws on family formation. Section 3 introduces and solves the model. Section 4 discusses estimates and identification under the baseline *mutual consent* divorce regime. Section 5 conducts the counterfactual impact evaluation of introducing unilateral divorce to the marriage market and presents evidence that externally validates the model. Finally, section 6 concludes.

## 2 Empirical evidence

Before the 1960s, most states enforced a *mutual consent* divorce regime (henceforth MCD). Under MCD, individuals in couples have the right to remain married. 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, since this spouse must be *bribed into accepting the divorce*. Starting in 1970, states began adopting a *unilateral divorce* regime (henceforth UD), under which either spouse has the right to seek a divorce without grounds for fault or the consent of their partner. Hence, under UD the distribution of resources *within marriage* favors the spouse who wishes to divorce, since 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 which relies on the assumption that utility in both marriage and divorce is fully transferable (Peters (1986); Chiappori et al. (2015)). Transferable utility means that how 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 empirically rejected.

## 2.1 UD decreases noncontractible marital investments

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, the career capital of one spouse, or professional degrees. Stevenson (2007) provides evidence that newlyweds in UD states are less likely to support *their spouse's* accumulation of human capital and more likely to increase their *own* human capital, relative to newlyweds in MCD states—a feature my model captures.[7]

The evidence that couples who marry 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.[8] Whereas under MCD spouses can reach an agreement on sharing 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 made during the marriage when UD is in place signifies a failure of the transferable utility assumption that implies that the divorce regime may affect investment behavior during marriage.

## 2.2 UD increases assortativeness in education

Divorce laws also affect marital choices. This was first established 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. To do so, I exploit panel variation in the timing of adoption of unilateral divorce (see appendix table F.1 in Voena (2015) for details) as a source of quasi-experimental variation in the right to divorce (a strategy that has been widely exploited in the litera-

[7]Complementing evidence provided by Stevenson (2007), I use Current Population Survey 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. There are 64% specializing households in the baseline MCD states, which decreases by 9 percentage points (14% decrease) when UD is introduced (the effect is significant at the 5% level, clustering standard errors at the state level).

[8]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 face when aiming to allocate the returns to human capital marital investments upon divorce (Sharton, 1990).

ture).[9]

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

$$Ed^w_{mtg} = \beta_0 + \sum_k \left[\beta_1^k UD^k_{tg} + \beta_2^k (Ed^h_{mtg} \times UD^k_{tg})\right] + \sum_g \beta_3^g (g \times Ed^h_{mtg}) + \delta_t + \delta_g + \epsilon_{mtg}. \quad (1)$$

$Ed^w$ and $Ed^h$ denote wife's and husband's years of education at the time of marriage, respectively; $UD^k$ is a set of dummy variables that take value one when UD was introduced (an interval) $k$ years ago, with $k = \Big\{(< -10), (-9, -8), (-7, -6), ..., (-1, -2), 0, (1, 2), (3, 4), ..., (> 10)\Big\}$; $\delta_t$ are time dummies that control for general trends in female education, and $\delta_g$ 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 $\beta_3^g$ between $Ed^w$ and $Ed^h$ (allowed to vary by state in the specification) indicates positive assortative matching on education. Coefficients $\beta_2^k$ measure the extent to which UD changes these sorting patterns for new marriages formed $k$ years into UD. In order to interpret $\beta_2^k$ as the impact of UD on assortative matching, it is important to control for the impact of UD on premarital education decisions. The dynamic specification (1) allows me to distinguish between the *immediate effect* of marrying in states that adopted UD recently—which most likely holds education fixed—from the longer-term effects that may also include changes in education due to UD.

The data come from the Panel Study of Income Dynamics (henceforth PSID) for the years 1968 to 1992. I restrict attention to newlyweds in their first marriage to avoid selection bias due to divorce after UD is introduced.[10]

Figure 1 plots coefficients $\beta_2^k$ (connected blue dots) and their confidence interval (dashed line) for the period prior to adoption ($k < 0$) and the period after adoption ($k \geq 0$).

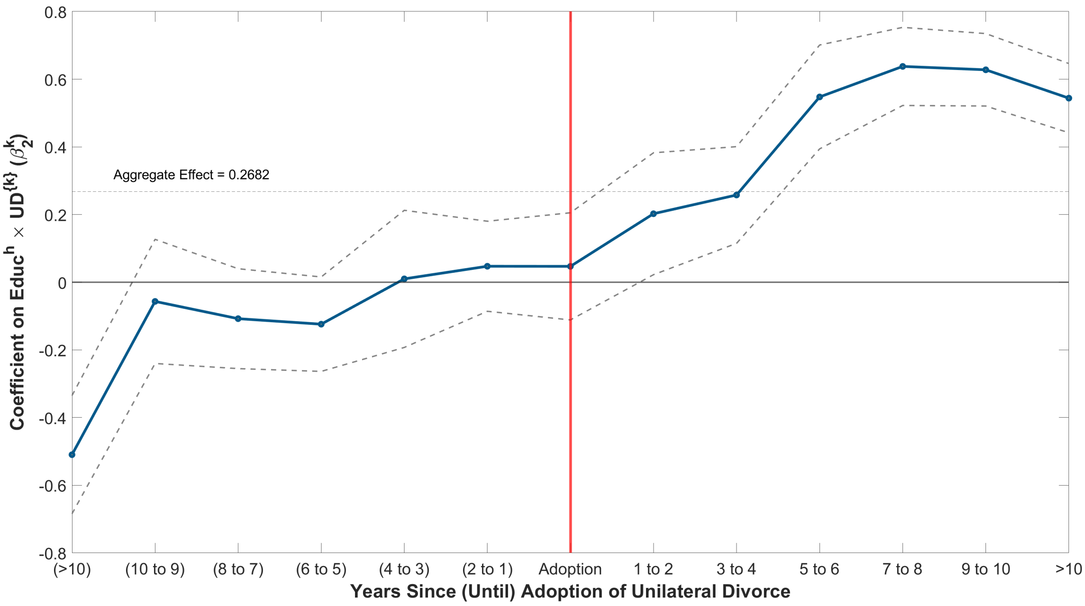
**Overall effects** First, I estimate model (1) by collapsing all years since or until adoption into dummy variable $UD$ that takes value one if UD is in place and zero otherwise.[11] On average at baseline, there is evidence of positive assortative matching in education:

[9] Gruber (2004) was one of the first to address the concern that states that adopt earlier differ 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.

[10] Newlyweds are couples formed within two years of the survey year (Stevenson, 2007).

[11] The model is $Ed^w_{mtg} = \beta_0 + \beta_1 UD_{tg} + \beta_2 (Ed^h_{mtg} \times UD_{tg}) + \sum_g \beta_3^g (g \times Ed^h_{mtg}) + \delta_t + \delta_g + \epsilon_{mtg}$.

Figure 1: Unilateral divorce and assortativeness in education for newlyweds




Every additional year of education for a husband signifies marrying a wife with around an extra 0.25 year of education.[12] On top of this, for newlyweds in UD states, there is an additional increment in assortativeness similar in magnitude to the main average husband's education effect, relative to newlyweds in MCD states (dashed black horizontal line in the figure). The results are significant at the 1% level (all standard errors clustered at state level).

Many newlyweds in my data marry in states that passed UD many years ago. If people react to the introduction of UD by changing their education prior to marriage, the higher similarity in spousal education in UD states could be a combination of changes in both the underlying preferences for partners and "protective" premarital investments in education.[13]

**Immediate and long-term effects** It is interesting, therefore, to understand how the degree of sorting due to UD evolves with years since adoption, as depicted by the estimates of $\beta_2^k$ in figure 1. I find evidence of positive and significant immediate effects that increase over time. Couples who marry in states that adopted UD within two years show an increment in assortative matching of 61.5% relative to the baseline association

[12] These main effects are also highly significant (coefficients and tests not reported in the figure).

[13] In effect, Bronson (2019) shows that gender gaps in college attainment decrease for cohorts who experience the introduction of UD in their early 20s relative to similar cohorts in MCD states. Blair and Neilson (2019) find this is due to a less pronounced reduction in college attainment for women relative to men.

between husband's and wife's education in those years. I interpret these immediate effects as likely reflecting changes in sorting patterns holding the education of individuals fixed at the onset of the UD adoption since two years may be insufficient for individuals to adjust their education in response to UD. The effects increase as states accumulate more years under UD, consistent with the alternative hypothesis that the higher association in spousal education also reflects protective premarital investments. It is worth noting that coefficients are insignificant most years prior to adoption, except for a negative coefficient over a decade preceding adoption, which provides support for the pre-trend identifying assumption.

In appendix A I show the regression outputs associated with figure 1. Moreover, I show that my conclusions are similar and statistically indistinguishable when estimating a reversed specification with husbands' education as the dependent variable, which provides reassurance that the estimated increments in the association in spousal education indeed capture changes in sorting and not in the education distributions (a point made by Gihleb and Lang (2016) and Eika, Mogstad, and Zafar (2019)). Complementing this evidence, in online appendix OA I show that UD also increases correlations in other measures of initial human capital and that conclusions remain similar for newlyweds observed in the Current Population Survey.

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

To unravel the mechanisms and welfare effects underlying the link between divorce laws and marriage patterns, I develop and solve a novel framework of marriage with endogenous dissolution and marital-specific capital accumulation.

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, which 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 $\mu_{s_f}$ and the mass of males of type $s_m$ is denoted $\mu_{s_m}$.

Agents live for $T + 1$ periods (denoted $t$), 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 2—described next—illustrates the life cycle of individuals.

Figure 2: The life cycle of individual $i \in \{f, m\}$ type $s_i$

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

**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. 15 *types* of households could form: nine *types* of couples ($\{hs, sc, c+\}^2$), three *types* of single women, and three *types* of single men.

Individuals who marry move on to a *Household life* cycle. Every period from 1 to $T$ they consume private goods $(c_f, c_m) \in R^2_+$ and public goods $q \in R_+$; and decide on household specialization, $k \in \{0, 1\}$, which takes value zero if the wife works in the labor market and one if she stays at home.[14] From period 2 to $T$, they decide whether to divorce, $D \in \{0, 1\}$, and a divorce transfer $\tau$. Individuals in this model do not save or accumulate assets.

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

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

[14] I only model the extensive margin of female labor supply and assume that men always work in the market. This decision is based on the fact that there is little variability in male hours of work in the data, whereby only 4% of men report zero annual hours, only 10% of men work less than part time, and the majority of men (56.3%) work longer than full time hours (2000 hours per year). In contrast, 25.17% of women supply zero hours to the market and 34.7% work less than 10 hours per week. Focusing on the extensive margin, in addition, significantly reduces the computational time in estimation and counterfactual exercises.

for wives and husbands, respectively. Women gain utility from staying at home through preference parameter $\alpha^{s_f s_m}$ that depends on the education composition of the couple to reflect the observed heterogeneity in household specialization depending on the education of their husbands. $\theta_{(fm)}$ is a couple-specific match quality term that initiates after period one and evolves as a random walk that starts at value $\overline{\theta}^{s_f s_m}$:

$$\theta_{(fm)t} = \theta_{(fm)t-1} + \epsilon_{(fm)t},$$

where $\epsilon_{(fm)t} \sim N(0, \sigma_\theta^{2 s_f s_m})$ and $\theta_1 = \overline{\theta}^{s_f s_m} + \epsilon_{(fm)1}$. The initial match quality and variance of innovation are type-of-couple specific to capture heterogeneity in the noneconomic value of different types of couples. For example, spouses of similar education may be more compatible and have more stable marriages relative to spouses of different education levels.

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 who 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 noncustodial ex-husband to the custodial ex-wife.[15] Divorced women derive utility from private and public consumption according to function

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

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

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

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

$$u_i^\emptyset(c_{it}) = ln[c_{it}].$$

Note that in order to enjoy public goods, an individual must marry.[16]

[15]The model feature whereby transfer $\tau$ is a choice can be easily modified to having, instead, a fixed exogenous transfer to capture, for example, court-mandated alimony payments. I opt to specify $\tau$ 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.

[16]Remarriage is not modeled. Incorporating remarriage in my equilibrium frictionless matching framework is challenging, because it would require individuals to anticipate, at the moment of the first marriage, the outcome of participating in a remarriage market after divorce. This outcome, interestingly, would depend on who else is expected to participate in the remarriage market, making this an interesting avenue for future research.

Moreover, relative to individuals in couples, single-headed households do not enjoy economies of scale in private consumption, meaning that only a fraction $\rho < 1$ of total expenditures in private consumption, $x_t$, translate into consumption units: $c_{it} = \rho x_t$ for singles and divorcees.

**Resources** The behavior of individual $i$ of gender $\mathcal{G}_i = \{\mathcal{X}, \mathcal{Y}\}$ and education $s_i$ influences the resources available to them at time $t$ through the evolution of their human capital $hk_{it}$,

$$hk_{it} = exp\big(a_1^{\mathcal{G}_i}(s_i)exper_{it} + a_2^{\mathcal{G}_i}(s_i)exper_{it}^2 + a_3(s_i)K_{it} \times \mathbb{1}_{\{\mathcal{G}_i=\mathcal{Y}\}} + \varepsilon_{it}\big), \tag{2}$$

which depends on their labor market experience, $exper$, and—in the case of men—their spouses' experience at home $K_t = \sum_{r=1}^{t-1} k_r$.[17] Per-period labor income consists of the market value of total human capital, $W_i(s_i) \times hk_{it}$, resulting in income process

$$lnw_{it} \quad = \quad \ln W_i(s_i) + a_1^{\mathcal{G}_i}(s_i)exper_{it} + a_2^{\mathcal{G}_i}(s_i)exper_{it}^2 + a_3(s_i)K_{it} \times \mathbb{1}_{\{\mathcal{G}_i=\mathcal{Y}\}} + \varepsilon_{it}, \tag{3}$$

where $\ln W_i(s_i)$ is the market price of education $s_i$, $a_1^{\mathcal{G}_i}$ and $a_2^{\mathcal{G}_i}$ parameterize the returns to experience, $a_3$ captures the returns to having a stay-at-home wife for men, and $\varepsilon$ captures a permanent income shock, specified as a random walk with innovation $\xi_{it} \sim N(0, \sigma_\xi^{2\mathcal{G}_i})$.

