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

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Abstract

This paper investigates how the adoption of unilateral divorce affects the gains from marriage and who marries whom. Exploiting variation in the timing of adoption across the US states, I first show that unilateral divorce increases assortative matching among newlyweds. To explain the link between divorce laws and matching patterns, I specify an equilibrium model of household formation, labor supply, private and public consumption, and divorce over the life cycle. Matching decisions depend on the anticipated welfare from marriage and divorce. The model has two key features (consistent with the data). First, working spouses whose partners do not work accumulate relatively more human capital during their lifetime, a fact that improves their outside value of divorce. Second, divorcees cannot sustain cooperation in public goods expenditures (interpreted as children's welfare), leading to inefficiencies that are mostly harmful to the top educated. Under unilateral divorce, the value of divorce becomes a credible threat that shifts the bargaining power in marriage, making both household production and marriage less attractive. This pushes the marriage market equilibrium towards more positive sorting in education and lower welfare, particularly for the highest educated. I estimate the model using data from households that form and live under the pre-reform *mutual consent* divorce regime. Using the estimates, I then introduce unilateral divorce and solve for the new equilibrium. I find sizable equilibrium effects. First, the correlation in spousal education increases and people, particularly educated females, become more likely to remain single. Second, the gains from marriage decrease for the least and the most educated. Lastly, the marital gains from acquiring a college or higher degree decreases for women and men under unilateral divorce. These results reflect previously overlooked consequences of reducing barriers to divorce.

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1 Introduction

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

By uncovering the underlying mechanisms that link changes in divorce laws to marital patterns and welfare, this paper offers a framework for thinking about the design of policies aiming to increase social welfare in an economy with low levels of spousal commitment. Unilateral divorce was supported based on the expected positive effects of allowing individuals the freedom to terminate their marriages if desired. However, my results reveal that this greater flexibility came at the cost of lower spousal commitment, which reduced the incentives to marry and changed individuals' preferences over partners. In turn, I show that these long term changes in the marriage market counteracted the positive effects that higher flexibility was thought to have. This paper, hence, fills an important gap in the discussion of the welfare effects of divorce laws and shows that unilateral divorce is not old news: its long run effects are still affecting the generations entering the marriage market today.

The adoption of unilateral divorce has been modeled by economists as a shift in the bargaining power in marriage from the spouse who wishes to stay married to the spouse who wishes to divorce. Most of the marriage market literature is embedded in the traditional *transferable utility* Becker-Coase framework under which changes in the distribution of property rights among spouses do not affect marriage decisions and patterns.[1] I start by testing this null hypothesis by exploiting heterogeneity in the timing of adoption of unilateral divorce by the individual states as a source of quasi-experimental variation. I show that unilateral divorce increases assortative matching and the proportion of two earner couples among newlyweds. I also show that more people remain single (evidence first established by Rasul (2006)).

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

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

The two key features of the model accord to empirical evidence. First, I estimate the effect of having a non working spouse on male earnings.[2] I use panel variation in property division laws upon divorce to generate exogenous variation in female labor supply, and find large positive effects. Second, in modeling the relationship among divorcees, I follow the related empirical literature. Most notably, Del Boca and Flinn (1995) and Flinn (2000) find support for a non cooperative relationship among ex spouses that I incorporate in the model.

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

Using the estimates, I then simulate the introduction of unilateral divorce and solve for the new equilibrium. I find four main equilibrium effects. First, assortative matching on education increases among those who marry. Second, people, particularly educated females, are more likely to remain single. Third, the gains from marriage decrease for the least and the most educated individuals. The effects are largest for the most educated females. Lastly, the marital

[2] I focus on one earner households where the wife stays at home because the frequency of stay-at-home husbands in the data is too low to identify the converse effect.

welfare gain from acquiring a college or higher degree decreases for both women and men.

These results suggest that unilateral divorce may have unintended *long run* consequences that had been previously overlooked. First, unilateral divorce may have contributed to the rise in income inequality across households by leading to an equilibrium with higher spousal homogamy in education (Greenwood, Guner, Kocharkov, and Santos, 2016).[3] Second, my results suggest that marital welfare decreases for couples formed *after* the adoption of unilateral divorce. Previous papers conclude that unilateral divorce improved the wellbeing of some groups of individuals *already married* at the time of the adoption (see, for example, Stevenson and Wolfers (2006) and Voena (2015). The welfare analysis in my paper, on the contrary, explicitly takes into account that new generations entering the marriage market *after* the reform in divorce laws may face different market conditions and different associated levels of welfare.[4]

This paper contributes to various strands in the literature. First, by focusing on the long run effects of divorce laws on the types of couples that form, I extend the literature that studies how divorce and other family laws impact the behavior of *already formed* couples (Voena (2015), Bayot and Voena (2015), Fernández and Wong (2011), Stevenson (2007), Oreffice (2007), Chiappori, Fortin, and Lacroix (2002)). I do this by embedding a collective life cycle model of household behavior into an equilibrium model of household formation that allows me to quantify the overall welfare in the marriage market. In analyzing these longer run impacts, I build on the contributions by Guvenen and Rendall (2015) and Fernández and Wong (2017). Guvenen and Rendall (2015) allow for the education choice of individuals before entering the marriage market to endogenously respond to changes in divorce laws and quantify the insurance value of education against divorce following the introduction of unilateral divorce. Moreover, Fernández and Wong (2017) analyze the welfare effects of introducing unilateral divorce allowing for endogenous selection into marriage. Like their papers, the welfare effects in my paper are derived from comparing the marriage market outcomes of individuals who entered the marriage market and lived their whole lives under a unilateral divorce regime to the outcomes of individuals in the baseline mutual consent divorce regime. Unlike their papers, in my work I

[3] Greenwood, Guner, Kocharkov, and Santos (2016) find a strong positive trend in the degree of assortativeness in the marriage market between 1960 and 2005 and estimate that income inequality across households would be significantly reduced if the levels of assortative matching had stayed constant at the 1960 levels.

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

explicitly model a competitive marriage market where the bargaining power of spouses at the time of marriage is endogenously determined as an equilibrium market price. Another important point of departure is that my model allows for spouses to make investments in marital specific capital, which endogenously affect the individuals' outside value of divorce and the probability of divorce. This approach allows me to analyze the impact of introducing unilateral divorce on matching patterns (when the education composition of the population is held fixed), on the investing behavior of spouses within marriage, and on the relative bargaining power of spouses in the marriage market.

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

I am not the first to extend the literature by combining an equilibrium model of marriage with the collective model of household behavior. I build on the recent contribution by Chiappori, Dias, and Meghir (Forthcoming), which develops 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,[6] and considers the possibility of non cooperative behavior among ex spouses.

By incorporating these new elements, I depart from the *transferable utility* structure and work, instead, in an *imperfectly transferable utility* (ITU) environment. In the ITU framework, the allocation of marital welfare among spouses is jointly determined with the value of the total welfare to be allocated. This has a practical implication in terms of estimation. On

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

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

the one hand, I follow the standard approach first developed by Choo and Siow (2006) and model the decision of whether to marry and to whom as a discrete choice problem that I take to the data. However, in the ITU framework, the parameters of the life cycle behavior of couples cannot be estimated separately from the spousal allocation of welfare that clears the marriage market. To estimate the model, therefore, I apply the empirical framework developed by Galichon, Kominers, and Weber (2016) and previously applied by Gayle and Shephard (2016) that extends the discrete choice techniques to an ITU environment. Importantly, in my empirical strategy, identification of matching patterns obtains from observed marital decisions and observed households' life cycle labor supply and divorce decisions. Despite the empirical challenge, allowing for divorce in equilibrium models of household formation and behavior is a research priority, considering that the probability of divorce for married females reach levels between 30% and 45% depending on the education of their partner.

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

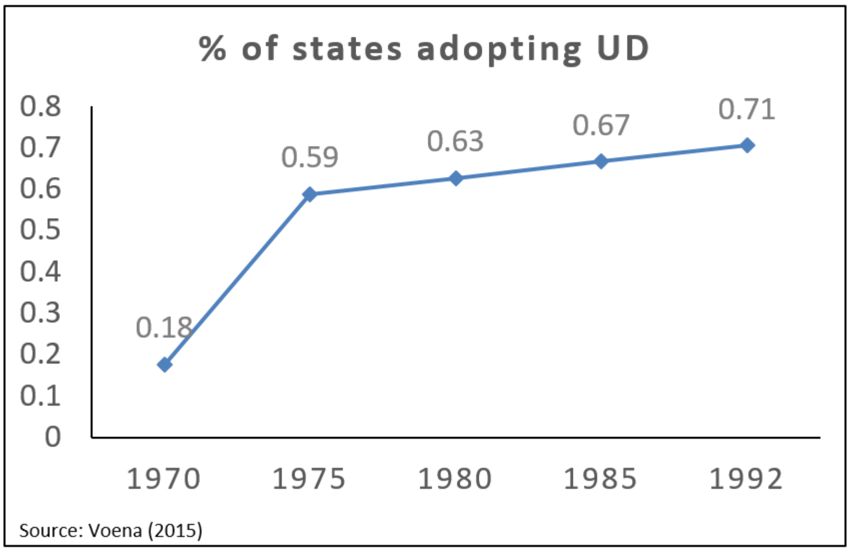
The paper is organized as follows. Section 2 presents some facts and novel evidence on the impact of divorce laws on family formation and behavior. Section 3 introduces the model. Section 4 outlines the solution of the model and the main driving forces. Section 5 derives the welfare measures to be quantified in the data. Section 6 presents the estimation of the model under the baseline *mutual consent* divorce regime and section 7 conducts the counterfactual impact evaluation of introducing unilateral divorce on the marriage market. Finally, section 8 concludes.

2 Empirical evidence

2.1 US divorce laws and how economists think about them

There is important variation in the timing of adoption of unilateral divorce by the individual states. Figure 1 shows the percent of the 50 US states and DC that had adopted unilateral divorce by selected years. Before the 1960s, most states enforced the *mutual consent* divorce regime, under which couples could only be granted a divorce if both spouses agreed to it or if spousal wrongdoing (such as domestic violence or adultery) was proved. Starting in 1970, states began adopting the *unilateral divorce* regime, under which any spouse can seek a divorce without fault grounds or the consent of their partner.

Figure 1: % of US states and D.C. adopting unilateral divorce, by year



The literature treats these two regimes as implying two opposite ways of allocating property rights among spouses. Under mutual consent divorce (henceforth MCD), individuals in couples have the right to remain married, and if one of the parties wishes to divorce, a mutual agreement must be reached. This is reflected in a distribution of resources *in divorce* that favors the spouse who wishes to continue the marriage, as this spouse must be *bribed* into accepting the divorce. Under unilateral divorce (henceforth UD), on the contrary, individuals in couples have the right to terminate their relationship whenever they desire so. If one partner wishes to stay married but the other does not, the marriage can only continue if a mutual agreement on the division of resources within the marriage is reached. Hence, the distribution of resources *within marriage* favors the spouse who has a credible threat to terminate the relationship, as this spouse needs to be *bribed* into staying married.

The variation in the timing of adoption across states has been widely exploited as a source of quasi-experimental variation in the relative bargaining power of spouses to estimate its effects on the behavior of married couples.

Accompanying the changes in legal grounds for divorce, we observe changes in the laws that govern how spouses must divide marital property in the event of a divorce. A recent paper by Voena (2015) exploits panel variation in changes in property division laws and shows significant effects on female labor supply and couples' assets accumulation.

This paper focuses on the effect of changes in the grounds for divorce on the marriage market equilibrium, leaving the investigation of the effects of division of property for future research. To the best of my knowledge, the impact of UD on marriage patterns has not been explored. In the next subsection, I present novel reduced form evidence on the causal effect of UD on assortativeness in the marriage market.

2.2 UD increases assortativeness in education and reduces marriage

In the traditional Beckerian framework often used to study marriage markets (including in most papers in the related literature), laws affecting the distribution of property rights among spouses do not affect who marries whom.[7] In a previous paper (Reynoso, 2017), I present novel evidence that divorce laws in fact do affect who marries whom. I reproduce the main result here.

[7]The result follows from the transferable utility structure of marital welfare. Transferable utility implies that the way in which spouses share their marital output does not change its value. Under transferable utility, moreover, the equilibrium in the marriage market is the set of couples and singles that maximizes the total sum of marital output, which is the same for any distribution of sharing rules within couples.

I estimate the following model for a newlywed couple m, time t, and state s:[8]

$$\begin{aligned} Educ^w_{mts} &= \beta_0 + \beta_1 UD_{ts} + \beta_2 Educ^h_{mts} \times UD_{ts} + \\ &\quad + \beta_3(t) \times Educ^h_{mts} + \beta_4(s) \times Educ^h_{mts} + \delta_t + \delta_s + \epsilon_{mts} \end{aligned} \quad (1)$$

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

The data comes from the Current Population Survey (henceforth, CPS) for years 1965 to 1992 and the Panel Study of Income Dynamics (henceforth, PSID) for the years 1968 to 1992. Figure 2 plots in light grey columns the average effect of husband education on wife education, over states and times (that is, the average of $\beta_3(t) + \beta_4(s)$). Dark grey columns show the sum of these average main effects and the additional effect of husband education on wife education in UD states (that is, the average of $\beta_3(t) + \beta_4(s)$ plus β_2). In both datasets, an additional year of education of the husband increases the education of the wife by over half a year, evidence of strong positive spousal sorting on education (light grey bars in figure 2). Assortative matching in education increases between 15.55% and 22.63% among newlyweds in UD states (in figure 2, this effect corresponds to the difference between dark and light grey bars). The increment in spousal sorting attributed to getting married in a UD state is statistically significant, with a p-value of 0.068 in the sample of newlyweds from the CPS data and with a p-value of 0.049 in sample of newlyweds from the PSID data. All standard errors are clustered at the state level.

In Reynoso (2017) I present various robustness checks that confirm that my estimates of β_2

[8] Newlyweds are couples formed within two years of the survey year. Restricting the analysis to newlyweds allows one to isolate the impact of UD on *matching* patterns from the effect of UD on the investment behavior of already married couples and selection bias driven by the duration of marriage. Because the measures of years of education consider up to a college degree, I restrict attention to couples that marry at or before the age of 25. The results are similar for all newlyweds and are observed for other outcomes (such as parental education or pre-marital labor income). The PSID includes a variable for the education category of individuals, that specifies professional degrees. When the model is estimated using category of education the results remain valid for the whole sample of newlyweds.

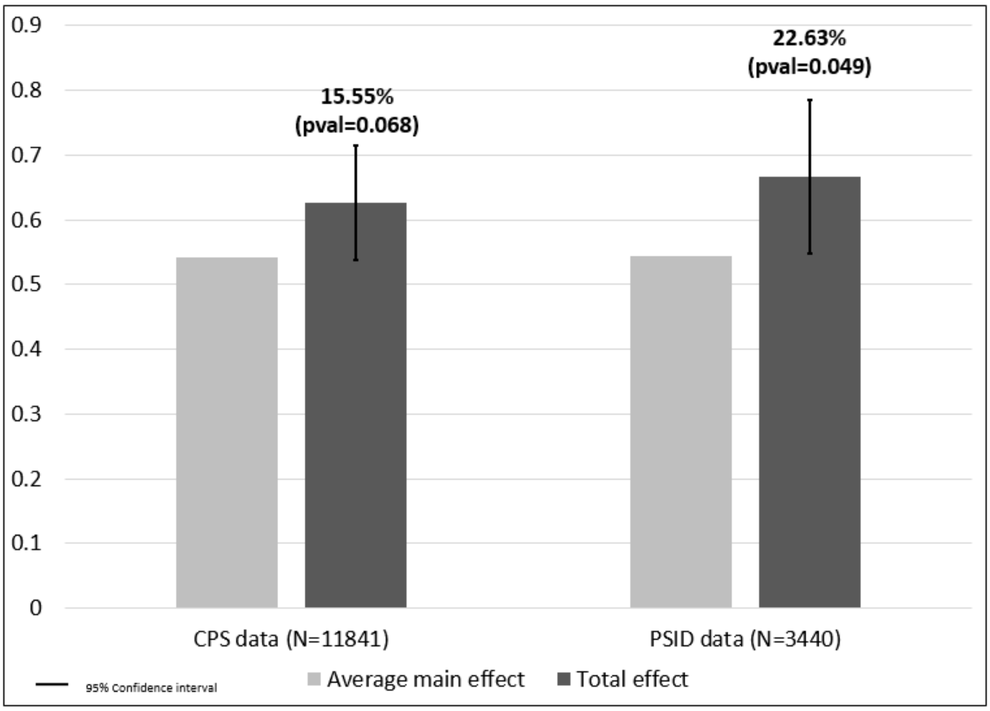
in model (1) are correctly interpreted as the impact of unilateral divorce on sorting in education in the marriage market. First, the effects are similar and remain significant in specifications that include a linear state trend that controls for differential trends across states that explain female education attainment. Second, my conclusions are unchanged when controlling for contemporaneous changes in property division laws, confirming that the increment in sorting is attributable to changes in the grounds for divorce. Third, to rule out the possibility that changes in the effect of husband's education on wife's education (as captured by β_2) are coming from changes in the relative variance of wife's education instead of from changes in the correlation of spouses' education (a concern raised by Gihleb and Lang (2016) and Eika, Mogstad, and Zafar (2017) in a different context), I estimate the reverse of specification (1).[9] The reverse specification has husband's education in the left hand side and wife's education in all the right hand side variables that include an education covariate. In effect, I find that coefficient β_2 in the reverse specification is both similar in magnitude and in statistical significance to the coefficient in specification (1), assuring us that we can interpret coefficient β_2 as the increment in assortative matching due to the introduction of UD.

