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# Marriage Markets and Divorce Laws

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This paper develops a model of search and learning in marriage markets to analyze how a liberalization of divorce laws affects marriage market outcomes. In particular we analyze how the move from mutual consent divorce to unilateral divorce affects marriage rates, the composition of those who marry, and divorce rates, under the assumption that households cannot reach Coasean bargains. The analysis highlights the distinction between the effects on the existing stock of married couples (a pipeline effect) and the effects on newly married couples (a selection effect). Although unilateral divorce laws increase divorce rates for those already married at the time of the law change, the change to unilateral divorce can cause those married to be better matched than those previously married under mutual consent divorce laws. Hence a change to unilateral divorce can cause a fall in the steady-state divorce rate. The results help interpret and reconcile much of the current empirical literature in this field.

## 1. Introduction

The nature of family life in America has changed dramatically over the past fifty years. Fewer persons are marrying than ever before, those who marry do so later in life, and more marriages are now broken by divorce than death.[1] Understanding the cause and effects of these changes is important for a number of reasons.

First, changing marital patterns have implications for individual behavior over the life cycle, such as labor market attachment, savings, and fertility. Aggregated across households, these changes will have considerable macroeconomic implications. Second, the decline in marriage is of concern if marriage is viewed as a good thing, in that there are positive private and social returns to marriage. A large body of literature, summarized in Waite and Gallagher (2000), indeed shows a robust correlation between being married and having better health, earning higher wages, and accumulating more wealth.[2] Third, the

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1. These changes are documented in Popenoe (1993) and Grossbard-Shechtman (2003) for example.

2. Relatedly, Akerlof (1998) shows that men who delay marriage or remain single are less likely to be employed, tend to have lower incomes than married men and are more prone to crime and drug use.

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rise in divorce is of concern if the well-being of divorcees and their children is lower than in marriage. The empirical evidence, summarized in Amato and Booth (1997), is consistent with this being true for most divorcees and their children.[3]

This paper develops a model of search in marriage markets that provides a basis for understanding how a reduction in the gains from marriage over remaining single and a liberalization of divorce laws affect marriage markets. I focus on three interdependent outcomes (i) marriage rates, (ii) the composition of those who marry, and (iii) divorce rates. These outcomes have been at the center of the empirical debate on how and why marriage markets have changed. The model establishes the effects on each outcome and the relation between them. This helps clarify, reinterpret, and reconcile much of the empirical literature.

The model emphasizes the role of learning the benefits of marriage over remaining single. I assume that individuals pass through two stages of learning. When individuals first meet in the marriage market, they receive a signal of the potential benefits from their marriage. This signal determines whether the members of this couple are better off marrying or remaining single. The second stage of learning occurs within marriage. Individuals update their prior beliefs about the benefits of marriage by accumulating knowledge during marriage. This determines whether an individual is better off remaining married or divorcing. Divorce is thus an optimal response to new information received during marriage.[4]

I first analyze the effects of a fall in the expected gains from marriage over remaining single. This can occur, for example, because of less social value and prestige being associated with marriage. The model generates a number of intuitive results in this baseline case. First, as the expected gains from marriage over remaining single fall, individuals become more selective in marriage decisions—they need to receive a higher signal of the gains from marriage to prefer to marry the individual they are matched with. This causes marriage rates to fall. In the new steady state, the quality of the marginal marriage therefore rises, in the sense that it has greater likelihood of remaining intact, all else equal.

The effect of a fall in the expected gains from marriage on divorce rates therefore operates through two channels. First, among the existing stock of married couples, marriages are more likely to end in divorce. This is referred to as a *pipeline effect.* However, newly married couples are better matched than

3. However, Piketty (2003) suggests that parental conflict, not divorce per se, is the reason why children who have been involved in divorce, do worse on a range of welfare measures compared to children in intact households.

4. Search models in the labor literature have highlighted two types of learning. First, in models of extensive or "on-the-job" search, separation occurs as workers reevaluate the value of the current match as information about alternative matches becomes available. Becker et al. (1977) and Mortensen (1988) model search in marriage markets in this way. Second, in models of intensive search, separation can occur as workers learn about the match between their own characteristics and those of their job. This paper follows Bougheas and Georgellis (1999) and Brien et al. (2002) in analyzing learning about the current match, both before and within marriage.

the existing stock of couples because the reservation marriage market signal has risen. This is a *selection effect.* In steady state the effect these newly formed couples have on the divorce rate dominates, so that the divorce rate falls overall.

The result emphasizes that empirical studies of the causal effect of any given social change on divorce outcomes need to distinguish between the pipeline and selection effects, which may move in opposite directions. Failure to do so leads to biased estimation of parameters of interest, and a misinterpretation of the evidence. In particular, social changes that cause the divorce rate to rise in the short run, as captured in the pipeline effect, may be more than offset in the long run, once the selection effects have worked through. The model is then extended to allow for heterogeneous marriage market participants. This provides a framework in which to understand the effects of divorce law liberalization—in particular, the movement from mutual consent to unilateral divorce that swept across America in the 1970s, a period widely referred to as the "divorce revolution."

As argued by Becker et al. (1977), if spouses can bargain efficiently, the Coase theorem implies that moving from a mutual consent to a unilateral divorce regime affects only the distribution of welfare within marriage, not the incidence of divorce. However a growing body of empirical evidence—discussed in detail later—suggests that marriage and divorce rates have been affected by changes in divorce laws. This is inconsistent with spouses being able to reach efficient bargains, as assumed in unitary (Becker, 1981) or Nash bargaining (McElroy and Horney, 1981) models of household behavior.[5]

To consider the implications for the marriage market if households do not reach efficient bargains, I assume that utility is nontransferable between spouses. Moving from a mutual consent to a unilateral divorce regime then has two opposing effects on the incentives to marry. On the one hand, individuals now know they cannot be stuck in a marriage they would prefer to leave. On the other hand, they may be in a marriage in which they prefer to stay but their spouse prefers to leave. By establishing the conditions under which the value of marriage is higher under a mutual consent regime than under unilateral divorce, the model helps gauge the net effects of a change in divorce regime on marriage rates, selection into marriage, and divorce rates.

The model shows that although unilateral divorce laws increase divorce rates for those already married at the time of the law change, a pipeline effect, they also have a selection effect. That is, those married under unilateral divorce can be better matched than those previously married under mutual consent. This leads to a fall in the steady-state divorce rate. Hence, contrary to much of the public policy debate that has focused solely on the pipeline effect, this analysis shows that a liberalization of divorce laws can reduce divorce rates in

5. Pollak (1985) first discussed the role of transactions costs in marriage. Peters (1986) sets out a model in which inefficiencies arise because spouses have private information over their divorce payoffs. Lundberg and Pollak (2001) and Murphy (2002) present models in which limits on marital contracting lead to inefficient outcomes. See Zelder (2003) for an overview of the empirical evidence on the efficiency of household decisions.

the long run. The final section uses insights from the model to shed new light on empirical trends in the American marriage market. The balance of evidence is consistent with the introduction of unilateral divorce laws as having reduced incentives to marry, caused selection into marriage, and having potentially reduced divorce rates in the long run.

The empirical literature has implicitly taken as its null hypothesis that by the Coase theorem, a change in the allocation of the right to divorce ought to have no effect on the incidence of marriage and divorce. This paper is the first to establish an alternative hypothesis. This alternative reconciles many of the existing empirical studies on the relation between divorce laws and marriage market outcomes, and gives directions for future research. The paper is organized into five sections. Section 2 develops the baseline marriage market model with homogeneous participants and analyzes the effects of a fall in the gains from marriage. Section 3 extends the model to one of heterogeneous types, to study the effects of changes in divorce laws. Section 4 uses this framework to interpret the empirical trends in the American marriage market. Section 5 concludes. All proofs are in the appendix.

## 2. A Search Framework

The marriage market is modeled in discrete time with finitely lived risk neutral participants. Total population is normalized to one. Each period a fraction $1-\beta$ of the population is born into the marriage market, and the same fraction dies each period. Birth and death rates are the same across men and women, so total population remains constant, with an equal number of men and women throughout.

An individual can be in one of three marital states: married, divorced, or single. The timing of the marriage market is as follows:

1. Each period every surviving single individual matches with a single person of the opposite sex with certainty. The matched couple receive an imperfect signal ($\sigma$) of the potential benefits to them should they marry.
2. Each individual decides to marry or remain single. If at least one of the matched couple decides to remain single, both remain single.
3. If they marry, the actual benefit from marriage ($\phi$) is realized in the next period. The couple can then either remain married forever or divorce and remain divorced forever.

This framework emphasizes the role of learning in marriage markets. There are two stages of learning—first, when individuals meet in the marriage market, they receive a signal of the potential benefits from their marriage, $\sigma$. The signal can be thought of as being correlated to the immediately observable traits of a potential marriage partner.[6] The signal determines whether a couple are better off marrying today or remaining single.

6. These traits can relate to market outcomes, such as earnings capacity, as well as nonmarket outcomes, such as personality. As the signal is to the couple, this framework differs from models of assortative matching such as that of Burdett and Coles (1997).

The second stage of learning occurs within marriage. Married individuals update their prior beliefs about the benefits from marriage by accumulating knowledge during marriage. This determines whether an individual is better off remaining married or divorcing. Divorce is thus an optimal response to new information received during marriage.[7]

I later allow for remarriage and for participants to be *ex ante* heterogeneous.[8]

The signal of the benefits from marriage has support $[\underline{\sigma}, \bar{\sigma}] = \Sigma$. The probability density function of signals is $f(\sigma)$, with associated cumulative density $F(\sigma)$. The distribution of signals is such that $\lim_{\sigma=\underline{\sigma}} f(\sigma) = 0$, $\lim_{\sigma=\bar{\sigma}} f(\sigma) = 0$. The conditional probability that the true benefit from marriage is $\phi$ is denoted $g(\phi|\sigma)$. The distribution of $g(\phi|\sigma)$ is assumed unimodal and symmetric with support $[\underline{\phi}, \bar{\phi}]$ for all signals. The associated cumulative distribution is denoted $G(\phi|\sigma)$. The expected benefits from marriage conditional on the worse marriage market signal being observed, $\underline{\sigma}$, are normalized to $\int_{\underline{\phi}}^{\bar{\phi}} \phi g(\phi|\underline{\sigma}) d\phi = 0$.

The per period payoff to remaining married is $\phi$, the per period divorce payoff is exogenously given by $\phi^* \geq 0$. The cumulative distribution of the actual benefit from marriage is assumed to be such that $\lim_{\sigma \to \underline{\sigma}} G(\phi^*|\sigma) = 1$ and $\lim_{\sigma \to \bar{\sigma}} G(\phi^*|\sigma) = 0$. Hence couples that receive the worse marriage market signal are certain to receive lower benefits in marriage than divorce, and those couples with the highest signal are certain to receive higher benefits in marriage than divorce. Signals are assumed to be ordered such that the distribution of the benefits from marriage generated by higher signals stochastically dominate the distributions given by lower signals:

*Assumption 1.* (First Order Stochastic Dominance): $G_\sigma(\phi|\sigma) < 0$ for all $\phi$.

Higher signals therefore imply higher expected benefits from marriage. Married individuals are better off remaining married if their payoff in marriage is higher than their divorce payoff. Hence the expected lifetime value of marrying today having received signal $\sigma$ is:

$$V(M|\sigma) = \int_{\underline{\phi}}^{\bar{\phi}} \phi g(\phi|\sigma) d\phi + \frac{\beta}{1-\beta}\left[\int_{\phi^*}^{\bar{\phi}} \phi g(\phi|\sigma) d\phi + G(\phi^*|\sigma)\phi^*\right] \quad (1)$$

where $\beta$ is the probability the individual survives to the next period. The first term is the expected marriage payoff in the first period of marriage, conditional on having received signal $\sigma$. The first term in brackets is the expected payoff in marriage conditional on the marriage remaining intact, i.e., if the benefit in marriage is at least as high as the divorce payoff so that $\phi \in [\phi^*, \bar{\phi}]$. The

7. These stages of learning are analogous to the types of learning in marriage markets discussed by sociologists. See, for example, Oppenheimer (1988) for a discussion of premarital socialization and postmarital selection.