Coefficient $a_3$—only relevant for men—reflects that household specialization $k$ allows husbands to accumulate more human capital, therefore increasing their lifetime income. 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. In contrast, stay-at-home wives are less experienced in the labor market than working women, so $k$ impacts women's income through $(a_1^{\mathcal{X}}, a_2^{\mathcal{X}})$.

While married, couples pool their labor income. I emphasize that total household income, $w_{ft} \times [1 - k_t] + w_{mt}$, depends on the past and present labor behavior of the wife through the dependence of $w_{ft}$ on $exper_{ft}$ but also of $w_{mt}$ on $K_{mt}$.

Never married and divorcees live off their labor income, $w_{it}$. Ex-spouses' resources in every period consist of individual labor earnings after child support transfers. I also

[17] Factor $\mathbb{1}_{\{\mathcal{G}_i=\mathcal{Y}\}}$ is an indicator which takes value one for men and zero for women.

emphasize that income process (3) implies that ex-husbands continue to enjoy returns to the years they were married to a stay-at-home wife, $K_{it}$, and that ex-wives continue to be penalized for their reduced experience in the labor market if they were stay-at-home wives.

As argued in section 2, spousal support in accumulation of human capital is a marital-specific investment difficult to divide and allocate in the event of divorce, so I interpret $(a_1^{\mathcal{G}_i}, a_2^{\mathcal{G}_i})$ and $a_3$ as capturing the importance of noncontractible marital investments in my model.[18]

## 3.1 Alternatives in the marriage market

At time $t = 0$, women and men meet in a marriage market, in which each decides whether to remain single or the education of a partner. Formally, an alternative in the marriage market is denoted by $s \in \mathcal{S}_0$, where $\mathcal{S}_0$ is the set of alternatives, including that of remaining single $s = \emptyset$,

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

Women and men 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 the *economic* value common to all females who join couple type $(s_f, s)$. 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 (formally stated in Assumption 1 in section 4 below).[19]

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

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

The economic components $\overline{U}^{s_f s_m}$ are endogenously determined by the decisions and allocation of resources between individuals in the household life stage.

[18] I remark that household specialization in my model affects women's utility and spouses' human capital, while related papers on contracting frictions in divorce explicitly model home production (e.g. Lafortune and Low (Forthcoming)).

[19] 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 (2017b)).

## 3.2 Intertemporal behavior of households under two divorce regimes

In every period $t \geq 1$ in the household life stage, individual $i$ is subject to income shocks $\varepsilon_{it}$ and couple $(f,m)$ is subject to 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. The exogenous value of never marrying for individual $i \in \{f,m\}$, $\overline{U}^{\emptyset} \in \{\overline{U}_{\mathcal{X}}^{s\emptyset}, \overline{U}_{\mathcal{Y}}^{\emptyset s}\}$, is

$$\overline{U}^{\emptyset} = E_0 \sum_{t=1}^{T} \delta^{t-1} u_i^{\emptyset}(\rho w_{it}(\varepsilon_{it})) + \overline{\theta}^{s_i}, \tag{4}$$

where the expectation is taken from the moment of household formation $(t = 0)$ with respect to the stream of income shocks, $\delta$ is the discount factor, and $\overline{\theta}^{s_i}$ is a noneconomic lifetime taste from singlehood allowed to vary by gender and education.

### 3.2.2 Potential couples

When they arrive at the marriage market, individuals take as given the utilities any potential partner requires to marry. For example, men type $s_m$ observe female utility prices $\{\overline{U}_{\mathcal{X}}^{ss_m}\}_{s\in\mathcal{S}}$. Similarly, women type $s_f$ observe 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.*

**Couples' decision process in marriage and divorce** Potential spouses commit to delivering these utility prices by choosing an intertemporal contingent allocation of consumption, female labor force participation, divorce, and child support transfers, *collectively.* That is, the contingent allocation is chosen to maximize a weighted sum of spouses' lifetime utilities.

The allocation is contingent on every-period realizations of state variables vector, $\omega_t$, in state space $\Omega_t$, which includes the beginning-of-period-$t$ weight in the wife's expected utility at time $t$, $\lambda_t^{s_f s_m}$, the number of years the wife stayed at home, and period-$t$ income and match quality shocks:

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

Furthermore, I assume that under both divorce regimes, couples also act collectively every period during marriage, but that they stop cooperation during divorce.

Building on the literature, I model divorcees as playing a noncooperative Stackelberg 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)). The ex-wife takes a child support transfer $\tau$ as given and chooses how to allocate her resources between expenditures in private and public goods. The ex-husband takes the ex-wife's public goods expenditure function of $\tau$ as given and decides on a child support transfer. This noncooperative game between ex-spouses has two important implications. First, it usually leads to inefficient levels of expenditures on the public good because the noncustodial parent cannot verify how the custodial parent allocates the transfer between public and her private consumption. Second, noncooperation in divorce also usually leads to inefficient household specialization within marriage, because the ex-spouse who profited from a supporting stay-at-home partner may not share the long-run returns to household specialization. As a result of noncooperation in divorce, my model exhibits imperfectly transferable utility (Chiappori, Iyigun, and Weiss, 2015).

These decision processes of both cooperation in marriage and noncooperation in divorce differ between the MCD and the UD regimes, as I formalize next.

**Household objective and participation constraint** Let $a_t(\omega_t)$ denote an allocation of consumption, household specialization, divorce, and divorce transfers at time $t$ and state $\omega_t$,

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

and let $a = \{\{a_t(\omega_t)\}_{\omega_t \in \Omega_t}\}_{t=1}^T$ be a contingent-upon-$\omega$ intertemporal plan. Moreover, denote by $u_i^M(a_t(\omega))$ and $u_i^D(a_t(\omega))$ individual $i$'s valuation of the period-state allocation $a_t(\omega_t)$ in marriage and divorce, respectively, which functional forms were introduced at the beginning of this section 3.[20] 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

[20] I suppress the time index in $\omega$ to ease notation.

lifetime welfare of at least her *posted* utility price, $\overline{U}_{\mathcal{X}}^{s_f s_m}$:

$$\begin{aligned} \overline{U}_{\mathcal{Y}}^{s_f s_m} = \max_{a \in \{\mathcal{A}_t\}_{t=1}^T} \quad & E_0 \sum_{t=1}^{T} \delta^{t-1} \Big\{ (1-D_t) u_m^M(a_t(\omega)) + D_t u_m^D(a_t(\omega)) \Big\} \\ s.t. \quad [pc_f(\lambda_0^{s_f s_m})]: \quad & E_0 \sum_{t=1}^{T} \delta^{t-1} \Big\{ (1-D_t) u_f^M(a_t(\omega)) + D_t u_f^D(a_t(\omega)) \Big\} \geq \overline{U}_{\mathcal{X}}^{s_f s_m} \end{aligned} \tag{5}$$

The objective function is the expected lifetime utility of the husband, which includes the husband's valuation in period-states of marriage and of divorce. The participation constraint, *[$pc_f$]*, restricts plan $a$ to give the wife a lifetime expected welfare—also derived from periods of marriage and divorce—of at least her posted price $\overline{U}_{\mathcal{X}}^{s_f s_m}$. The multiplier of [$pc_f$] 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 budget constraints** Plan $a$ is also restricted by budget constraints

$$[bc^M]: \ \forall \omega, t > 0 : D_t = 0 : \ \ c_{ft} + c_{mt} + q_t = w_{ft}(\omega) \times [1 - k_t] + w_{mt}(\omega) \quad \text{and}$$

$$[bc^D]: \ \forall \omega, t > 1 : D_t = 1 : \ \ x_{ft} + q_t = w_{ft}(\omega) + \tau_t; \quad x_{mt} = w_{mt}(\omega) - \tau_t$$

in marriage and divorce, respectively. *[$bc^M$]* restricts total expenditures in private and public goods in marriage not to exceed the sum of spouses' earnings. The budget constraint in divorce for the ex-wife indicates that her expenditures on private and public goods do not exceed her earnings plus the amount of child support transfers. For the ex-husband, his expenditures on private goods must not exceed his earnings net of child support transfers.

**Collective household problem under MCD** As introduced in section 2, a distinctive institutional feature of the MCD regime is that *divorce* requires mutual consent. I incorporate this feature by allowing couples to *divorce with settlement*: for the first period after divorce, ex-spouses decide on the efficient levels of private and public goods expenditures, and divorce transfers that make both parties agree on divorcing, if that exists. Thereafter, they interact in the noncooperative way described above. Formally, the divorce settlement restricts plan $a$ to satisfy the incentive-compatibility constraint

*[$ic_i^D$]* and divorce rule *[dr]*:

$$\textit{[}ic_i^D(MCD)\textit{]: } \forall\omega, r>1: D_r = 1: \quad E_r\sum_{t=0}^{T-r}\delta^t u_i^D(a_{r+t}(\omega)) \geq E_r\sum_{t=0}^{T-r}\delta^t u_i^M(a_{r+t}(\omega)), \quad \forall i\in\{f,m\}$$

$$\textit{[}dr(MCD)\textit{]: } \quad \forall\omega, r>0: \quad D_r = 1 \Leftrightarrow \exists\{a_{r+t}\}_{t=0}^{T-r} : [ic_i^D(MCD)] \textit{ satisfied.}$$

The $[ic_i^D(MCD)]$ constraint restricts plan $a$ to be such that, at any period-state $(r,\omega)$ in which divorce occurs, both spouses prefer their allocation in divorce to their allocation in marriage. The divorce rule prescribes that the couple divorces if and only if such allocation exists. This negotiation of the divorce settlement implies an increment in the value of divorce for the spouse who preferred to stay married before the settlement. 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 (2019)).

All in all, the collective household problem under MCD is:

$$\textit{Solve (5) subject to } [bc^M],\ [bc^D],\ [ic_i^D(MCD)],\textit{ and } [dr(MCD)]. \tag{6}$$

The problem under MCD specifies a collective household problem with endogenous divorce and full commitment with the initial female weight in marriage, $\lambda_0^{s_f s_m}$. In appendix B and online appendix OB I describe the model solution by backward induction. To highlight important aspects here, I derive the value of the divorce settlement and non-cooperation in divorce thereafter, the value of staying married, and the decision rule on divorce under MCD.

**Collective household problem under UD** In contrast, the distinctive feature of the UD regime is that any partner can unilaterally end the relationship while *continuing the marriage* requires mutual consent. I incorporate this feature by allowing couples to revise, every period in marriage, the intra-household allocation of consumption between spouses (Mazzocco (2007), Voena (2015), and Bronson (2019)). Formally, the revision within marriage restricts plan $a$ to satisfy the incentive-compatibility constraint *[$ic_i^M$]*

and divorce rule *[dr]*:

$$
\begin{aligned}
&[ic_i^M(UD)]\text{:} \quad \forall \omega, r > 1 : D_r = 0 : \quad E_r \sum_{t=0}^{T-r} \delta^t u_i^M(a_{r+t}(\omega)) \geq E_r \sum_{t=0}^{T-r} \delta^t u_i^D(a_{r+t}(\omega)), \quad \forall i \in \{f, m\} \\
&[dr(UD)]\text{:} \qquad \forall \omega, r > 0 : \qquad D_r = 1 \Leftrightarrow \nexists \{a_{r+t}\}_{t=0}^{T-r} : [ic_i^M(UD)] \textit{ satisfied}
\end{aligned}
$$

The $[ic_i^M(UD)]$ constraint restricts plan $a$ to be such that both spouses prefer their allocation in marriage to their allocation in divorce, at any period-state $(r, \omega)$ in which the marriage continues. The divorce rule prescribes that the couple divorces if and only if no such allocation exists. This enduring updating of the intra-household allocation during marriage implies that whenever one of the partners is tempted to leave, the lifetime utility of the tempted spouse gains more weight in the couple's problem and $\lambda_t^{s_f s_m}$ may differ from $\lambda_0^{s_f s_m}$. 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); Bronson (2019); Shephard (2019); Ligon, Thomas, and Worrall (2000)).

All in all, the collective household problem under UD is:

$$\textit{Solve (5) subject to } [bc^M], [bc^D], [ic_i^M(UD)], \textit{ and } [dr(UD)]. \tag{7}$$

The problem under UD specifies a collective household problem with endogenous divorce and limited commitment with the initial weight on women's utility in marriage.[21] In appendix B and online appendix OB I describe how I solve the model under UD. Importantly, I describe how every period the household searches for a new weight in wife's flow utility to avoid divorce if both parties prefer to stay married at the updated Pareto weight.