Not only do those who marry match more assortatively, but also more individuals choose to remain single under UD relative to MCD, as shown by Rasul (2006). His estimates suggest that, after the introduction of UD, the number of marriages per 1000 adults in UD states decrease by 46% of the baseline difference between adopting and non adopting states, and that the number of marriages per 1000 single adults declines by 82% relative to baseline differences.

This evidence rejects the null *neutrality* hypothesis that divorce laws do not affect marriage decisions, as implied by the Becker-Coase framework. In Reynoso (2017), I build a theory that shows that when we consider marital investments with returns that are unverifiable to courts and accumulate in the private account of one of the spouses, divorce laws affect the equilibrium in the marriage market. The reason is that UD induces couples to change their

[9] Gihleb and Lang (2016) and Eika, Mogstad, and Zafar (2017) study changes in sorting over time, while I study changes in sorting across divorce regimes. I address their statistical argument because it is directly applicable to my context. Both papers point out that the main effect of husband's education on wife's education in a specification like (1) is the product of the correlation coefficient between female and male education variables and the relative variance of wife's education to husband's education: $corr(Educ^w, Educ^h) \times \dfrac{Var(Educ^w)}{Var(Educ^h)}$. Hence, changes in the effect of husband's education on wife's education may reflect differences in the relative variance across divorce regimes. As a check, they suggest regressing the reverse specification: if the relative variance is constant across regimes, coefficients β_2 in both the main and the reverse regressions will have the same magnitudes and sign.

Figure 2: Newlyweds match more assortatively in education in UD states



investing behavior in marriage, which impacts their attractiveness in the marriage market. I next present evidence that UD affect these *non-contractible* marital investments.

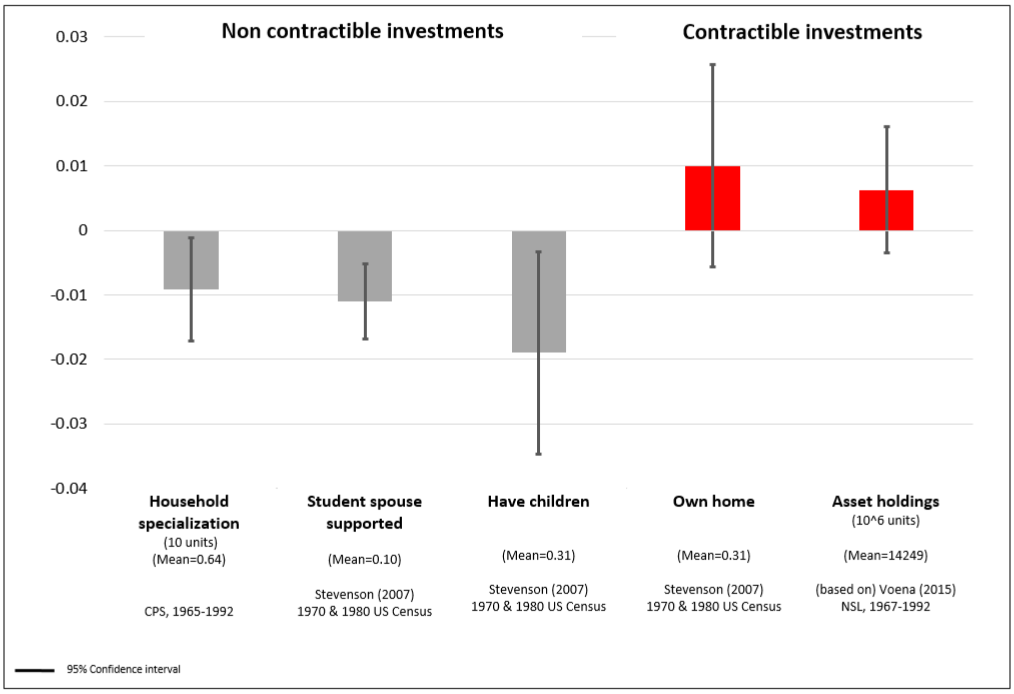
2.3 UD decreases non contractible marital investments

In this section, I reproduce and extend the evidence established by Stevenson (2007) that the introduction of UD causes couples to decrease investments in intangible assets (such as human capital), but not in physical assets. The leading explanation for this pattern is that the introduction of unilateral divorce reduces the commitment of ex spouses to share the capital that was jointly accumulated during the marriage but that is either unobservable or unverifiable. While courts can enforce a division of tangible assets to achieve a certain distribution of resources among ex partners, this may not be implementable with human capital. Spousal human capital is, in this sense, a *non contractible* marital investment that is appropriated by one of the spouses. Stevenson (2007) uses a long differences approach to estimate a regression for newlywed couple m, at time t, and state s, of the form:

$$MI_{mts} = \beta_0 + \beta_1 UD_{ts} + \delta_t + \delta_s + \gamma' X_{mts} + \epsilon_{mts} \quad (2)$$

MI reflects various measures of marital investments, UD takes value one if UD is in place, and X is a vector of various covariates, including couples' characteristics. β_1 captures the effect of UD on the investing behavior of newlyweds. In figure 3, I plot the β_1 coefficient estimate together with the estimated 95% confidence interval for various measures of marital investments.

Figure 3: Less non contractible marital investments in UD states



I consider three types of non contractible investments. *Household specialization* takes value one if one spouse specializes in home production and the other in the labor market. I use newlyweds in the CPS data to estimate model (2) for this outcome. In reporting the significance of effects, all standard errors are clustered at the state level. There are 64% specializing households in the baseline MCD states, a fraction that decreases by 0.09 percentage points (14% decrease) when UD is introduced (the effect is significant at the 5% level). The next two outcomes are taken from table 2 in Stevenson (2007). *Student spouse supported* takes value one if one of the spouses is pursuing an advanced degree while the partner supports them. The baseline of 10% of such households in MCD states is reduced by 1.1 percentage points (11% decrease) in UD states (the effect is significant at the 1% level). Finally, *have children* follows a similar pattern.

The last two outcomes capture marital investments that are easier to allocate in the case of divorce: housing and physical asset holdings. The evidence on housing is also taken from table 2 in Stevenson (2007) while the evidence on asset holdings is own based on the dataset used by Voena (2015). Married couples do not modify these types of investments due to the introduction of UD. It is worth noting that Voena (2015) emphasizes that the asset accumulation behavior of couples does not respond to the introduction of UD, but it is affected by property division laws.

This evidence suggests that when commitment to sharing property upon divorce decreases, couples reduce the accumulation of assets that are difficult to price and allocate among ex spouses by third parties. Specifically, individuals are less likely to invest in the human capital *of their partners* and more likely to invest in their *own* human capital. In the next two subsections, I quantify the returns to investing in the career capital of the spouse (2.4) and the returns to investing in own career capital (2.5).

2.4 Household specialization increases the earnings of working spouses

The evidence that couples formed under unilateral divorce invest less in the career of their partners suggests not only that career capital is difficult to contract upon, but also that the monetary value of the human capital transfers are sizable. To explore this, I estimate the impact of having a non-working spouse on earnings.[10] I focus on the impact of stay-at-home wives on the earnings of husbands because the frequency of stay-at-home husbands is too low to identify the converse effect.[11]

I estimate the following model of earnings for male m of education h, in state s, and age t:

$$\ln w_{mst} = a_0(h) + a_1(h)t + a_2(h)t^2 + a_3(h)K_t + b(h)'X_{mst} + \delta_t + \delta_s + \varepsilon_{mst} \quad (3)$$

The education levels considered are *high school*, *some college*, and *college degree or higher*. K_t is the number of years that the male was married to a stay-at-home wife. Wife housework supply is endogenous in a model of male earnings. In effect, non labor income (such as husband's earnings) affects female labor supply. To address this endogeneity concern, I estimate the

[10] Of all the modes of non contractible investments considered in the previous sub-section, I focus on household specialization for two reasons. First, it is the most prevalent mode of spousal support in the data. Second, unlike quality of children, there is a directly observed measure of human capital returns, namely, earnings.

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

model using a two step approach.

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

In a first stage, I build on the empirical analysis by Voena (2015) and predict the probability that a female specializes in household labor using panel variation in property division laws upon divorce as a source of exogenous shifters in female labor market attachment.[12] Together with the introduction of UD, in the sample period, most states adopt a legal regime that allows spouses to keep a fraction of marital assets in the event of a divorce (regardless of who holds the formal title). These are the *community property* or *equitable distribution of property* regimes.[13] One of the main findings by Voena (2015) is that when UD is introduced in such states, female labor supply decreases significantly.[14] In my context, therefore, these changes in property division laws should cause females to specialize more in home production.

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

$$k_{fst} = \alpha(h) + \overline{\beta}(h)' Z_{fst} + \overline{\gamma}(h)' X_{fst} + \delta_t + \delta_s + \eta_{fst} \quad (4)$$

The education levels are the same as in model (3). The dependent variable, k, takes value one if the woman supplies zero hours of work in the labor market. Z is the vector of policy regimes capturing the interaction between grounds for divorce and property division upon divorce. X is a set of control variables capturing family composition, marital status, and duration of marriage. Finally, δ_t and δ_s are a set of year and state fixed effects that control for trends in female labor supply and state-specific environments affecting female participation.

I estimate model (4) using all single, married, and divorced women in the PSID data, for the period 1968 to 1992.[15] Table 11 in appendix A shows the estimation results. Women that live

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

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

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

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

in *community property* states that introduce unilateral divorce (row labeled $UD \times ComProp$) are 6% and 12% more likely to specialize in household labor relative to women in community property states under the baseline mutual consent regime. The effects are highly significant at the 5% and 1% level (standard errors are clustered at the state level). These results are consistent with the analysis by Voena (2015) and suggest that the interaction between grounds for divorce and division of property significantly affects female labor supply.

Second step

Using the first stage estimates, I estimate the effect of wife's experiences in home production on male earnings.[16] To do so, I first select the appropriate set of males, taking into account two features. First, because I need to observe the *history* of wives' labor supply for each male, I restrict attention to married and divorced males that I *observe getting married* (in addition to all singles). Second, because of the structure of the PSID, some males leave the panel if they get divorced. To avoid selection bias due to this fact, I restrict the analysis to the so called *sample* males, who keep being interviewed after any change in household composition.[17]

For the selected males in the sample period, I construct a measure of wife's experience in the household up to period t:

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

Regression estimates are shown in tables 12 and 13 for male hourly and annual earnings, respectively. It is worth mentioning that second stage regressions include the same set of control variables X considered in the first stage regressions, including marital status, the duration of marriage, family size, partner education and age, and state and time fixed effects. The excluded instruments are the vector Z of divorce laws indicators.[18] The effect of wife's experience in home production on earnings are presented in figure 4.

The effects of having a stay-at-home partner on earnings are positive and significant. The largest effects are observed in the groups of males with some college. The results indicate that

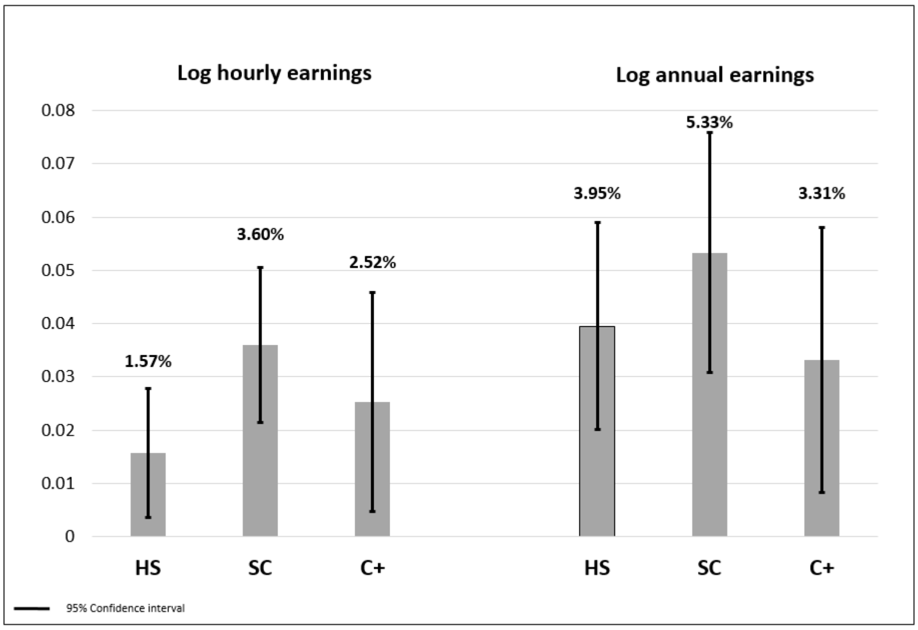
for future research.

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

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

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

Figure 4: The effect of years of marriage to a stay-at-home wife on male earnings



an additional year of marriage to a non working wife increases male hourly earnings by 1.5% for the least educated and over 3.5% for males who attended some college. Moreover, annual earnings increase between 4% and 5.5% for every additional year the wife does not work.[19]

The evidence suggests that household specialization is a marital investment that accumulates in the private earnings account of the working spouse. Even when part of the ex spouses' earnings are shared for a limited period of time following a divorce, the legal literature contains reports of many court cases in which judges recognize the impossibility of compensating supporting spouses for the value of the career they helped to build. In addition, supporting spouses not only contribute in creating human capital value for their partner, but also depreciate their own human capital by spending years out of the labor market. The following section quantifies the depreciation cost of having less experience in the labor market.

2.5 The value of experience in the labor market

This section quantifies the value of the opportunity cost to household specialization, that is, the returns to experience in the labor market. Because most supporting spouses are wives, I

[19]A few additional highlights are worth mentioning. As expected, the price of education at zero years of experience (the estimate of the constant in equation (3)) is increasing in the level of education and the age profiles are concave for both males and females. Moreover, the duration of marriage or whether the individual is married is positively correlated with earnings only for the least educated.

focus on the returns to experience for females and estimate the following model of earnings for female f of education h, in state s, and time t:

$$\ln w_{ft} \quad = \quad a_0(h) + a_1(h)Exper_t + a_2(h)Exper_t^2 + b(h)'X_{fst} + \delta_t + \delta_s + \varepsilon_{fst} \tag{5}$$

The education levels considered are *high school*, *some college*, and *college degree or higher*. $Exper_t$ is the number of years that the female worked in the labor market up to period t. Coefficient a_1 measures the return to the first year in the labor market and coefficient a_2 measures the variation of the return to experience as labor market participation accumulates. Women who choose to participate in the labor market may be different from women who choose to stay at home in unobservable characteristics that may also explain females wages. This poses two challenges to the identification of the returns to experience in specification (5). First, experience is endogenous in a model of female earnings.[20] Second, the distribution of wage offers is censored by the decision to participate: we only observe the *accepted* wages of women who decided to work (Heckman, 1979). For this reason, first, I include covariates in the model that control for some of the unobserved heterogeneity. In specification (5), vector X includes indicators for *marital status* and *family size*. Moreover, δ_t is a year fixed effects that controls for aggregate trends in wages and δ_s is a state fixed effect that controls for permanent differences in female wages across states of residence. Second, I use a two-step control function approach. In a first step, I estimate a model for participation and a model for experience using changes in divorce laws and female age as sources of variation in female labor force participation that are excluded from a model of earnings. I then predict the residuals from the first step regressions. In a second step, I estimate model (5) for female earnings including the estimated residuals from the first step in order to account for unobserved factors driving both participation or experience and earnings. I describe and analyze the results from the two-step estimation next.

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

First step

In a first step, I estimate the following models of participation in the labor market (specified as not specializing in home production, $1-k$) and for experience in the labor market ($Exper$, the sum of $1-k$ up to period $t-1$) for female f of education h in state s at time t:[21]

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

where Z is a vector of female age and the same set of policy regimes capturing the interaction between grounds for divorce and property division upon divorce used in the first stage of the estimation of male earnings; Z^l is a vector of female age and a set of policy variables that capture the number of years the policy regimes where in place; and X is a set of control variables including marital status and family size. For consistency with the structural model presented in the next section 3, I specify *age* as a categorical variable that captures 15 intervals of individuals' age: $Age = \{< 23, [23-25], [26-28], ..., \geq 62\}$. The estimation of the model for female participation in the labor market is exactly analogous to the estimation of the first step in section 2.4 (except that the dependent variable in the participation equation is $1-k$, instead of k). The results for the model of female experience are presented in table 14 in appendix A. The main predictor of experience is age, that presents a concave profile.[22]

The error terms from these models capture unobservable variables that affect female particiaption and experience in the labor market. In order to control for these sources of unobserved heterogeneity, I obtain the residuals from the models of participation and experience and include them as covariates in the female earnings regression (5).[23] I turn to this next.

Second step

In the second step I estimate the model for female earnings (5) additionally including the residuals from the first step regressions as control variables. In all specifications I include

[21]To estimate the model for experience of females in the labor market, I restrict attention to all females in the PSID that I observe from the age of 30 or before.

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

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

indicator variables for marital status and family size and state and time fixed effects. The excluded instruments in the female earnings regressions are *age* and the vector of policy variables capturing the interaction between grounds for divorce and division of marital property and the number of years the policies where in place.