8. Extending the model to allow more periods of learning would capture couples choosing to cohabit prior to marriage, as in Brien et al. (2002). In addition, allowing for on-the-job search, so married individuals could match with singles or other married individuals, gives qualitatively similar results if the cost of searching on-the-job is sufficiently higher than the cost of search for singles.

second term in brackets is the expected divorce payoff, where $G(\phi^*|\sigma)$ is the probability of the couple divorcing conditional on having received marriage market signal $\sigma$.

It will be convenient to rewrite this as:

$$V(M|\sigma) = \int_{\underline{\phi}}^{\bar{\phi}} \phi g(\phi|\sigma) d\phi + \frac{\beta}{1-\beta}\left[(1-G(\phi^*|\sigma))\int_{\phi^*}^{\bar{\phi}} \phi h(\phi|\sigma)d\phi + G(\phi^*|\sigma)\phi^*\right] \qquad (1')$$

where $h(\phi|\sigma) = \frac{g(\phi|\sigma)}{1-G(\phi^*|\sigma)}$ is the expected benefit from marriage conditional on the marriage remaining intact.

*Assumption 2.* $h_\sigma(\phi|\sigma) > 0$.

As a higher signal is observed, individuals shift weight from their expected divorce payoff to the expected payoff in marriage conditional on the marriage remaining intact. Assumption 2 guarantees the expected lifetime value of marriage then increases because the expected payoff in marriage conditional on the marriage remaining intact is itself increasing in the signal.

*Lemma 1.* Under assumptions 1 and 2, the expected lifetime value of marrying today increases in the marriage market signal: $V_\sigma(M|\sigma) > 0$.

The next assumption ensures individuals prefer to be in successful marriages, rather than just using marriage as a route by which to get as quickly as possible into divorce. In other words, the value of marriage unconditional on any signal, $V(M)$, is higher than the present value of remaining divorced forever.

*Assumption 3.* $V(M) > \frac{1}{1-\beta}\phi^*$.

After observing the marriage market signal, individuals decide whether to marry the person they are matched with or remain single. The expected lifetime value of remaining single is:

$$V(S) = -s + \beta \int_{\underline{\sigma}}^{\bar{\sigma}} \max[V(M|\sigma), V(S)] f(\sigma) d\sigma \qquad (2)$$

where the per period payoff to singles is normalized to $-s$, the per period search cost. This search cost is assumed to be small. The second term in (2) is the expected value of making the optimal decision in the next period.

Suppose there exists a signal $\sigma_R \in \Sigma$, such that $V(M|\sigma_R) \geq V(S)$. In other words there is at least one signal for which individuals weakly prefer to marry than remain single—a result verified below. The expected lifetime value of remaining single can then be rewritten as:

$$V(S, \sigma_R) = -s + \beta \int_{\underline{\sigma}}^{\sigma_R} V(S, \sigma_R) f(\sigma) d\sigma + \beta \int_{\sigma_R}^{\bar{\sigma}} V(M|\sigma) f(\sigma) d\sigma.$$

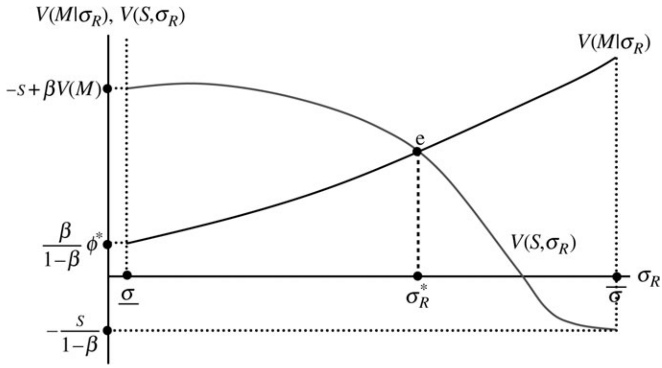


Figure 1. The Equilibrium Reservation Marriage Market Signal.

Solving for $V(S, \sigma_R)$;

$$V(S, \sigma_R) = \frac{-s + \beta \int_{\sigma_R}^{\bar{\sigma}} V(M|\sigma) f(\sigma) d\sigma}{1 - \beta F(\sigma_R)}. \tag{3}$$

The value of remaining single depends on the per period payoff to being single and the expected lifetime value of marriage from the next period onward. Both factors are discounted at a rate that increases in the probability of no suitable match being found. The equilibrium reservation signal $\sigma_R^*$ is the signal at which individuals are indifferent between marrying and remaining single:

$$V(M|\sigma_R^*) = V(S, \sigma_R^*). \tag{4}$$

*Proposition 1.* Under Assumptions 1 to 3, there exists a marriage market signal $\sigma_R^*$ such that $V(M|\sigma_R^*) = V(S, \sigma_R^*)$.

The determination of the equilibrium reservation signal is shown in Figure 1. The expected lifetime value of marriage is increasing in the signal by Lemma 1. Setting a higher reservation signal has two effects on the expected lifetime value of remaining single. On the one hand, conditional on marriage, the expected benefits from marriage in the next period rise. This increases the value of remaining single. On the other hand, setting a higher reservation signal implies the individual is more likely to remain single and undertake costly search in the next period. This reduces the value of remaining single. The proof of Proposition 1 shows that the former effect dominates for low reservation signals, and the latter effect dominates for high reservation signals.

For all signals $\sigma_R \in [\underline{\sigma}, \sigma_R^*)$, individuals are better off remaining single and searching for at least one more period. For all signals $\sigma_R \in (\sigma_R^*, \bar{\sigma}]$, individuals are better of marrying the individual they are matched with.

## 2.1 Comparative Statics

Divorce Payoffs and Search Costs. When divorce payoffs rise, individuals are willing to trade off being in a marriage of potentially lower benefits rather than remain single. This is because the expected payoff in marriage, conditional on the marriage surviving, increases. This is reinforced by the fact that even in the bad state of the world—divorce—the individual is better off. Hence as divorce payoffs rise, individuals set a lower reservation marriage market signal and the marginal marriage becomes of lower quality, in the sense that it is less likely to remain intact, all else equal.[9]

An increase in search costs reduces the expected lifetime value of remaining single. The expected lifetime value of marriage conditional on any signal, is unchanged. Hence the equilibrium reservation signal falls. The marginal marriage is of worse quality as search becomes more costly.[10]

*Proposition 2.* The equilibrium reservation marriage market signal, $\sigma_R^*$, decreases in (i) the per period divorce payoff, $\phi^*$; (ii) search costs, $s$.

Note that the expected duration of search is:

$$\beta F(\sigma_R^*) + (\beta F(\sigma_R^*))^2 + \cdots = \frac{\beta F(\sigma_R^*)}{1 - \beta F(\sigma_R^*)}. \tag{5}$$

This increases in the equilibrium reservation signal. Therefore, as the expected payoff in marriage conditional on the marriage surviving increases, say because of rising divorce payoffs, individuals expect to search for less time before they match with someone they prefer to marry rather than remain single.

Remarriage. If individuals can remarry, the expected lifetime value of marrying today is:

$$\begin{aligned} V(M|\sigma) = &\int_{\underline{\phi}}^{\bar{\phi}} \phi g(\phi|\sigma) d\phi + \frac{\beta}{1-\beta} \int_{\phi^*}^{\bar{\phi}} \phi g(\phi|\sigma) d\phi \\ &+ \beta G(\phi^*|\sigma) V(S, \sigma_R) \end{aligned} \tag{6}$$

where $V(S, \sigma_R)$ is the value of remaining single and $\sigma_R$ is the reservation marriage market signal. The lifetime value of marriage conditional on the signal this period, is still increasing in this signal under assumption 1. The value of remaining single is independent of the signal received this period because

9. This result is similar to the standard result in models of search in labor markets, i.e., that reduced firing costs result in more match formation (Bentolila and Bertola, 1990).

10. Hence changes in search costs—such as those caused by the wider availability of contraceptive technology in the 1970s—will have similar effects on the marriage market as changes in divorce payoffs. However, to keep the exposition clear, I will focus on the effects of changes in divorce payoffs.

(i) individuals do not recall past matches; (ii) individuals do not direct their search so signals are uncorrelated over time.[11]

Allowing for remarriage increases the present value of divorce from $\frac{1}{1-\beta}\phi^*$ to $V(S, \sigma_R)$, effectively reducing the cost of exiting marriage. Hence the value of marrying today is underestimated in the previous framework because the cost of divorcing is overestimated. In short, allowing for remarriage lowers the equilibrium reservation signal set in the marriage market. In turn, this reduces the quality of the marginal marriage that forms.

## 2.2 Marriage Market Equilibrium

To close the model and derive steady-state marriage and divorce rates, I assume individuals can remarry so that in any given period, an individual is either single or married. In steady state, the stock of individuals in each marital state $k$, $n_k$, $k \in \{s, m\}$ is constant. Individuals flow into singlehood through birth and divorce, and leave through marriage or death. Similarly individuals enter marriage when they find suitable matches, and leave through death or divorce. I make the simplifying assumption that married couples die together so there are no widows in the economy.

The following flow equations define the stready state:

$$\begin{aligned}(1-\beta) + \beta\Gamma_{ms}n_m &= \beta(1 - F(\sigma_R^*))n_s + (1-\beta)n_s \\ \beta(1 - F(\sigma_R^*))n_s &= \beta\Gamma_{ms}n_m + (1-\beta)n_m \\ n_s + n_m &= 1 \end{aligned} \tag{7}$$

where $1 - F(\sigma_R^*)$ is the flow of singles into marriage, and $\Gamma_{ms} = \int_{\sigma_R^*}^{\bar{\sigma}} G(\phi^*|\sigma)f(\sigma)d\sigma$ is the flow of married individuals into singlehood. Solving for $n_k$;

$$n_s^* = \frac{(1-\beta) + \beta\Gamma_{ms}}{1 - \beta(F(\sigma_R^*) - \Gamma_{ms})} \tag{8}$$

$$n_m^* = \frac{\beta(1 - F(\sigma_R^*))}{1 - \beta(F(\sigma_R^*) - \Gamma_{ms})}. \tag{9}$$

*Lemma 2.* The stock of singles increases in both the reservation marriage market signal, and the flow of married individuals into singlehood. The stock of married individuals decreases in both the reservation marriage market signal, and the flow of married individuals into singlehood.

11. Extensions left for future research include allowing unattached individuals to direct their search, by selecting jobs, colleges, and leisure activities in order to affect the chances of meeting a suitable person of the opposite sex.

As total population is normalized to one, the crude marriage rate (marriages per capita) is the flow of singles into marriage, multiplied by the stock of singles:

$$MR = (1 - F(\sigma_R^*))n_s^*. \tag{10}$$

The crude divorce rate (divorces per capita) is the flow of married individuals into singlehood, multiplied by the stock of married individuals:

$$DR = \Gamma_{ms} n_m^*. \tag{11}$$

*Lemma 3.* Crude marriage and divorce rates both decrease in the reservation marriage market signal.

When the equilibrium reservation signal increases, the flow of singles into marriage falls, but as shown in Lemma 2, the stock of singles rises. This latter effect dominates so the marriage rate increases overall. For the divorce rate, when the equilibrium reservation signal increases, the flow of individuals from marriage back into singlehood falls. This is reinforced by the stock of married individuals also falling, so that the divorce rate falls overall.

In other words as individuals require higher marriage market signals to be observed before they marry, there is selection into marriage. Those who now marry are better selected in that their marriages are more likely to remain intact, all else equal, relative to the initial stock of married couples. This selection into marriage causes the steady state divorce rate to fall. The next result makes precise the relation between marriage and divorce rates:

*Lemma 4.* The crude marriage rate is always greater than the crude divorce rate. The relation between the two is:

$$MR = \frac{(1 - F(\sigma_R^*))(\Gamma_{ms} - DR)}{\Gamma_{ms}}. \tag{12}$$

Having described the process of marital formation and dissolution, I now bring the results together to consider the effects of social change on the marriage market.

## 2.3 A Fall in the Gains From Marriage

A large sociological and economic literature documents how the gains from marriage over being single may have fallen over the past forty years. We capture these types of social change, which affect all marriage market participants in the same way, through a decrease in divorce payoffs. This reduces the gains from marriage relative to being single by reducing both the expected payoff in marriage conditional on the marriage remaining intact, and reducing the payoff in divorce directly.