### 3.3 Equilibrium in the marriage market

From men-type $s_m$'s perspective, the economic value from marrying a woman-type $s_f$ is a function of her posted price, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, which results from solving problems (6) or (7). Those

[21]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.

values define the ex ante Pareto frontier, $\varphi^{s_f s_m}$, in divorce regime $\mathcal{D} \in \{MCD, UD\}$:

$$\varphi^{s_f s_m} = \overline{U}_{\mathcal{Y}}^{s_f s_m}(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda_0^{s_f s_m}), \mathcal{D}). \tag{8}$$

Moreover, the economic value from not marrying, $\overline{U}_{\mathcal{Y}}^{\emptyset s}$, results from expression (4). After drawing their vector of taste shocks, $\{\beta_m^{s s_m}\}_{s \in \mathcal{S}_0}$, $s_m$-men choose singlehood or the type of partner to maximize total marital value:

$$s \in \mathcal{S}_0 = \arg\max \Big\{ \overline{U}_{\mathcal{Y}}^{\emptyset s_m} + \beta_m^{\emptyset s_m}, \overline{U}_{\mathcal{Y}}^{hs s_m} + \beta_m^{hs s_m}, \overline{U}_{\mathcal{Y}}^{sc s_m} + \beta_m^{sc s_m}, \overline{U}_{\mathcal{Y}}^{c+ s_m} + \beta_m^{c+ s_m} \Big\}. \tag{9}$$

Women on the other side of the market solve an analogous partner choice problem.[22]

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

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

Let $\mu_{s_f \to s_m}(\Upsilon)$ denote the mass of $s_f$ women who, at prices $\Upsilon$, choose to marry type $s_m$ men. Let $\mu_{s_f \leftarrow s_m}(\Upsilon)$ denote the mass of $s_m$ men who, at prices $\Upsilon$, choose to marry type $s_f$ women.[23] An equilibrium in the marriage market is a set of couples and a matrix of prices such that *for all couple-types*, the masses of women and men who want to form that couple-type are equal:

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

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

[22] Note that women can similarly anticipate the value of their marriage market alternatives given men-type prices by solving analogous problems (6) or (7) when the objective function is female lifetime utility subject to a male participation constraint. In other words, by standard assumptions function $\varphi$ can be inverted:

$$(\varphi^{s_f s_m})^{-1} = \overline{U}_{\mathcal{X}}^{s_f s_m}(\overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda_0^{s_f s_m}), \mathcal{D}).$$

Together with knowledge of their value from never marrying and marital taste shocks, females can similarly solve their partner choice problem.

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

Interestingly, the set of utility prices that captures the value of marital alternatives, $\Upsilon$, is endogenously determined by market-clearing conditions in the marriage market. If there is, for instance, an excess demand for women-type $s_f$ from men-type $s_m$, the utility that $s_m$ men must deliver to $s_f$ women, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, will increase. Under the new utility prices, however, the decisions that solve problems (6) and (7) may be different, so $s_m$-men will revise their partner choices at the new prices—therefore affecting the demand for $s_f$ types. Moreover, generally problems (6) and (7) will have different solutions. For example, the divorce settlement period under MCD provides an opportunity for couples to split the future returns of household specialization, but no such contract occurs under UD. As a result, the investing behavior of couples in marriage will generally differ between the two divorce regimes, impacting the value from marriage and, therefore, the partner choice problem. Therefore, the vector $\Upsilon$, the matching of women and men types, $\mu$, and households' optimal contracts $a$ are determined by the divorce regime and market-clearing in all types of couples.

In appendix B I apply the results by Galichon, Kominers, and Weber (2019) to show that the marriage market equilibrium in my model exists and is unique under both divorce regimes.

## 3.4 Model effects of introducing UD

Under UD, there is a tendency towards a higher degree of assortative matching. First, low educated women—who have lower opportunity costs from staying at home—have fewer incentives to specialize under UD, which decreases their attractiveness to high-educated men, relative to MCD. Second, easier divorce under UD increases the attraction of high types to each other—who would divorce less than mixed couples given that complementary spousal incomes makes divorce more costly for homogamous high-type couples. However, in my ITU model, the relative supply of education types determines utility prices and marital values through competition in the marriage market, therefore affecting who marries whom. Hence, the effects of UD on assortative matching may differ across marriage markets with different education distributions.

The welfare effects of introducing UD are also ambiguous. First, fix marriage market prices. 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 affected by own income shocks—as in MCD—but also by their spouse's income shocks that may trigger a welfare-reducing reallocation of consumption between spouses. Second, the changes in behavior induced by the introduction of UD may also change utility prices, affecting the gains from marriage.

Therefore, evaluating the equilibrium impacts of UD requires empirical investigation.

# 4 Estimation

## 4.1 Data and sample

The data source is the Panel Study of Income Dynamics (PSID). Panel data are required to track the history of wives' labor supply and of divorce. Three 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 the introduction of unilateral divorce for each US state from previous papers (see Voena (2015)) and for which the PSID was still an annual survey. Second, I select households I observe forming. In the case of couples, I consider first marriages from the year of marriage, which I observe from the Marriage History PSID supplement. In the case of singles, I follow Chiappori, Salanié, and Weiss (2017b) and consider only never-married individuals who are still single by the age of 40. In appendix C.1 I provide the details of sample selection and how I identify and follow households. Lastly, and importantly, I select data from households that form and remain during the whole sample period in states under the pre-reform *mutual consent* divorce regime (19 states). MCD states provide a promising laboratory for simulating the introduction of UD. In sum, the sample used for internal estimation consists of an unbalanced panel of 3528 households (2817 couples, 400 single women, and 311 single men), for a total of 43322 observations.

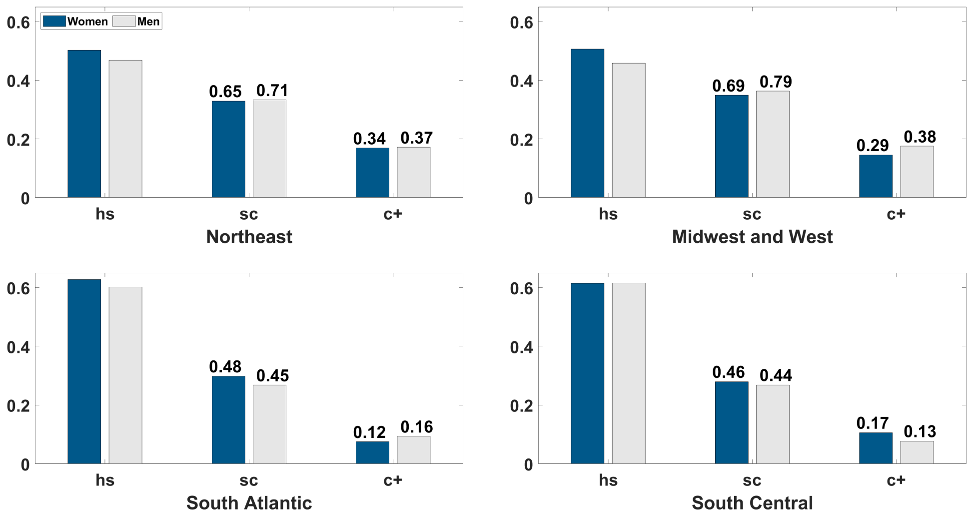
**Four US marriage markets** I exploit variation in education distributions across US regions. Building on Gayle and Shephard (2019), I define a marriage market based on Census Bureau Regions and Divisions, which group states by geographic location. Because of sample size considerations, I define four marriage markets, denoted by $g$:

$$g = \{\textit{Northeast, Midwest and West, South Atlantic, South Central}\}.$$

Table A2 in appendix C.1 lists the MCD states used in estimation within each marriage market and the sample sizes.[24]

Figure 3 presents the share of women and men of education $s$ relative to the number of households with women, by marriage market.[25] Numbers above $sc$ and $c+$ bars indicate the share relative to $hs$. The Northwest and the Midwest and West markets are relatively more educated, with about half women and men with $hs$ education and over one-third of $c+$ educated people for every $hs$ individual. The South Atlantic and South Central markets are relatively less educated with, over 60% of people with $hs$ education and less than one-fifth of $c+$ educated people per $hs$ individual. The South Central market, in turn, has two interesting characteristics. First, women are in highest excess supply, with 0.9614 man per woman, compared with 0.97, 0.99, and 0.963 man per woman in the other markets, respectively. Second, South Central is the only marriage market with an excess supply of women among the $c+$ educated.

Figure 3: Share of women and men of education $s = \{hs, sc, c+\}$, by marriage market




Notes: Education types are high school (hs), some college (sc), and college degree or higher (c+). The bars plot the share of men and women of each education type relative to the number of households with women. Figures above $sc$ and $c+$ bars indicate the share relative to $hs$.

[24]Within each market, I consider all marriages formed in the time frame to be part of the same generation. Unfortunately, the sample size for some types of couples is too small to allow me analyze many generations.

[25]Hence, in each market, the shares of women sum to one and the shares of men sum to the sex ratio, which allows me to illustrate both the relative supply of education types in each market and the gender gaps in those supplies.

## 4.2 Estimation method and heuristics for identification

For the empirical analysis, I consider each decision period $t$ in the model to correspond to three years in the data indexed by the age interval of the household (effectively the age of the *head* of the household). The life cycle lasts $T = 10$ age intervals: $\{\leq 25, [26-28], [29-31], ..., \geq 50\}$.

Estimation of the structural model proceeds in two steps. In a first step, I set the values of those parameters that are identified outside of the model to the levels estimated by either me or in the literature (assumption 1):

**Assumption 1** *The idiosyncratic marital preference shock is distributed standard Type I:* $\beta_i^{s_f s_m} \sim TypeI(0,1)$, $i \in \{f, m\}$. *Moreover, the ex-husband's utility weight on the public good,* $\gamma$, *the discount factor,* $\delta$, *the consumption scale,* $\rho$, *and the variance of permanent income for men and women,* $\sigma_\xi^{2^{\mathcal{G}_i}}$, *are set at the values described in table A3 in appendix C.2.*

In a second step, I estimate the remaining 33 preference parameters and 21 income process parameters (from model (3)) within the model: nine preferences for stay-at-home wife, $\{\alpha^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; nine standard deviations of the match quality process of couples, $\{\sigma_\theta^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; 15 mean match quality components, $\{\bar{\theta}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, $\{\bar{\theta}^{s_f \emptyset}\}_{s_f\in\mathcal{S}}$, $\{\bar{\theta}^{\emptyset s_m}\}_{s_m\in\mathcal{S}}$; six education prices, $\ln W(s_i)$; 12 parameters of the experience profile of wages, $\{(a_1^{\mathcal{G}_i}(s_i), a_2^{\mathcal{G}_i}(s_i)\}_{s_i\in\mathcal{S};i=\{f,m\}}$; and three returns to spousal experience, $\{a_3(s_m)\}_{s_m\in\mathcal{S}}$. Moreover, jointly in estimation, I compute the 36 initial female Pareto weights, $\{\lambda_g^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, that clear each marriage market.[26]

### 4.2.1 Identification

The model is identified from variation—across marriage markets, within couple types, and within education types—in education supply vectors, marriage patterns, selection into work, and divorce. I present a heuristic argument for identification in online appendix OC.5. First, I follow Gayle and Shephard (2019) and Galichon, Kominers, and Weber (2019) to argue that the initial Pareto weights are identified from variation in education vectors across marriage markets. Intuitively, variation in the supply of education types serves as a distribution factor that allows me to identify the initial Pareto weights

[26]Throughout the paper, I normalize the weights in women's and men's expected utilities in problems (6) and (7) to sum to one. That is, the initial female Pareto weight in couple type $(s_f, s_m)$ and market $g$ is $\lambda_g^{s_f s_m} = \dfrac{\lambda_{0g}^{s_f s_m}}{1+\lambda_{0g}^{s_f s_m}}$ and the male weight is $1 - \lambda_g^{s_f s_m}$, where $\lambda_{0g}^{s_f s_m}$ is the multiplier of restriction $[pc_f]$ in problems (6) and (7) for households in marriage market $g$.

independently of the preference and income process parameters that affect the life cycle of couples. Once the initial Pareto weights are identified, and under assumption 1, identification of the remaining 54 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 labor supply and divorce behavior.

Based on the heuristic proof, I construct 252 moments that aggregate individual choices as a function of parameters and can be measured in the data. The model is overidentified because each parameter is common to all marriage markets $g$ but associated with behavioral moments that vary across $g$. By marriage market, $g$, I construct: the frequency of singles by education (24 moments), the frequency of each type of couple (72 moments),[27] the pooled fraction (over the whole period of marriage) of stay-at-home wives within each couple type (36 moments), the probability of divorce for each couple type (36 moments), average earnings by education and gender (24 moments), and experience and spousal experience earnings profiles by education and gender (60 moments).

### 4.2.2 The method of simulated moments

To estimate the 54 parameters, I apply the method of simulated moments (McFadden (1989); Pakes and Pollard (1989)), subject to market-clearing equilibrium conditions (Su and Judd, 2012). For any parameter vector, $\Pi$, I simulate the model to produce the vector of 252 moments, $mom_{sim}$, that have a data counterpart, $mom_{data}$, and search for the parameter vector that minimizes the distance between simulated and observed moments, subject to market-clearing:

$$\begin{aligned} [\hat{\Pi}, \Lambda(\hat{\Pi})] = \arg\min_{\Pi,\Lambda} \quad & [mom_{sim}(\Pi,\Lambda) - mom_{data}]'\mathcal{V}[mom_{sim}(\Pi,\Lambda) - mom_{data}] \\ s.t. \quad & \forall (s_f, s_m) : \mu_{s_f \rightarrow s_m}(\Pi,\Lambda) = \mu_{s_f \leftarrow s_m}(\Pi,\Lambda), \end{aligned} \tag{10}$$

where $\Lambda = \left\{\lambda_g^{s_f s_m}\right\}_{(s_f,s_m)\in\mathcal{S}^2}$ is the matrix of initial female Pareto weights and $\mathcal{V}$ is a positive semi definite weighting matrix specified as the inverse of the diagonal of the covariance of the data.[28]

[27] The model generates this moment for the nine types of couples from both the choices of women and the choices of men in four marriage markets.

[28] Note that for each set of structural parameters, $\Pi$, we can solve for the market-clearing initial weights. However, as Adda and Cooper (2000) and Gayle and Shephard (2019) remark, it is extremely

### 4.3 Estimation results

Table 1 presents estimates of preference parameters and table A4 of income process parameters. Table 1 reports the number of households (column labeled *Hhs.*) and observations (column labeled *Obs.*), the values of parameters that solve problem (10) (columns labeled *Est.*), standard errors (columns labeled *s.e.*),[29] and the group of moments each estimate is most sensitive to in estimation (columns labeled *Moments*).[30] Each row corresponds to a household type.