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

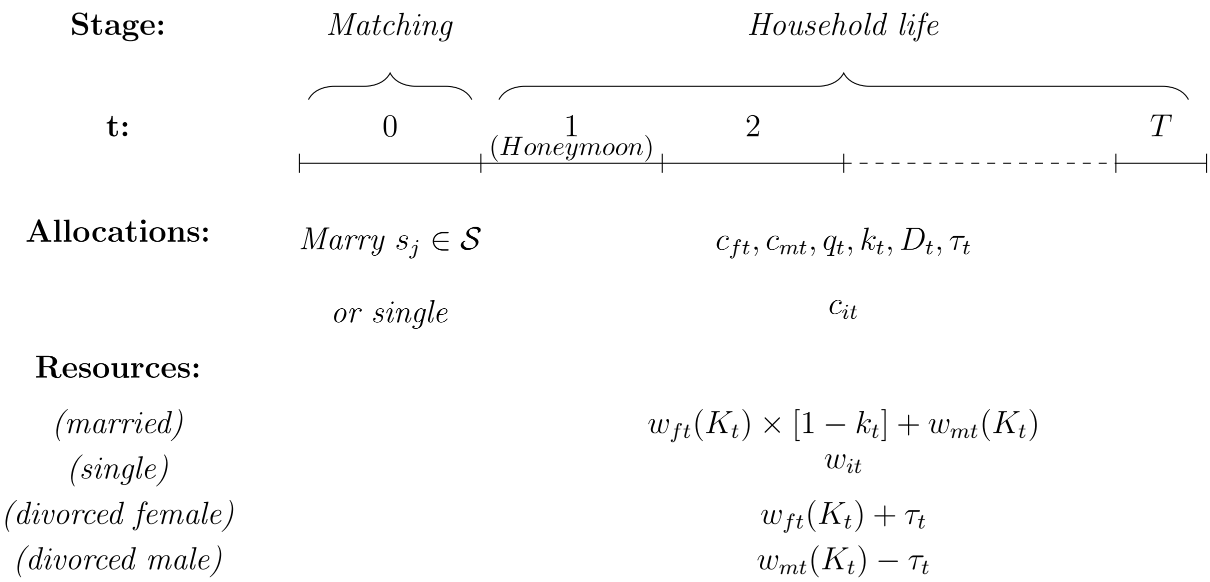
3 A life cycle model of marriage, marital investments, and divorce under two divorce regimes

To study the general equilibrium effect of introducing unilateral divorce and to understand the mechanisms behind the reduced form effects, I specify an equilibrium model of household formation, labor supply, private and public consumption, and divorce over the life cycle.

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 initial human capital, $s_i \in \mathcal{S} = \{S^1, ..., S^I\}$. The mass of females of type s_f is denoted by μ_{s_f} and the mass of males of type s_m is denoted μ_{s_m}.

Agents live for $T + 1$ periods, grouped in two stages: matching and household life. Figure 5 illustrates the life cycle of inidividuals.

Figure 5: The life cycle of individual $i \in \{f, m\}$ type s_i



In the matching stage at period $t = 0$ individuals meet in a marriage market and face the alternatives of marrying someone of the opposite sex and education $s \in \mathcal{S}$ or remaining single. The life of singles or couples develops from periods 1 to T.

Individuals that form couples at $t = 0$ enjoy an initial *honeymoon* period where they remain married. Once the honeymoon is over, the couple has the option to divorce, $D \in \{0, 1\}$. While the marriage lasts, couples purchase public goods, $q \in R_+$, allocate expenditures on private consumption among wife and husband, $(c_f, c_m) \in R^2_+$, and allocate wife's labor supply, $k \in \{0, 1\}$, to housework ($k = 1$) or work in the labor market ($k = 0$). During every period, couples' resources come from pooling the labor market earnings of wife, w_f, and husband, w_m. Consistent with the evidence presented in section 2.4, the earnings of husbands at time t depend on the wife's experience in the household, $K_t = \sum_{r=1}^{t-1} k_r$. Consistent with the evidence presented in section 2.5, the earnings of females also depend on the number of periods out of the labor market, K_t. In allocating female time out of work, the couple faces a novel trade off: on the one hand, wives who stay at home do not have earnings in the present and earn less in the future; on the other hand, the earnings of husbands increase if their wife stays at home. Hence, the total resources of married couples, $w_{ft}(K_t) \times [1 - k_t] + w_{mt}(K_t)$, depend on the past and present labor behavior of the wife.

If a couple divorces, ex spouses continue to consume public goods, but the wife controls expenditures on q. The public good has the interpretation of children that remain under the full custody of the mother after divorce. Ex spouses are linked by their choice of a *child support* transfer $\tau \geq 0$ from the non custodial ex husband to the custodial ex wife. There is no remarriage.[24] Ex spouses' resources in every period consist of individual labor earnings after child support transfers. Note, importantly, that, during divorce, ex husbands continue to enjoy the returns to the years they were married to a stay-at-home wife. Similarly, during divorce, ex wives continue to be penalized for their reduced experience in the labor market if they were stay-at-home wives.

Single individuals only consume private goods and live off their labor earnings, w_i, consistent with the interpretation of q as expenditures on children: in order to enjoy public goods, an individual must marry.

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

$$c_{it} = \rho x_t$$

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

At the time of household formation, individuals observe the divorce regime $\mathcal{D} \in \{MCD, UD\}$ and expect it to persist.

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

3.1 The marriage market

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

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

$$\mathcal{S}_0 = \emptyset \cup \mathcal{S} = \{\emptyset, S^1, ..., S^I\},$$

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

Females and males within an education type have heterogeneous tastes for each alternative s. 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, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, is common to all females joining the same type of couple, (s_f, s) or to all females of the same education who remain single, $(s_f, \emptyset)$. The second term, $\beta_f^{s_f s}$ is an idiosyncratic taste deviation.[25]

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

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

Before making their marital decision, individuals observe the total value from each alternative s. First, the vector of all taste shocks $\{\beta_f^{s_f s}\}_{s \in \mathcal{S}_0}$ and $\{\beta_m^{s s_m}\}_{s \in \mathcal{S}_0}$ is revealed to each female and male, respectively. Second, each individual observes the mean value of singlehood, $\{\overline{U}_{\mathcal{X}}^{s_f \emptyset}\}$ for females and $\{\overline{U}_{\mathcal{X}}^{\emptyset s_m}\}$ for males. Third, individuals take as given the mean utilities that any potential partner of the opposite sex requires in order to get married. For example, all males type s_m observe the vector $\{\overline{U}_{\mathcal{X}}^{s s_m}\}_{s \in \mathcal{S}_0}$. Similarly, all females type s_f observe the vector $\{\overline{U}_{\mathcal{Y}}^{s_f s}\}_{s \in \mathcal{S}_0}$. In this sense, individuals in the marriage market are *utility price* takers and the marriage market is *competitive*.

The marital choice problem of females consists of choosing the type of partner that, at the given utility prices and revealed shocks, maximizes their marital value (the problem for males is analogous.):

$$\max_{s \in \mathcal{S}} \Big\{ \overline{U}_{\mathcal{X}}^{s_f \emptyset} + \beta_f^{s_f \emptyset}, \overline{U}_{\mathcal{X}}^{s_f S^1} + \beta_f^{s_f S^1}, ..., \overline{U}_{\mathcal{X}}^{s_f S^I} + \beta_f^{s_f S^I} \Big\} \tag{6}$$

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

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

[25] 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 (Forthcoming), Chiappori, Salanié, and Weiss (2017)).

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

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

1. *a matrix of utility prices for females' and males' types,* Υ*, and*
2. *an assignment of female types to males types,* $\mu : \mathcal{S} \to \mathcal{S}$*, such that for all* $s_f \in \mathcal{S}$ *and all* $s_m \in \mathcal{S}$

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

3. *the measure of individuals in the marriage market equals the sum of married and single individuals:*

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

Note that, importantly, in this model the set of utility prices that capture the value of marital alternatives, Υ, is endogenously determined as part of the competitive equilibrium in the marriage market. However, not only market clearing forces determine these prices. In this model, the individuals' values from singlehood and from marrying any type of partner at the posted *partner* prices, are also endogenously determined by the optimal intertemporal behavior of singles and (potential) couples in the household life stage. I describe these intertemporal problems next.

3.2 Intertemporal behavior of households under two divorce regimes

After the matching stage, the household life starts. Every period in the household life stage individual i is subject to earnings shocks, ε_{it}. Moreover, every period after the honeymoon married individuals in couple (f, m) are subject to a common idiosyncratic match quality shock, $\theta_{(f,m)t}$. Importantly, shocks ε_{it} and $\theta_{(f,m)t}$ are not observed until after the match occurs.

3.2.1 Singles

Singles spend all their labor market earnings on private consumption. Let $u_i(c_{it})$ denote the per period valuation that individual i derives from quantity c_{it}. The value, $\overline{U}^{\emptyset} \in \{\overline{U}_{\mathcal{X}}^{\emptyset s}, \overline{U}_{\mathcal{Y}}^{s\emptyset}\}$, of arriving single to the household life stage is:

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

where the expectation is taken from the moment of household formation $(t = 0)$ with respect to the stream of earnings shocks.

3.2.2 Potential couples

I next describe the problem of a generic couple type $(s_f, s_m) \in \mathcal{S}^2$ that enters married to the honeymoon period. To ease notation, I suppress dependency on education types.

A disgression: the relationship between divorcees

To better understand the life cycle problem of newlyweds, it is useful to know how ex spouses interact. In modeling divorcees, I follow the related literature (Del Boca and Flinn (1995), Flinn (2000), Weiss and Willis (1985), Weiss and Willis (1993), Chiappori, Iyigun, and Weiss (2015), Guvenen and Rendall (2015)). Ex spouses enjoy a common public good, interpreted as children's quality, that is under the full custody of the ex wife. The ex husband may contribute to pay for the public good by making child support transfers to the ex wife. By default, divorcees play a non cooperative Stackelberg game where the ex wife takes a child support transfer as given and chooses how to allocate her resources into expenditures in private consumption and the public good. The ex husband, in turn, takes the ex wife's expenditures on the public good as given and decides on a child support transfer. This non cooperative game between ex spouses usually leads to inefficient levels of expenditure on the public good. Importantly, I assume that when the divorce regime is one of mutual consent, divorcees are able to cooperate in making the efficient consumption and child support decisions for the first period of divorce.

Back to the couple's problem

At the beginning of each period, the couple draws values for the earnings and the match quality shocks, and observes the history of female housework supply. A vector of realizations of these variables is an element ω_t of the couple's state space at time t, Ω_t:

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

At the time of marriage, potential spouses commit to delivering the mean utility prices posted in the marriage market ($\overline{U}_{\mathcal{X}}^{s_f s_m}$ to the potential wife and $\overline{U}_{\mathcal{Y}}^{s_f s_m}$ to the potential husband) by choosing an intertemporal contingent allocation of consumption, female housework supply, divorce, and child support transfers. Let $a_t(\omega)$ denote an allocation at time t and state ω_t,

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

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

The couple chooses a to maximize the expected lifetime welfare of the husband subject to the wife's achieving an expected lifetime welfare of at least her posted price, $\overline{U}_{\mathcal{X}}^{s_f s_m}$, and to a set of budget and participation constraints.

Formally, let $u_i^M(a_t(\omega))$ and $u_i^D(a_t(\omega))$ denote the per period valuation that individual i derives from the period-state allocation $a_t(\omega_t)$ in marriage and in divorce, respectively.[26] The

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

couple solves the following Pareto problem:

$$\begin{aligned}
\overline{U}_{\mathcal{Y}}^{s_f s_m} = \max_{a} \quad & E_0 \sum_{t=1}^{T} \delta^{t-1}\Big\{(1-D_t)u_m^M(a_t(\omega)) + D_t u_m^D(a_t(\omega))\Big\} \qquad (7)\\
s.t. \quad [pc_f(\lambda_0)]: \quad & E_0 \sum_{t=1}^{T} \delta^{t-1}\Big\{(1-D_t)u_f^M(a_t(\omega)) + D_t u_f^D(a_t(\omega))\Big\} \geq \overline{U}_{\mathcal{X}}^{s_f s_m}\\
\forall \omega, r>0: D_r = 0: \quad [bc^M]: \quad & c_{fr} + c_{mr} + q_r = w_{fr}(1-k_r) + w_{mr}\\
[pc_i^M(\mathcal{D})]: \quad & E_r \sum_{t=0}^{T-r} \delta^t u_i^M(a_{r+t}(\omega)) \geq E_r \sum_{t=0}^{T-r} \delta^t u_i^D(a_{r+t}(\omega)), \quad \forall i \in \{f,m\}\\
\forall \omega, r>1: D_r = 1: \quad [bc^D]: \quad & \begin{cases} x_{fr} + q_r = w_{fr} + \tau_r \\ x_{mr} = w_{mr} - \tau_r \\ c_{ir} = \rho x_{ir}, \quad \forall i \in \{f,m\} \end{cases}\\
[pc_i^D(\mathcal{D})]: \quad & E_r \sum_{t=0}^{T-r} \delta^t u_i^D(a_{r+t}(\omega)) \geq E_r \sum_{t=0}^{T-r} \delta^t u_i^M(a_{r+t}(\omega)), \quad \forall i \in \{f,m\}
\end{aligned}$$

Problem (7) specifies a collective household problem with the alternative of divorce under two divorce regimes.[27] The objective function is the expected lifetime utility of the husband, that includes the husband's valuation in period-states of marriage and of divorce.

The first constraint in the couple's problem, $[pc_f]$, is the participation constraint of the wife at the time of marriage. This constraint restricts plan a to give the wife a lifetime expected welfare of at least her posted price $\overline{U}_{\mathcal{X}}^{s_f s_m}$ in the sub-market for couple type (s_f, s_m). An object that will become very relevant in the empirical section of this paper is the multiplier λ_0 of this constraint, which represents the (female) Pareto weight of the problem.[28]

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

The next constraints, $[pc_i^M]$, are the individuals' participation constraints in marriage. These constraints indicate that at any state and period where the couple stays married, the expected

[27]The formulation 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.

[28]Throughout the paper, I normalize the weights in females' and males' expected utilities in problem (7) to sum to one. That is, the female Pareto weight in couple type (s_f, s_m) is $\lambda^{s_f s_m} = \dfrac{\lambda_0^{s_f s_m}}{1+\lambda_0^{s_f s_m}}$ and the corresponding weight for males is $1 - \lambda^{s_f s_m}$.

value of staying married exceeds the value of divorcing, for both spouses. Importantly, whether participation constraints in marriage play a role in the couple's problem or not depends on the divorce institutions. In particular, restrictions $[pc_i^M]$ must be satisfied only when the divorce regime is one of unilateral divorce. This is because under unilateral divorce, the marriage can only continue if both spouses prefer their allocation in marriage to their allocation in divorce (while under mutual consent marriage continues by default, without the need for participation constraints in marriage). One way that spouses can achieve mutual consent for staying married is by revising, every period, the intra-household distribution of resources among spouses (Mazzocco (2007), Voena (2015), and Bronson (2015)). This reallocation of resources within the household implies that, at those periods in which $[pc_i^M]$ of one of the partners binds (that is, the partner is tempted to leave), the lifetime utility of the tempted spouse gains more weight in the couple's problem.

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

The next constraints, $[pc_i^D]$, are the individuals' participation constraints in divorce. These constraints indicate that at any state and period where the couple divorces, the expected value of divorcing exceeds the value of staying married, for both spouses. Once again, the relevance of participation constraints in divorce on the couple's problem depends on the divorce institutions. In particular, constraints $[pc_i^D]$ must be satisfied only if the divorce regime is one of mutual consent. This is because under mutual consent divorce, the couple can only divorce if both ex spouses prefer their allocation in divorce to their allocation in marriage (while under unilateral divorce spouses can divorce with no such restriction). One way that spouses can achieve a mutual consent for divorce is by negotiating over a divorce settlement at the time of divorce. In this paper, I assume that divorcees agree on a divorce settlement by engaging in an initial period of cooperation after divorce, where they efficiently decide on the ex spouses' expenditures in private and public goods, and on child support transfers.

A contingent intertemporal plan a that solves problem (7) prescribes not only allocations in marriage, but also allocations in divorce. At first sight it may seem unreasonable that ex spouses continue to act according to plan a. However, this is taken into account at the moment of deciding on a: the couple simply anticipates that ex spouses would play a Stackelberg game in divorce (with possibly an initial period of cooperation) and incorporates the resulting optimal choices in the plan. The same is, of course, true for the allocations in marriage. All in all, plan a must be *incentive compatible* in the sense that it has to be individually optimal at every period-state. This is guaranteed by requiring that plan a satisfies all the period-states participation constraints.

The value of the couple's problem (7) defines the ex ante Pareto frontier from the perspective of the time of marriage. That is, the relationship between the lifetime utilities of husband and wife that result from solving problem 2 and that depend on the divorce regime $\mathcal{D}$:[29]

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

At any given utility price for a type of partner, relationship $\varphi^{s_f s_m}$ informs individuals of the mean value of that particular marital option. The competitive equilibrium in the marriage market results from pining down the point in the ex ante Pareto frontier, of each couple type, such that supply of females equals demand for females in all types of couples.

3.3 Taking stock: divorce laws and household formation

The details of the partner choice and household intertemporal problems show that the equilibrium in the marriage market depends on the divorce regime. First, the divorce regime affects the constraints of problem (7). While under unilateral divorce participation constraints in marriage must be satisfied and participation constraints in divorce play no role, the opposite is true under the mutual consent divorce regime. Second, per period allocations in marriage and in divorce are affected by the divorce regime. Under unilateral divorce, the distribution of

[29] Note that females can similarly anticipate the value of their marriage market alternatives given male prices by solving the analogous to problem (7) when the objective function if female lifetime utility subject to a male participation constraint. In other words, standard assumptions on utility functions imply that function φ can be inverted:

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

resources within the marriage varies across period-states to guarantee satisfaction of the participation constraints in marriage, while under mutual consent divorce no such variation takes place. Moreover, while under unilateral divorce the individual values of divorce are derived from the allocations that ex spouses would choose without cooperating, under the mutual consent regime the individual values of divorce are derived from the allocations that ex spouses would choose if they could act cooperatively for one period.