I consider the effects on three types of marriage market outcome. First, on crude marriage and divorce rates as defined in (10) and (11). Second, on marriage and divorce propensities—the number of marriages per single, and divorces per married. These measures are relative to the "at risk" population in each case, and are defined as follows:

$$MS = \frac{(1 - F(\sigma_R^*))}{n_s^*} \tag{13}$$

$$DM = \frac{\Gamma_{ms}}{n_m^*}. \tag{14}$$

A third measure of interest is the level of turnover in the marriage market, namely the number of divorces per marriage:

$$T = \frac{DR}{MR} = \frac{\beta\Gamma_{ms}}{1 - \beta(1 - \Gamma_{ms})}. \tag{15}$$

This depends on the equilibrium reservation signal through the flow of individuals into divorce.

*Proposition 3.* As the gains from marriage over being single fall (i) crude marriage and divorce rates both fall; (ii) the number of marriages per single falls, the change in the number of divorces per marriage is ambiguous; (iii) marriage market turnover increases.

To see the intuition behind this result, suppose the gains from marriage over being single fall because individuals become worse off in divorce. As shown in Proposition 2, the equilibrium reservation signal then rises. In other words, the optimal responses of individuals to becoming worse off in divorce is to be more selective in original marriage decisions. From Lemma 3, this causes crude marriage and divorce rates to both fall.

In the new steady state, the marginal marriage is of higher quality in the sense that it has greater likelihood of remaining intact, all else equal. This makes clear that the fall in steady state divorce rates is composed of two separate effects. First, among the existing stock of married couples, marriages are less likely to end in divorce. This is a pipeline effect. Second, newly married couples are better matched than the existing stock of couples. This is because the equilibrium reservation signal rises. Individuals are only willing to enter potentially higher quality marriages because of a lower payoff in divorce. This is a selection effect. These couples also contribute to decreasing the divorce rate in the new steady state.

Proposition 3 also states that the number of marriages per single falls. This is because the flow of individuals from singlehood into marriage decreases as divorce payoffs fall. This effect is reinforced by the stock of singles rising.

The effect of a fall in the gains from marriage on the number of divorces per marriage is however ambiguous, because of two offsetting factors. On the one hand, the fall in the gains from marriage causes the flow of individuals from marriage into singlehood to fall. Fewer couples are likely to be in such bad marriages that spouses prefer to break up. On the other hand the stock of married individuals also falls.

The last result, that marriage market turnover decreases with a fall in divorce payoffs, implies that the change in marriage rate is greater than the change in divorce rate at any given reservation signal. In other words, the marriage rate is more volatile than the divorce rate in response to social changes that reduce the gains from marriage.[12]

## 3. Divorce Laws

One of the most important changes in marriage markets in the postwar period has been regarding the laws governing divorce, or what has widely been referred to as the "divorce revolution." Between 1968 and 1977 the majority of US states moved from mutual consent divorce, where both spouses needed to consent to divorce, to unilateral divorce, where either spouse could unilaterally file for divorce.[13]

As first argued by Becker et al. (1977), if spouses can bargain efficiently, the Coase theorem implies that moving to unilateral divorce only affects the distribution of welfare within marriage, not the likelihood of marital breakdown. However spouses may be unable to bargain efficiently for a variety of reasons, spouses may be unable to commit *ex ante* to all possible divisions of surplus from marriage, or there may be transactions costs arising from private information. If so, the incidence of marriage and divorce differs under mutual consent and unilateral divorce laws.[14]

To derive the implications for the marriage market if couples do not reach efficient bargains, I consider a world in which spouses are heterogeneous and utility is nontransferable between them. Spouses are denoted as husband ($h$) and wife ($w$). The benefit of marriage to spouse $i$ is $\phi_i$, where $\phi_h$ and $\phi_w$ have

12. It is also straightforward to show that as search costs increase (i) crude marriage and divorce rates both rise; (ii) the number of marriages per single rises, the change in the number of divorces per marriage is ambiguous; (iii) marriage market turnover decreases. The intuition is the same as before. As search costs rise individuals become willing to enter matches of potentially lower quality—a selection effect. This reduces the quality of the marginal marriage, and increases the divorce rate in steady state.

13. Criticism of the mutual consent system stemmed from the view that it reduced the welfare of spouses, and led to perjured testimony in collusive divorce proceedings that fostered disrespect toward the law. Both concerns stem from whether spouses can reach efficient bargains. If spouses were unable or unwilling to make such agreements, some marriages would not be dissolved under mutual consent even though it would be Pareto efficient to do so. If spouses could bargain efficiently, the perception was that men had to "bribe" their wives in order for them to consent to divorce leading to collusion between spouses in court proceedings. See Jacob (1988) and Parkman (1992) for a fuller discussion.

14. Clark (1999) shows that even without transactions costs, divorce laws can affect the likelihood of divorce. This depends on the shape of the utility possibility frontiers of spouses in marriage and divorce. Throughout his analysis, he takes marital formation as given.

support $\Phi = [\underline{\phi}, \bar{\phi}]$. Spouse $i$ has a per period utility in marriage of $u(\phi_h, \phi_w)$. I consider the following class of utility functions:

$$\mathbf{U}^{+} = \{u : \Phi^2 \rightarrow \mathbb{R}_{+};\ u_1 \geq 0, u_2 \geq 0, u_{12} \geq 0\}. \quad (16)$$

Each spouse's utility in marriage increases in his/her own benefit and that of the other spouse, and benefits across spouses are weak complements. This captures the benefits of marriage arising from characteristics on which spouses positively sort, such as income and education. In the marriage market, the matched couple receive an imperfect signal of the potential benefits to them should they marry. The true benefits from marriage are realized in the next period if they marry. The couple can then either remain married forever or divorce and remain divorced forever. Hence the model retains the same marriage market timing as in Section 2.

The benefits from marriage across spouses, conditional on signal $\sigma \in \Sigma$ having been observed in the marriage market, are distributed according to a joint cumulative distribution $G(\phi_h, \phi_w|\sigma)$. This has an associated joint density function $g(\phi_h, \phi_w|\sigma)$. The marginal distribution of benefits to spouse $i$ is denoted $Gi(\phi_i|\sigma)$. The expected one period utility from marriage conditional on the worse marriage market signal being observed is normalized to zero so that $\int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\underline{\sigma}) d\phi_h d\phi_w = 0$. The value of marriage is thus nonnegative for all signals.

Spouses are heterogeneous in two dimensions. First, the marginal distribution of benefits from marriage are assumed not to be everywhere identical. Second, the utility in divorce to husband and wife are $u(\phi_h^*, 0)$ and $u(0, \phi_w^*)$ respectively, where $\phi_i^* \in [\underline{\phi}, \bar{\phi}]$.

The joint cumulative distribution of benefits within marriage is assumed to be such that $\lim_{\sigma \rightarrow \bar{\sigma}} G(\phi_h^*, \phi_w^*|\sigma) = 0$ and $\lim_{\sigma \rightarrow \underline{\sigma}} G(\phi_h^*, \phi_w^*|\sigma) = 1$. Couples that receive the lowest possible signal are certain to both have lower benefits in marriage than in divorce. Couples that receive the highest possible signal in the marriage market are certain to both have higher benefits in marriage than divorce.

In order to rank the expected utility from marriage conditional on different marriage market signals, a further restriction needs to be placed on the joint cumulative distribution of the benefits from marriage. This restriction, derived in Atkinson and Bourguignon (1982), relates to the following function:

$$K(\phi_h, \phi_w|\sigma) = -[G(\phi_h, \phi_w|\sigma) - G_h(\phi_h|\sigma) - G_w(\phi_w|\sigma)].$$

*Assumption 4.* $K_\sigma(\phi_h, \phi_w|\sigma) \leq 0$ for all $\phi_h$, $\phi_w$.

As shown by Atkinson and Bourguignon (1982), assumption 4 is sufficient to ensure that signals can be ordered such that the distribution of utility in

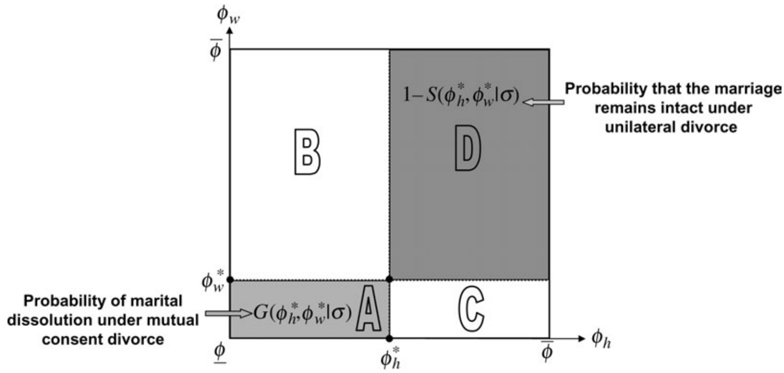


Figure 2. The Probability of Divorce Under Different Divorce Regimes.

marriage generated by higher signals stochastically dominate the distributions given by lower signals.[15]

*Assumption 5.* $G_\sigma(\phi_h, \phi_w|\sigma) \leq 0$ for all $\phi_h$, $\phi_w$.

This implies first order dominance in the marginal distributions. Namely that $G_{h\sigma}(\phi_h|\sigma) \leq 0$ and $G_{w\sigma}(\phi_w|\sigma) \leq 0$.[16]

Two divorce regimes are considered—mutual consent (*MC*) and unilateral divorce (*UNI*). The key difference between these regimes is made clear in Figure 2. This shows all potential joint realizations of spousal benefits from marriage. Under mutual consent divorce, the couple remain married if at least one prefers to. This corresponds to region B + C + D in Figure 2. In contrast,

15. To be clear, consider two marriage market signals $\sigma_1, \sigma_2 \in \Sigma$ such that $\sigma_1, \sigma_2$. Assumption 4 ensures that for the class of utility functions $\mathbf{U}+$:

$$\int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h,\phi_w)g(\phi_h,\phi_w|\sigma_1)d\phi_h d\phi_w \geq \int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h,\phi_w)g(\phi_h,\phi_w|\sigma_2)d\phi_h d\phi_w.$$

An interpretation of Assumption 4 suggested by Atkinson and Bourguignon (1982), is that the cumulative distribution taken over the rectangle $(\phi_h, \bar{\phi}; \phi_w, \bar{\phi})$ is everywhere greater than, or no less, for $\sigma_1$ than for $\sigma_2$.

16. This implies the joint cumulative distribution taken over the rectangle $(\underline{\phi}, \phi_h; \underline{\phi}, \bar{\phi}_w)$ is everywhere less than, or no greater, for $\sigma_1$ than for $\sigma_2$. Assumption 5 is required for the analysis of a mutual consent divorce regime. As shown by Atkinson and Bourguignon (1982), if the utility function lies in the following class:

$$\mathbf{U}^- = \{u : \Phi^2 \to \mathbb{R}^+; u_1 \geq 0, u_2 \geq 0, u_{12} \leq 0\}$$

then Assumption 5 is sufficient for first order stochastic dominance in the per period utility from marriage across marriage market signals. In this case, benefits from marriage are weak substitutes across spouses. This class of utility function better captures gains to marriage arising from characteristics on which spouses negatively sort, such as specialization in home production.

under unilateral divorce, the couple remain married only if both prefer it to do so. This corresponds to region D.

The trade-off for spouse $i$ when moving from a mutual consent to unilateral divorce is as follows. On the one hand, under unilateral divorce $i$'s partner may leave the marriage despite the fact that $i$ wants it to continue. Under mutual consent, the marriage would have remained intact in these cases. This decreases the value of marriage to $i$, all else equal.

On the other hand, under unilateral divorce, each spouse knows they cannot be stuck in marriage they would prefer to leave. Under mutual consent, the marriage would have remained intact in these cases. This increases the value of marriage to $i$, all else equal. We now establish the net effect of these countervailing forces on the value of marriage.