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, household specialization increases wives' utility and men's human capital but reduces wives' human capital. Interestingly, the estimates of $\alpha^{s_f s_m}$ are highest for households with *hs* men and lowest for households with *c+* men. Intuitively, when the man is of high education the household gains the most from having a stay-at-home wife in terms of male human capital. Therefore, even a low value of $\alpha$ would induce wives to be out of the labor force. In general, moreover, households with less educated women have a higher taste for staying at home. The fraction of stay-at-home wives is the most important set of moments in pinning down the preference for staying out of work. Columns (6) to (8) show the estimated per-period *noneconomic* value of each type of household. Couples with *hs* and *sc* women have the highest noneconomic values. In my model the complementarity of spousal types in the economic component would induce most couples to be of the same education, so to reflect the observed frequency of off-diagonal couples, the noneconomic component must increase. The lowest value for couples with *c+* wives probably reflects a distaste for marriages in which the wife is more educated than the husband. Columns (12) to

time consuming to solve for equilibria at all points considered within the search procedure over the parameter space and futile at parameter values for which there is mismatch between simulated and observed moments. In practice, therefore, I treat initial 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); Adda and Cooper (2000); Gayle and Shephard (2019)).

[29] Calculated from the variance matrix of estimator vector (10) equal to $\left[D_m'\mathcal{V}D_m\right]^{-1}D_m'\mathcal{V}C\mathcal{V}'D_m\left[D_m'\mathcal{V}D_m\right]^{-1}$, where $D_m$ is the $252 \times 54$ matrix of the numerical partial derivative of moment conditions with respect to each parameter at $\Pi = \hat{\Pi}$—calculated as the simple average of the backward and the forward numerical derivative as proposed by Andrews, Gentzkow, and Shapiro (2017b)—and $C$ is the covariance matrix of the data moments.

[30] I follow Andrews, Gentzkow, and Shapiro (2017a) and Gayle and Shephard (2019) and analyze the sensitivity of estimates to estimation moments by computing $|Sensitivity| = |-\left[D_m'\mathcal{V}D_m\right]^{-1}D_m'\mathcal{V}|$ and multiplying each element by the standard deviation of the corresponding moment.

(14) show the *lifetime* non-economic value of singlehood. The average per-period non-economic taste for singlehood has to be much higher than that of couples to match the observed fraction of singles. This is because the economic value for couples is bigger than for singles due to economies of scale in private consumption, the presence of public goods, and spousal complementarities. 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 because women are in slightly excess supply in the data. As expected, these estimates are most sensitive to matching patterns and marriage stability. 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 is 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.

Table 1: Internally estimated parameters and main sensitivity moments: Preference parameters

| | Sample size | | S-a-h wife preference, $\alpha^{s_f s_m}$ | | | Mean match quality, $\bar{\theta}^{s_f s_m}$ | | | Variance match quality, $\sigma^{2 s_f s_m}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hhs. | Obs. | Est. | s.e. | Moments | Est. | s.e. | Moments | Est. | s.e. | Moments |
| **Household type** | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| Couples ($s_f$,$s_m$) | | | | | | | | | | | |
| **(hs,hs)** | 1178 | 16408 | 12.44 | 0.17 | *sah* | 5.38 | 0.81 | *dp, mp* | 81.08 | 13.67 | *sah, mp* |
| **(hs,sc)** | 393 | 5164 | 7.38 | 0.27 | *sah* | 4.96 | 0.57 | *sah* | 83.15 | 11.57 | *dp, sah* |
| **(hs,c+)** | 46 | 583 | 5.49 | 0.52 | *sah* | 5.31 | 0.58 | *sah, mp* | 26.25 | 3.39 | *sah* |
| **(sc,hs)** | 348 | 4431 | 10.29 | 0.17 | *sah* | 5.82 | 0.69 | *dp, mp* | 46.96 | 5.71 | *dp, mp* |
| **(sc,sc)** | 393 | 4901 | 6.87 | 0.22 | *sah, mp* | 5.53 | 0.62 | *sah, dp* | 51.95 | 6.39 | *sah, dp* |
| **(sc,c+)** | 123 | 1720 | 5.27 | 0.55 | *sah* | 5.32 | 0.57 | *sah, dp* | 32.48 | 7.37 | *mp, dp* |
| **(c+,hs)** | 44 | 545 | 8.69 | 0.21 | *dp, sah* | 4.57 | 0.40 | *sah, mp* | 21.75 | 3.09 | *dp, mp* |
| **(c+,sc)** | 102 | 1305 | 8.16 | 0.17 | *dp, sah* | 4.41 | 0.43 | *sah* | 31.81 | 3.54 | *sah, dp* |
| **(c+,c+)** | 190 | 2309 | 7.72 | 0.19 | *dp, sah* | 4.59 | 0.14 | *dp, sah* | 16.19 | 0.88 | *dp, sah* |
| | | | | | | Taste for singlehood, $\theta^{s_i}$ | | | | | |
| | | | | | | Est. | s.e. | Moments | | | |
| | | | | | | (12) | (13) | (14) | | | |
| Single females ($s_f$) | | | | | | | | | | | |
| **hs** | 213 | 1963 | | | | 152.61 | 6.56 | *sah, mp* | | | |
| **sc** | 143 | 1317 | | | | 151.93 | 6.52 | *mp, sah* | | | |
| **c+** | 44 | 527 | | | | 141.62 | 4.45 | *mp, sah* | | | |
| Single males ($s_m$) | | | | | | | | | | | |
| **hs** | 172 | 1026 | | | | 147.18 | 6.89 | *dp, mp* | | | |
| **sc** | 91 | 702 | | | | 145.92 | 6.32 | *sah, dp* | | | |
| **c+** | 48 | 421 | | | | 146.37 | 6.54 | *sah, mp* | | | |

Notes: $s_f$ and $s_m$ refer to the education of women and men, respectively, which are high school (hs), some college (sc), and college degree or higher (c+). *Hhs.* denotes the number of households used 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 errors calculated as explained in footnote 29; and *Moments*, the group of the two moments with the highest sensitivity measure computed as explained in footnote 30. The group of sensitivity moments are presented in order of importance and are *mp* (matching patterns or singlehood frequencies), *dp* (divorce probabilities), and *sah* (stay-at-home wife frequencies). For example, the two most important moments in the estimation of $\alpha^{hshs}$ are the frequency of couples type $(hs, hs)$ with stay-at-home wives in markets Midwest and West and South Central, so I report their group—*sah*.

Table 2 shows the implied equilibrium initial female Pareto weights in couples with $s_f$ wives and $s_m$ husbands, averaged across markets. The female initial weight is increasing in female education, reflecting that female education is valuable in the marriage market. Moreover, the weight increases when a woman "marries down": Women who marry a lower educated husband are compensated with a higher share of household resources. Interestingly, the woman's weight in $(c+, c+)$ couples is lowest in the South Central market, where $c+$ women are in excess supply relative to $c+$ men (results available in online appendix OD).

Table 2: Initial Pareto weights under MCD, averaged across marriage markets

| | $s_m$ | | |
|---|---|---|---|
| $s_f$ | **hs** | **sc** | **c+** |
| **hs** | 0.50 | 0.43 | 0.37 |
| **sc** | 0.64 | 0.56 | 0.42 |
| **c+** | 0.66 | 0.57 | 0.44 |

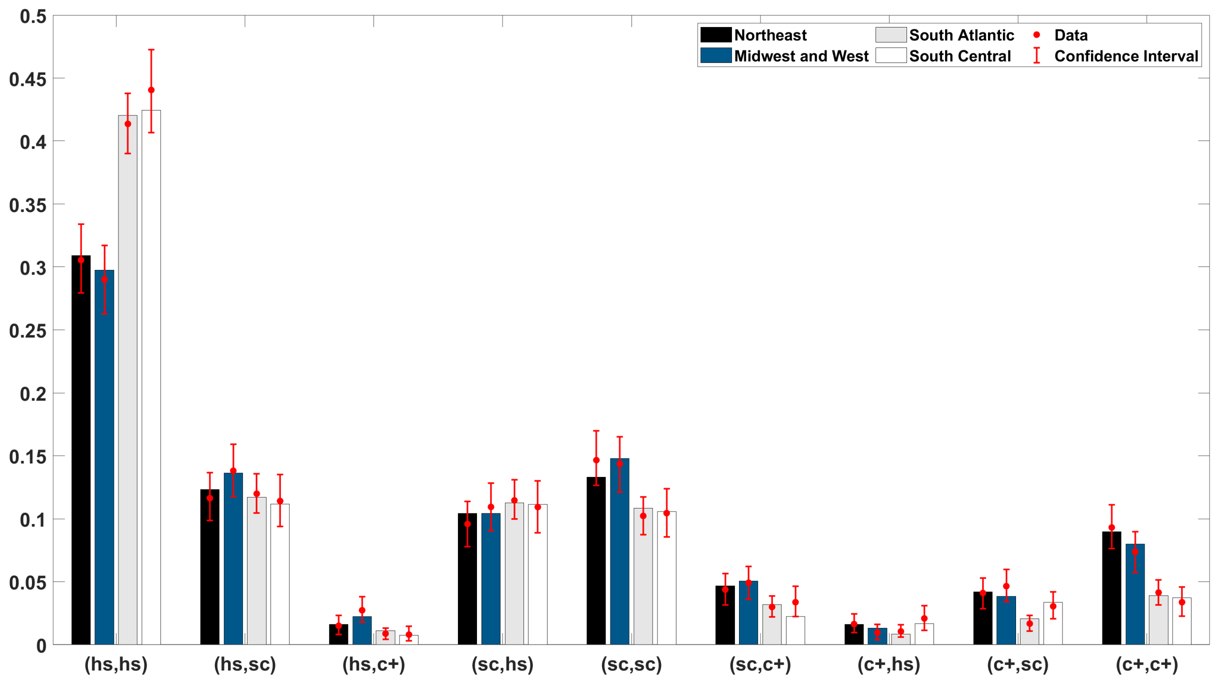
Notes: MCD stands for *mutual consent divorce*. $s_f$ and $s_m$ refer to the education of women and men, respectively, which are high school (hs), some college (sc), and college degree or higher (c+). Each cell shows the weighted average across markets of the MCD equilibrium initial female Pareto weight in couple $(s_f, s_m)$, weighted by market size.

## 4.4 Targeted and untargeted moments

**Targeted moments** The estimated model reproduces equilibrium matches, behavior, and selection into work in all four marriage markets very well. Here I show that the estimated model replicates the matches in the data (figure 4) and appendix C.4 discusses the model's performance in terms of singlehood frequencies, fraction of couples with stay-at-home-wives, fraction of couples who divorce, and earnings. Colored bars in figures represent a marriage market: Northeast (black), Midwest and West (blue), South Atlantic (gray), and South Central (white). Bar heights equal the value of simulated moments from the model evaluated at the MCD equilibrium initial female Pareto weights and estimates; red dots and vertical whiskers indicate the value and confidence intervals in the data, respectively.

As seen in figure 4, the estimated model matches the frequency of each type of couple in the data very closely, and in all cases the simulated frequency falls within the empirical confidence interval. Importantly, the estimated model is in equilibrium since the fractions of couples simulated from women choices equal those simulated from men choices.

Figure 4: Frequency of couple type $(s_f, s_m)$ in the model and the data by marriage market




Notes: $s_f$ and $s_m$ refer to the education of women and men, respectively, which are high school (hs), some college (sc), and college degree or higher (c+).

Moreover, in appendix C.4 I show that the model replicates very well the frequency of singles and the life cycle behavior of couples in all four marriage markets. This renders the model suitable for performing counterfactual policy experiments.

**Untargeted dynamic behavior** My model also replicates fairly well the dynamic behavior of couples which was not targeted in estimation. Figure A1 in appendix C.4 shows model's untargeted moments in dashed blue lines, and data moments counterparts in solid blue lines with bootstrapped 95% confidence intervals in dashed gray lines. The top and bottom-left panels show the fraction of women who stay out of the labor market by education and age of household intervals. The bottom-right panel, in turn, reproduces the duration of marriage for the sample who divorces by type of couple in the model and the data.[31]

The model replicates very well the dynamics of female labor supply for the some-college- and college-plus-educated women. For these groups, the fraction of women who stay-at-home are within the confidence intervals from the data and initially increase when households are young. For the high-school-educated women, the model does not capture the decreasing trend over the life cycle observed in the data.

My model also replicates well the qualitative patterns of marriage duration for those who divorce. Just as in the data, couples with college-plus educated spouses last more. However, my model heavily overestimates the duration of marriages for eventual divorcees. A key factor to explain this is that in my model the variance of the match quality does not depend on years since marriage. For example, a specification in which negative shocks to match quality are more frequent at the initial periods in marriage generates more couples to last less in the model, for all couple types. However, such specification not only required additional parameters to be estimated but also proved unsuccessful in matching key moments for my analysis, such as marriage patterns. Another contributing factor is the lack of data on the relationship between divorcees in the PSID, which could help me discipline the value of divorce by age more flexibly.[32]

[31] I did not target these moments because of the small sample size of some types of households when fragmenting the data by market and household age—which implies I construct them pooling all markets together.

[32] The study of the lives of divorcees is an exiting open area of research.

# 5 The equilibrium effects of UD and their mechanisms

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 (which, as shown, accurately replicates the observed marriage market) and fix (i) the fraction of women and men of each education type in each market (figure 3); (ii) pre-set parameters (table A3); and (iii) the parameters from the life cycle of households and income process at the levels estimated under MCD (tables 1 and A4). In this environment, I expose individuals at the time of marriage with the new UD regime and solve for the new marriage market equilibrium. I explore the impact of UD on the initial market-clearing Pareto weights (subsection 5.1), on marriage patterns (subsection 5.2), on equilibrium household specialization and divorce (subsection 5.3), and on the gains from marriage (subsection 5.4).

I first focus on a complete introduction of UD as implemented in the US, which I denote **UD full model**. Recall from section 3 that I model this departure from MCD as (i) ex-spouses divorce without settlement and (ii) in every period, spouses consent to stay married by updating the period's Pareto weight.