Different divorce laws result in different solutions of the intertemporal problem of households (7), leading to different values of partner alternatives (which in turn determine the relative value of singlehood). As a result, the divorce regime affects the value of the partner choice problem (6) (for females and the analogous problem for males), influencing the equilibrium in the marriage market.

The model just introduced makes at least three novel contributions to the literature, as it was outlined in the introduction. First, the model embeds a life cycle collective household model into a general equilibrium model of marriage. Second, the model allows for endogenous *ex post* dissolution of the matches that form in the marriage market. Third, the model is suitable for conducting policy evaluation as it is specified for two different divorce institutions.

3.4 Empirical specification

I now introduce the empirical specifications that I use to take the model to the data.

3.4.1 Marital preferences

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

Assumption 1 *β is distributed standard Type I:*

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

3.4.2 Flow utilities

Single individual i derives flow utility from the consumption of private goods and from a mean taste from singlehood, $\overline{\theta}^{s_i}$, according to utility function

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

Married females derive flow utility from private and public consumption and household labor supply. Married males derive utility from private and public consumption. Spouses additionally enjoy a common couple specific match quality, θ_{fm}. The flow utilities for wives and husbands are, respectively:

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

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

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

The match quality process, $\theta_{(fm)t}$, starts after period one and evolves as a random walk that starts at value $\overline{\theta}^{s_f s_m}$:

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

where $\epsilon_t \sim N(0, \sigma_\theta^2)$ and $\theta_1 = \overline{\theta}^{s_f s_m} + \epsilon_1$.

Divorced females and males derive utility from private and public consumption. Females' flow utility is:

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

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

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

3.4.3 Earnings processes

Earnings in this structural model vary by gender and education type. Both females and males have a mean earnings component that is common to any individual of the same education and a random idiosyncratic deviation from the mean. Consistent with the evidence shown in section 2.5, the mean component of earnings for females depends on the market price of their education, $W^{\mathcal{X}}(s_f)$, and on a polynomial on their experience in the labor market at time t, $Exper_t$ (defined as the number of periods they worked in the labor market from the moment of household formation until period $t-1$). Moreover, according to the evidence shown in section 2.4, the mean component of male earnings additionally includes the *home production* experience of their wives, K. For both females and males, the stochastic component of earnings includes a permanent income term, ε, and classical measurement error, e.[30] The earnings of a woman of education s_f and a man of education s_m in the structural model are specified as follows:[31]

$$lnw_{ft} = lnW^{\mathcal{X}}(s_f) + a_1^{\mathcal{X}}(s_f)Exper_t + a_2^{\mathcal{X}}(s_f)Exper_t^2 + \varepsilon_{ft} + e_{ft} \quad (8)$$

for females and

$$lnw_{mt} = lnW^{\mathcal{Y}}(s_m) + a_1^{\mathcal{Y}}(s_m)t + a_2^{\mathcal{Y}}(s_m)t^2 + b^{\mathcal{Y}}(s_m)K_t + \varepsilon_{mt} + e_{ft} \quad (9)$$

for males.

Permanent income evolves as a random walk:

$$\varepsilon_{it} = \varepsilon_{it-1} + \xi_{it}$$

with $\xi_{it} \sim N(0, \sigma_\xi)$ and $\varepsilon_{i1} = \xi_{i1}$

4 Model solution: outline and main forces

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

First, I characterize the individual values associated with every possible alternative in the marriage market. One alternative is to remain single: I characterize the value of forming

[30] Note that I include transitory shocks to earnings as part of the measurement error.

[31] Note that in the empirical models of earnings estimated in sections 2.4 and 2.5 I include several covariates that control for unobserved heterogeneity (for example, family composition and state and time fixed effects). In the specification of earnings in the structural model, however, I only account for own and spousal experience and a process for permanent income.

household $(s_f, \emptyset)$ for females type s_f and of forming household $(\emptyset, s_m)$ for males type s_m. This results in values $\overline{U}_{\mathcal{X}}^{s_f\emptyset}$ and $\overline{U}_{\mathcal{Y}}^{\emptyset s_m}$, for all s_f for all s_m individual types (section 4.1).

The other set of alternatives are the partner types: I characterize the values of joining couples $\{(s_f, s)\}_{s\in\mathcal{S}}$ for females type s_f and the values of joining couples $\{(s, s_m)\}_{s\in\mathcal{S}}$ for males type s_m. To do this, I solve the intertemporal problem of couples in the household life stage by backwards induction and derive the value of each household member at period one, for any given potential partner price. The values of the different partner type alternatives will depend crucially on the female Pareto weight in each type of couple, $\lambda^{s_f s_m}$. Recall that this object is a function of the multiplier of the female participation constraintat the time of marriage, $[pc_f]$, in problem (7). Therefore, it is directly linked to female given price $\overline{U}_{\mathcal{X}}^{s_f s_m}$. Given a matrix of Pareto weights for all types of couples, $\Lambda = \left\{\lambda^{s_f s_m}\right\}_{(s_f,s_m)\in\mathcal{S}^2}$, the solution of the intertemporal household problem of couples results in values $\left\{\left(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda^{s_f s_m})\right)\right\}_{(s_f,s_m)\in\mathcal{S}^2}$ (section 4.2.3).

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

4.1 The value of singlehood

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

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

4.2 The value of marrying under two divorce regimes

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

denote the period a couple divorces (where $2 \leq t^D \leq T$).

4.2.1 The value of divorce

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

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

$$\begin{aligned} v_{ft}^A = \max_{x_{ft}, q_t} \quad & ln[c_{ft} q_t] + \delta E_t v_{ft+1}^A \\ s.t. \quad [BC_f^D]: \quad & x_{ft} + q_t = w_{ft} + \tau_t \\ & c_{ft} = \rho x_{ft} \\ & \tau_t \geq 0 \end{aligned} \tag{10}$$

Let $q_t^*(\tau_t)$ be the ex wife's choice of expenditure in the couple's public good. The problem of the divorced man in the autarky stage is to choose the transfer that maximizes his utility:

$$\begin{aligned} v_{mt}^A = \max_{x_{mt}, \tau_t} \quad & ln[c_{mt} (q_t^*(\tau_t))^\gamma] + \delta E v_{mt+1}^A \\ s.t. \quad [BC_m^D]: \quad & x_{mt} = w_{mt} - \tau_t \\ & c_{mt} = \rho x_{mt} \\ & \tau_t \geq 0 \end{aligned} \tag{11}$$

Appendix B.1 shows that this game has either an interior or a corner solution for the child support transfer at every period $t \geq t^D$:

$$\tau_t = \begin{cases} \dfrac{\gamma w_m - w_f}{1+\gamma} & if \; \tau > 0 \\ 0 & otherwise \end{cases} \qquad for \; any \quad t \geq t^D$$

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

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

Appendix B.1 also shows that at the last period, T, the values of autarky for the ex wife and the ex husband are, respectively:

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

and

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

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

The value of a divorce settlement at time t^D

I now describe the individual values of divorce if the couple can achieve cooperation in choosing the efficient levels of public and private consumption in the first period after divorce. Let the vector of choice variables at time t^D be $a_{t^D} = \{x_{ft^D}, x_{mt^D}, q_{t^D}, \tau_{t^D}\}$ and let $\widetilde{\lambda}$ be any weight in the ex wife utility in divorce. At the time of the divorce settlement, the couple anticipates that they will live in autarky from the next period on and choose a_{t^D} to maximize a weighted sum of utilities:

$$\max_{a_{t^D}} \quad \widetilde{\lambda}\Big(u^D_f(c_{ft^D}, q_{t^D}) + \delta E v^A_{ft^D+1}\Big) + (1-\widetilde{\lambda})\Big(u^D_m(c_{mt^D}, q_{t^D}) + \delta E v^A_{mt^D+1}\Big) \tag{12}$$

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

Appendix B.1 shows that the value of cooperation at any time t followed by a lifetime of autarky are, respectively,

$$v^D_{ft}(\widetilde{\lambda}, \omega_t) = ln\Big[\rho\widetilde{\lambda}\kappa(\widetilde{\lambda}, \gamma)\Big(\frac{\mathcal{W}^D_t(\omega_t)}{1+\kappa(\widetilde{\lambda}, \gamma)}\Big)^2\Big] + \delta E\Big[v^A_{ft+1}(\omega_{t+1}|\omega_t)\Big] \tag{13}$$

and

$$v^D_{mt}(\widetilde{\lambda}, \omega_t) = ln\Big[\rho(1-\widetilde{\lambda})\kappa(\widetilde{\lambda},\gamma)^{\gamma}\Big(\frac{\mathcal{W}^D_t(\omega_t)}{1+\kappa(\widetilde{\lambda},\gamma)}\Big)^{1+\gamma}\Big] + \delta E\Big[v^A_{mt+1}(\omega_{t+1}|\omega_t)\Big] \tag{14}$$

where $\kappa(\lambda, \gamma) = \lambda + (1-\lambda)\gamma$ is a notational shortcut.

Summing up: the value of divorce under two divorce regimes

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

[**Mutual consent divorce**] If the regime is one of MCD, spouses cooperate in the first period of divorce and live in autarky for the rest of their lifetime. Hence, individual values are the expected discounted values derived from the efficient divorce settlement at time t^D plus the autarky continuation values. These values are derived by evaluating expressions (13) and (14) at time t^D. ■

[**Unilateral divorce**] If the regime is one of UD, spouses cannot sustain cooperation and live in autarky from period t^D onward. The values of divorcing at time t^D for wife and husband are, respectively:

$$v^A_{ft^D}(\omega_{t^D}) = \begin{cases} ln\Big[\rho\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}^D_{t^D}(\omega_{t^D})}{2}\Big)^2\Big] + \delta E\Big[v^A_{ft^D+1}(\omega_{t^D+1}|\omega_{t^D})\Big] & if\ \tau_{t^D} > 0 \\ ln\Big[\rho\Big(\frac{w_{ft^D}(\omega_{t^D})}{2}\Big)^2\Big] + \delta E\Big[v^A_{ft^D+1}(\omega_{t^D+1}|\omega_{t^D})\Big] & otherwise \end{cases}$$

and

$$v^A_{mt^D}(\omega_{t^D}) = \begin{cases} ln\Big[\rho\frac{\mathcal{W}^D_{t^D}(\omega_{t^D})}{1+\gamma}\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}^D_{t^D}(\omega_{t^D})}{2}\Big)^{\gamma}\Big] + \delta E\Big[v^A_{mt^D+1}(\omega_{t^D+1}|\omega_{t^D})\Big] & if\ \tau_{t^D} > 0 \\ ln\Big[\rho w_{mt^D}(\omega_{t^D})\Big(\frac{w_{ft^D}(\omega_{t^D})}{2}\Big)^{\gamma}\Big] + \delta E\Big[v^A_{mt^D+1}(\omega_{t^D+1}|\omega_{t^D})\Big] & otherwise \end{cases}$$

■

An important takeaway from the relationship between divorcees is that divorce entails losses of efficiency that may be most harmful to women.[32] First, because of the complementarity between expenditures in public goods and expenditures in private goods, women will invest

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

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

4.2.2 The value of *staying* married

Let $\widetilde{a}_t = \{c_{ft}, c_{mt}, q_t, k_t\}$ be the decisions that a couple makes if the marriage continues in period t. Let λ_t be the weight in females' expected utility from the perspective of period t. The individual values of staying married in t and entering period $t+1$ as married are derived by solving the following Pareto problem in marriage:

$$\begin{aligned} \max_{\widetilde{a}_t} \quad & \lambda_t\Big(u_f^M(c_{ft}, q_t, k_t) + \delta E v_{ft+1}^M\Big) + (1-\lambda_t)\Big(u_m^M(c_{mt}, q_t) + \delta E v_{mt+1}^M\Big) \\ s.t. \quad & [BC_t^M] : c_{ft} + c_{mt} + q_t = w_{ft}(1-k_{ft}) + w_{mt} \end{aligned} \tag{15}$$

Let $\mathcal{W}_t(\omega_t, k_t)$ denote the resources the couple has available in period t and state ω_t:

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

Appendix B.2 shows that the values of continuing the marriage for the wife and the husband are, respectively,

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

and

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

where k_t^* represents the optimal choice of k_t.

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

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

4.2.3 The value of arriving married

A couple that arrives married at any period t also makes a divorce decision by comparing the values of divorce and of staying married. This decision will depend on the divorce regime.

[**Mutual consent divorce**] At the given Pareto weight in marriage, λ_t, the couple chooses to divorce if and only if there exists a weight in the ex wife's utility in divorce, λ^{DS}, that makes both spouses better off than in marriage. That is:

$$D_t = 1 \Leftrightarrow \exists \lambda^{DS} : \begin{cases} v^D_{ft}(\lambda^{DS}) > v^M_{ft}(\lambda_t) \\ v^D_{mt}(\lambda^{DS}) > v^M_{mt}(\lambda_t) \end{cases}$$

Interestingly, the divorce settlement depends on the Pareto weight in marriage. ■

[**Unilateral divorce**] At the current Pareto weight in marriage, λ_t, divorce occurs by default unless spouses find an allocation in marriage preferred by both to their autarky allocation. A change in the allocation in marriage is reflected by an update in the weights on the utilities of the spouses (Mazzocco, 2007). Let the update in the female Pareto weight in marriage be denoted by ν. The couple's decision to remain married is:

$$D_t = 0 \Leftrightarrow \exists \nu_t : \begin{cases} v^M_{ft}(\lambda_t + \nu_t) \geq v^A_{ft} \\ v^M_{mt}(\lambda_t + \nu_t) \geq v^A_{mt} \end{cases}$$

■

Details on how couples make the divorce decision in each regime are in appendix B.3. The appendix also shows that while under mutual consent divorce, the female Pareto weight in marriage will remain constant, under unilateral divorce, it will be updated every period to guarantee satisfaction of the participation constraints in marriage:

$$\lambda_t = \begin{cases} \lambda & \textit{if } \mathcal{D}\textit{=MCD} \\ \lambda_{t-1} + \nu_{t-1} & \textit{if } \mathcal{D}\textit{=UD} \end{cases}$$

where λ denotes the relative weight in the female lifetime utility at the time of marriage (a function of the multiplier of the female participation constraint, $[pc^f]$, in problem (7)).

Let a_t^* be the solution to the couple's period problem, that includes the divorce and child support decisions. All in all, the spouses' individual values at time $t > 1$ are:

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

At any time t, these values are derived by working backwards from the last period (appendix B.3 provides detailed derivations).

In the first period of the marriage stage, the couple does not divorce. Their value is then,

$$v_{f1}(\lambda_1) = v_{f1}^M(\lambda_1, a_1^*)$$
$$v_{m1}(\lambda_1) = v_{f1}^M(\lambda_1, a_1^*)$$

Note that λ_1 is the *initial* female Pareto weight with which the couple arrives at the honeymoon period. The life cycle problem is solved for all types of couples. Hence, from the perspective of the time of marriage, the values of forming household (s_f, s_m) for any female of type s_f and any male of type s_m are, respectively:

$$\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}) = E v_{f1}^M(\lambda^{s_f s_m})$$
$$\overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda^{s_f s_m}) = E v_{m1}^M(\lambda^{s_f s_m})$$

4.3 The marriage market equilibrium

For any matrix of female Pareto weights in all types of couples, $\Lambda = \left\{\lambda^{s_f s_m}\right\}_{(s_f, s_m)\in\mathcal{S}^2}$, the solution to the intertemporal household problem of couples results in the mean values that females and males derive from their partner alternatives, $\left\{\left(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda^{s_f s_m})\right)\right\}_{(s_f, s_m)\in\mathcal{S}^2}$.

Anticipating these mean valuations and knowing their value of remaining single ($\overline{U}_{\mathcal{X}}^{s_f\emptyset}$ for females and $\overline{U}_{\mathcal{Y}}^{\emptyset s_m}$ for males) and idiosyncratic taste shocks ($\beta_f^{s_f s}$ and $\beta_m^{s s_m}$), individuals choose whether to get married and (if so) the education of their partner by solving problem (6). By aggregating females' and males' individual choices within every sub-marriage market, we obtain the supply and demand for females within each type of couple. The model closes by finding the matrix of couple-type Pareto weights such that all sub markets clear,

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

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

The structure of utilities introduced in section 3.4 satisfy the sufficient conditions for existence of equilibria in Gayle and Shephard (2016). Hence, a marriage market equilibrium exists under both divorce regimes. In appendix C, I describe a fixed point algorithm used to solve for the market clearing Pareto weights, which adapt those proposed by Gayle and Shephard (2016) and Galichon, Kominers, and Weber (2016) to my setting.

4.4 Model mechanisms

Because of its stochastic structure, the model does not have an analytic solution and one must rely on numerical methods to solve the model for different parameter values.[33] Characterization of equilibria in terms of which female types marry which male types is not straightforward, as the model exhibits an *imperfectly transferable utility* structure, in either divorce regime. This means that the way in which spouses allocate lifetime utilities affects the total welfare the couple produces by getting married. Legros and Newman (2007) derive sufficient conditions for positive assortative matching in ITU models, but the presence of marital taste shifters in my model may imply that their result breaks down. There are features of the model, however, that suggest directions in terms of sorting patterns. On the one hand, complementarity between expenditures in q and c should make high types attract each other. On the other hand, complementarity between expenditures in q and wife time out of work, k, should make high type males attracted

[33]The model I develop in Reynoso (2017) has a much simpler stochastic structure with a closed form solution under both divorce regimes. Having an analytical solution for the model allows me to characterize equilibria in terms of matching patterns in both mutual consent and unilateral divorce regimes. In that paper, I also derive in closed form the conditions parameters of the model such that a change in the divorce regime gives rise to an equilibrium with stronger assortative matching.

to low type females, who have the lowest opportunity cost of leisure. By having a stay-at-home wife, males accumulate more human capital, which makes their outside value of divorce more attractive. On the contrary, by accumulating experience in home production, females suffer a depreciation in their human capital, which makes their outside option from marriage less valuable. The introduction of unilateral divorce, therefore, may deter females from spending time out of work, decreasing the attraction of opposites. These forces interact with the marital taste shocks that are unobserved to researchers. Therefore, the characterization of equilibria under both divorce regimes is a matter of empirical investigation.