### 3.1 Mutual Consent

In a mutual consent divorce regime, the expected lifetime value of marrying today for individual $i$ conditional on having observed signal $\sigma$ is:

$$\begin{aligned} V_i^{MC}(M|\sigma) = & \int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\sigma) d\phi_h d\phi_w \\ & + \frac{\beta}{1-\beta}(1 - G(\phi_h^*, \phi_w^*|\sigma)) \\ & \times \begin{pmatrix} \int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\sigma) d\phi_h d\phi_w \\ - \int_{\underline{\phi}}^{\phi_h^*} \int_{\underline{\phi}}^{\phi_w^*} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\sigma) d\phi_h d\phi_w \end{pmatrix} \\ & + \frac{\beta}{1-\beta} G(\phi_h^*, \phi_w^*|\sigma) u(\phi_i^*, 0). \end{aligned} \tag{17}$$

The first term is the expected payoff in the first period of marriage, in which spouses learn the true benefits from marriage to each of them. With probability $1 - G(\phi_h^*, \phi_w^*|\sigma)$ at least one spouse prefers to remain married. Conditional on the marriage remaining intact, the only combination of benefits in marriage that cannot arise is that both spouses have lower benefits than in divorce. Hence with probability $G(\phi_h^*, \phi_w^*|\sigma)$ divorce occurs, and each spouse then obtains a per period utility of $u(\phi_i^*, 0)$. The next result establishes that marriage market signals can be ordered:

*Lemma 5.* Under assumptions 4 and 5, in a mutual consent divorce regime, the expected lifetime value of marrying today increases in the marriage market signal: $V_{i\sigma}^{MC}(M|\sigma) > 0$.

When matched couples receive higher marriage market signals, the value of marriage is altered in two ways. First, the probability of the marriage remaining intact increases because the likelihood that both husband and wife obtain lower benefits in marriage than divorce decreases. Hence individuals shift weight from their expected utility in divorce towards their expected utility in marriage, raising the value of marriage. Second, conditional on the marriage remaining intact, the couples' expected utility from marriage increases. This also raises the value of marriage.

These two effects reinforce each other so that in a mutual consent divorce regime, the value of marriage increases as higher signals are observed.

## 3.2 Unilateral Divorce

In a unilateral divorce regime, either spouse can unilaterally decide to end the marriage. The probability of divorce, $S(\phi_h^*, \phi_w^*|\sigma)$, is thus higher than under a mutual consent regime. The divorce probabilities across regimes are related as follows:

$$S(\phi_h^*, \phi_w^*|\sigma) = G_h(\phi_h^*|\sigma) + G_w(\phi_w^*|\sigma) - G(\phi_h^*, \phi_w^*|\sigma). \tag{18}$$

This captures the pipeline effect on divorce rates of moving from mutual consent to unilateral divorce. This says that for the existing set of married couples, the move to unilateral divorce increases the likelihood of divorce. However, there will also be a selection effect of this change in divorce law caused by a change in the reservation marriage market signal among newly matched couples. This selection effect may potentially offset the pipeline effect. To see this, we need to establish how the reservation signal differs across the divorce regimes.

In a unilateral divorce regime, the marriage breaks down if at least one spouse prefers to divorce. The expected lifetime value of marrying today under unilateral divorce for individual $i$ having observed signal $\sigma$ is:

$$\begin{aligned} V_i^{UNI}(M|\sigma) = & \int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\sigma) d\phi_h d\phi_w \\ & + \frac{\beta}{1-\beta}(1 - S(\phi_h^*, \phi_w^*|\sigma)) \\ & \times \left( \int_{\phi_h^*}^{\bar{\phi}} \int_{\phi_w^*}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\sigma) d\phi_h d\phi_w \right) \\ & + \frac{\beta}{1-\beta} S(\phi_h^*, \phi_w^*|\sigma) u(\phi_i^*, 0). \end{aligned} \tag{19}$$

The first term is the expected payoff in the first period of marriage. With probability $1 - S(\phi_h^*, \phi_w^*|\sigma)$ both spouses prefer to remain married. Conditional on the marriage remaining intact, both spouses are guaranteed at least the benefits they would obtain in divorce, $\phi_i^*$. With probability $S(\phi_h^*, \phi_w^*|\sigma)$ at least one spouse prefers to divorce, the marriage breaks down and spouses obtain a per period utility of $u(\phi_i^*, 0)$. The next result establishes that marriage market signals can be ordered:

*Lemma 6.* Under Assumption 4, in a unilateral divorce regime, the expected lifetime value of marrying today increases in the marriage market signal: $V_{i\sigma}^{UNI}(M|\sigma) > 0$.

When matched couples receive higher marriage market signals, the probability the marriage remains intact increases because the likelihood that either husband or wife obtain lower benefits in marriage than divorce is smaller. To see this note that:

$$S_\sigma(\phi_h^*, \phi_w^*|\sigma) = G_{h\sigma}(\phi_h^*|\sigma) + G_{w\sigma}(\phi_h^*|\sigma) - G_\sigma(\phi_h^*, \phi_w^*|\sigma) \leq 0$$

from Assumption 4. Second, conditional on the marriage remaining intact, the couples' expected utility from marriage increases. These effects reinforce each other so the value of marriage increases as better signals are observed.

To compare divorce regimes, note first from (18) that divorce is more likely to occur under unilateral divorce. This reduces the value of marriage under unilateral divorce relative to mutual consent divorce. However, conditional on the marriage remaining intact, expected utility in marriage is higher under unilateral divorce because neither spouse can be stuck in a marriage they would prefer to leave. This increases the value of marriage under unilateral divorce relative to mutual consent divorce.

To establish the dominant effect, we decompose the difference in the value of marriage under the divorce regimes as follows:[17]

$$\begin{aligned}
&\frac{1-\beta}{\beta}(V_i^{MC}(M|\sigma) - V_i^{UNI}(M|\sigma)) \\
&= ((1-G(\phi_h^*,\phi_w^*|\sigma)-(1-S(\phi_h^*,\phi_w^*|\sigma))\begin{pmatrix} \int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \\ -u(\phi_i^*,0) \end{pmatrix} \\
&\quad + (1-G(\phi_h^*,\phi_w^*|\sigma))\begin{Bmatrix} \int_{\underline{\phi}}^{\phi_h^*} u(.)g(\phi_h|\sigma)d\phi_h \\ -\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \end{Bmatrix} \\
&\quad + (1-G(\phi_h^*,\phi_w^*|\sigma))\begin{Bmatrix} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_w|\sigma)d\phi_w \\ -\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \end{Bmatrix}.
\end{aligned} \tag{20}$$

The first term is the difference in the probability of the marriage remaining intact under the two divorce regimes. This is positive as the probability of the marriage remaining intact is higher in a mutual consent divorce regime. This is multiplied by the gain in expected utility in marriage conditional on both spouses preferring to remain married, over the actual utility in divorce. This compares the expected utility in marriage in the divorce regimes in region D of figure 2.

The second term is the probability of the marriage remaining intact under mutual consent divorce, multiplied by the utility in marriage conditional on the husband obtaining at least the same benefit in marriage as in divorce. This compares the expected utility in marriage under divorce regimes in region C.

17. Learning takes place under both regimes in the first period of marriage. Hence the expected utility during this period plays no role in determining the difference in the value of marriage between divorce regimes.

This term is positive because only under a mutual consent divorce regime does the marriage survive in this case.

The final term is the corresponding term assuming the wife obtains at least the same benefits in marriage as in divorce. This compares the expected utility in marriage under divorce regimes in region B. Again, this term is positive because only under a mutual consent divorce regime 20 does the marriage survive in this case. To summarize:

*Proposition 4.* The value of marriage is higher in a mutual consent divorce regime than in a unilateral divorce regime: $V_i^{MC}(M|\sigma) \geq V_i^{UNI}(M|\sigma)$.

### 3.3 Marriage Market Equilibrium

After observing the marriage market signal, individuals decide whether to marry or remain single. The expected lifetime value of remaining single to individual $i$ in divorce regime $r \in \{MC, UNI\}$ is derived in a similar way to before:

$$V_i^r(S, \sigma_{iR}) = \frac{-s + \beta \int_{\sigma_{iR}}^{\bar{\sigma}} V_i^r(M|\sigma) f(\sigma) d\sigma}{1 - \beta F(\sigma_{iR}^r)} \tag{21}$$

where $\sigma_{iR}^r$ is the reservation signal of individual $i$ in regime $r$, and the per period search cost $s$, is assumed the same for men and women. Define a reservation signal, $\sigma_{iR}^{r*}$, by gender, at which members of each gender are indifferent between marrying today and remaining single:

$$V_i^r(M|\sigma_{iR}^{r*}) = V_i^r(S, \sigma_{iR}^{r*}). \tag{22}$$

To be clear, this reservation signal differs within a divorce regime by gender, and also differs across mutual consent and unilateral divorce regimes by gender.

*Assumption 6.* $V_i^r(M) > \frac{1}{1-\beta} u(\phi_i^*, 0)$ for $i \in \{h, w\}$, $r \in \{MC, UNI\}$.

This generalizes assumption 3 to each divorce regime. It says the unconditional value of marriage, $V_i^r(M)$, is higher than the present value of remaining divorced forever. This ensures individuals prefer to be in successful marriages, rather than using marriage as a route by which to get as quickly as possible into divorce.

*Proposition 5.* Under assumptions 4, 5 and 6, there exists a marriage market signal, $\sigma_{iR}^{r*}$, such that $V_i^r(M|\sigma_{iR}^{r*}) = V_i^r(S, \sigma_{iR}^{r*})$ for men and women in both mutual consent and unilateral divorce regimes.

Any matched couple will marry if both individuals prefer to marry than remain single. Hence the equilibrium reservation signal is determined by the more selective gender:

$$\sigma_R^{r*} = \max(\sigma_{hR}^{r*}, \sigma_{wR}^{r*}). \tag{23}$$

If individuals can remarry once divorced, the previous analysis goes through except that $V_i^r(S, \sigma_{iR}^{r*})$ is substituted in for $u(\phi_i^*, 0)$ everywhere. The steady state marriage market equilibrium under each divorce regime is then defined by a series of flow equations analogous to those in (7), where the equilibrium marriage market reservation signal is defined as in (23).

## 3.4 Discussion

We can now compare marriage market equilibria across divorce regimes. As shown in Proposition 4, the value of marriage is lower in a unilateral divorce regime. However, the value of remaining single, which depends partly on the expected value of marrying in the next period, is therefore also lower in a unilateral divorce regime.

Without placing further restrictions on the distribution of signals, the equilibrium reservation signals across divorce regimes, $\sigma_R^{MC}*$ and $\sigma_R^{UNI}*$, cannot therefore be unambiguously ranked.

Hence contrary to popular wisdom, moving from a mutual consent to a unilateral divorce regime need not imply higher marriage and divorce rates. This ambiguity arises because of two offsetting effects of moving from mutual consent to unilateral divorce. On the one hand, individuals now know they cannot be stuck in a marriage they would prefer to leave. On the other hand, they may be in a marriage in which they prefer to stay but their spouse prefers to leave. These countervailing forces are only brought out by explicitly modelling the fact that households cannot reach Coasean bargains.

Overall, the move to unilateral divorce may lead to selection into marriage such that newly matched couples are less likely to divorce than the existing couples. This selection effect may then offset the pipeline effect of unilateral divorce leading to higher divorce rates among existing married couples. It is this latter effect that has been focused on in the public policy debate on the reform of divorce laws.

This result is also in contrast to the view that more liberal divorce laws simply reduce the costs of exiting marriage and so increase divorce payoffs. If so, the prediction from almost any search model would be that because individuals then become less selective in their original marriage decision, marriage rates should rise moving from mutual consent to unilateral divorce. As the marginal couple is then less well matched, the divorce rate also rises in steady state.

The first of these predictions finds no empirical support. In a companion paper, Rasul (2003), I estimate the causal effect of introducing unilateral divorce on marriage rates. I find the move to unilateral divorce led to a significant and permanent decline in marriage rates. The additional findings of that research, as well as other empirical research on marriage markets and divorce laws, are discussed in more detail in the next section.