To understand the contribution of distinctive features (i) and (ii) in the overall impact, I develop two counterfactual specifications of the UD regime by shutting features (i) and (ii) down one at a time. First, in specification **UD with divorce settlement**, I allow couples to cooperate on a divorce settlement as they would do under MCD, but otherwise they divorce unilaterally. This period of cooperation allows the spouse who does not want to divorce to improve their position in divorce—for example, by receiving transfers that may in part compensate for reductions in human capital due to marital investments and lead to efficient expenditures on the public good. Second, in specification **UD without renegotiation**, I impose that couples commit to the initial Pareto weight during their marriage as they would do under MCD, but still divorce unilaterally. A constant Pareto weight throughout the life cycle reduces individuals' exposure to changes in their spouses' outside options, but also reduces individuals' ability to improve their position in marriage in response to better own outside options.

For all of these specifications—*UD full model*, *UD with divorce settlement*, and *UD* *without renegotiation*—I solve for the new marriage market equilibrium and initial Pareto weights applying the algorithm developed by Gayle and Shephard (2019) and Galichon, Kominers, and Weber (2019).

Finally, I explore how differences in the supply of education across the four marriage markets affect the impact of introducing UD by conducting the whole analysis by marriage market. Because I fix education distributions at baseline levels, these exercises reveal the equilibrium effects of making divorce easier before individuals revisit their (premarital) education choice.

## 5.1 Impact on initial Pareto weights

The introduction of UD reduces the initial female share of household resources in all types of couples. On average, the initial Pareto weights of $c+$-women decrease the most due to UD. The least educated women are the next most affected. Interestingly, in couples with *hs* and *sc* men, a $c+$ degree becomes a handicap for women, whose initial Pareto weight fall below those of *sc* women. Table OA.6 in online appendix OE shows these results.

The reduction in women's position in marriage occurs because when UD is introduced when the *baseline* initial Pareto weights are in place, too many men choose to remain single, which generates an excess supply of women in all sub-marriage markets. To induce men to marry, the share of total marital welfare allocated to women must decrease. This initial imbalance occurs because UD harms men in two important ways. First, divorce becomes more likely and men suffer a decrease in access to public goods enjoyment in divorce. Second, women in marriage increase their labor supply, which reduces the value of divorce for men who accumulate less human capital during marriage. Women's reduction in welfare is mitigated relative to that of men, since women enjoy public goods more exclusively in divorce and arrive with improved human capital due to participating more in the labor market during marriage.

## 5.2 Impact on assortative matching

The introduction of unilateral divorce causes an immediate increment in assortative matching in the marriage market, consistent with the empirical evidence presented in section 2. Building on the literature (most recently, Greenwood, Guner, Kocharkov, and Santos (2016); Eika, Mogstad, and Zafar (2019); Chiappori, Costa Dias, Crossman, and

Meghir (2020a); Chiappori, Costa Dias, and Meghir (2020b)), I explore various measures of assortative matching.[33]

First, in table 3 I explore the excess fraction of marriages in my model relative to what would be implied by random matching, keeping the fraction that marries constant. This measure compares the observed frequency of households that results from individuals' decisions to the frequencies that would result if women and men were randomly paired. Formally, in each of the eight sub-tables by model specification (MCD and UD full model) and marriage market, rows refer to women's education type, columns to men's education type, and cells are computed as $\mu_{s_f \leftrightarrow s_m} - \mu^M_{s_f} \times \mu^M_{s_m}$—where $\mu_{s_f \leftrightarrow s_m}$ is the fraction of couple-type $(s_f, s_m)$ and $\mu^M_s$ the fraction of education group $s$ that marries according to the model specification and market.

[33] This literature discusses the fact that measuring changes in assortative matching is challenging, given that not only the underlying preferences for types of partners change over time or across regions but also the education distribution of women and men. My analysis of changes in assortative matching across divorce regimes, importantly, circumvents these difficulties because it holds population vectors fixed.

Table 3: Excess marriages relative to random matching by marriage market

| | **MCD** | | | **UD full model** | | | **MCD** | | | **UD full model** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Northeast** | | | | | | **Midwest and West** | | | | | |
| $s_f \diagdown s_m$ | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** |
| **hs** | 0.10 | -0.05 | -0.07 | 0.11 | -0.05 | -0.06 | 0.10 | -0.07 | -0.07 | 0.12 | -0.06 | -0.07 |
| **sc** | -0.02 | 0.04 | -0.01 | -0.05 | 0.07 | -0.01 | -0.01 | 0.04 | -0.02 | -0.06 | 0.06 | -0.00 |
| **c+** | -0.06 | -0.00 | 0.07 | -0.07 | -0.03 | 0.09 | -0.04 | 0.00 | 0.06 | -0.06 | 0.01 | 0.06 |
| | **South Atlantic** | | | | | | **South Central** | | | | | |
| $s_f \diagdown s_m$ | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** | **hs** | **sc** | **c+** |
| **hs** | 0.09 | -0.05 | -0.05 | 0.10 | -0.09 | -0.05 | 0.09 | -0.05 | -0.03 | 0.08 | -0.04 | -0.02 |
| **sc** | -0.05 | 0.04 | -0.00 | -0.03 | 0.07 | -0.01 | -0.05 | 0.04 | 0.02 | -0.05 | 0.04 | 0.02 |
| **c+** | -0.04 | 0.01 | 0.04 | -0.02 | -0.00 | 0.04 | -0.06 | -0.00 | 0.04 | -0.06 | -0.01 | 0.03 |

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. $s_f$ and $s_m$ refer to the education of women and men, respectively, which are high school (hs), some college (sc), and college degree or higher (c+). Each cell shows the difference between the fraction of marriages in my model relative to what would be implied by random matching, keeping the fraction that marries constant.

All eight models exhibit positive assortative matching (henceforth, PAM). Indeed, in all specifications diagonal numbers are positive, which indicates that each same-education marriage in my model is in excess of what would be implied by random matching.

Moreover, comparing the degrees of PAM between the MCD and UD full models, we observe an increment in PAM in the first three markets. Interestingly, in most markets this is driven by higher frequencies of $(hs, hs)$ and $(sc, sc)$ relative to random matching, while the fraction of $(c+, c+)$ increases in the Northeast but remains constant across regimes in Midwest and West and South Atlantic. In the South Central market—in which recall that $c+$ women are in excess supply relative to $c+$ men—the introduction of UD causes an immediate *decrease* in the degree of PAM, mainly due to the reduction in the frequency of $(hs, hs)$- and $(c+, c+)$-couples.

A comparison across markets also reveals that the relatively most educated markets exhibit the highest degrees of PAM and the highest increment in PAM due to UD.

The investigation of mechanisms reveals that restoring some of the MCD elements while under UD mitigates or even reverses the increment in sorting brought by UD. To see this, in table 4 I show an aggregate measure of PAM, namely, the ratio of the fraction of same-education couples in my model relative to that fraction under random matching by market and model specification. A value higher than one indicates positive assortative matching. In all markets, a divorce settlement or commitment with the initial Pareto weight while under UD implies lower PAM than under UD full model—which implies a lower increment in PAM due to UD. These results suggest that the higher attraction of likes under UD stems, in part, from the lower cooperation and risk sharing opportunities implied by UD, which, as argued in section 2, reduces security for the less educated spouses in dissimilar couples.[34]

[34] Other measures of PAM also increase due to UD (results available upon request).

Table 4: Ratio of model's share of same-education couples to that share if random matching

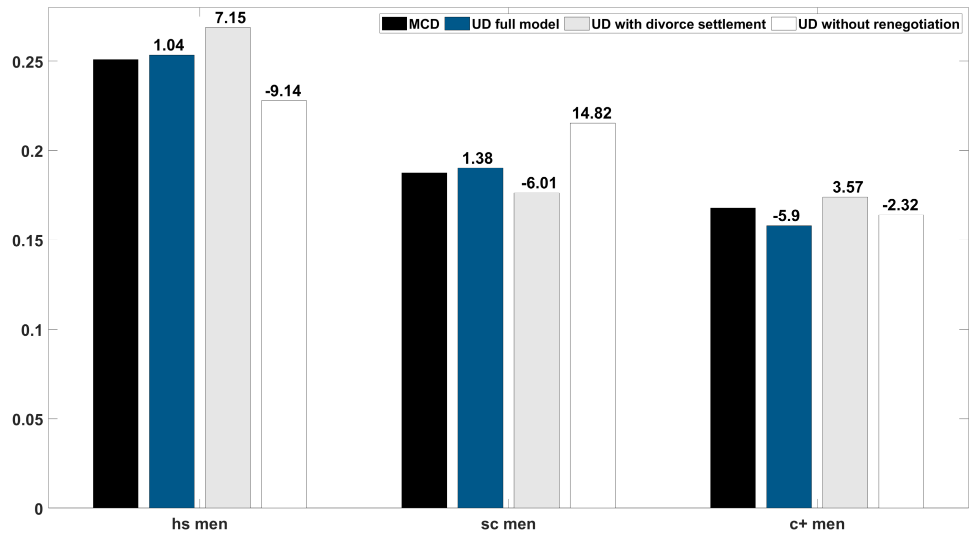
| **Market** | **MCD** | **UD full model** | **UD with divorce settlement** | **UD without renegotiation** |
|---|---|---|---|---|
| Northeast | 1.56 | 1.68 | 1.58 | 1.47 |
| Midwest and West | 1.52 | 1.59 | 1.48 | 1.45 |
| South Atlantic | 1.35 | 1.43 | 1.34 | 1.27 |
| South Central | 1.35 | 1.31 | 1.31 | 1.26 |

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*.

## 5.3 Impact on *Equilibrium* life cycle behavior

My estimated model implies that newlyweds who marry under the new UD equilibrium are less likely to specialize and more likely to divorce.[35]

Figure 5: Share of men married to stay-at-home wives averaged across marriage markets




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+). Numbers above bars represent percentage changes relative to MCD.

Figure 5 shows the fraction of men of a certain education type who live in specializing households averaged across markets. For each education group, the colored bars show the fractions under MCD (black), UD full model (blue), UD with divorce settlement (gray), and UD with renegotiation (white). Figures above bars indicate the percentage change relative to MCD.

The full introduction of UD implies that the share of $c+$-educated men who marry stay-at-home women decreases, on average, by 6% relative to MCD. This reduction stems in part from the fact that under UD these men are more likely to marry equally educated women who are more attached to the labor market and in part because UD induces more women to work in the market. More protection to specializing spouses through divorce

[35]It is important to note that before estimation, the predictions from my ITU model are ambiguous. First, in Reynoso (2017), I show within a simple stylized model that whether UD leads to changes in household specialization depends on model parameters. In this ITU framework, when UD is introduced not only do the marital benefits from household specialization change but also the marriage market Pareto weights, which induces further changes in the incentives to specialize. Second, whether divorce probabilities increase following the introduction of UD also depends on the parameters of the model, as Chiappori, Iyigun, and Weiss (2015) demonstrate. In my model, and at the estimated parameters and equilibrium Pareto weights, there is less household specialization and more divorce when unilateral divorce is introduced.

settlements or commitment with the initial sharing rule (gray and white bars) mitigate the UD effect. Effects are heterogeneous by market for *sc*-educated men (figure OA.2 in online appendix OE). On average, they marry stay-at-home wives more frequently under UD, but effects are driven by the southern markets in which *sc*-educated men marry hs-women—who are more likely to stay at home—at higher rates upon introduction of UD.

Figure 6 shows divorce probabilities by couple type, averaged across markets. Each panel conditions on wives' education levels and varies the husband's education levels. I show the probabilities under MCD and each of the UD specifications, with figures above bars again indicating the (average) percentage change relative to MCD.[36]

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.[37] However, the largest *increments* in the frequency of divorce are observed in couples with $c+$ wives, who nevertheless continue to have the lowest divorce likelihood.

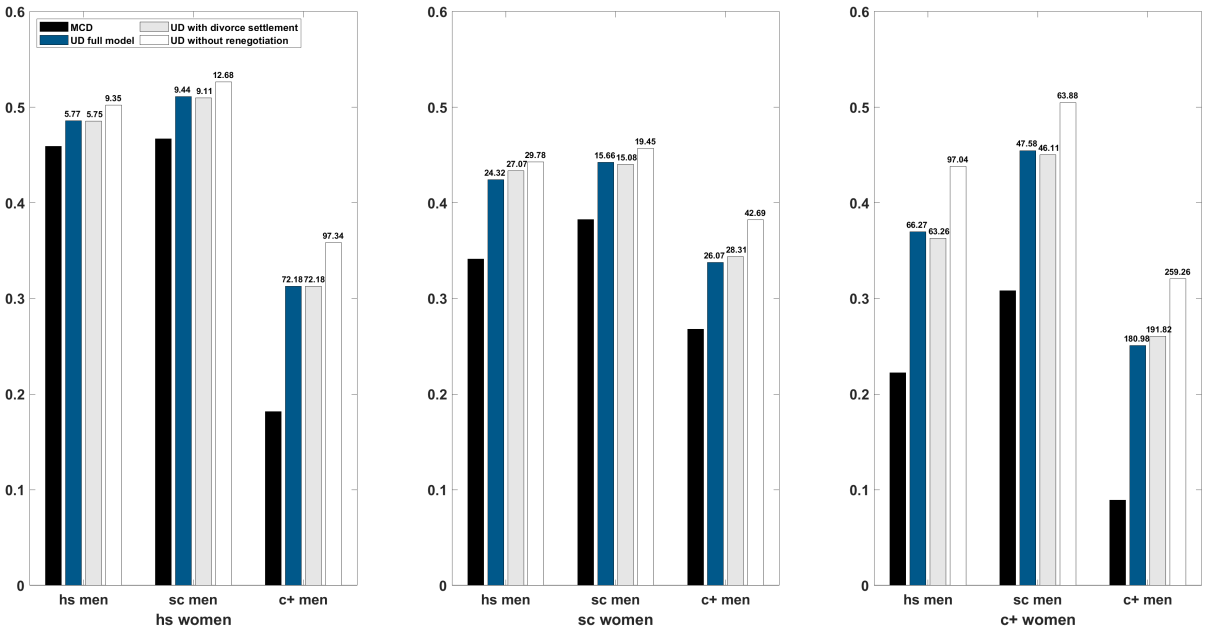
When exploring the underlying mechanisms, divorcing with settlement does not change the probability of divorce under UD. This is because a period of sharing in divorce does not affect the fact that one of the spouses seeks to divorce and no renegotiation within marriage can deter them. Interestingly, but not surprisingly, constraints on renegotiating the marriage contract to avoid divorce increases the likelihood of divorce.