5 Measuring marital welfare

The model allows us to derive the probability of observing an individual of education s married to an individual of education s' in closed form. At any matrix of female Pareto weights in all types of couples, Λ, the proportion of type s_f females that would choose to marry a type s_m male equals the probability that the vector of marital taste shocks, β, takes values such that s_m is the preferred option for a (random) female of type s_f:

$$\begin{aligned} p_{s_f \to s_m} &= Pr\Big[\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}) + \beta_f^{s_f s_m} > \max_{s \neq s_m}\Big\{\overline{U}_{\mathcal{X}}^{s_f \emptyset} + \beta_f^{s_f \emptyset}, \overline{U}_{\mathcal{X}}^{s_f s}(\lambda^{s_f s}) + \beta_f^{s_f s}\Big\}\Big] \\ &= \frac{exp[\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m})]}{exp[\overline{U}_{\mathcal{X}}^{s_f \emptyset}] + \sum_s exp[\overline{U}_{\mathcal{X}}^{s_f s}(\lambda^{s_f s})]} \times \frac{\mu_{s_f}}{\mu_{s_f}} \\ &= \frac{\mu_{s_f \to s_m}(\Lambda)}{\mu_{s_f}} \end{aligned} \tag{16}$$

where the second equality results from the Tipe I distribution of β (assumption 1). With these probabilities, and the associated lifetime values of each alternative, I construct various welfare measures: the gains from marriage, the marital returns to education, and the total marital welfare.

The gain from marriage for females of education s_f is the expected extra value obtained on top of their value of singlehood:

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

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

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

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

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

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

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

With these choice probabilities, we can construct the analogous measures of welfare for males.

In order to quantify these welfare measures, one needs to compute the expected lifetime utilities from the various marital alternatives and the choice probabilities. These elements can be identified from various moments observed in the data. Importantly, the proportion of each type of couple, the proportion of singles, and the life cycle labor supply and divorce behavior of couples are observed in the data. The rest of the paper develops the empirical strategy to compute the various measures of welfare and perform the impact evaluation of introducing unilateral divorce in an environment where the mutual consent regime is in force.

6 Estimation

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

6.1 Parameters estimated outside of the model

Earnings processes

The deterministic and stochastic components of earnings processes (equations (8) and (9)) are estimated outside of the model. In section 2.4 I analyzed the results from estimating the deterministic part of male earnings, where, importantly, I use a two-step approach to predict wives' experience in the household and estimate its impact on male earnings. Moreover, in section 2.5, I analyze the results from estimating the deterministic part of female earnings, implementing a control function approach to account for selection bias due to censoring of the female wage offer and unobserved heterogeneity in the participation decision.

In this section, hence, I analyze the estimation of the *stochastic component* of earnings, specifically, the variance of permanent income. For this, I use the same samples employed in the estimation of the corresponding deterministic part of earnings. Let the stochastic term in equations (8) and (9) be denoted by $\widetilde{u}_{it} = \varepsilon_{it} + e_{it}$ (the sum of permanent income and measurement error). The variance of permanent income is identified by the moment (Meghir and Pistaferri, 2004)[34]

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

The results indicate that female earnings are more volatile than male's, with the variance of shocks estimated at $\widehat{\sigma}^{\mathcal{X}}_{\xi} = 0.1035$ and $\widehat{\sigma}^{\mathcal{Y}}_{\xi} = 0.0739$, respectively. These estimates are close to those obtained by Voena (2015) (0.074 and 0.042, respectively). My estimates are higher, however, probably due to the fact that I use a younger sample of individuals.[35]

[34] In the case of females, I account for selection following the procedure in Low, Meghir, Pistaferri, and Voena (2017).

[35] Recall that to keep track of female labor market experience, I restrict attention to females that I observe

Pre-set parameters

The following table outlines the parameters of the model that I input based on values obtained from the literature, their values, and the source for this information.

Each decision period t in the model corresponds to three years in the data indexed by the age interval of the household (effectively the age of the *head* of the household). I consider $T = 10$ age intervals: $\{\leq 25, [26-28], [29-30], ..., \geq 50\}$.[36] I set the ex husband's weight on the public good in divorce, γ, to 0.7, a value that is at the intersection of the various estimates found in the related studies.[37] As it is standard, I set the consumption scale for single headed households to the McClements scale of 0.61. Finally, from my sample, I compute the ratio of the number of individuals of education s_i by gender to the number of females. This allows me to have a common denominator in the calculation of choice probabilities for both females and males.

Table 1: Pre-set parameters

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

Notes: *Anyaegbu (2010).

from age 30 or younger and to males that I observe from the moment of household formation.

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

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

6.2 Internally estimated parameters and heuristics for identification

Using the estimates obtained outside of the model, I then internally estimate the remaining structural parameters.

6.2.1 Data and sample

The data source is the Panel Study of Income Dynamics (PSID). Panel data is needed to keep track of the history of wives' labor supply. Two sample selection decisions are worth mentioning. First, I restrict attention to the years 1968 to 1992, for which there is a codification of the timing of introduction of unilateral divorce for each US state from previous papers (see Voena (2015)). Second, I select households that I observe forming. In the case of couples, I consider first marriages from the wedding date. In the case of singles, I follow Chiappori, Salanié, and Weiss (2017) and consider only never married individuals that are still single by the age of 40. In appendix D I provide the details of sample selection and how I identify and follow households.[38]. Lastly, and importantly, I select data from households that form and spend the whole sample period in states under the pre-reform *mutual consent* divorce regime (15 states). Mutual consent states provide promising laboratory for the performance of the counterfactual exercise of simulating the introduction of unilateral divorce. In sum, the sample used for the internal estimation consists of an unbalanced panel of 2682 households (2037 couples, 364 single females, and 281 single males), adding up to 35114 observations.[39]

6.2.2 Estimation and identification

I estimate the following 33 structural parameters:

- Nine preferences for stay-at-home wife: $\{\psi^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$
- Nine standard deviations of the match quality process of couples: $\{\sigma_\theta^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$
- 15 mean match quality components: $\{\bar{\theta}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, $\{\bar{\theta}^{s_f \emptyset}\}_{s_f\in\mathcal{S}}$, $\{\bar{\theta}^{\emptyset s_m}\}_{s_m\in\mathcal{S}}$

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

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

Moreover, I compute the nine female Pareto weights, $\{\lambda^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$, that clear all sub marriage markets.

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

Formally, let any vector of the 33 structural parameters be denoted by Π. I choose the vector $\hat{\Pi}$ and the associated market clearing Pareto weights, $\lambda(\hat{\Pi})$ such that

$$\begin{aligned}
[\hat{\Pi}, \lambda(\hat{\Pi})] = \underset{\Pi,\lambda}{argmin} \quad & [mom_{sim}(\Pi,\lambda) - mom_{data}]'\mathcal{V}[mom_{sim}(\Pi,\lambda) - mom_{data}] \\
s.t. \quad & \forall(s_f, s_m) : \mu_{s_f \to s_m}(\Pi,\lambda) = \mu_{s_f \leftarrow s_m}(\Pi,\lambda)
\end{aligned} \tag{17}$$

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

Note that for each set of structural parameters, Π, one can solve for the market clearing Pareto weights by applying the algorithm described in appendix C. However, as Adda and Cooper (2000) and Gayle and Shephard (2016) remark, it is extremely time consuming to solve for equilibria at all points considered within the search procedure over the parameter space. Furthermore, for those parameter values such that the moments simulated from the model do not match their data counterparts, solving for equilibria is futile. In practice, therefore, I treat the Pareto weights as an additional set of parameters to be "estimated" and the market clearing conditions as an additional set of moments to be matched to the data (Su and Judd (2012)). This strategy of using equilibrium relationships to discipline parameters and endogenous variables was previously applied by Adda and Cooper (2000) and Gayle and Shephard (2016).

The 66 moments used to solve problem (17) are: the frequency of singles by education (6 moments), the frequency of each type of couple (18 moments),[40] the pooled fraction (over the whole period of marriage) of stay-at-home wives within each couple type (9 moments), the

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

fraction of stay-at-home wives by female education and age of the household (12 moments),[41] the probability of divorce for each couple type (9 moments), and the female divorce hazard by education and age of the household (12 moments). The choice of moments is heavily driven by the role of each parameter in the model. Specifically, each parameter affects two characteristics of simulated individuals in the model: their relative valuation of marital alternatives, and their behavior over the life cycle. I provide a heuristic argument for identification based on the link between parameters and model moments.

First, all parameters are related to the mean values of marital alternatives, $\overline{U}_{\mathcal{X}}^{s_f s}$ and $\overline{U}_{\mathcal{Y}}^{s s_m}$, producing variation in matching patterns. For example, consider an increment in the preference for a stay-at-home wife in couple type (s_f, s_m), ψ^{s_f, s_m}. A higher wife's taste for leisure increases the value of marriage for both spouses. This makes all females type s_f relatively more attracted to s_m males and vice versa, increasing the proportion of (s_f, s_m) type of couples. Similarly, an increment in the mean match quality value for couple (s_f, s_m), $\overline{\theta}^{s_f s_m}$, makes the value of joining such type of couple higher for both s_f females and s_m males, leading to an increment in the number of individuals choosing to form these types of couples. On the contrary, conditional on the mean match quality, a higher quality variance for couple type (s_f, s_m), $\sigma_{\theta}^{s_f s_m}$, implies more states where the value of marriage is low, creating a tendency towards a reduction in the proportion of couples of this type. Similarly, a higher taste for remaining single, $\overline{\theta}^{s_f \emptyset}$ or $\overline{\theta}^{s_m \emptyset}$, makes individuals relatively less attracted to partners of all education types, reducing the number of all types of marriages.

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

First, the preference for leisure, $\psi^{s_f s_m}$, is obviously linked to the labor supply behavior of females: the higher this preference term, the higher the frequency of females specializing in home production. This parameter is also constrained by the divorce probabilities, because a higher value from leisure increases the total *flow* utility for both spouses, making divorce less attractive. Second, and similarly, the mean and variance of the match quality process of

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

couples is governed by the divorce decision: while a higher mean quality value makes the flow utility higher, reducing the likelihood of divorce, a higher variance of the match quality has the opposite effect. Lastly, all parameters are constrained by the satisfaction of market clearing conditions in all types of couples. The model produces the demand and supply of females within each couple type from the choices of females and from the choices of males. At any given set of parameters, these two model moments need not coincide, so Pareto weights and the model parameters will shift until a) there is no excess demand in any couple type and b) the distribution of marriages across couple types replicates the one observed in the data. Note that Pareto weights create important heterogeneity in how spouses value the particular type of couple to which they belong.

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

6.3 Estimation results

Tables 2 and 3 report the values of the parameters that solve problem (17).

Table 2 shows the estimates of the parameters of the life cycle of *couples*. Each row corresponds to a couple type, (s_f, s_m), where the first coordinate indicates the education of the wife and the second coordinate, the education of the husband.[42]

Overall, the parameters have the expected relative magnitudes. The mean taste for the wife staying at home for couples type (s_f, s_m), $\psi^{s_f s_m}$, is highest when the male is at most a high school graduate and lowest when the male has a college degree or more. Recall that, in the model, there are two benefits of having a stay-at-home wife: female utility from leisure and male accumulation of human capital. Interestingly, the estimates of $\psi^{s_f s_m}$ indicate that in couples with the highest benefit in terms of human capital accumulation, the preference for staying at home is the lowest. The spousal common match quality for couple type (s_f, s_m), $\overline{\theta}^{s_f s_m}$, is lowest for couples where the wife holds a college degree or higher, probably reflecting a distaste for marriages where the wife is of the highest education relative to the husband. Finally, the standard deviation of the match quality for couple type (s_f, s_m), $\sigma_\theta^{s_f s_m}$, captures the volatility of the marriage quality. The estimates indicate that, in couples with college plus

[42]The calculation of standard errors is in progress.

Table 2: Estimates of the parameters of the life cycle of couples

Couple type (s_f, s_m)	S-a-h wife preference $\psi^{s_f s_m}$	Match quality mean $\overline{\theta}^{s_f s_m}$	Match quality s.d. $\sigma_\theta^{s_f s_m}$
(hs,hs)	1.34	5.37	8.97
(hs,sc)	0.83	4.93	9.00
(hs,c+)	0.26	5.28	4.60
(sc,hs)	1.08	5.82	6.68
(sc,sc)	0.49	5.52	7.16
(sc,c+)	0.03	5.31	5.51
(c+,hs)	1.05	4.46	4.70
(c+,sc)	0.71	4.41	5.54
(c+,c+)	0.58	4.55	4.18

Notes: s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). Couple type (s_f, s_m) indicates a marriage between a female of education s_f and a male of education s_m. *"S-a-h"* stands for *"Stay-at-home"*. Each cell shows the estimate of the parameter indicated in the column label for couple type (s_f, s_m).

educated spouses, the match quality of the period stays the closest to the mean match quality relative to other types of couples. This result reveals that couples with the highest educated spouses have the most stable tastes for the type of couple they joined.

Table 3 shows the estimates of the taste for remaining single, $\overline{\theta}^{s_f \emptyset}$ for females of education s_f and $\overline{\theta}^{\emptyset s_m}$ for males of education s_m. Recall that, in the model, individuals do not enjoy public goods unless they get married. The main role of this parameter is to capture other factors that make singlehood attractive. Without a systematic taste for remaining single, individuals would prefer to join a bad marriage, divorce right away, and enjoy the rest of their lives as divorcees (which is almost like being single but enjoying public goods).

Table 3: Estimates of the mean preference for remaining single

Educ.	Females $\overline{\theta}^{s_f \emptyset}$	Males $\overline{\theta}^{\emptyset s_m}$
hs	152.25	146.85
sc	151.25	145.90
c+	140.67	146.47

Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). s_f refers to the education of females, s_m to the education of males, and $\emptyset$ to the condition of being single.

High school and some college females need a higher taste for remaining single than males of the same education, to reproduce the fraction of singles in the data. This may be due to the fact that women are in excess supply in the data.

Table 4 shows the female Pareto weights in the equilibrium under mutual consent divorce when the parameters of the model are set at the estimated levels. The rows label the education of the wife, s_f, and the columns label the education of the husband, s_m. Each cell displays the equilibrium female Pareto weight in couple (s_f, s_m). The female Pareto weight is increasing in female education, reflecting the fact that education is a valuable trait in the marriage market. Moreover, the female Pareto weight increases when a woman "marries down": for females to be willing to marry a lower educated husband, they must be compensated with a higher share of household resources. It is worth noting that both the magnitudes and patterns of these Pareto weights resemble those obtained by Gayle and Shephard (2016) also using US data.

Table 4: Female Pareto weights under mutual consent divorce

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

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

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

In both tables, *Data* refers to the observed moment, *[95% CI]* to the bootstrapped confidence interval of the observed moment, and *Model* to the moment simulated by the model under the mutual consent equilibrium female Pareto weights, $\widehat{\lambda}^{s_f s_m}$, when the parameters are set at the estimated levels. The model does remarkably well. The most important feature to notice is

Table 5: Target moments in estimation: couples' behavior

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

Notes: s_f refers to the education of females and s_m to the education of males. Education types are: high school (hs), some college (sc), and college degree or higher (c+). Couple type (s_f, s_m) indicates a marriage between a female of education s_f and a male of education s_m. Columns labeled *Data* show the indicated moment calculated from the sample of selected households in the Panel Study of Income Dynamics (see sections 6.2.1 and 6.2 for details on sample selection). *[95% CI]* shows bootstrapped 95% confidence intervals of data moments. Columns labeled *Model* show the same moments calculated on the sample simulated from the model. Δ stands for *distance*.

that the estimates of the parameters in the life cycle of households and the implied Pareto weights reflect equilibrium in the marriage market as produced by the model. To see this, firstly note in table 6 that the model simulated with the estimates reproduces the fraction of singles by education exactly. Secondly, note the three columns under the label *Matching patterns* in table 5. These columns display the observed and simulated fraction of couples relative to the amount of females. The model produces the supply side (from female choices) and the demand side (from male choices) of these frequencies. The second column shows the supply side. Overall, at the estimated parameters and implied Pareto weights simulated female choices accurately reproduce the observed composition of households. Importantly, the third column shows that supply equals demand in all sub-marriage markets, indicating that the model produces a marriage market in equilibrium at the parameter estimates.

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

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

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

Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). Columns labeled *Data* show the fraction of singles calculated from the sample of selected households in the Panel Study of Income Dynamics (see sections 6.2.1 and 6.2 for details on sample selection). *[95% CI]* shows bootstrapped 95% confidence intervals of the observed fractions. Columns labeled *Model* show the fraction of singles in the sample simulated from the model.