A second issue is the relationship between individual divorce payoffs and the reservation signal set by gender. Consider how the value of marriage changes with a higher divorce payoff across the two divorce regimes. In a mutual consent divorce regime:

$$\frac{1-\beta}{\beta}\frac{\partial V_i^{MC}(M|\sigma)}{\partial \phi_i^*}$$
$$= -\frac{\partial G}{\partial \phi_i^*}\left\{\int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(.)g(.|\sigma)d\phi_h d\phi_w - \int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(.|\sigma)d\phi_h d\phi_w - u(\phi_i^*, 0)\right\}$$
$$-(1-G(.|\sigma))\frac{\partial}{\partial \phi_i^*}\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(.|\sigma)d\phi_h d\phi_w + G(.|\sigma)\frac{\partial}{\partial \phi_i^*}u(\phi_i^*, 0). \quad (24)$$

In a unilateral divorce regime;

$$\frac{1-\beta}{\beta}\frac{\partial V_i^{UNI}(M|\sigma)}{\partial \phi_i^*} = -\frac{\partial S}{\partial \phi_i^*}\left\{\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(.|\sigma)d\phi_h d\phi_w - u(\phi_i^*, 0)\right\}$$
$$+(1-S(.|\sigma))\frac{\partial}{\partial \phi_i^*}\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(.|\sigma)d\phi_h d\phi_w$$
$$+S(.|\sigma)\frac{\partial}{\partial \phi_i^*}u(\phi_i^*, 0). \quad (25)$$

Each of the terms in (25) has an analogous term in (24). The first terms correspond to fall in the probability of the marriage remaining intact as the divorce payoff rises, multiplied to the expected gain from marriage over divorce.

The second term is the change in the expected benefits from marriage as the divorce payoff rises, conditional on the marriage remaining intact. This is negative in a mutual consent regime because as the divorce payoff rises, spouse $i$ is more likely to be locked into a marriage he or she prefer to leave. The corresponding term under unilateral divorce is also negative because as the divorce payoff rises, the couple are less likely to both have benefits greater than their divorce payoff.

The final term is the change in the expected divorce payoff. This increases in the divorce payoff, and so can potentially offset the first two terms. A sufficient condition for this not to be the case is that, in a mutual consent divorce regime:

$$\frac{\partial}{\partial \phi_i^*}\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(.|\sigma)d\phi_h d\phi_w \geq \frac{G(.|\sigma)}{(1-G(.|\sigma))}\frac{\partial}{\partial \phi_i^*}u(\phi_i^*, 0) \quad (26)$$

and in a unilateral divorce regime;

$$-\frac{\partial}{\partial \phi_i^*}\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(.|\sigma)d\phi_h d\phi_w \geq \frac{S(.|\sigma)}{(1-S(.|\sigma))}\frac{\partial}{\partial \phi_i^*}u(\phi_i^*, 0). \quad (27)$$

If (26) and (27) hold, a number of interesting results follow in both divorce regimes. First, the value of marriage is decreasing in the divorce payoff in either divorce regime. This leads to a result analogous to proposition 2, that the reservation signal to gender $i$, $\sigma_{iR}^{r*}$, decreases in their per period divorce payoff, $\phi_i^*$.

As individuals become better off in divorce, they are willing to enter marriages of potentially lower quality. The intuition is that with a higher divorce payoff, the expected payoff conditional on the marriage remaining intact is higher, and this is reinforced by the individual being better off even in the bad state of the world—divorce. Hence with higher divorce payoffs, the marginal marriage that forms is of worse quality—in the sense that it is less likely to remain intact.

The comparative static properties of the marriage market equilibrium within each divorce regime, are then similar to those set out in Section 2. In particular, as divorce payoffs rise, the gains from marriage over remaining single fall, and individuals are only willing to enter matches of potentially higher quality. This raises the equilibrium reservation signal and the quality of the marginal marriage, so that steady state marriage rates decrease.

The effect of higher divorce payoffs on divorce rates can again be decomposed into a pipeline and selection effect. First, among the existing stock of married couples, marriages are less likely to end in divorce—a pipeline effect. Newly married couples are also better matched than the existing stock of couples because the reservation marriage market signal has risen—a selection effect. This also causes the divorce rate to fall.

Second, the gender with the lowest divorce payoff determines the equilibrium reservation signal in the marriage market, $\sigma_R^{r*}$, as defined in (23). If women are worse off in divorce than men, as suggested by empirical evidence, women will choose to marry men, not vice versa.

Third, policies such as those relating to the allocation of marital assets in divorce will affect the marriage market equilibrium. Consider the move from a common property divorce regime to an equitable division property regime. In the former, spouses are entitled to only the assets they themselves brought into marriage, or some other nonequitable rule is in place. Under an equitable regime, property and assets are equally divided in divorce.

Suppose women gain primarily from such a redistribution of property in divorce. The reservation signal set by women falls, that set by men rises. In the new steady state, the reservation marriage market signal falls, so that marriage rates rise. As the marginal marriage is of lower quality than before, the selection effect causes divorce rates to then rise in steady state.

A large literature has analyzed the effects of increased labor market opportunities for women on marriage markets.[18] This framework captures such opportunities through an improvement of women's outside option to marriage, i.e., an increase in $\phi_w^*$ relative to $\phi_h^*$. This has similar effects on marriage market outcomes as a redistribution of property in divorce in favor of women—marriage and divorce rates rise. However, improved labor market opportunities for women are likely to have also changed bargaining powers inside marriage. Developing the model to capture the household bargaining process remains an important extension to consider in future research.

18. These include increases in the ratio of female to male wages, in women's career attachment to the labor force, decreases in gender segregation in hiring and training by employers, and changes in the composition of production and technology that increase demand for female relative to male labor.

## 4. Empirical Trends in the American Marriage Market

### 4.1 Marriage Market Outcomes

The framework developed can be used to interpret the changes in the American marriage market over the past two generations. I focus on the same outcomes emphasized throughout—crude marriage and divorce rates, rates of marriage per single and divorces per married, and marriage market turnover.

Figure 3i shows crude marriage and divorce rates from 1960 to 2000, defined as the number of marriages (divorces) per 1000 of the population aged 15 to 65. This highlights the dramatic rise in marriage rates when the first of the baby boomers entered the marriage market, and the sustained decline in marriage since the early 1970s. The figure also shows the dramatic rise in divorce rates—divorce rates more than doubled between 1965 and 1980, before also entering a sustained period of decline.[19]

Three features of the data are consistent with the relationship between marriage and divorce rates as summarized in Lemma 4 and equation (12). First, marriage rates are always higher than divorce rates. Second, marriage rates are more volatile than divorce rates—the coefficients of variation are 1.57 and 0.62 for marriage and divorce rates respectively. Third, trends in the divorce rate follow those in marriage rates after some lag. As expected, this lag corresponds closely to the average length of marital duration. Taken together, the data suggests divorce rates can be expected to decline for at least another decade.

Crude marriage and divorce rates hide much of the underlying variation of interest. In particular, being calculated in per capita terms, these are not relative to the "at risk" population. Figure 3ii therefore shows trends in marriages per single, and divorces per married, as these more closely capture the propensities to marry and divorce.

The two marriage series—whether in per capita terms or relative to the stock of singles—are positively correlated and display similar patterns over time. In particular, the dramatic decline in marriage is apparent in both figures 3i and 3ii. On the divorce rate, the number of divorces per married couple also rose until the late 1970s before declining slightly.

Figure 3iii shows marriage market turnover. There is always less than one divorce per marriage. A distinct change in the equilibrium rate of marriage market turnover again occurs sometime in the mid-1970s. Prior to then, the number of divorces was around a quarter of the number of marriages. Subsequent to then, the number of divorces was around half the number of marriages. Within each period, the level of marriage market turnover has been relatively stable.

Taken together, the data suggest that over the past thirty years, individuals have become more selective in marriage decisions so the equilibrium marriage market reservation signal has risen. This is consistent with the gains to marriage over being single having fallen. Identifying the qualitative and

19. Michael (1988) documents why only a small part of the change in divorce rates can be accounted for by a changing age-sex composition of the population over time.

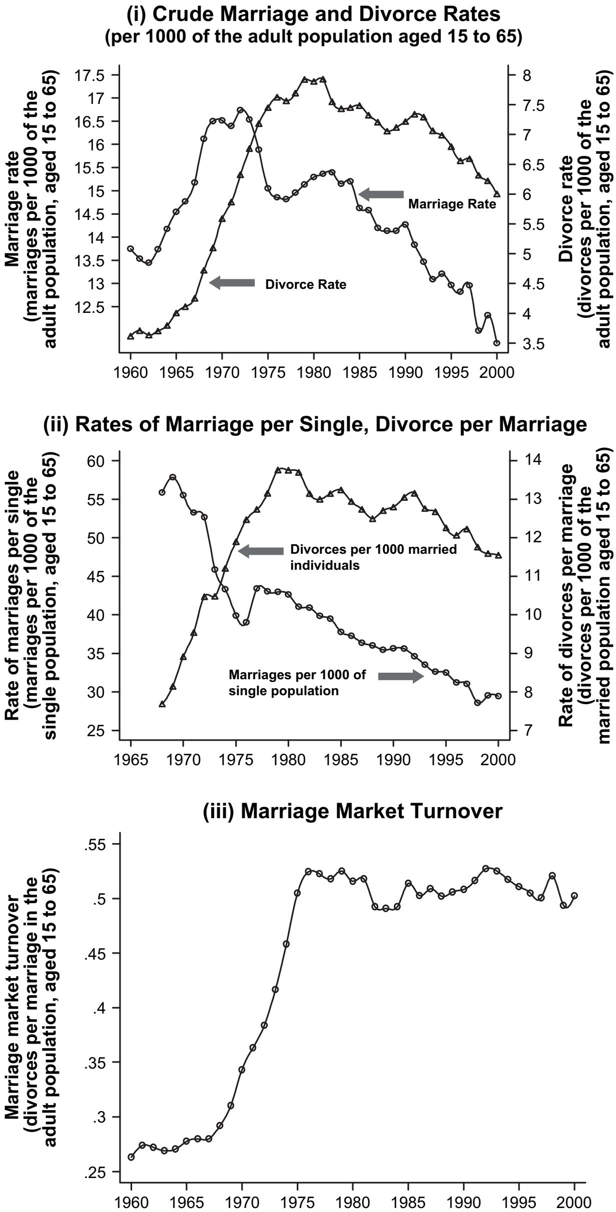


Figure 3. (i) Crude Marriage and Divorce Rates. (ii) Rates of Marriage per Single, Divorce per Marriage. (iii) Marriage Market Turnover.

Notes: Marriage and divorce rates series are weighted by mid year state populations to form aggregate rates. The stock of married and single individuals is constructed from CPS data, from 1968 onwards. For some years, only a subset of states are available. The series for the rates of marriage per singles and divorces per married are weighted to account for this. In each case, the stock of singles and married refers to those aged 15 to 65. In 2002 all states, except NB and MS, required individuals to be 18 to marry without parental consent. NB sets the age of consent at 19, MS sets it at 21. DE, FL, GA, KY, MD, OK allow pregnant teens or teens who have already had a child to get married without parental permission. In FL, KY, and OK the couple require court authorization.

quantitative importance of the underlying social changes that have led to these changes in marriage rates, divorce rates, and selection into marriage, defines a rich research agenda for the future.

## 4.2 The Divorce Revolution

Casual observation of figures 3i to 3iii all suggest that sometime in the 1970s, there was a profound structural change in the American marriage market. A natural candidate to explain this is the liberalization of divorce laws in this decade, a period widely referred to as the "divorce revolution".[20] Between 1968 and 1977 the majority of states passed unilateral divorce laws, moving from a regime in which the dissolution of marriage required the mutual consent of both spouses, to one in which spouses could unilaterally file for divorce. The purpose of this section is to highlight the potential role this change in divorce regime may have had.

Figures 4i and 4ii graph the crude marriage and divorce rates split by adoption of unilateral divorce. The dashed vertical line at 1972 corresponds to the median year of adoption. States that adopted unilateral divorce had historically higher marriage and divorce rates than nonadopters. While marriage and divorce rates have declined across all states, both rates in adopting states had converged to their levels in nonadopting states by the end of the 1990s.

Figures 5i to 5iii graph the number of marriages per single, divorces per married, and marriage market turnover, again by adoption of unilateral divorce law. In all three series, there is again a gradual convergence between adopting and nonadopting states, starting sometime in the 1970s.

Another way to interpret figure 5i is in terms of the probability that any given matched couple decide to marry, $F(\sigma_R^*)$. This is derived from (10) as one minus the ratio of marriages to singles. Figure 5i thus shows how $1-F(\sigma_R^*)$differs by the adoption of unilateral divorce. Mutual consent states have higher reservation signals. In 1964, the probability of any given matched couple having married was 5% in mutual consent states, and just over 4% in unilateral states. As a result individuals in mutual consent states are better selected and this explains the lower initial levels of divorce rates in mutual consent states. However, after the adoption of unilateral divorce, there is convergence between the two series. By 2000, the probability any given matched couple marry is 3% in any state.