My conclusion that UD increases the probability of divorce compares to that of Wolfers (2006), who finds that after a decade of increment following UD adoption, the *divorce rate* reverts to its baseline steady-state level. Differently from Wolfers' exercise, my results exclude existing couples and keep constant some elements—such as education distributions and other policy changes—that may have evolved over time and that may be the mechanisms behind Wolfers' findings. More importantly, table A6 in appendix D shows that my model replicates very well the effects Wolfers (2006) and Gruber (2004) find for the *stock of divorces*—which is the variable I focus on—on a sample of mostly

[36] I show results at the couple-type level averaged across markets because my model implies insignificant variation in the divorce probabilities across markets but significant heterogeneity in divorce probabilities depending on the education composition of couples.

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

Figure 6: Divorce probability, averaged across marriage markets, by type of couple




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+). Numbers above bars represent percentage changes relative to MCD.

already married couples.[38]

## 5.4 Impact on gains from marriage

Finally, I explore how the introduction of UD affects the *gains from marriage* (henceforth, GM), that is, the expected benefit of marrying in addition to remaining single before marital preference shocks realize. This is an interesting measure from a policy perspective, because it allows designers to anticipate the welfare effects of the policy change *before* the new generation arrives at the affected marriage market.[39] As described in section 3.4, the effect of UD on the GM is ambiguous since UD implies less restrictions to divorce but also less spousal support and risk sharing opportunities. These two impacts occur together with changes in equilibrium marital patterns and lifetime allocation of resources, both of which in turn affect the value from marriage relative to singlehood.

Figure 7 shows the GM for women averaged across marriage markets, as implied by my model in each specification. The numbers above bars show the percentage change

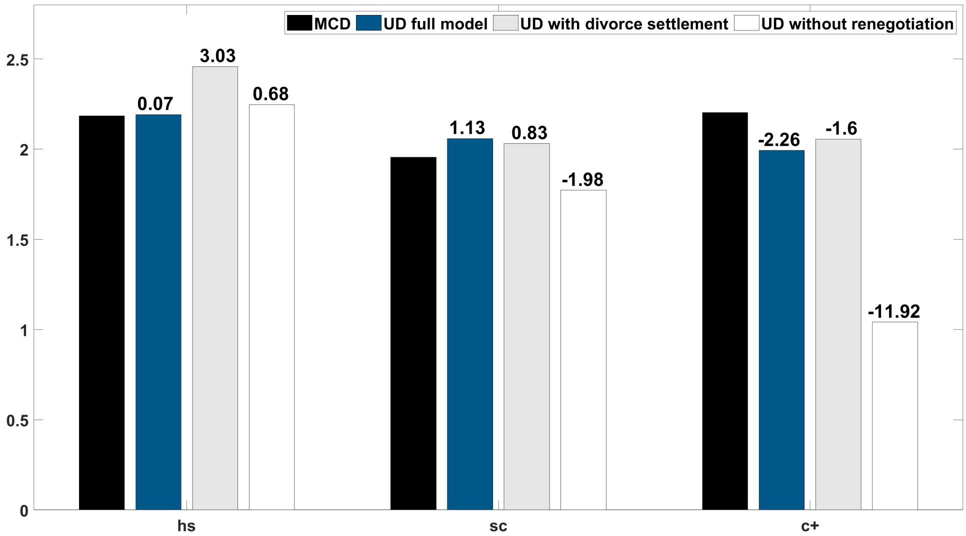
[38] I also check and confirm that my results are not due to numerical error (I expand on this in online appendix OF in which I discuss various robustness checks).

[39] Building on Choo and Siow (2006), I exploit properties of the Type I distribution of marital shocks and compute the gains from marriage for women-type $s_f$ as (and analogously for men)

$$GM_f = E_\beta U_{\mathcal{X}} - E_\beta U_{\mathcal{X}}^{\emptyset} = \ln\Big(\sum_{s \in \mathcal{S}_0} exp[\overline{U}_{\mathcal{X}}^{s_f s}]\Big) - \overline{U}_{\mathcal{X}}^{s_f \emptyset}.$$

in per-period private consumption that would be required for women to be indifferent between the corresponding divorce regime and the MCD one.[40]

Figure 7: Gains from marriage and consumption equivalence for women averaged across markets




*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+). Numbers above bars are consumption equivalence measures (computed as explained in footnote 41).

First, the GM for women are positive under both the MCD and UD divorce regimes.

Second, the GM increase for the middle-educated women when UD is introduced. To maintain the MCD regime, *sc* women require to be compensated by 1.13% of per-period consumption over their lifetime. The most important mechanism is the higher freedom to divorce under UD. To see this, note from the white bars in figure 7 that the GM would decrease relative to MCD when UD is restricted to avoid renegotiation within marriage. This suggests that this group benefits from the flexibility in UD to reap the gains from evolving one's own outside options.

Third, the GM decrease for $c+$ women. In order to maintain the MCD regime, $c+$ women are willing to give up 2.26% of per-period consumption over their lifetime under UD. For this group—which experiences the highest increment in divorce—cooperation in divorce via a divorce settlement mitigates the negative effect of UD on GM. Moreover, restrictions on within-marriage renegotiation also harm this group, because it prevents $c+$-women from reaping the benefits of their favorably evolving outside options. Finally,

[40]This percentage is calculated as $100 \times \pi$, where $\pi$ 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 $\overline{U}(c, \mathcal{D})$ is the expected lifetime indirect utility from consumption $c$ in the divorce regime $\mathcal{D}$ equilibrium.

the drop in GM is biggest in the Southern marriage markets,[41] where $c+$-women are marrying their likes at lower rates, which indicates that the increment in positive assortative matching due to UD contributes to mitigating the negative effects on GM for $c+$ women.

Finally, on average, the GM slightly increase for *hs* women. Both divorce settlements and commitment with the initial sharing rule amplify these effects. For this group there is heterogeneity by market. In the two most educated markets, where *hs* women are significantly more likely to marry *hs* men upon the introduction of UD, they suffer a decrease in their GM under UD relative to MCD. In the least educated Southern markets, where *hs* women are more likely to marry up under UD, their GM improve or only slightly decrease.

### 5.5 External validation and robustness of the model

I provide model-independent evidence in support of my model. First, in appendix D I show that my model reproduces well the impact of UD on assortative matching and on the behavior of *already formed* couples—impacts which were not targeted in estimation. Second, my main results are robust to various alternative model specifications (detailed in online appendix OF).

## 6 Conclusion

This paper quantifies the marriage market *equilibrium* effects of reducing barriers to divorce. I find sizable equilibrium effects, which indicate that UD causes an increment in assortative matching, a reduction in household specialization, and a rise in divorce. Moreover, the gains from marriage are reduced for most groups. To analyze the underlying mechanisms, I restore some of the elements of the MCD regime while keeping divorce as an unilateral decision. My analysis suggests that most of the equilibrium effects of adopting unilateral divorce are due to the lower cooperation and risk sharing opportunities in marriage implied by UD, which reduces incentives for dissimilar couples to match and to engage in efficient household specialization and sharing upon divorce. Hence, policies that restore efficiency within marriage and in divorce may counteract the equilibrium effects of limited spousal commitment.

[41] Results by marriage market are reported in figure OA.3 in online appendix OE.

The novel framework I develop embeds a collective life cycle model of the family in an equilibrium frictionless matching model of household formation. My model significantly extends previous papers in empirically relevant dimensions. The key features of the model include allowing for spousal support in the 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 identified in the data and that I do not target in estimation, and therefore validate the model predictions. Importantly, the model reproduces my novel finding that UD causes assortativeness in education to increase (section 2).

The result whereby the introduction of UD decreases the gains from marriage for *newly formed* couples is subject to some modeling choices. For example, I do not model domestic violence which may provide a force towards increased welfare under UD for a fraction of women (Stevenson and Wolfers, 2006). Furthermore, my analysis excludes potentially positive long-term welfare effects due to narrower gender gaps in labor market outcomes under UD, in which women increase their human capital (Bronson, 2019) and labor force participation.

Despite these caveats, an immediate reduction in welfare may not seem surprising, given that UD implies lower spousal commitment. However, the result raises the question of who voted for UD. My equilibrium framework emphasizes the crucial distinction between the policy impacts 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).[42] My paper captures that new generations entering the marriage market under the new UD regime face different market conditions that imply lower levels of well-being. Hence, it highlights the importance of considering the marriage market equilibrium effects of policies that affect the family and prompts an agenda to investigate the effectiveness of policies and commitment devices that generate welfare improvements within the UD environment.

[42]This is an important point emphasized by Chiappori, Iyigun, Lafortune, and Weiss (2017a) in a different context concerned with changes in alimony laws for cohabiting couples in Canada.

# Appendix A Regression outputs associated with Figure 1

Panel A in Table A1 presents the estimates of the overall specification (in columns (1) and (3)),

$$Ed^w_{mtg} = \beta_0 + \beta_1 UD_{tg} + \beta_2(Ed^h_{mtg} \times UD_{tg}) + \sum_g \beta_3^g (g \times Ed^h_{mtg}) + \delta_t + \delta_g + \epsilon_{mtg}, \quad (11)$$

and of the dynamic model (1) introduced in section 2 (in columns (2) and (4)), where the specifications in columns (3) and (4) also include a state-specific linear trend.

The bottom row labeled "$Ed^h$" reports the average association between husbands' and wives' education at the time of marriage for control states. Rows labeled *"$Ed^h \times UD^k$"* report the additional increment in the spousal correlation in education due to the introduction of UD $k$ years ago (where $k < 0$ indicates the years previous to the adoption of UD).

As described in section 2 in the main text—in which figure 1 plots the coefficients from columns (1) and (2)—the overall, immediate, and long-term additional effects of marrying in a UD state on assortative matching on education are positive, significant, and large. When adding a linear trend the overall effects remain significant and similar in magnitude, and the immediate additional effects of UD become noisier and start showing up later. Some of the years preceding the adoption of UD show a negative and fairly constant additional effect on assortative matching relative to the baseline correlation, but this is not the case in the years closer to adoption. However, I cannot completely rule out that the degree of sorting is trending up in states that eventually adopt UD, so the results should be interpreted under this caveat.

In order to ensure that $\beta_2$ captures the increment in sorting in education due to the introduction of UD, I perform two robustness checks. First, my conclusions are unchanged when controlling for contemporaneous changes in property division laws, which confirms that the increment in sorting is attributable to changes in the grounds for divorce. Second, I verify that $\beta_2$ 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 (2019). As a check, they suggest regressing the reverse specification; for example, for my dynamic model:

$$Ed^h_{mtg} = \beta_0 + \sum_k \left[\beta_1^k UD^k_{tg} + \beta_2^k (Ed^w_{mtg} \times UD^k_{tg})\right] + \sum_g \beta_3^g (g \times Ed^w_{mtg}) + \delta_t + \delta_g + \epsilon_{mtg} \quad (12)$$

If the relative variance of education across genders stays constant across divorce regimes, coefficients $\beta_2$ in both the main and reverse regressions will have the same magnitudes and sign.

Table A1: Unilateral divorce and assortativeness in education for newlyweds (PSID data)—main and reversed specifications

| | Panel A—Dependent variable: $Ed^w$ | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Ed^h \times UD$ | 0.2682*** | | 0.2683*** | |
| | (0.0779) | | (0.0823) | |
| Newlyweds after UD introduced: | | | | |
| $Ed^h \times UD^{\{0\}}$ | | 0.0469 | | -0.0485 |
| | | (0.0808) | | (0.0931) |
| $Ed^h \times UD^{\{1,2\}}$ | | 0.2024** | | 0.0913 |
| | | (0.0919) | | (0.1090) |
| $Ed^h \times UD^{\{3,4\}}$ | | 0.2578*** | | 0.1409* |
| | | (0.0729) | | (0.0837) |
| $Ed^h \times UD^{\{5,6\}}$ | | 0.5476*** | | 0.4367*** |
| | | (0.0783) | | (0.0872) |
| $Ed^h \times UD^{\{7,8\}}$ | | 0.6378*** | | 0.5233*** |
| | | (0.0589) | | (0.0610) |
| $Ed^h \times UD^{\{9,10\}}$ | | 0.6278*** | | 0.5166*** |
| | | (0.0546) | | (0.0408) |
| $Ed^h \times UD^{\{>10\}}$ | | 0.5440*** | | 0.4450*** |
| | | (0.0522) | | (0.0681) |
| Newlyweds before UD introduced: | | | | |
| $Ed^h \times UD^{\{-1,-2\}}$ | | 0.0472 | | -0.0536 |
| | | (0.0679) | | (0.0625) |
| $Ed^h \times UD^{\{-3,-4\}}$ | | 0.0099 | | -0.0915 |
| | | (0.1034) | | (0.1015) |
| $Ed^h \times UD^{\{-5,-6\}}$ | | -0.1240* | | -0.2467*** |
| | | (0.0712) | | (0.0750) |
| $Ed^h \times UD^{\{-7,-8\}}$ | | -0.1077 | | -0.2759*** |
| | | (0.0753) | | (0.0818) |
| $Ed^h \times UD^{\{-9,-10\}}$ | | -0.0567 | | -0.2578** |
| | | (0.0936) | | (0.1267) |
| $Ed^h \times UD^{\{<-10\}}$ | | -0.5097*** | | -0.6543*** |
| | | (0.0891) | | (0.1426) |
| $Ed^h$ | 0.2572 | | 0.2606 | |
| Linear trend | No | No | Yes | Yes |
| Observations | 6125 | 6125 | 6125 | 6125 |