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

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

7 The equilibrium effects of introducing UD

In this section I simulate the adoption of unilateral divorce when the baseline MCD regime is in place, and analyze the equilibrium effects. To do so, I start from the equilibrium of the model under MCD (that, as shown, accurately replicates the features of the observed marriage market). Throughout this counterfactual exercise, I keep several model ingredients constant. First, I fix the population vectors, that is, the total amount of females and males, and the fraction of them in each education type. Second, I fix the parameters from the life cycle of households at the levels estimated under MCD: the coefficient on the preference for stay-at-home wife, $\{\widehat{\psi}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$ (so that $\alpha^{s_f s_m} = \psi^{s_f s_m} W(s_f)$); the mean match quality, $\{\widehat{\overline{\theta}}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; the standard deviation of the match quality, $\{\widehat{\sigma_\theta}^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$; and the mean preference for remaining single, $\{\widehat{\overline{\theta}}^{s_f,\emptyset}\}_{s_f\in\mathcal{S}}$ for females, and $\{\widehat{\overline{\theta}}^{\emptyset,s_m}\}_{s_m\in\mathcal{S}}$ for males. Third, I keep the distribution of taste shifters for marital alternatives, $\beta_f^{s_f s}$ and $\beta_m^{s s_m}$, unchanged. In this environment, I expose individuals at the time of marriage with a change in the grounds for divorce and in the relationship among ex spouses: divorce does not require the consent of the partner and ex spouses act in autarky from the first period of divorce. Finally, I solve for the marriage market equilibrium in the new unilateral divorce regime.

The details of the algorithm used to solve for the equilibrium under unilateral divorce are presented in appendix C. The algorithm contains three main procedures. The first procedure consists of computing the mean values of partner alternatives, $\big\{(\overline{U}_{\mathcal{X}}^{s_f s_m}(\lambda^{s_f s_m}), \overline{U}_{\mathcal{Y}}^{s_f s_m}(\lambda^{s_f s_m}))\big\}_{(s_f,s_m)\in\mathcal{S}^2}$, given any set of female Pareto weights for each couple *type*, $\Lambda = \{\lambda^{s_f s_m}\}_{(s_f,s_m)\in\mathcal{S}^2}$. To do this, for any given $\lambda^{s_f s_m}$, I solve the life cycle problem of households under the unilateral divorce regime using the set of estimated parameters $\widehat{\Pi}$. Note that the value of singlehood does not depend on $\lambda^{s_f s_m}$ and is constant across divorce regimes. The second procedure of the algorithm consists of using the values of marital alternatives to solve the individuals' partner choice problems (6) and construct the resulting aggregate supply and demand of females in each couple type. Finally, the third procedure repeats the first and second procedures searching over the matrix of Pareto weights until all markets for couple types clear.[43]

Changes in equilibria across regimes stem from changes in the relative value of marriage alternatives, caused by changes in married households' allocations of labor supply, consumption, divorce, and child support transfers over the life cycle. Is is instructive, therefore, to describe the potential forces affecting couples' behavior in marriage across regimes. Suppose that we *keep Pareto weights fixed* at the equilibrium under mutual consent and introduce unilateral divorce. Couples' behavior is affected in at least two ways. First, unilateral divorce may lead to a *constrained* efficient allocation of female labor supply over the life cycle that is different from the one under mutual consent. When women specialize in home production the earnings of husbands increase, which improves males' outside value of divorce. When the regime is one of unilateral divorce, husbands in specializing households have higher bargaining power, inducing women to increase their labor supply in the market. I establish this claim in Reynoso (2017) within a much simpler stylized model.

The second effect of unilateral divorce is that of reducing barriers to dissolution. Whether divorce probabilities increase or not depends on the parameters of the model, as Chiappori, Iyigun, and Weiss (2015) illustrate. In this model, and at the parameters and Pareto weights consistent with the mutual consent regime equilibrium, couples divorce more when unilateral divorce is introduced.

Recall that we are fixing the Pareto weights at the levels of the equilibrium under the mutual consent regime. The decrease in female housework supply and the increase in divorce affect the value of marriage and of marrying a partner of type $s \in \mathcal{S}$, leading to imbalances of supply and demand in the markets for couple types. As a result, prices will adjust to restore equilibrium. Table 7 shows the baseline and the counterfactual equilibria female Pareto weights.

[43]Recall from section 4 that, under unilateral divorce, couples are unable to commit to a *constant* sharing rule within the marriage: the weight on the lifetime utility of the female will evolve over the time-states spectrum to guarantee satisfaction of the participation constraints in marriage for both spouses at every period-state. However, couples can exactly anticipate the update in their Pareto weight at any state and period if they know such Pareto weight. Therefore, to find equilibria under unilateral divorce, it is sufficient to solve for the *initial* Pareto weight that determines the initial allocation of resources within the couple.

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

Table 7: Baseline and counterfactual equilibria female Pareto weight, $\lambda^{s_f s_m}$

Couple type (s_f, s_m)	Regime MCD	UD
(hs,hs)	0.49	0.42
(hs,sc)	0.41	0.34
(hs,c+)	0.36	0.34
(sc,hs)	0.63	0.60
(sc,sc)	0.55	0.50
(sc,c+)	0.40	0.37
(c+,hs)	0.65	0.54
(c+,sc)	0.55	0.39
(c+,c+)	0.41	0.35

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. Row labels correspond to couple types: the first coordinate indicates wife's education and the second coordinate, husband's education. Education types are: high school (hs), some college (sc), and college degree or higher (c+).

Explaining what drives these initial imbalances and the subsequent forces towards market clearing is not straightforward. Recall that in this *imperfectly transferable utility* framework, Pareto weights and individual welfare are jointly determined. On the one hand, the expected lifetime utility of spouses *is determined by* the Pareto weights that affect the female participation constraint in the intertemporal problem of couples. On the other hand, the expected lifetime utility of individuals *determines* the Pareto weights through the market clearing conditions in all sub-marriage markets. Hence, the picture of the change in equilibria across regimes is incomplete without a portray of the changes in the *equilibrium* life cycle behavior of couples, marriage probabilities, sorting patterns, and gains from marriage. The following sub sections characterize the baseline and counterfactual equilibria in these dimensions.

7.1 *Equilibrium* life cycle behavior

The previous paragraphs analyzed the model forces regarding household behavior *outside* of the equilibrium. In this section I compare the behavior of couples across the MCD and the UD equilibria.

Table 8 shows the fraction of couples, within each couple type, that divorces at some point in their lifetime. Each row corresponds to a couple type, (s_f, s_m). The table displays the fraction of couples who divorce in the equilibrium under mutual consent (column MCD), in the equilibrium under unilateral divorce (column UD), and the change in the probability of divorce when unilateral divorce is introduced (UD-MCD). In the new divorce regime, the probability of dissolution increases for all types of couples.[44] The patterns of divorce are replicated across regimes: couples with low educated spouses continue to exhibit the highest rates of marriage turnover.[45] However, the largest *increments* in the frequency of divorces are observed in couples with college plus wives.[46]

[44]Unfortunately, it is impossible to replicate this counterfactual effect in the data, as we expect many other environmental changes to occur between the moment any couple marries and divorces, apart from the change in the divorce regime.

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

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

Table 8: Divorce probability in equilibrium, by type of couple and divorce regime

Couple type (s_f,s_m)	Divorce probability MCD	UD	Change in probability
(hs,hs)	0.46	0.50	0.04
(hs,sc)	0.47	0.50	0.04
(hs,c+)	0.16	0.22	0.07
(sc,hs)	0.33	0.40	0.08
(sc,sc)	0.36	0.45	0.09
(sc,c+)	0.22	0.33	0.11
(c+,hs)	0.22	0.38	0.16
(c+,sc)	0.30	0.44	0.14
(c+,c+)	0.08	0.28	0.20

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. Row labels correspond to couple types: the first coordinate indicates wife's education and the second coordinate, husband's education. Education types are: high school (hs), some college (sc), and college degree or higher (c+). *Change in probability* is the difference between the divorce probability under UD and MCD.

On the contrary, in the new equilibrium, female labor supply is not significantly affected, despite the model forces towards lower household specialization when unilateral divorce is introduced. Interestingly, even though under unilateral divorce all women accrue a lower share of household resources (at least initially, as evidenced by the drop in the female Pareto weights), wives are able to sustain their baseline leisure levels.

7.2 Matching and sorting

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

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

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

Lastly, lower barriers to divorce may lead to changes in sorting patterns through at least two channels. Firstly, *indirectly* by inducing changes in female labor supply. Secondly, directly by affecting the probability of divorce. Indeed, the data suggests that the most educated individuals divorce more if they "marry down". By marrying each other, the most educated can reduce the likelihood of divorce. Hence, in a regime like unilateral divorce, where the risk of divorce is higher, the top educated may find each other more attractive, leading to higher correlation in spousal education. Note that even when my results indicate that marriages among the highest educated individuals experience the highest increment in divorce probabilities following the introduction of UD, couple type $(c+, c+)$ exhibits the second lowest probability of divorce under UD.

I next present evidence that the introduction of UD effectively leads to more positive sorting in the marriage market. Table 9 shows marital choice probabilities, that is, the fraction of individuals within each education type that chose alternative $s \in \mathcal{S}_0$ in the marriage market. The column labeled *"Educ. s_i"* indicates the education of the individual and the column labeled *"Marital alternative s"* refers to the set of options in the marriage market: an education of a partner or remaining single. The information is displayed by gender. Columns labeled *"MCD"* show the baseline choice probabilities while columns labeled *"UD"* show the probabilities in the counterfactual scenario where couple marry under the unilateral divorce regime. The last column shows the change in choice probabilities across regimes (UD-MCD). In the equilibrium under the unilateral divorce regime, high school and college plus graduates are more likely to remain single relative to the equilibrium under the mutual consent regime. The largest effect is observed for the most educated females, who increase their likelihood of not marrying by almost 23% (which corresponds to three percentage points).

Table 9: Marital choice probabilities in equilibrium, by gender, education, and divorce regime

Educ.	Marital alternative	Females: Choice probability		Females: Change in probability	Males: Choice probability		Males: Change in probability
s_i	s	MCD	UD		MCD	UD	
hs	**hs**	0.63	0.61	-0.02	0.65	0.64	-0.02
	sc	0.20	0.21	0.01	0.20	0.20	0.00
	c+	0.02	0.02	0.00	0.03	0.03	0.01
	$\emptyset$	0.15	0.16	0.01	0.12	0.13	0.01
sc	**hs**	0.35	0.35	0.00	0.38	0.39	0.01
	sc	0.38	0.39	0.02	0.40	0.41	0.01
	c+	0.12	0.11	-0.01	0.11	0.09	-0.02
	$\emptyset$	0.16	0.15	-0.01	0.11	0.11	-0.00
c+	**hs**	0.13	0.15	0.02	0.10	0.10	0.00
	sc	0.29	0.23	-0.06	0.31	0.28	-0.03
	c+	0.45	0.46	0.01	0.46	0.46	0.01
	$\emptyset$	0.13	0.16	0.03	0.13	0.16	0.02

Notes: MCD stands for *mutual consent divorce.* UD stands for *unilateral divorce. Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). *Marital alternative* indicates the education type of the partner (with same value labels as *Educ.*) or the alternative of remaining single ($\emptyset$). The cells under columns labeled *Choice probability* show the fraction of individuals of $Educ = s_i$ who choose alternative s. *Change in probability* is the difference in choice probabilities across regimes (UD-MCD).

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

It is interesting to analyze how those who decide to get married change their partner type choice across regimes. This is shown in table 10, which has the same structure as table 9. In both divorce regimes individuals who marry are more likely to marry someone of their same education, reflecting positive assortative matching. With the exception of high school graduates, the frequency of married individuals with partners of their same education increases after the introduction of unilateral divorce. This effect is highest for college educated females that increase their probability of marrying a college educated male by 6% (over 3 percentage points).

Table 10: Marital sorting patterns in equilibrium, by gender, education, and divorce regime

		Females			Males		
Educ.	**Partner's educ.**	Partner's educ. choice probability		Change in probability	Partner's educ. choice probability		Change in probability
s_i	s	MCD	UD		MCD	UD	
hs	**hs**	0.74	0.73	-0.01	0.74	0.73	-0.01
	sc	0.24	0.25	0.01	0.23	0.23	0.00
	c+	0.02	0.02	0.00	0.03	0.04	0.01
sc	**hs**	0.41	0.41	-0.00	0.43	0.44	0.01
	sc	0.45	0.47	0.02	0.45	0.46	0.02
	c+	0.14	0.13	-0.01	0.12	0.10	-0.02
c+	**hs**	0.15	0.18	0.03	0.11	0.12	0.01
	sc	0.33	0.27	-0.06	0.36	0.33	-0.03
	c+	0.52	0.55	0.03	0.53	0.55	0.02

Notes: MCD stands for *mutual consent divorce*. UD stands for *unilateral divorce*. *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). *Partner's educ.* indicates the education type of the partner (with same value labels as *Educ.*). The cells under columns labeled *Partner's educ. choice probability* show the fraction of individuals of $Educ = s_i$ *who marry* and choose a partner of education s. *Change in probability* is the difference in choice probabilities across regimes (UD-MCD).

Overall, the results imply that the correlation in wives' and husbands' education increases by 10.28% under unilateral divorce, relative to mutual consent. This figure is close to the observed difference in differences effect that lies between 15% and 23%, providing an out of sample validation of the fit of the model under the counterfactual unilateral divorce regime.

7.3 Welfare analysis

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

To understand whether higher flexibility or lower commitment dominate the welfare effects, I start by analyzing how the *social* welfare compares across divorce regimes. The social welfare associated with divorce regime $\mathcal{D}$ is calculated as the weighted sum of the total expected lifetime utility across individuals:[47]

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

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

To complete the characterization of equilibria across divorce regimes and the marriage market equilibrium effects of adopting unilateral divorce, I next compute and compare the gains from marriage and total marital welfare that result from the estimated model under mutual consent and from the simulated model under unilateral divorce.

7.3.1 The gains from marriage

In this section I calculate the gains from marriage, that is, the expected benefit of marrying, on top of what is gained by remaining single, for the different education groups. Figure 6 shows the gains from marriage for females in the top panel and the gains from marriage for males in the bottom panel. In both cases, the first three bars correspond to the figures for the model estimated under mutual consent and the last three bars to the model simulated under unilateral divorce. Each bar corresponds to the education level indicated in the row labeled *Educ.*. The height of bars (indicated above) represent expected utility units. Finally, the bottom rows labeled $\%\ c_{ft}(\omega_t)$ and $\%\ c_{mt}(\omega_t)$ display the percent of private consumption that a female or male (respectively) of the indicated education is willing to pay to be indifferent

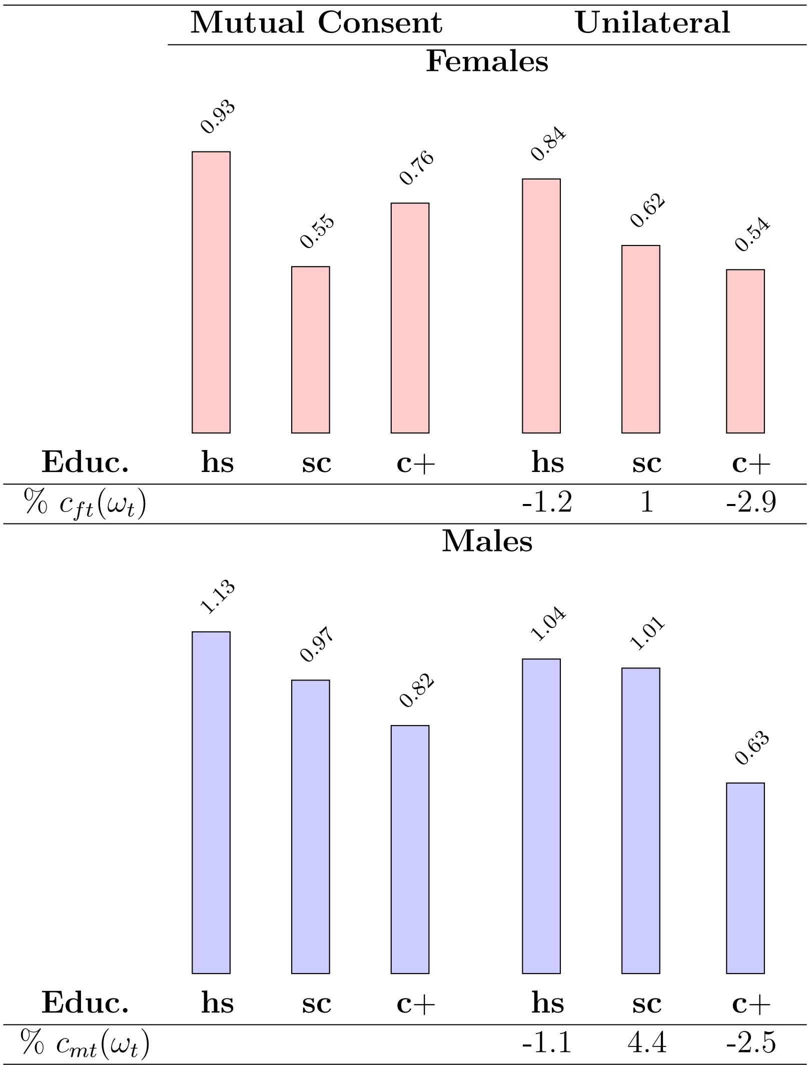
[47]Note that the following expression can be equivalently written as

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

that uses the choice probabilities.

between the unilateral divorce and the mutual consent divorce regimes.[48] A first pattern to

Figure 6: Gains from marriage by gender, education, and divorce regime



Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). The bars depict the gains from marriage for the corresponding gender-education group under mutual consent or unilateral divorce regime. The gains from marriage are computed as the additional expected lifetime utility of the group on top of the group's value of remaining single (formally derived in section 5). % $c_{ft}(\omega_t)$ and % $c_{mt}(\omega_t)$ indicate the percent of private consumption that a female or male (respectively) of the indicated education is willing to pay to be indifferent between the unilateral divorce and the mutual consent divorce regimes.