Figure 5i can also be used to derive the expected duration of search across divorce regimes, $\frac{\beta F(\sigma_R^*)}{1-\beta F(\sigma_R^*)}$. Assuming $\beta = 0.95$, the series for marriages per single suggests that in 1968 the expected duration of search in mutual consent states was 8 periods, and 9.5 in states that would later adopt unilateral divorce.

20. Of course this is not the only interpretation of the data. For example Goldin and Katz (2002) provide a detailed analysis of how the diffusion of the contraceptive pill has affected marriage incentives for women. Moreover, there remains some debate over the exact timing and definitions of unilateral divorce. Zelder (1993) provides a full discussion of this issue.

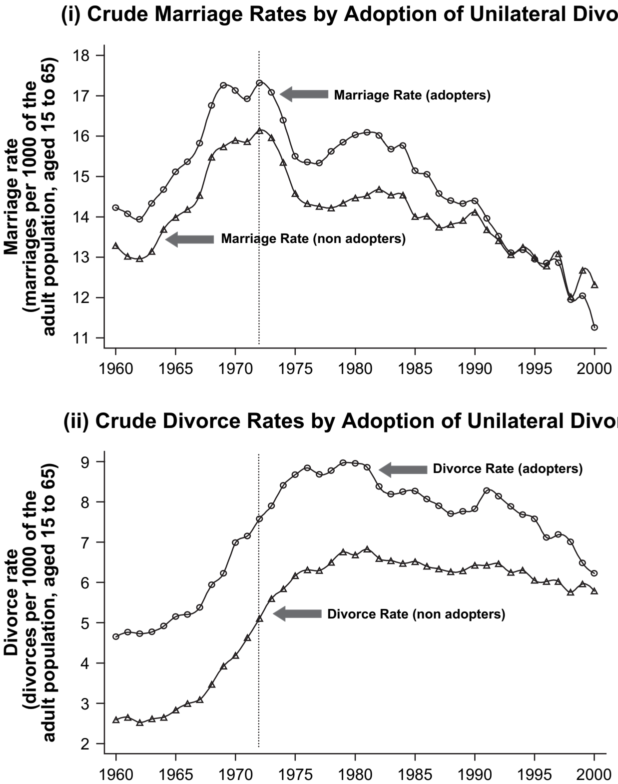


Figure 4. (i) Crude Marriage Rates by Adoption of Unilateral Divorce. (ii) Crude Divorce Rates by Adoption of Unilateral Divorce.

Notes: Source for the year of adoption of unilateral divorce is Friedberg (1998), table 1. In total 31 states adopted unilateral divorce between 1968 and 1985. Each series is calculated as a population weighted average of state level marriage and divorce rates, excluding Nevada.

By 2000 this had risen and converged to 11.5 periods across both divorce regimes.

Figure 5ii on divorces per marriage provides additional insights. In particular, there is a continued increase in divorces per marriage in adopting states after 1972—the median year of adoption. Moreover, starting in 1980, the number of divorces per marriage begins declining in adopting states. No change in trend immediately around 1972 is observed for nonadopting states. However rates of divorce per marriage in nonadopting states plateau from 1980 onward.

The change in adopting states reflects two different effects highlighted in the previous analysis. First, the existing stock of married couples who married under mutual consent divorce laws, are more likely to divorce all else equal. This is the pipeline effect. These marriages were those in which one spouses would have preferred to leave if they could. It was only after the change in divorce regime, however, that this spouse could unilaterally file for divorce.

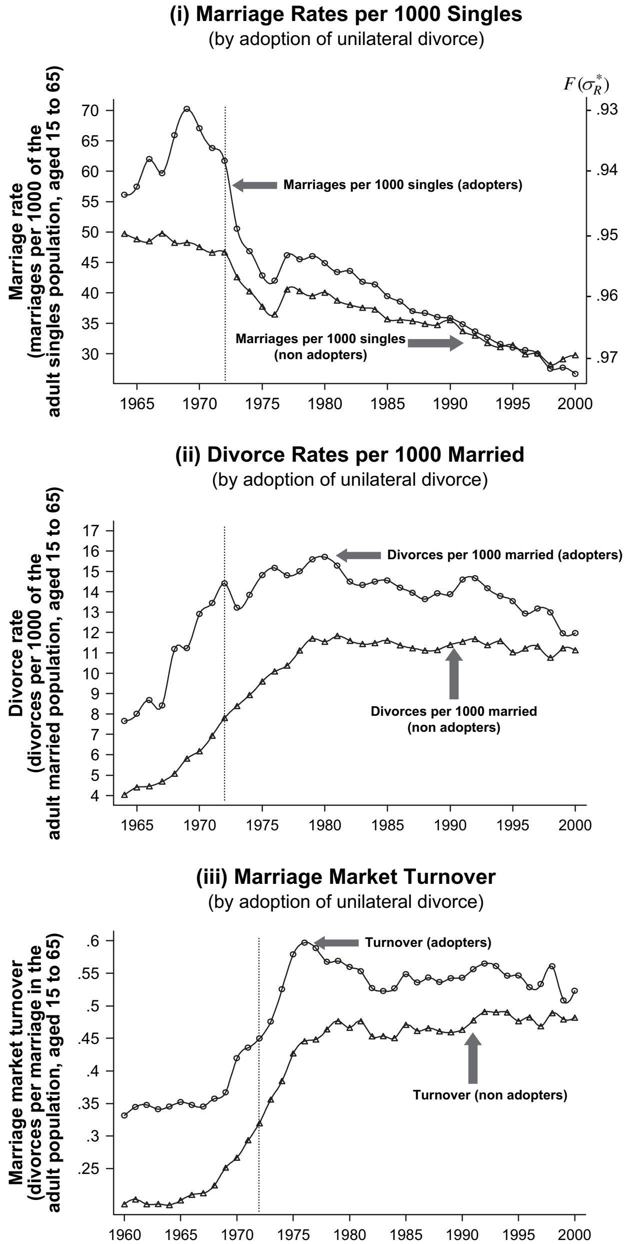


Figure 5. (i) Marriage Rates per 1000 Singles by Adoption of Unilateral Divorce. (ii) Divorce Rates per 1000 Married by Adoption of Unilateral Divorce. (iii) Marriage Market Turnover by Adoption of Unilateral Divorce.

Notes: In total 31 states adopted unilateral divorce between 1968 and 1985. Each series is calculated as a population weighted average of state level marriage and divorce rates, excluding Nevada. The stock of married and single individuals is constructed from CPS data, for 1964 onwards. For some years, only a subset of states are available. The series for the rates of marriage per singles and divorces per married are weighted to account for this.

Second, for couples married under unilateral divorce, the equilibrium marriage market signal, $\sigma_R^{UNI}*$, differs from those previously married under mutual consent, $\sigma_R^{MC}*$. Hence these newly married couples have a different divorce propensity than those married under the previous divorce regime. This difference in divorce propensities is a selection effect.

The balance of evidence suggests, contrary to popular wisdom, couples became better matched under unilateral divorce than mutual consent divorce. Marriage and divorce rates in unilateral divorce states both converge to the levels in mutual consent states.

I explore empirically the causal effect of divorce laws on marriage rates in a companion paper, Rasul (2003). Using US state level panel data from 1960 to 2000, I find robust evidence that after the adoption of unilateral divorce, marriage rates declined significantly and permanently in adopting states. The effect of unilateral divorce on marriage rates accounts for 10% of the overall decline in the marriage rate.

Unilateral divorce is also found to cause greater declines in marriage rates in states in which women are economically better off relative to men. This is precisely the circumstance in which the wife may prefer to divorce even though the husband prefers the marriage to continue. In these states, moving from mutual consent to unilateral divorce reduces the value of marriage to men by more, all else equal.

The findings of Choo and Siow (2003) are also consistent with this. They derive a statistic to measure the gains to marriage based on observed match frequencies. They calibrate their statistic using US census data and find the gains to marriage for young adults fell substantially between 1970 and 1980.

By precisely distinguishing pipeline and selection effects, this paper also helps reinterpret the empirical evidence on the causal effect of divorce laws on divorce rates. Using US state level panel data, Friedberg (1998) found that unilateral divorce explains 17% of the rise in divorces per capita from 1968 to 1988. Given the link between divorce laws and incentives to marry, this paper suggests that by ignoring the effects of divorce laws on the incentive to marry, these results are likely to underestimate the true causal effect of divorce laws on divorce rates.

Wolfers (2003) extends Friedberg's sample to before 1968 and finds the effect of unilateral divorce on divorce rates to die out after a decade, a result confirmed by Gruber (2004) using census data. This is consistent with the pipeline effect eventually being offset by the selection effect. Although not the focus of his paper, when Wolfers extends the sample beyond 1988, he finds some evidence consistent with the selection effect dominating in steady state. This issue remains to be fully explored empirically.

In terms of evidence on the better selection of couples under unilateral divorce, two papers estimate the likelihood of marital breakdown conditional on being married, across divorce regimes. Weiss and Willis (1997) report using data from the National Study of the High School Class of 1972, that couples married under unilateral divorce are less likely to divorce than those married under mutual consent, all else equal, despite living in a more liberal divorce regime. Mechoulan (2003) finds similar evidence using CPS data.

Finally, Murphy (1999) presents evidence that the average difference in child outcomes between children of married and unmarried parents has increased since 1960. He argues that this reflects a compositional effect, that the difference in quality between the pool of surviving marriages and other couples has increased over time.

This debate is far from settled. The framework developed here has made precise the interlinkage between marriage rates, divorce rates, and selection into marriage. Any empirical research examining these outcomes, will need to account for these linkages. Moreover, the key distinction to be made, and that has typically been missing from existing work, is between those married before and after the move from mutual consent to unilateral divorce law.

## 5. Conclusion

Since Gary Becker's seminal works, economists have become ever more interested in both the microeconomic decisions of the family and their macroeconomic consequences. This is especially salient given the nature of the family has changed so dramatically since the 1950s. In just about any type of behavior connected to marriage markets, historical trends have either accelerated or reversed direction altogether.

These changes have not gone unnoticed by economists, lawyers, and sociologists, and a plethora of explanations have been offered to explain the breakdown of the traditional family. Policy makers have also been concerned with the decline in the traditional family. A raft of pro-marriage policies have been recently introduced across the US. These include media campaigns, the reintroduction of covenant marriages, and the removal of marriage penalties in tax codes and medicaid programs (Gardiner et al., 2002).

In this paper I develop a search model of marriage markets that emphasizes the role of learning the true gains from marriage before and during marriage. I first ask what is the effect on the marriage market if the gains to marriage fall. The model distinguishes two separate phenomena that have confounded much of the empirical analysis in this field. There is a pipeline effect on the current stock of married couples directly, and an effect on the composition of couples that decide to marry—a selection effect.

I then develop the model to ask what is the effect of a liberalization of divorce laws, moving from mutual consent to unilateral divorce. Again I make precise the existence of a pipeline and selection effect. While the pipeline effect of the move to unilateral divorce causes an increase in divorce rates, the selection effect is less clear cut, and may offset the pipeline effect. The analysis highlights the possibility that making divorce easier leads to a lower long run divorce rate as those that choose to marry become better selected over time. An immediate implication is that divorce laws have impacts beyond the effect on the divorce rate alone. Hence divorce laws are unlikely to be useful instruments for divorce propensities in empirical work.

Most of the literature has taken as its null hypothesis that by the Coase theorem, a change in the allocation of the right to divorce ought to have no affect on the incidence of divorce. This paper is the first to establish an alternative hypothesis based on the assumption that households do not reach efficient bargains. This alternative hypothesis explains and reconciles many earlier empirical results and gives direction for future research.

A natural extension to the model would be to also model the intrahousehold bargaining problem. The incentives to invest in marital specific capital would also be affected by a liberalization of divorce laws. On the one hand, the greater instability of marriage as captured by the pipeline effect reduces the incentives of couples to invest into marital specific capital. On the other hand, if the marginal couple is better matched under unilateral divorce as captured by the selection effect, this may increase incentives to invest.[21]

A second natural extension would be to make signals individual specific. This would shed light on assortative matching in the marriage market, and how this type of selection changes across divorce regimes. Given that under a unilateral divorce regime an individual cannot be stuck in marriage they would prefer to leave, there are fewer incentives to positively sorted on characteristics that are complementary across spouses. However, as individuals may be in a marriage in which they prefer to stay but their spouse prefers to leave, there are also fewer incentives to negatively sort on characteristics that are substitutable across spouses, such as specialization in household production.