| | Panel B—Dependent variable: $Ed^h$ | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Ed^w \times UD$ | 0.2786*** | | 0.2673*** | |
| | (0.0944) | | (0.0868) | |
| Newlyweds after UD introduced: | | | | |
| $Ed^w \times UD^{\{0\}}$ | | 0.2185** | | 0.1257 |
| | | (0.0850) | | (0.0919) |
| $Ed^w \times UD^{\{1,2\}}$ | | 0.3496*** | | 0.2308** |
| | | (0.0796) | | (0.0934) |
| $Ed^w \times UD^{\{3,4\}}$ | | 0.4137*** | | 0.2954*** |
| | | (0.0779) | | (0.0844) |
| $Ed^w \times UD^{\{5,6\}}$ | | 0.7103*** | | 0.5971*** |
| | | (0.0857) | | (0.0853) |
| $Ed^w \times UD^{\{7,8\}}$ | | 0.7350*** | | 0.6020*** |
| | | (0.0610) | | (0.0556) |
| $Ed^w \times UD^{\{9,10\}}$ | | 0.7981*** | | 0.6536*** |
| | | (0.0592) | | (0.0557) |
| $Ed^w \times UD^{\{>10\}}$ | | 0.7507*** | | 0.6065*** |
| | | (0.0656) | | (0.0689) |
| Newlyweds before UD introduced: | | | | |
| $Ed^w \times UD^{\{-1,-2\}}$ | | 0.1737* | | 0.0569 |
| | | (0.0915) | | (0.0931) |
| $Ed^w \times UD^{\{-3,-4\}}$ | | 0.1737 | | 0.0523 |
| | | (0.1392) | | (0.1356) |
| $Ed^w \times UD^{\{-5,-6\}}$ | | -0.0085 | | -0.1212 |
| | | (0.1208) | | (0.1189) |
| $Ed^w \times UD^{\{-7,-8\}}$ | | -0.1990 | | -0.2664* |
| | | (0.1744) | | (0.1484) |
| $Ed^w \times UD^{\{-9,-10\}}$ | | -0.2207 | | -0.2889* |
| | | (0.1808) | | (0.1623) |
| $Ed^w \times UD^{\{<-10\}}$ | | -0.4334*** | | -0.5243*** |
| | | (0.1458) | | (0.1147) |
| $Ed^w$ | 0.2841 | | 0.2895 | |
| Linear trend | No | No | Yes | Yes |
| Observations | 6125 | 6125 | 6125 | 6125 |

Notes: The sample consists of all newlyweds (couples married within two years of the survey year) in their first marriage. PSID stands for *Panel Study of Income Dynamics*. $Ed^w$ and $Ed^h$ refer to years of completed education for wife and husband, respectively. UD stands for *Unilateral Divorce*. All specifications include year and state dummies. 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.

Panel B of table A1 shows the estimation results of the reversed model. Estimates of $\beta_2^k$ in specifications (1) to (4) are each similar in magnitude and significance across panels A and B. Moreover, I perform a 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 for the overall effects and the immediate effects in the early years of UD (p-values of the four tests range between 0.52 and 0.83). However, consistent with the finding that women change their education differently than men when they face UD (Bronson, 2019), the coefficients that capture marriage over 4 years into UD start showing differences across specifications.

# Appendix B Model solution, existence, and uniqueness

My model is captured by the imperfectly transferable utility empirical framework introduced by Galichon, Kominers, and Weber (2019) (henceforth GKW) so I apply their proof for existence and uniqueness of the marriage market equilibrium to my model.

To do so, I first show in Lemma 1 that the marriage market stage in my model is represented by GKW's *proper bargaining framework*, which is the building block for their result. This means that my model belongs to the class of "proper collective models" as defined by Weber (2022) and can therefore be embedded in an imperfectly transferable utility matching framework to study existence and uniqueness. Second, in Lemma 2 I show that my model satisfies the assumptions in GKW's Theorem 1 for existence and uniqueness.

**The proper bargaining set in my model** First note that the solutions of problem (6)—under MCD—or problem (7)—under UD—define the set of feasible economic lifetime expected utilities of any couple type $(s_f, s_m)$, $\mathcal{F}^{s_f s_m} \in R^2$, for any given $\lambda^{s_f s_m} = \dfrac{\lambda_0^{s_f s_m}}{1+\lambda_0^{s_f s_m}} \in (0,1)$, in which $\lambda_0^{s_f s_m} > 0$ is the multiplier of the participation constraint in those problems:[43]

$$\mathcal{F}^{s_f s_m} = \left\{ (U_{\mathcal{X}}^{s_f s_m}, U_{\mathcal{Y}}^{s_f s_m}) \in R^2 : \quad U_{\mathcal{Y}}^{s_f s_m} \leq \overline{U}_{\mathcal{Y}}^{s_f s_m}(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}), \mathcal{D}) \quad \wedge \quad U_{\mathcal{X}}^{s_f s_m} \leq \overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}) \right\}$$

[43] In footnote 26 I explain that I normalize the initial Pareto weights to sum to one.

To characterize this set, I solve the model by backward induction under both divorce regimes. The detailed solution is derived in online appendix OB, in which I characterize the individual values of every possible marital choice—singlehood (section OB.1) and marriage (section OB.2)—and obtain[44]

$$\begin{aligned}\overline{U}^{s_f s_m}_{\mathcal{X}}(\lambda^{s_f s_m}) &= E(v^M_{f1}(\omega_1)) \\ &= E\Big(ln\Big[\lambda\Big(\frac{\mathcal{W}_1(\omega_1, k^*_1(\omega_1))}{2}\Big)^2\Big] + \overline{\theta} + \epsilon_1 + \delta E\Big[v_{f2}(\omega_2|\omega_1, k^*_1(\omega_1))\Big]\Big)\end{aligned} \tag{13}$$

and

$$\begin{aligned}\overline{U}^{s_f s_m}_{\mathcal{Y}}(\overline{U}^{s_f s_m}_{\mathcal{X}}(\lambda^{s_f s_m}), \mathcal{D}) &= E(v^M_{m1}(\omega_1)) \\ &= E\Big(ln\Big[(1-\lambda)\Big(\frac{\mathcal{W}_1(\omega_1, k^*_1(\omega_1))}{2}\Big)^2\Big] + \overline{\theta} + \epsilon_1 + \delta E\Big[v_{m2}(\omega_2|\omega_1, k^*_1(\omega_1))\Big]\Big)\end{aligned} \tag{14}$$

where $k^*_1(\omega_1) \in \{0, 1\}$ is the optimal stay-at-home wife in period one and state $\omega_1$, $\mathcal{W}_1(\omega_1, k^*_1) = \alpha k^*_1 + w_{f1}(\omega_1)(1-k^*_1) + w_{m1}(\omega_1)$ denotes a conditional-on-$k^*_1$ amount of lifetime resources allocated to period 1 and state $\omega_1$, and where note that the continuation values $v_{f2}(\omega_2|\omega_1, k^*_1(\omega_1))$ and $v_{m2}(\omega_2|\omega_1, k^*_1(\omega_1))$ are the values for women and men of arriving married at period $t = 2$ in which the couple additionally makes a divorce decision (see details in online appendix OB.2.3). Also recall that the initial Pareto weight updates over time.

**Lemma 1** *The couple-type-specific feasible bargaining set from the perspective of the time of marriage, $\mathcal{F}^{s_f s_m}$—described by expressions (13) and (14)—is closed, nonempty, lower comprehensive, and bounded above under both divorce regimes. That is, $\mathcal{F}^{s_f s_m}$ is a proper bargaining set in the sense of* Definition 1 *in GKW.*

**Proof 1 (Proof of Lemma 1)** *First, the set of feasible utilities is* closed *by continuity of the maximum value in problems (6) and (7) under MCD and UD, respectively. This implies that the frontier of the set—described by (13) and (14)—is continuous.*

*Second, the set of feasible utilities is* nonempty *and* lower comprehensive *because couples can always achieve arbitrarily low values of expected lifetime utilities by allocating private consumption in period $t = 1$ and any realization of shocks arbitrarily close to zero.*

[44] To ease notation, in what follows I suppress the dependence on the type of couple when clear from context.

*Such an allocation is attainable with all of the ex-post budgets of period $t = 1$ and trivially satisfies any incentive compatibility constraint of problems (6) and (7) because divorce is not possible at $t = 1$.*

*Third, the set is* bounded above. *To see this, note that in my model, the match quality and income shocks have finite expectations and that the values of staying married and of divorcing under MCD and UD are finite. These features imply that the maximum feasible expected lifetime value that the wife can obtain when the husband obtains any finite lifetime utility $\underline{U_{\mathcal{Y}}}$ is, in turn, finite. Therefore, in any sequence of pairs of husband's lifetime utility $U^n_{\mathcal{Y}} \to \underline{U_{\mathcal{Y}}}$ and wife's lifetime utilities $U^n_{\mathcal{X}} \to +\infty$ there exists a term $N$ arbitrarily large such that for all $n > N$ $(U^n_{\mathcal{X}}, U^n_{\mathcal{Y}})$ is not feasible. The same argument obtains when constructing a sequence such that the wife's lifetime expected utility is bounded below and the husband's utility approaches arbitrarily large numbers.*

*As a result, $\mathcal{F}^{s_f s_m}$ is a proper bargaining set.*

*An alternative argument is worth noting. Conditioning on any possible (not necessarily optimal) history of stay-at-home wife $\{k_t(\omega_t)\} \in \{0, 1\}^{T \times dim(\Omega_t)}$, each "conditional-on-history-feasibility set" is a proper set by the above argument. By GKW's Lemma 2, the feasibility set in my model (which is the union of the conditional-on-history-feasibility sets) is proper.* ■

**Lemma 2** *My model satisfies assumptions 1, 2, and 3 in GKW by the following properties:*

1. *For any couple $(f, m)$ of type $(s_f, s_m)$, the* couple-specific *feasible bargaining set can be written as the coordinate-wise sum of the* couple-type-*specific feasible bargaining set and the idiosyncratic marital taste shocks, $\mathcal{F}^{s_f s_m} \oplus \{\beta^{s_f s_m}_f, \beta^{s_f s_m}_m\}$ (GKW's assumption 1).*

2. *For all female (male) types $s_f \in \mathcal{S}$ ($s_m \in \mathcal{S}$), the maximum utility that this type can obtain in a marriage with a man (woman) type $s_m$ ($s_f$) is finite for all $s_m \in \mathcal{S}$ ($s_f \in \mathcal{S}$) (GKW's assumption 2).*

3. *The idiosyncratic marital shocks have a nonvanishing distribution (GKW's assumption 3).*

**Proof 2 (Proof of Lemma 2)** *GKW's assumption 1 is satisfied by construction because marital taste shocks are additively separable from the economic value of joining a* *certain type of household. My model satisfies GKW's assumption 2 because it has a finite number of periods, the initial and updated Pareto weights are in the set* $(0, 1)$*, flow utilities have a natural logarithm form, the expected values of marriage and divorce at any period are finite, and the continuation values are discounted at a finite rate. Therefore, the maximum lifetime utility a man can obtain with any type of partner occurs when* $\lambda \to 0$*, giving the man finite consumption and finite utility values in all periods (as seen in expression (14)). Similarly, the maximum lifetime utility a woman can obtain with any type of partner occurs when* $\lambda \to 1$*, also giving women finite utility in all periods (as seen in expression (13)). Finally, GKW's assumption 3 follows from my assumption 1:* $\beta_i^{s_f s_m} \sim TypeI(0, 1)$*,* $i \in \{f, m\}$*.* ■

**Existence and Uniqueness** By lemmas 1 and 2, my model satisfies all the conditions for GKW's Theorem 1. As a result, the marriage market equilibrium in my model exists and is unique.

# Appendix C Estimation

## C.1 Sample selection, household identity, and marriage markets

I track the life cycle of households from the moment of marriage, as explained in section 4.1.[45] I increase the sample size by also including married households of heads who I observe for the first time when they are very young—less than 30 years old.

I identify households over their life cycle—including split-off households of married couples who divorce—with the identification number of the sample member. There are two exceptions to this methodology when the household has both the head and the spouse as sample members. First, if spouses do not divorce in the time frame, I use the identification number of head of the household to identify and follow the household. Second, when spouses divorce in the time frame, I identify all the original household, the ex-wife's, and the ex-husband's split-off households with the identification number of the head of the *original* household. Doing this prevents double-counting divorced households or considering a second marriage to be a first one.[46]

[45] The PSID surveys households of *sample* members— members of *original* 1968 surveyed households and of their offspring.

[46] The PSID presents a challenge when following married couples if the couple divorces: There is

The four marriage markets used in estimation are shown in Table A2.

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 to be 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.

Table A2: Description of marriage markets and sample sizes

| Marriage Market | MCD States used in estimation | Hhs. | Obs. |
|---|---|---|---|
| Northeast | Vermont, New Jersey<br>New York, Pennsylvania | 809 | 9685 |
| Midwest and West | Illinois, Ohio, Missouri<br>South Dakota*, Utah* | 810 | 9774 |
| South Atlantic | DC, Maryland, North Carolina,<br>South Carolina, Virginia, West Virginia* | 1254 | 15878 |
| South Central | Mississippi, Tennessee,<br>Arkansas, Louisiana | 655 | 7985 |

Notes: MCD stands for *mutual consent divorce*. *Hhs.* denotes the number of households and *Obs.* the number of observations used in estimation. *State introduced unilateral divorce shortly before the end of my sample period and is included to increase the sample size since the vast majority of couples in these states live under MCD.