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

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

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

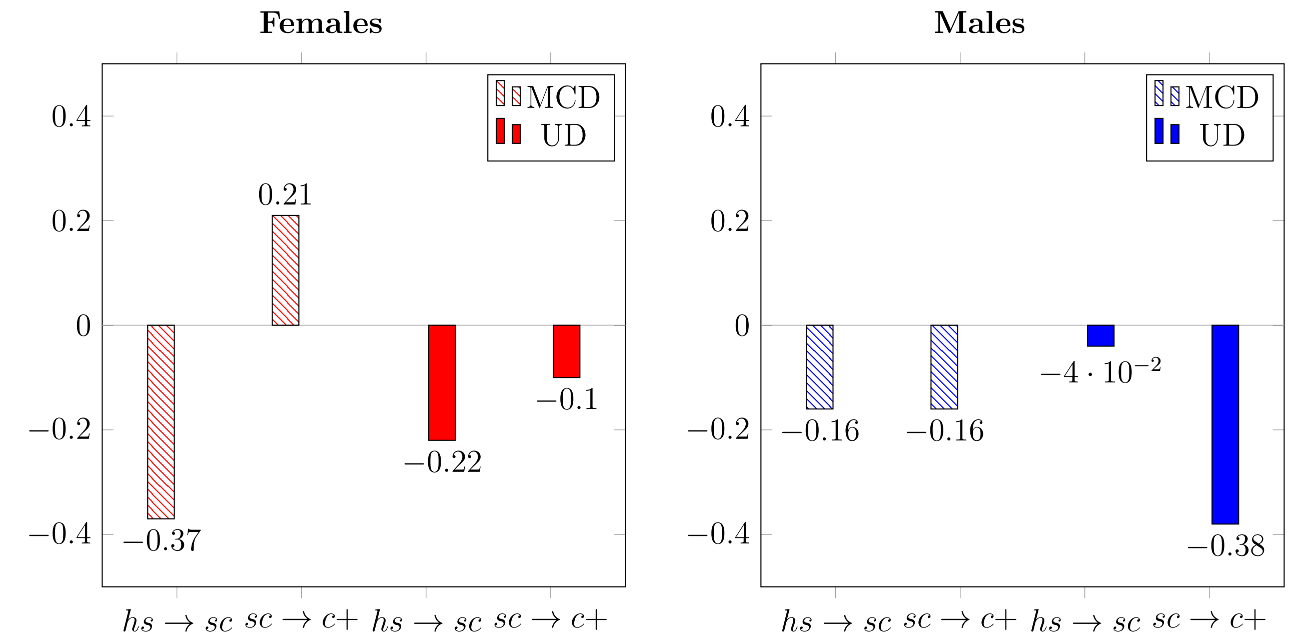
where $\overline{U}^{s_f s_m}(c, \mathcal{D})$ reflects the expected lifetime (indirect) utility from consumption c in the equilibrium under divorce regime $\mathcal{D}$.

public goods that marriage grants them.

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

Lastly, I analyze how the gains from marriage vary with education. While for males the gains from marriage are decreasing in education in both divorce regimes, for females they exhibit a "U-shape" under MCD but become decreasing in education under UD. The difference in gains from marriage across consecutive education levels is known in the literature as *the marital returns to education* and was introduced by Chiappori, Iyigun, and Weiss (2009) and first estimated by Chiappori, Salanié, and Weiss (2017) for various US cohorts. For convenience, I plot the difference in gains from marriage across education groups in figure 7 for females, in the left panel, and for males, in the right panel. The height of bars is indicated by the figures on top or below bars. The bottom row of each panel indicates the considered change in education, from high school to some college ($hs \rightarrow sc$) and from some college to college plus ($sc \rightarrow c+$). Lastly, striped bars display figures for the estimated mutual consent regime while solid bars indicate figures under the simulated unilateral divorce regime.

Figure 7: Marital returns to education by gender, education, and divorce regime



Notes: the bars plot the change in the gains from marriage that results from increasing the education level to the next consecutive education type, by gender. The gains from marriage are computed as the additional expected lifetime utility of the group on top of the group's value of remaining single (formally derived in section 5). Bars labeled $hs \rightarrow sc$ indicate the marital returns to education for individuals with at most high school education and bars labeled $sc \rightarrow c+$ indicate the marital returns to education for individuals with some college education.

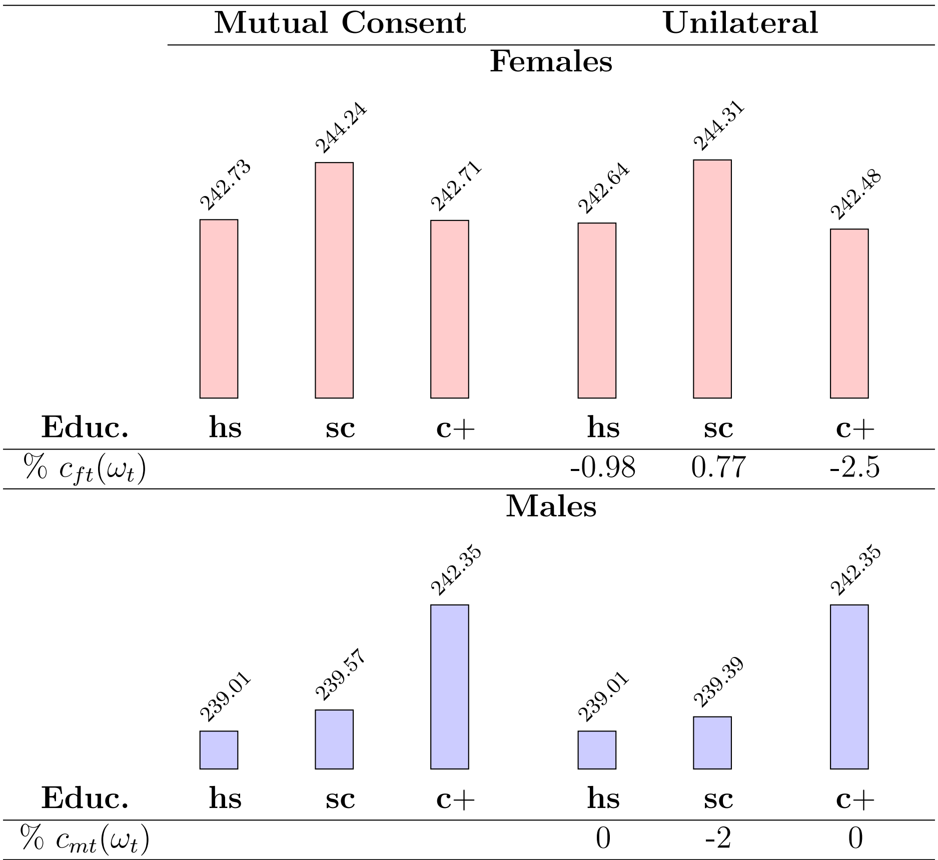
Noticeably, the marital returns to a college plus degree are positive for females under mutual consent divorce and become negative under unilateral divorce. These results imply that the *marital* returns to education decrease for the most educated after the adoption of UD. Interestingly, even when in the new equilibrium the college plus group has a lower probability of "marrying down", the returns to education in the marriage market decrease when spousal commitment decreases.

7.3.2 Marital welfare

Finally, I analyze the marital welfare, that is, the expected lifetime utility gained in marriage, conditional on getting married. This is plotted in figure 8. The figure has the same structure as figure 6.

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

Figure 8: Marital welfare by gender, education, and divorce regime



Notes: *Educ.* indicates individuals' education types: high school (hs), some college (sc), and college degree or higher (c+). The bars depict the marital welfare for the corresponding gender-education group under mutual consent or unilateral divorce regime. The marital welfare is computed as the total expected lifetime utility conditional on getting married (formally derived in section 5). % $c_{ft}(\omega_t)$ and % $c_{mt}(\omega_t)$ indicate the percent of private consumption that a female or male (respectively) of the indicated education is willing to pay to be indifferent between the unilateral divorce and the mutual consent divorce regimes.

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

7.3.3 Understanding welfare effects

There are four main conclusions from the welfare analysis.

First, the introduction of unilateral divorce decreases social welfare for *newly formed* couples. On the one hand, this result may seem not surprising given that UD implies lower spousal commitment. On the other hand, an interesting puzzle arises: if social welfare decreases following the introduction of UD, who voted for UD? This puzzle is resolved if we consider the possibility that the group with the right to vote for a policy change is not the only group affected by the policy. In an equilibrium framework, there is certainly a key distinction between the welfare effect of a policy change for *already formed* couples (who are part of the marriage market at the time of the vote) and for "unborn" couples to be formed in the future (who were *not* in the marriage market at the time of the vote). This is an important point emphasized by Chiappori, Iyigun, Lafortune, and Weiss (2016) in a different context.[49] Previous welfare analyses have effectively found welfare improvements of UD for married couples, particularly for married females who increase their bargaining power in marriage (Voena, 2015) and have more freedom to leave low quality marriages (Stevenson and Wolfers, 2006). My paper, on the contrary, restricts the welfare analysis to couples formed *after* the policy change. The conclusion that social welfare decreases for this group reflects the existence of *unintended* consequences of UD: while for already formed couples the flexibility of divorce may have boosted wellbeing, new generations entering the marriage market under the new regime face different market conditions that imply lower levels of wellbeing.

Second, the introduction of unilateral divorce has non monotonic effects, increasing the gains from marriage for the individuals with some college education and reducing the gains from marriage for the least and the most educated. The non monotonicity in the effects result from the combination of the various equilibrium forces. For example, in this model where savings are assumed away, marriage is the only source of insurance against income shocks. However, the introduction of unilateral divorce reduces risk pooling within marriage, decreasing marital value for all types of couples. The negative effects from lower risk sharing are particularly important for the lowest educated, who lose welfare under unilateral divorce in spite of ending up matching with higher educated partners. Another important results of the equilibrium under unilateral divorce is that divorce probabilities are increased for all types of couples relative to the baseline regime. Recall that divorce harms both males and females because ex spouses deviate from the efficient expenditure in public goods, females have the burden of making expenditures in the public good, and males suffer a distance effect due to being the non custodial parents. As discussed in section 7.1, the *increment* in divorce is particularly important for the college plus educated. Hence, in spite of being better matched under unilateral divorce, the value of marriage decreases due to the higher incidence of divorce, dominating the welfare effects for this group. On the contrary, for the middle educated, the positive effects of increased homogamy dominates resulting in positive welfare changes.

The third conclusion from the welfare analysis is that the introduction of unilateral divorce

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

seems to be most detrimental for women, particularly the least and the most educated. These groups show the highest drops in both the gains from marriage and the marital welfare. This conclusion is in line with Fernández and Wong (2017), who also find that unilateral divorce is mostly harmful for poorer women.[50]

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

8 Conclusion

This paper quantifies the long run marriage market *equilibrium* effects of reducing barriers to divorce. I find sizable equilibrium effects. First, the correlation in spousal education increases

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

by 10.3%, matching the observed reduced form estimates. Second, people, particularly educated females, are more likely to remain single. Third, the gains from marriage, computed as the expected excess value of marrying a partner of a certain education over the value of remaining single, increases for the some college educated but decreases for the least and the most educated individuals. Lastly, the marital welfare gains from acquiring a college or higher degree decreases under unilateral divorce.

It is important to remark that the welfare metrics associated with marriage market equilibria are heavily driven by modeling choices. The framework I develop incorporates empirically relevant dimensions that are absent in previous papers (most importantly, the possibility of divorce and the consumption of public goods within and without marriage) and opens up an exiting agenda.

First, it is left for future research to investigate the equilibrium effects of divorce laws interacted with other policy changes occurring within the same time frame (such as changes in property division laws and efforts to make professional degrees obtained during a marriage an asset to be divided in the event of a divorce). These policies may have mitigated the effects of unilateral divorce estimated in my paper. Importantly, the framework I develop can be applied to evaluate the effectiveness of policies aiming to increase marital welfare within the unilateral divorce regime.

Second, this paper provides an adequate framework for studying the design of commitment devices that lessen the negative effects of limited spousal commitment for new couples, while maintaining the benefits of having the possibility to divorce with minimal restrictions. In ongoing work, I evaluate the effectiveness of increasing access to housing assets, particularly for young couples. Young couples face more barriers to the accumulation of physical assets, but produce the highest returns to human capital investments within the marriage. In this extension, I evaluate whether increasing investment opportunities in physical assets for young couples can restore some of the efficiency in marital investments in human capital and alleviate the negative welfare equilibrium effects of unilateral divorce in the marriage market.

Third, in light of the open discussion on the influence of public goods expenditures in divorce on the gains from marriage, in ongoing work I extend this model to add a production function of child quality. Given the dynamic complementarity in investment in children's skills, such a framework would allow us to study the welfare of children and the investing behavior of parents both in marriage and in divorce, taking into account the influence of the equilibrium in the marriage market in a context of limited spousal commitment.

Fourth, my framework can be applied to empirically investigate trends in assortative matching and spousal welfare in an environment where *in equilibrium* as high as 40% of matched couples will divorce. I would like to emphasize that high marriage turnover is still consistent with a marriage market in equilibrium (after all, divorce is nothing but an *equilibrium* behavior of *matched* couples).

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

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Appendix A Estimation of earnings processes

A.1 Male earnings

A.1.1 First step: Female labor force participation

Table 11: Divorce laws and female housework supply

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

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

A.1.2 Second step: male earnings regressions

Table 12: The impact of stay-at-home wife capital on *ln* hourly earnings of males

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

Notes: The dependent variable is the natural logarithm of real hourly wages (in 1990 prices). *Educ.* refers to the highest education level achieved by the male. $\widehat{K}$ is the predicted number of years (from the first step estimation in table 11) that the male was married to a stay-at-home female. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *Married* is a dummy variable that takes value one if the individual is married. *Duration* is a count variable capturing the number of years an individual has been married. All regressions include state and year fixed effects. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level.

Table 13: The impact of stay-at-home wife capital on *ln* annual earnings of males

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

Notes: The dependent variable is the natural logarithm of real annual wages (in 1990 prices). *Educ.* refers to the highest education level achieved by the male. $\widehat{K}$ is the predicted number of years (from the first step estimation in table 11) that the male was married to a stay-at-home female. Age is a categorical variable that captures intervals of individuals' age: $\{< 23, [23-25], [26-28], ..., \geq 62\}$. *Married* is a dummy variable that takes value one if the individual is married. *Duration* is a count variable capturing the number of years an individual has been married. All regressions include state and year fixed effects. Standard errors clustered at the state level are in parentheses. ***Significant at the 0.01 level. **Significant at the 0.05 level.

A.2 Female earnings

A.2.1 First step: the experience regressions

Table 14: Regression model of female experience in the labor market

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

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

A.2.2 Second step: female earnings regressions

Table 15: Female earnings regressions controlling for labor market participation

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

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

Appendix B Model solution

B.1 The value of being divorced

Let $1 < t^D \leq T$ be the year of divorce. The first period in divorce, t^D, the couple allocates resources solving the cooperative problem (12). Every period after that, $t > t^D$, ex spouses solve their respective autarky problems (10) and (11). I obtain the value of divorce by backwards induction starting from the autarky stage.

Autarky stage ($t > t^D$)

For a general period $t > t^D$ and given any transfer τ, the ex wife's chooses how much to spend in her private consumption and in the couple's public good by solving problem (10). Because choice variables do not affect the continuation value, the solution to this problem is found by solving:

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

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

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

The ex husband takes the ex wife decision rule as given and decides on the size of the transfer τ_t to make, by solving problem (11). Again, because the current choice of τ does not affect the continuation value of autarky, the interior solution to this problem is found by solving:

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

This problem has either an interior or a corner solution:

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

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

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

The value of autarky for the ex wife is the expected discounted value of living in autarky for periods $t = \{t^D + 1, ..., T\}$:

$$v^A_{ft^D+1}(\omega_{t^D+1}) = \begin{cases} ln\Big[\rho\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}^D_{t^D+1}(\omega_{t^D+1})}{2}\Big)^2\Big] + \delta E\Big[v^A_{ft^D+2}(\omega_{t^D+2}|\omega_{t^D+1})\Big] & if\ \tau > 0 \\ ln\Big[\rho\Big(\frac{w_{ft^D+1}(\omega_{t^D+1})}{2}\Big)^2\Big] + \delta E\Big[v^A_{ft^D+2}(\omega_{t^D+2}|\omega_{t^D+1})\Big] & otherwise \end{cases} \tag{18}$$

Similarly, the value of autarky for the ex husband is the expected discounted value of living in autarky for periods $t = \{t^D + 1, ..., T\}$:

$$v^A_{mt^D+1}(\omega_{t^D+1}) = \begin{cases} ln\Big[\rho\frac{\mathcal{W}^D_{t^D+1}(\omega_{t^D+1})}{1+\gamma}\Big(\frac{\gamma}{1+\gamma}\frac{\mathcal{W}^D_{t^D+1}(\omega_{t^D+1})}{2}\Big)^\gamma\Big] + \delta E\Big[v^A_{mt^D+2}(\omega_{t^D+2}|\omega_{t^D+1})\Big] & if\ \tau > 0 \\ ln\Big[\rho w_{mt^D+1}(\omega_{t^D+1})\Big(\frac{w_{ft^D+1}(\omega_{t^D+1})}{2}\Big)^\gamma\Big] + \delta E\Big[v^A_{mt^D+2}(\omega_{t^D+2}|\omega_{t^D+1})\Big] & otherwise \end{cases} \tag{19}$$

Cooperative stage ($t = t^D$)

In a mutual consent divorce regime, at the time of divorce the couple negotiates the division of the joint value produced in the cooperative stage. Let $\widetilde{\lambda}$ be the weight in the ex wife utility in divorce. In period t^D the couple chooses private and public consumption levels by jointly solving the Pareto problem (12). Because the sharing rule in period t^D does not impact the continuation value of autarky for any of the ex spouses, the allocation of expenditures in private consumption and the public good also solves problem:

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

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

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

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

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

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

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

and

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

Note that the efficient levels of expenditure in private and public consumption depend on the Pareto weight in divorce, reflecting the fact that the cooperative program in divorce does not satisfy the transferable utility property. This is due to the fact that ex spouses have different valuations in divorce.[51]

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

$$\kappa(\widetilde{\lambda}, \gamma) = \widetilde{\lambda} + (1-\widetilde{\lambda})\gamma \tag{20}$$

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

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

[51]Identical preferences of individuals is necessary for TU to hold in divorce (Chiappori et al., 2015)

and

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

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

$$v_{ft}^{D}(\omega_t) = ln\Big[\rho\widetilde{\lambda}\kappa(\widetilde{\lambda},\gamma)\Big(\frac{\mathcal{W}_t^D(\omega_t)}{1+\kappa(\widetilde{\lambda},\gamma)}\Big)^{2}\Big] + \delta E\Big[v_{ft+1}^{A}(\omega_{t+1}|\omega_t)\Big] \tag{21}$$

and

$$v_{mt}^{D}(\omega_t) = ln\Big[\rho(1-\widetilde{\lambda})\kappa(\widetilde{\lambda},\gamma)^{\gamma}\Big(\frac{\mathcal{W}_t^D(\omega_t)}{1+\kappa(\widetilde{\lambda},\gamma)}\Big)^{1+\gamma}\Big] + \delta E\Big[v_{mt+1}^{A}(\omega_{t+1}|\omega_t)\Big] \tag{22}$$

B.2 The value of staying married

In this subsection I derive the value of continuing the marriage at any period $t \geq 1$ in which the couple arrives married. In this model, the only decision variable that influences the lifetime resources of the couple is female labor supply that affects female future earnings through experience and male future earnings through the spousal support effect. Hence, the solution to the couple's problem *if the marriage continues*, problem (15), can be found following a *three stage formulation* as described by Chiappori and Mazzocco (2015). Let λ_t be any given wife's Pareto weight at time t (not necessarily the one consistent with the equilibrium in the marriage market).