Developing the model with individual signals of match quality would not only help gauge the net effects of these changes across divorce regime, it would also relate to recent empirical papers by Gruber (2004) and Johnson and Mazingo (2000). They show that individuals exposed to unilateral divorce laws as children, do worse on a range of welfare outcomes, than those who lived under mutual consent. If we are to understand the effects on children of a liberalization of divorce laws, a more refined understanding of what is meant by better selection into marriage will be required.

## Appendix: Proofs

*Proof of Lemma 1.* As $\int_{\phi^*}^{\bar{\phi}} h(\phi|\sigma)d\phi = 1$, $\int_{\phi^*}^{\bar{\phi}} \phi h(\phi|\sigma)d\phi$ is the expected payoff in marriage conditional on the marriage remaining intact, and having received signal $\sigma$ in the marriage market. Differentiating the expected lifetime value of marriage $(1')$ with respect to $\sigma$;

$$V_\sigma(M|\sigma) = \int_{\underline{\phi}}^{\bar{\phi}} \phi g_\sigma(\phi|\sigma)d\phi + \frac{\beta}{1-\beta}\left[\begin{array}{c} -G_\sigma(\phi^*|\sigma)\left(\int_{\phi^*}^{\bar{\phi}} \phi h(\phi|\sigma)d\phi - \phi^*\right) \\ +[1-G(\phi^*|\sigma)]\int_{\phi^*}^{\bar{\phi}} \phi h_\sigma(\phi|\sigma)d\phi \end{array}\right].$$

21. A number of recent empirical studies have argued that changes in divorce laws lead to changes in bargaining power across spouses within marriage. Evidence in favor of this has been found in the context of labor supply (Gray, 1998; Chiappori et al., 2002), spousal homicide and domestic violence (Stevenson and Wolfers, 2003), and investments into marital specific capital (Stevenson, 2003).

The first term is positive because of the first order stochastic dominance of signals. The second term is positive because $-G\sigma(\phi^*|\sigma) > 0$ and the expected benefit from marriage conditional on the marriage remaining intact must be at least the divorce payoff, $\phi^*$. Hence $h_\sigma(\phi|\sigma) > 0$ is sufficient to ensure the value of marrying today is increasing in the signal. ■

*Proof of Proposition 1.* Consider first the expected lifetime value of remaining single at the two extreme values of the reservation marriage market signal:

$$V(S,\underline{\sigma}) = -s + \beta V(M)$$
$$V(S,\bar{\sigma}) = \frac{-s + \beta V(M|\bar{\sigma})f(\bar{\sigma})}{1-\beta}.$$

If $\sigma_R = \underline{\sigma}$ the individual marries the first person they meet in the marriage market. The value of remaining single is then the one period search cost plus the discounted value of marriage, unconditional on any signal. If $\sigma_R = \bar{\sigma}$ the individual only marries the individual they are matched with if the highest possible signal is received. The value of remaining single is made up of two terms—the present value of searching each period, and the expected value of marrying after having received the highest signal, $\bar{\sigma}$. As $\lim_{\sigma=\bar{\sigma}} f(\sigma) = 0$, $V(S,\bar{\sigma}) = -\frac{s}{1-\beta}$. Hence $V(S, \sigma_R)$ is positive at low reservation signals, and negative at high reservation signals.

To understand the behavior of $V(S, \sigma_R)$ between the extreme values of $\sigma_R$, differentiate $V(S, \sigma_R)$ with respect to $\sigma_R$:

$$\begin{aligned}\frac{\partial V(S,\sigma_R)}{\partial \sigma_R} &= -\frac{\beta s f(\sigma_R)}{(1-\beta F(\sigma_R))^2} + \beta\frac{\partial}{\partial \sigma_R}\left[\frac{\int_{\sigma_R}^{\bar{\sigma}} V(M|\sigma)f(\sigma)d\sigma}{1-\beta F(\sigma_R)}\right] \\ &= \frac{\beta f(\sigma_R)}{(1-\beta F(\sigma_R))^2}\left[\beta\int_{\sigma_R}^{\bar{\sigma}} V(M|\sigma)f(\sigma)d\sigma - s - (1-\beta F(\sigma_R))V(M|\sigma_R)\right].\end{aligned} \tag{A1}$$

Hence there are two effects of setting a higher reservation signal on the expected lifetime value of remaining single. On the one hand, the individual is more likely to remain single and undertake costly search in the next period. This reduces the value of remaining single. On the other hand, conditional on marriage, the expected benefits from marriage rise. This increases the value of remaining single.

To see how $V(S, \sigma_R)$ changes at the extreme values of the reservation signal:

$$\begin{aligned}\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\underline{\sigma}} &= \beta f(\underline{\sigma})(\beta V(M) - s - V(M|\underline{\sigma})) \\ &= \beta f(\underline{\sigma})(V(S|\underline{\sigma}) - V(M|\underline{\sigma}))\end{aligned}$$

$$\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\bar{\sigma}} = \frac{\beta f(\bar{\sigma})}{(1-\beta)^2}[V(M|\bar{\sigma})(\beta(1+f(\bar{\sigma})) - 1) - s].$$

The interesting case is when $V(S|\underline{\sigma}) > V(M|\underline{\sigma})$, so that the individual is better off searching. This ensures $\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\underline{\sigma}} > 0$. Otherwise individuals would rather marry given even the lowest possible signal. As $\lim_{\sigma=\underline{\sigma}} f(\sigma) = 0$, $\beta(1+f(\bar{\sigma}))-1<0$, it follows that $\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\bar{\sigma}} < 0$.

The expected lifetime value of marriage conditional on having received signal $\sigma_R$ is $V(M|\sigma_R)$. This is positive and increasing everywhere in $\sigma_R$ from Lemma 1. Evaluating at $\sigma_R = \underline{\sigma}$:

$$
\begin{aligned}
V(M|\underline{\sigma}) &= \int_{\underline{\phi}}^{\bar{\phi}} \phi g(\phi|\underline{\sigma})d\phi + \frac{\beta}{1-\beta}\left[\int_{\phi^*}^{\bar{\phi}} \phi g(\phi|\underline{\sigma})d\phi + G(\phi^*|\underline{\sigma})\phi^*\right] \\
&= 0 + \frac{\beta}{1-\beta}[0 + 1.\phi^*] = \frac{\beta}{1-\beta}\phi^*
\end{aligned}
$$

as $\lim_{\sigma\to\underline{\sigma}} G(\phi|\sigma) = 1$. From assumption 3, $V(M) > \frac{1}{1-\beta}\phi^*$, and combining this with the first result above, we have that $V(S,\underline{\sigma}) > V(M|\underline{\sigma})$. Hence given the lowest possible signal has been received, the individual is better off remaining single than marrying. Combining this with the earlier results that $\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\underline{\sigma}} > 0$, $\left.\frac{\partial V(S,\sigma_R)}{\partial \sigma_R}\right|_{\sigma_R=\bar{\sigma}} < 0$, $V(M|\sigma) \geq 0$ for all $\sigma$, and $V(S|\bar{\sigma}) = -\frac{s}{1-\beta} < V(M|\bar{\sigma})$, gives the result that both the value of marriage and value of remaining single increase in the signal, but the value of remaining single eventually falls as higher reservation signals are set. Hence by continuity of $V(M|\sigma_R)$ and $V(S,\sigma_R)$ in $\sigma_R$, there exists a marriage market signal $\sigma_R^*$ such that $V(M|\sigma_R^*) = V(S,\sigma_R^*)$. ■

*Proof of Proposition 2.* Totally differentiating (4) with respect to the per period divorce payoff;

$$
\frac{d\sigma_R^*}{d\phi^*} = \left[\frac{\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} - \frac{\partial V(S,\sigma_R^*)}{\partial \phi^*}}{\frac{\partial V(S,\sigma_R^*)}{\partial \sigma_R^*} - \frac{\partial V(M|\sigma_R^*)}{\partial \sigma_R^*}}\right]. \tag{A2}
$$

Consider the terms in the numerator;

$$
\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} = \frac{\beta}{1-\beta}G(\phi^*|\sigma_R^*)
$$

$$
\frac{\partial V(S,\sigma_R^*)}{\partial \phi^*} = \frac{\beta}{1-\beta F(\sigma_R^*)}\int_{\sigma_R}^{\bar{\sigma}} \frac{\partial V(M|\sigma)}{\partial \sigma_R^*} f(\sigma)d\sigma.
$$

Note that $\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*}$ is decreasing in $\sigma_R^*$ by the first order stochastic dominance of signals. Hence a higher per period divorce payoff has the greatest effect on the lifetime value of the marginal marriage. Differentiating the lifetime value of being in the marginal marriage with respect to $\phi^*$;[22]

$$\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} = \frac{\int_{\sigma_R^*}^{\bar{\sigma}} \frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} f(\sigma)d\sigma}{1 - F(\sigma_R^*)} > \frac{\beta \int_{\sigma_R^*}^{\bar{\sigma}} \frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} f(\sigma)d\sigma}{1 - \beta F(\sigma_R^*)}$$
$$> \frac{\beta \int_{\sigma_R}^{\bar{\sigma}} \frac{\partial V(M|\sigma)}{\partial \phi^*} f(\sigma)d\sigma}{1 - \beta F(\sigma_R^*)} = \frac{\partial V(S, \sigma_R^*)}{\partial \phi^*}$$

where the second inequality holds because $\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} = \frac{\beta}{1-\beta} G(\phi^*|\sigma_R^*)$ is decreasing in $\sigma_R^*$. Hence the numerator in (A2) is positive.

To calculate the sign of the denominator in (A2), note that at the equilibrium reservation signal $\sigma_R^*$, $V(M|\sigma_R)$ intercepts $V(S, \sigma_R)$ from below, so that $\frac{\partial V(M|\sigma_R^*)}{\partial \sigma_R^*} > \frac{\partial V(S,\sigma_R^*)}{\partial \sigma_R^*}$ at the equilibrium reservation signal. Therefore;

$$\frac{d\sigma_R^*}{d\phi^*} = \left[ \frac{\frac{\partial V(M|\sigma_R^*)}{\partial \phi^*} - \frac{\partial V(S,\sigma_R^*)}{\partial \phi^*}}{\frac{\partial V(S,\sigma_R^*)}{\partial \sigma_R^*} - \frac{\partial V(M|\sigma_R^*)}{\partial \sigma_R^*}} \right] = \frac{\text{positive}}{\text{negative}} < 0$$

and so the equilibrium reservation signal decreases in the per period divorce payoff.