## C.2 Pre-set parameters

Table A3 outlines the parameters of the model that I input based on values obtained from the literature or my data, their values, and the source for this information.

Table A3: Pre-set parameters

| **Parameter** | Definition | Value | Source |
|---|---|---|---|
| $\gamma$ | Ex-husband's weight on $q$ | 0.7 | DBF, F, WW |
| $\delta$ | Discount factor | 0.98 | Voena (2015) |
| $\rho$ | Consumption scale | 0.61 | McClements scale* |
| $\frac{\mu_{s_f}}{\mu_f}\|_g$ | Female education measures | $\{0.50, 0.33, 0.17\}\|_1$<br>$\{0.51, 0.35, 0.15\}\|_2$<br>$\{0.63, 0.30, 0.07\}\|_3$<br>$\{0.61, 0.28, 0.11\}\|_4$ | PSID |
| $\frac{\mu_{s_m}}{\mu_f}\|_g$ | Male education measures | $\{0.47, 0.33, 0.17\}\|_1$<br>$\{0.46, 0.36, 0.18\}\|_2$<br>$\{0.60, 0.27, 0.09\}\|_3$<br>$\{0.62, 0.27, 0.07\}\|_4$ | PSID |
| $T$ | Length of life cycle | 10 | - |
| $t$ | Decision period | 3 | - |
| $\widehat{\sigma}_{\xi}^{2\mathcal{X}}$ | Permanent income variance (women) | 0.074 | Voena (2015) |
| $\widehat{\sigma}_{\xi}^{2\mathcal{Y}}$ | Permanent income variance (men) | 0.042 | Voena (2015) |

Notes: DBF stands for Del Boca and Flinn (1995), F for Flinn (2000), and WW for Weiss and Willis (1993).*Anyaegbu (2010). *PSID stands for Panel Study of Income Dynamics.* $\gamma = 0.7$ *matches the average estimated relative willingness to pay for the public good by the husband in the literature. Unavailable data on transfers between divorcees is required to estimate this parameter.*

## C.3 Estimates of the income process

Table A4 presents estimates of the income process parameters from model (3), for each gender and education group. The table reports the number of observations (column labeled *Obs.*), the values of parameters that solve problem (10) (columns labeled *Est.*), standard errors (columns labeled *s.e.*) calculated as explained in footnote 29 and the group of sensitivity moments (columns labeled *Moments*) computed as explained in footnote 30. The estimates indicate that for both men and women the price of initial skills is increasing in their education and experience follows a concave profile for all education groups. Men's returns to experience are increasing in their education; the first period in the labor market increases men's baseline income in between 15% and 30% and every year after the increment slows down in between 1% and 2%. In addition, educated men benefit from a 4% to 5% increase in income for every period they have been married to a stay-at-home woman. Women's returns to experience follow an inverse-U shape in education, whereby labor market entry income increases by 9% for the most educated women and by 12.55% to 13.54% for the less educated. However, income growth decreases less with experience for the most educated relative to the lower educated women.

Finally, experience parameters are most sensitive to women's labor supply—consistent with the heuristic identification argument and the indirect inference strategy. Moreover, the price of education is sensitive to marriage patterns because it is so central to the attractiveness between the different types at the beginning of the household life.

Table A4: Internally estimated parameters and main sensitivity moments: Income process parameters.

| **Individual type** | Obs. | Mean price of education | | | Returns to experience | | | | | | Returns to spousal experience | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | experience | | | $\text{experience}^2$ | | | | | |
| | | Est. | s.e. | Moments | Est. | s.e. | Moments | Est. | s.e. | Moments | Est. | s.e. | Moments |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| Men ($s_m$) | | | | | | | | | | | | | |
| **hs** | 22410 | 8.86 | 0.66 | *dp, mp* | 0.1495 | 0.0434 | *sah* | -0.0120 | 0.0044 | *sah* | 0.0040 | 0.0109 | *sah* |
| **sc** | 12072 | 9.01 | 0.44 | *mp* | 0.1837 | 0.0720 | *sah, dp* | -0.0120 | 0.0029 | *sah* | 0.0484 | 0.0143 | *sah* |
| **c+** | 5033 | 9.29 | 0.54 | *sah* | 0.3012 | 0.1123 | *sah, mp* | -0.0196 | 0.0082 | *sah, dp* | 0.0444 | 0.0346 | *sah* |
| Women ($s_f$) | | | | | | | | | | | | | |
| **hs** | 24118 | 8.81 | 0.43 | *sah, dp* | 0.1255 | 0.0154 | *sah* | -0.0074 | 0.0017 | *sah* | | n.a. | |
| **sc** | 12369 | 9.09 | 0.49 | *mp, sah* | 0.1354 | 0.0166 | *mp, sah* | -0.0087 | 0.0017 | *sah* | | n.a. | |
| **c+** | 4686 | 10.15 | 0.59 | *sah* | 0.0898 | 0.0235 | *sah, dp* | -0.0049 | 0.0017 | *sah* | | n.a. | |

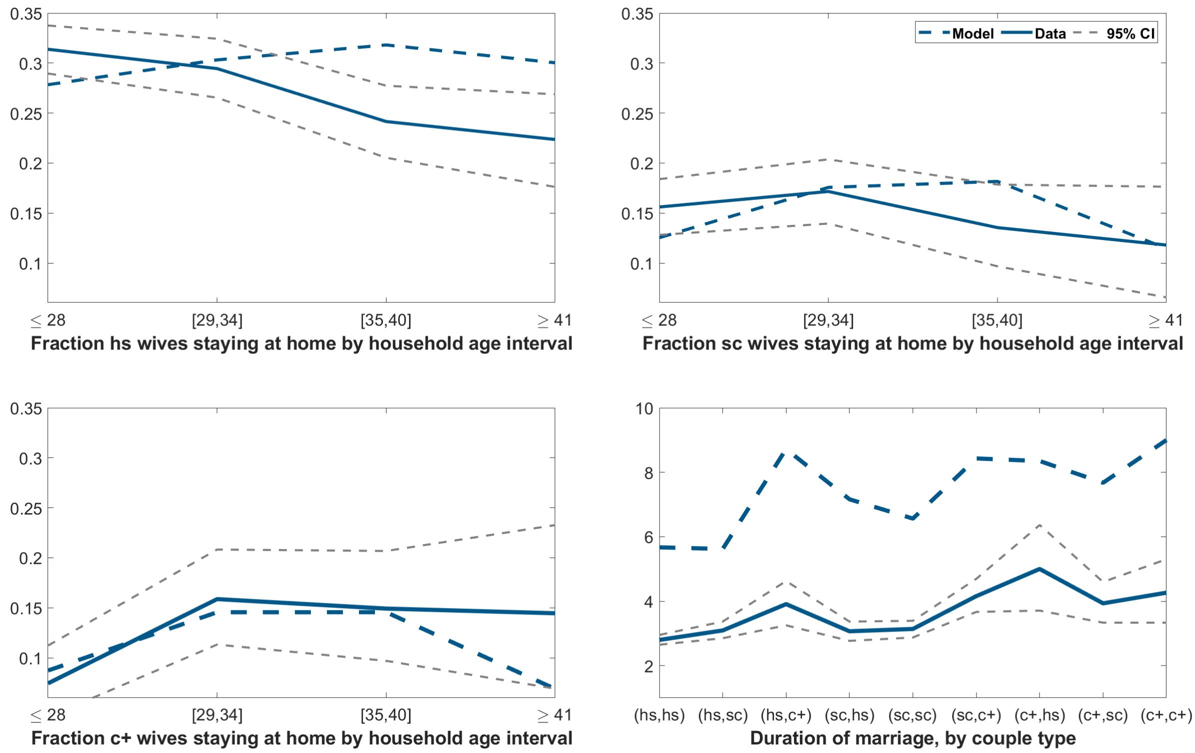
Notes: $s_f$ and $s_m$ refer to the education of women and men, respectively, which are high school (hs), some college (sc), and college degree or higher (c+). *Obs.* denotes the number of observations used in estimation. *Est.* denotes the parameter estimates; *s.e.*, the standard errors calculated as explained in footnote 29; and *Moments*, the group of the two moments with the highest sensitivity measure computed as explained in footnote 30. The group of sensitivity moments are presented in order of importance and are *mp* (matching patterns or singlehood frequencies), *dp* (divorce probabilities), and *sah* (frequency of stay-at-home wives). *n.a.* indicates that the parameter is not relevant for the group in the row.

## C.4 Additional targeted and untargeted moments

The model does a very good job in replicating the observed fraction of singles by education, the frequency of stay-at-home wives, and divorce probabilities. Figure OA.1 in online appendix OD shows that in most markets, the fractions produced by be model are very close in magnitude to the observed fractions and fall within the data confidence interval. Moreover, in all markets the model reproduces well the patterns of earnings observed in the data (table OA.5). For example, in both the model and the data the constant in the earnings equations are higher for women relative to men, reflecting the fact that women who participate accept higher wages.

Additionally, figure A1 shows couples' dynamic behavior—which is untargeted in estimation.

Figure A1: Untargeted moments: equilibrium dynamic behavior under MCD




Notes: *MCD* stands for *Mutual Consent Divorce*. Education types are high school (hs), some college (sc), and college degree or higher (c+). Household age intervals in the horizontal axes of the first three panels group the $T = 10$ age intervals ($\{\leq 25, [26-28], [29-31], ..., \geq 50\}$, as defined in table A3 of appendix C.2 ) in the indicated four groups. *Duration of marriage* is indicated in the vertical axis of the fourth panel and corresponds to the $T = 10$ age intervals.

# Appendix D Validation of the model

I provide out-of-sample validation of my model by showing the effects of UD on new marriages and on already married couples which are untargeted moments in my estimation. In online appendix OF I further discuss model validation by performing various robustness checks.

**Impact of UD on assortative matching** Table A5 shows the change in the correlation in spousal education due to the introduction of UD as predicted by the model (column labeled *Model*) and the same change as observed in the data (column labeled *Data*). To produce the data counterpart of this moment, I consider all newlyweds in their first marriage in the PSID data from 1967 to 1992 and compute the state-year correlation in education of wives and husbands. To reflect closely the model, I define education based on the same categories of education used in my quantitative exercises (high school or less, some college, and college or more). With this data, I run the following regression for state $g$ and time $t$:

$$Correlation(Ed^w, Ed^h)_{tg} = \beta_0 + \sum_k \beta^k UD^k_{tg} + \delta_t + \delta_g + \epsilon_{tg}. \tag{15}$$

Coefficient on $\beta^{\{0,1,2\}}$ captures the immediate effect of UD on assortative matching, which is consistent with the effect computed in the model (see section 2 for a discussion).

Table A5: Impact of UD on the correlation in spousal education types

| **Moment** | Marriage market | Model | Data |
|---|---|---|---|
| | All markets | 3.32% | 8.74%$^{\dagger}$ |
| | Northeast | 8.57% | 18.44% |
| $\beta^{\{0,1,2\}}$ | Midwest and West | 10.51% | 4.68%$^{\dagger}$ |
| | South Atlantic | 0.26% | 80.8% |
| | South Central | -6.47% | $-33.13\%^{\dagger}$ |

Notes: UD stands for *unilateral divorce*. *Model* refers to the simulated effects of UD. *Data* refers to the effect found in the PSID on the sample of newlyweds for years 1968 to 1992. All data-generated effects are statistically significant unless otherwise indicated by $^{\dagger}$not statistically significant.

My model predicts that assortative matching in education among those who marry increase by 3.32% due to UD, which is close to the observed difference-in-differences effect of 8.74%. Moreover, consistent with the data, my model predicts an increment in assorative matching in the Northeast, Midwest and West, and South Atlantic marriage markets, and a decrease in assortative matching in the South Central marriage market. Many of these effects are noisy in the data, probably due to low sample size when computing the correlation by state and year. To increase sample size I perform various robustness checks that support the predictions of the model. First, when I do not restrict attention to newlywed couples the overall immediate effect of UD on spousal correlation in education types becomes significant and similar in magnitude to the effect reported in the first row of table A5. Second, both the overall effects and the effects by market are consistent with those predicted by my model when I run regressions of the effect of UD on the regression coefficient of the education of one spouse on the education of the other (as I show in section 2).

**Impact of UD for already formed couples** I use my estimated model under MCD to quantify the impact of UD for already married couples. I simulate as many households of each type and age at introduction of UD to replicate the fractions observed in the PSID data. I pool together all markets to be consistent with the literature. Column *Model* in table A6 reports the model-generated impact of UD for already married couples in the employment of married women, of newlywed married women, and in the likelihood of divorce. Column *Literature* shows the effects reported in previous empirical studies.

Table A6: Impact of UD for already married couples

| **Moment** | Model | Literature | Source |
|---|---|---|---|
| Employment of married women | -0.001† | [-0.027, -0.034]†<br>0.006† | Voena (2015)<br>Gray (1998) |
| Employment of newlywed women | 0.041 | [0.015; 0.028] | Stevenson (2007) |
| Divorced | 15.4% | 11.6%<br>[9%; 12.1%] | Gruber (2004)<br>Wolfers (2006) |

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 UD effects in my model and *Literature* to those in the literature.

Consistent with 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. 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 life cycle increase their likelihood of employment by 4.1 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 divorced is estimated in between 9% and 12.1% relative to the mean probability in the reduced form analysis by Wolfers (2006) and Gruber (2004), and in 15.4% by my model.[47]

# Appendix E Data availability

Code for replication and instructions to access the data are provided in Reynoso (2024a). This project uses publicly available data from the Panel Study of Income Dynamics (PSID, 2016). Per the PSID Conditions of Use, the cleaned data for this project is saved in repository Reynoso (2024b)

[47] Wolfers (2006) and Gruber (2004) do not restrict attention to couples who married under MCD in their analysis, but because of the years in their data, their results are to a great extent driven by already married couples at UD adoption.

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