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

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

The second stage in the solution of problem (15) corresponds to the *resource allocation stage*. Given a fixed amount of lifetime resources allocated to period t and state ω_t,

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

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

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

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

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

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

$$q_t = \frac{\mathcal{W}_t(\omega_t)}{2}$$
and
$$C_t = \frac{w_{ft}(1-k_t) + w_{mt} - \alpha k_t}{2}$$

By the intrahousehold allocation first order conditions,

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

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

Finally, the last stage in the solution of program (15) corresponds to the *intertemporal stage*, where the couple decides how to allocate lifetime resources to each period. In this model, the only decision variable that changes lifetime and within period resources is female labor supply. The couple jointly chooses female household labor supply, k_t, so as to maximize the weighted sum of spouses' utilities, given the Pareto weight:

$$\begin{aligned} \max_{k_t} \quad & \lambda_t ln\Big[\lambda_t\Big(\frac{\mathcal{W}_t(\omega_t, k_t)}{2}\Big)^2\Big] + (1-\lambda_t) ln\Big[(1-\lambda_t)\Big(\frac{\mathcal{W}_t(\omega_t, k_t)}{2}\Big)^2\Big] \\ & + \delta\Big\{\lambda_t E\Big[v^M_{ft+1}(\omega_{t+1}|\omega_t, k_t)\Big] + (1-\lambda_t)E\Big[v^M_{mt+1}(\omega_{t+1}|\omega_t, k_t)\Big]\Big\} \end{aligned} \tag{23}$$

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

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

Similarly, the analogous value for the husband is:

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

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

B.3 The value of arriving married

In this subsection I derive the value of arriving married at any period $t \geq 1$. Because the continuation value at any period depends on the current choices of k and D, I solve the model by backwards induction.

Period T

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

$$\max_{k_T} \quad \lambda_T ln\Big[\lambda_T\Big(\frac{\mathcal{W}_T(\omega_T, k_T)}{2}\Big)^2\Big] + (1-\lambda_T) ln\Big[(1-\lambda_T)\Big(\frac{\mathcal{W}_T(\omega_T, k_T)}{2}\Big)^2\Big] \tag{24}$$

Let k^*_T be the solution to program (24). The spouses' values of continuing the marriage in period T are (considering also the match quality shock):

$$v^M_{fT} = ln\Big[\lambda_T\Big(\frac{\mathcal{W}_T(\omega_T, k^*_T)}{2}\Big)^2\theta_T\Big] \tag{25}$$

$$v^M_{mT} = ln\Big[(1-\lambda_T)\Big(\frac{\mathcal{W}_T(\omega_T, k^*_T)}{2}\Big)^2\theta_T\Big] \tag{26}$$

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

[Mutual Consent divorce]

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

$$v_{fT}^{D}(\lambda_T) = ln\Big[\lambda_T\Big(\frac{\kappa(\lambda_T,\gamma)\mathcal{W}_T^D(\omega_T)}{1+\kappa(\lambda_T,\gamma)}\Big)^2\Big] \tag{27}$$

$$v_{mT}^{D}(\lambda_T) = ln\Big[(1-\lambda_T)\Big(\frac{\kappa(\lambda_T,\gamma)\mathcal{W}_T^D(\omega_T)}{1+\kappa(\lambda_T,\gamma)}\Big)^2\Big] \tag{28}$$

where $\kappa(\lambda,\gamma)$ was defined in (20). Given expressions (25) to (28), there are six possible scenarios:

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

– If there is no feasible revision of the Pareto weight in divorce, the couple stays married and the period individual values are $v_{fT} = v^M_{fT}$ and $v_{mT} = v^M_{mT}$.

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

[**Unilateral divorce**]

Note that the values associated to staying married at any female Pareto weight, λ are $v^M_{fT}(\lambda)$ and $v^M_{mT}(\lambda)$. These values are given by evaluating expressions (25) and (26) with weight λ, where k^*_T is the solution to problem (24) when the weight is λ. Suppose the couple arrives at period T married with wife Pareto weight λ_T.

The assumptions of the model when divorce is unilateral imply that divorcees do not go through a cooperative stage. Hence, the value of the divorce if the couple divorces in the last period is the value of autarky. From the solution to the autarky problem presented in section B.1 it follows that ex spouses values of autarky are:

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

and

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

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

- If $v^M_{fT}(\lambda_T) > v^A_{fT}$ and $v^M_{mT}(\lambda_T) > v^A_{mT}$, the couple stays married and the period individual values are $v_{fT} = v^M_{fT}(\lambda_T)$ and $v_{mT} = v^M_{mT}(\lambda_T)$.
- If $v^M_{fT}(\lambda_T) < v^A_{fT}$ and $v^M_{mT}(\lambda_T) < v^A_{mT}$, the couple divorces and the period individual values are $v_{fT} = v^A_{fT}$ and $v_{mT} = v^A_{mT}$.
- If $v^M_{fT}(\lambda_T) < v^A_{fT}$ and $v^M_{mT}(\lambda_T) > v^A_{mT}$, the couple searches to see if there exists a revision of the Pareto weight in marriage, ν_T, such that $v^M_{fT}(\lambda_T + \nu_T) = v^A_{fT}$ and $v^M_{mT}(\lambda_T + \nu_T) > v^A_{mT}$. Then, there are two possible scenarios:

  - If an η_T such that $\lambda_T + \nu_T \in (0,1)$ exists, the couple stays married and the period individual values are $v_{fT} = v^M_{fT}(\lambda_T + \nu_T)$ and $v_{mT} = v^M_{mT}(\lambda_T + \nu_T)$.
  - If there is no feasible revision of the Pareto weight in marriage, the couple divorces and the period individual values are $v_{fT} = v^A_{fT}$ and $v_{mT} = v^A_{mT}$.

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

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

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

$$v_{fT}(\omega_T) = (1 - D^*_T)v^M_{fT}(\omega_T) + D^*_T v^D_{fT}(\omega_T)$$
$$v_{mT}(\omega_T) = (1 - D^*_T)v^M_{mT}(\omega_T) + D^*_T v^D_{mT}(\omega_T)$$

Period $T-1$

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

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

To determine the value of staying married throughout period $T-1$, the couple chooses k_{T-1} so as to solve problem (23) at period $T-1$ and at any given female Pareto weight λ_{T-1}. Let k^*_{T-1} be the couple's choice of female housework supply. The value of continuing the marriage for the wife and the husband is, respectively:

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

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

The values of divorce depend on the divorce regime. Under mutual consent divorce, the values of divorce result from the value of cooperating in divorce in period $T-1$ and living in autarky in period T. These values are obtained from evaluating expressions (21) and (22) at period $T-1$ and any given Pareto weight. Differently, under unilateral divorce the values of divorce are the values of living in autarky from the moment of divorce onward, values obtained by evaluating expressions (18) and (19) at time $T-1$. Note that the continuation values from staying married in $T-1$ are different from the continuation values following divorce in period $T-1$, because divorce is an absorbing state.

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

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

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

Period $t > 1$

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

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

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

$$\lambda_t = \begin{cases} \lambda & \textit{if } \mathcal{D}{=}MCD \\ \lambda_{t-1} + \nu_{t-1} & \textit{if } \mathcal{D}{=}UD \end{cases}$$

Period $t = 1$

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

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

Appendix C Numerical algorithm to solve for equilibria

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

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

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

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

    - For females type s_f supplying in the market for s_m male types, from the expression of the choice probabilities (16) we have that

$$\ln[\mu_{s_f \to s_m}(\Lambda)] - \ln[\mu_{s_f \to \emptyset}(\Lambda)] = \overline{U}_{\mathcal{X}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{X}}^{s_f \emptyset}(\Lambda) \tag{29}$$

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

$$\ln[\mu_{s_f \leftarrow s_m}(\Lambda)] - \ln[\mu_{\emptyset \leftarrow s_m}(\Lambda)] = \overline{U}_{\mathcal{Y}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{Y}}^{\emptyset s_m}(\Lambda) \tag{30}$$

3. For each couple type, take the difference between (29) and (30), and impose the market clearing condition $\mu_{s_f \rightarrow s_m}(\Lambda) = \mu_{s_f \leftarrow s_m}(\Lambda)$, leading to a system of equations, $\forall(s_f, s_m) \in \mathcal{S}^2$:

$$\ln[\mu_{\emptyset \leftarrow s_m}(\Lambda)] - \ln[\mu_{s_f \rightarrow \emptyset}(\Lambda)] = \overline{U}_{\mathcal{X}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{X}}^{s_f \emptyset}(\Lambda) - \left(\overline{U}_{\mathcal{Y}}^{s_f s_m}(\Lambda) - \overline{U}_{\mathcal{Y}}^{\emptyset s_m}(\Lambda)\right) \tag{31}$$

4. Find the matrix of Pareto weights, Λ^*, that is the root of the system of equations (31).
5. With the matrix Λ^* of Pareto weights, update the measure of single females and males by computing the choice probabilities (16) for remaining single.
6. Repeat steps 1 through 5 until the measure of singles converges. Compute the competitive equilibrium as the matrix Λ when the algorithm stopped and the resulting measures of female types married to male types.

The algorithm above converges to a competitive equilibrium given that the utility functions in my model satisfy the regularity conditions in Gayle and Shephard (2016). Let $u_i^{\mathcal{MS}}$ denote the individual utility functions when the marital status is $\mathcal{MS} = \{$*single, married, divorced*$\}$ (functional forms presented in section 3.4). The said regularity conditions are: $u_i^{\mathcal{MS}}$ is increasing and concave in c, q, and k; and $\lim_{c_i \to 0} u_i^{\mathcal{MS}} = \lim_{c_j \to 0} u_j^{\mathcal{MS}} = -\infty$. Gayle and Shephard (2016) show that these conditions are sufficient for existence of the competitive equilibrium, that is, existence of a matrix Λ at which the excess demand is zero for all types of couples (s_f, s_m). These conditions are also shown to be sufficient for the equilibrium to be unique.

Appendix D Sample selection and household identity

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

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

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

- If household has only one sample member, I use the identification number of the sample member to identify the household.
- When the household has both the head and the spouse as sample members and spouses do not divorce in the time frame, I use the identification number of head of the household to identify the household.
- When the household has both the head and the spouse as sample members and spouses are observed to get divorced in the data, I identify all the original household, the split off household of the ex wife, and the split off household of the ex husband with the

identification number of the head of the *original* household. Doing this prevents to double count divorce cases or consider a second marriage as a first one.

For estimation, I restrict attention to selected households that form and live under the baseline mutual consent divorce regime. The next table summarizes the number of households that I follow and the total number of observations that I use in estimation:

Table 16: Number of households and observations used in estimation

Household type	Sample size	
	Households	Observations
Couples (s_f,s_m)		
(hs,hs)	847	11,401
(hs,sc)	277	3,541
(hs,c+)	28	315
(sc,hs)	259	3,296
(sc,sc)	287	3,594
(sc,c+)	89	1,182
(c+,hs)	36	466
(c+,sc)	82	1,052
(c+,c+)	132	1,635
Single females		
hs	203	1,832
sc	122	1,151
c+	39	470
Single males		
hs	162	935
sc	81	627
c+	38	330

Notes: Row labels correspond to couple types and single types. For couples, the first coordinate indicates wife's education and the second coordinate, husband's education. Education types are: high school (hs), some college (sc), and college degree or higher (c+).

Appendix E Model fit of life cycle behavior of females

Figure 9: Female housework supply, by education and interval of household age

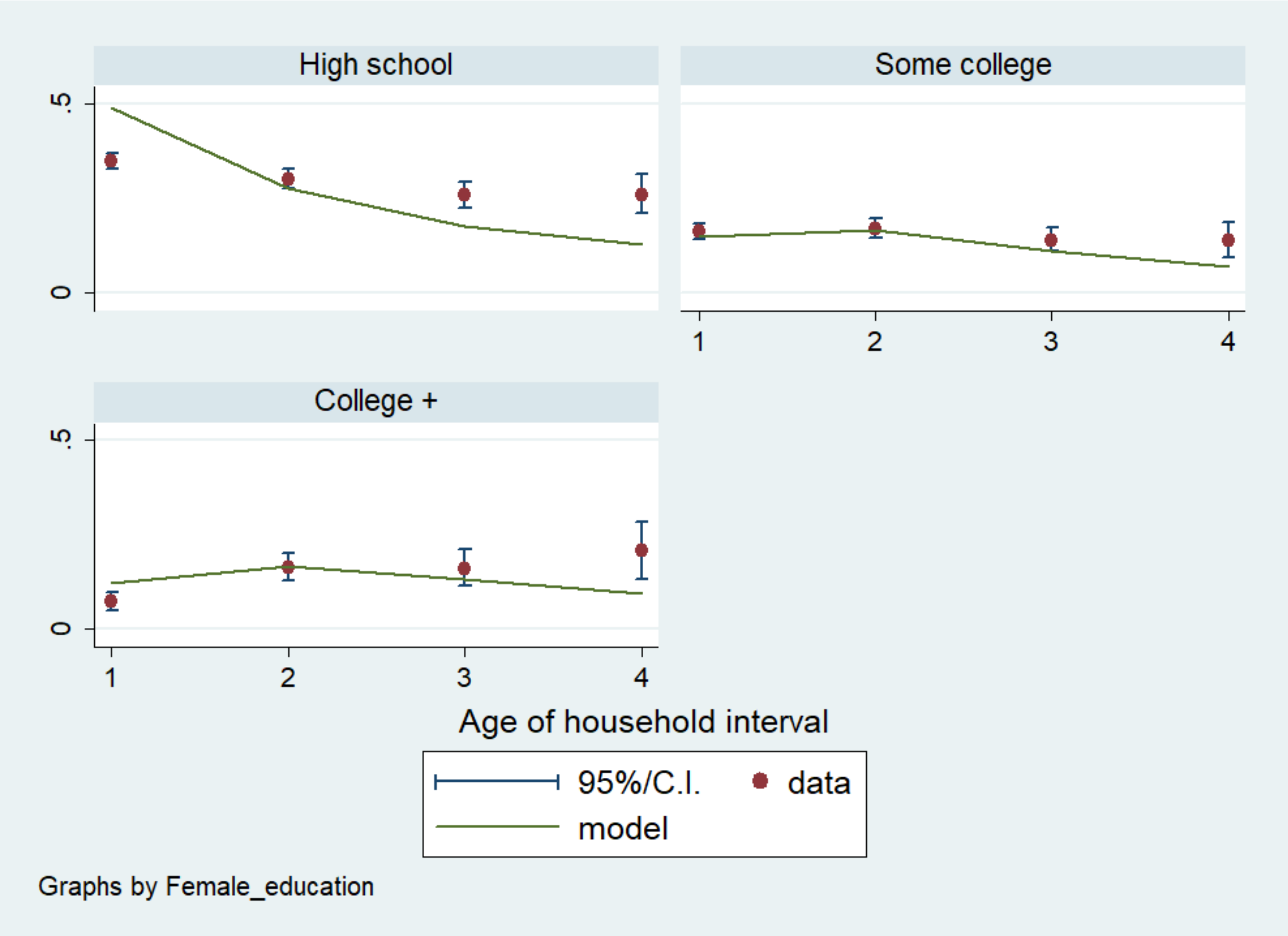

Figure 10: Female divorce probability, by education and interval of household age