Search costs do not affect the expected lifetime value of marriage. However the expected lifetime value of remaining single is reduced. From (A1) note the slope of $V(S, \sigma_R)$ falls as search costs rise. Hence;

$$\frac{d\sigma_R^*}{ds} = \left[ \frac{\frac{\partial V(M|\sigma_R^*)}{\partial s} - \frac{\partial V(S,\sigma_R^*)}{\partial s}}{\frac{\partial V(S,\sigma_R^*)}{\partial \sigma_R^*} - \frac{\partial V(M|\sigma_R^*)}{\partial \sigma_R^*}} \right] = \frac{\text{positive}}{\text{negative}} < 0$$

so the equilibrium reservation signal falls with higher search costs. ■

*Proof of Lemma 2.* The results follow from straightforward differentiation of $n_s^*$;

$$\frac{\partial n_s^*}{\partial \sigma_R^*} = f(\sigma_R^*) \left[ \frac{(1-\beta) + \beta\Gamma_{ms}}{(1 - \beta(F(\sigma_R^*) - \Gamma_{ms}))^2} \right] \beta f(\sigma_R^*) > 0$$

$$\frac{\partial n_s^*}{\partial \Gamma_{ms}} = \frac{1}{(1 - \beta(F(\sigma_R^*) - \Gamma_{ms}))^2} [(1 - \beta(F(\sigma_R^*) - \Gamma_{ms}))\beta - (1 - \beta + \beta\Gamma_{ms})\beta]$$
$$= \frac{\beta^2(1 - F(\sigma_R^*))}{(1 - \beta(F(\sigma_R^*) - \Gamma_{ms}))^2} > 0.$$

22. This follows the same method as the proof of the main result in Bougheas and Georgellis (1999).

Given that $n_m^* = 1 - n_s^*$, it follows that $\frac{\partial n_m^*}{\partial \sigma_R^*} < 0$ and $\frac{\partial n_m^*}{\partial \Gamma_{ms}} < 0$. ■

*Proof of Lemma 3.* Differentiating the marriage rate with respect to $\sigma_R^*$;

$$\begin{aligned}\frac{\partial(MR)}{\partial\sigma_R^*} &= -f(\sigma_R^*)n_s^* + \frac{(1-F(\sigma_R^*))}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2} \\ &\quad\times\begin{bmatrix}(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))\beta\frac{\partial(\Gamma_{ms})}{\partial\sigma_R^*} \\ -(1-\beta+\beta\Gamma_{ms})\left(-\beta f(\sigma_R^*)+\beta\frac{\partial(\Gamma_{ms})}{\partial\sigma_R^*}\right)\end{bmatrix} \\ &= -f(\sigma_R^*)n_s^* + \frac{(1-F(\sigma_R^*))}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2} \\ &\quad\times\begin{bmatrix}-\beta(1-\beta+\beta\Gamma_{ms})G(\phi^*|\sigma_R^*)f(\sigma_R^*) \\ +\beta(1-\beta+\beta\Gamma_{ms})(G(\phi^*|\sigma_R^*)-1)f(\sigma_R^*)\end{bmatrix} < 0.\end{aligned}$$

Similarly for the divorce rate;

$$\begin{aligned}\frac{\partial(DR)}{\partial\sigma_R^*} &= \frac{1}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2} \\ &\quad\times\begin{bmatrix}(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))\left(-\beta f(\sigma_R^*)\Gamma_{ms}+\beta(1-F(\sigma_R^*))\frac{\partial(\Gamma_{ms})}{\partial\sigma_R^*}\right) \\ +\beta^2(1-F(\sigma_R^*))\Gamma_{ms}\left(f(\sigma_R^*)-\frac{\partial(\Gamma_{ms})}{\partial\sigma_R^*}\right)\end{bmatrix} \\ &= \frac{1}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2} \\ &\quad\times\begin{bmatrix}\beta(1-F(\sigma_R^*))g(\phi^*|\sigma_R^*)(\beta F(\sigma_R^*)-1) \\ +\beta\Gamma_{ms}f(\sigma_R^*)(\beta(1-\Gamma_{ms})-1)\end{bmatrix} < 0.\end{aligned}$$

Differentiating marriage and divorce rates with respect to the flow of individuals from marriage into singlehood;

$$\begin{aligned}\frac{\partial(MR)}{\partial\Gamma_{ms}} &= (1-F(\sigma_R^*))\left[\frac{\beta(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))-\beta(1-\beta+\beta\Gamma_{ms})}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2}\right] \\ &= \left[\frac{\beta(1-F(\sigma_R^*))}{1-\beta(F(\sigma_R^*)-\Gamma_{ms})}\right]^2 > 0\end{aligned}$$

$$\frac{\partial(DR)}{\partial\Gamma_{ms}} = n_m^* - \Gamma_{ms}\frac{\beta^2(1-F(\sigma_R^*))}{(1-\beta(F(\sigma_R^*)-\Gamma_{ms}))^2} = n_m^*\left[\frac{1-\beta F(\sigma_R^*)}{1-\beta(F(\sigma_R^*)-\Gamma_{ms})}\right] > 0.$$

Hence the marriage rate decreases in the reservation signal, and increases in the flow of individuals from marriage into singlehood. The divorce rate decreases in the reservation signal and increases in the flow of individuals from marriage into singlehood. ■

*Proof of Lemma 4.* Note from (10);

$$MR = (1 - F(\sigma_R^*))n_s^* = (1 - F(\sigma_R^*))(1 - n_m^*) = \frac{(1 - F(\sigma_R^*))(\Gamma_{ms} - DR)}{\Gamma_{ms}}$$

which is equation (12) in the main text. If the marriage rate is greater than the divorce rate;

$$DR < \frac{(1 - F(\sigma_R^*))(\Gamma_{ms} - DR)}{\Gamma_{ms}}$$

$$DR < \frac{(1 - F(\sigma_R^*))\Gamma_{ms}}{\Gamma_{ms} + (1 - F(\sigma_R^*))}.$$

Substituting in for $DR = \Gamma_{ms} n_m^* = \Gamma_{ms} \frac{\beta(1-F(\sigma_R^*))}{1-\beta(F(\sigma_R^*)-\Gamma_{ms})}$, the marriage rate is greater than the divorce rate if;

$$\frac{\beta(1 - F(\sigma_R^*))\Gamma_{ms}}{1 - \beta(F(\sigma_R^*) - \Gamma_{ms})} < \frac{(1 - F(\sigma_R^*))\Gamma_{ms}}{\Gamma_{ms} + (1 - F(\sigma_R^*))}$$

$$\beta\Gamma_{ms} + \beta(1 - F(\sigma_R^*)) < 1 - \beta F(\sigma_R^*) + \beta\Gamma_{ms}.$$

This holds if $\beta < 1$ which is always true. ■

*Proof of Proposition 3.* The first part of the proof follows from the results in proposition 2 and lemma 3;

$$\frac{d(MR)}{d\phi^*} = \frac{\partial(MR)}{\partial\sigma_R^*}\frac{\partial\sigma_R^*}{\partial\phi^*} = (\text{negative})(\text{negative}) > 0$$

$$\frac{d(DR)}{d\phi^*} = \frac{\partial(DR)}{\partial\sigma_R^*}\frac{\partial\sigma_R^*}{\partial\phi^*} = (\text{negative})(\text{negative}) > 0.$$

To see the effect on the number of marriages per single, note that;

$$\frac{\partial(MS)}{\partial\sigma_R^*} = \frac{-n_s^* f(\sigma_R^*) - (1 - F(\sigma_R^*))\frac{\partial n_s^*}{\partial\sigma_R^*}}{(n_s^*)^2} < 0.$$

This is negative because, as shown in lemma 2, $\frac{\partial n_s^*}{\partial\sigma_R^*} > 0$. Hence;

$$\frac{d(MS)}{d\phi^*} = \frac{\partial(MS)}{\partial\sigma_R^*}\frac{\partial\sigma_R^*}{\partial\phi^*} = (\text{negative})(\text{negative}) > 0.$$

To see the effect on the number of divorces per married, note that;

$$\frac{\partial(DM)}{\partial\sigma_R^*} = \frac{n_m^* \frac{\partial\Gamma_{ms}}{\partial\sigma_R^*} - \Gamma_{ms}\frac{\partial n_m^*}{\partial\sigma_R^*}}{(n_m^*)^2}$$

which is of ambiguous sign because, as shown in lemma 2, $\frac{\partial n_m^*}{\partial\sigma_R^*} < 0$. Hence $\frac{d(DM)}{d\phi^*} = \frac{\partial(DM)}{\partial\sigma_R^*}\frac{\partial\sigma_R^*}{\partial\phi^*}$ is of ambiguous sign. To see the effect on marriage market turnover;

$$T = \frac{DR}{MR} = \frac{\Gamma_{ms} n_m^*}{(1 - F(\sigma_R^*))n_s^*} = \frac{\beta\Gamma_{ms}}{1 - \beta(1 - \Gamma_{ms})}.$$

Differentiating with respect to the equilibrium reservation signal;

$$\begin{aligned}\frac{\partial T}{\partial\sigma_R^*} &= \frac{1}{(1 - \beta(1 - \Gamma_{ms}))^2}\left[(1 - \beta(1 - \Gamma_{ms}))\beta\frac{\partial\Gamma_{ms}}{\partial\sigma_R^*} - \beta\Gamma_{ms}\beta\frac{\partial\Gamma_{ms}}{\partial\sigma_R^*}\right] \\ &= -\frac{(1 - \beta)\beta G(\phi^*|\sigma_R^*)f(\sigma_R^*)}{(1 - \beta(1 - \Gamma_{ms}))^2} < 0.\end{aligned}$$

Combining this result with that in proposition 2,

$$\frac{dT}{d\phi^*} = \frac{\partial T}{\partial\sigma_R^*}\frac{\partial\sigma_R^*}{\partial\phi^*} = (\text{negative})(\text{negative}) > 0$$

so turnover increases in divorce payoffs. ■

*Proof of Lemma 5.* Note that the expected period payoff in marriage conditional on the marriage surviving can be rewritten as;

$$\begin{aligned}&\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w + \int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \\ &\quad + \int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w - 2\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \\ &= \int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w + \int_{\underline{\phi}}^{\phi_h^*} u(.)g(\phi_h|\sigma)d\phi_h \\ &\quad + \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_w|\sigma)d\phi_w - 2\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w.\end{aligned}$$

The first term above corresponds to region D in figure 2, the second term to region A + B, the third term to A + C, and the last term to 2A. Hence together they correspond to B + C + D. Substituting this into (17), differentiating with respect to σ, and rearranging;

$$\frac{\partial V_i^{MC}(M|\sigma)}{\partial\sigma} = \int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w$$

$$+\frac{\beta}{1-\beta}(1-G(\phi_h^*,\phi_w^*|\sigma))\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w$$

$$+\frac{\beta}{1-\beta}(1-G(\phi_h^*,\phi_w^*|\sigma))\left\{\begin{array}{c}\int_{\underline{\phi}}^{\phi_h^*} u(.)g_\sigma(\phi_h|\sigma)d\phi_h \\ -\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w\end{array}\right\}$$

$$+\frac{\beta}{1-\beta}(1-G(\phi_h^*,\phi_w^*|\sigma))\left\{\begin{array}{c}\int_{\underline{\phi}}^{\phi_w^*} u(.)g_\sigma(\phi_w|\sigma)d\phi_w \\ -\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w\end{array}\right\}$$

$$-\frac{\beta}{1-\beta}G_\sigma(\phi_h^*,\phi_w^*|\sigma)\left\{\begin{array}{c}\int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \\ -\int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \\ -u(\phi_i^*,0)\end{array}\right\}. \quad \text{(A3)}$$

The first two terms are positive by first order stochastic dominance. The third term corresponds to the expected utility in regions A + B minus region A in figure 2;

$$\int_{\underline{\phi}}^{\phi_h^*} u(.)g_\sigma(\phi_h|\sigma)d\phi_h - \int_{\underline{\phi}}^{\phi_h^*}\int_{\underline{\phi}}^{\phi_w^*} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w$$
$$= \int_{\underline{\phi}}^{\phi_h^*}\int_{\phi_w^*}^{\bar{\phi}} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w$$

which is again positive. A similar argument then applies to the fourth term in (1). The final term is the expected utility in marriage conditional on the marriage remaining intact, minus the utility in divorce. By definition, this is positive. Hence in a mutual consent divorce regime, the value of marrying today increases in marriage market signals. ■

*Proof of Lemma 6.* Differentiating (19) with respect to $\sigma$, and substituting in for $S(\phi_h^*,\phi_w^*|\sigma)$ from (18);

$$\frac{\partial V_i^{UNI}(M|\sigma)}{\partial\sigma} = \int_{\underline{\phi}}^{\bar{\phi}}\int_{\underline{\phi}}^{\bar{\phi}} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w + \frac{\beta}{1-\beta}(1-S(\phi_h^*,\phi_w^*|\sigma))$$
$$\times\left(\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g_\sigma(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w\right)$$
$$-\frac{\beta}{1-\beta}\left(\begin{array}{c}G_{h\sigma}(\phi_h^*|\sigma)+G_{w\sigma}(\phi_w^*|\sigma) \\ -G_\sigma(\phi_h^*,\phi_w^*|\sigma)\end{array}\right)$$
$$\times\left(\begin{array}{c}\int_{\phi_h^*}^{\bar{\phi}}\int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h,\phi_w|\sigma)d\phi_h d\phi_w \\ -u(\phi_i^*,0)\end{array}\right).$$

The first two terms are positive by first order stochastic dominance. Note that in the third term;

$$G_{h\sigma}(\phi_h^*|\sigma) + G_{w\sigma}(\phi_w^*|\sigma) - G_\sigma(\phi_h^*, \phi_w^*|\sigma) = K_\sigma(\phi_h^*, \phi_w^*|\sigma) \leq 0$$

from assumption 4. The final term is the difference between the expected utility in marriage conditional on the marriage remaining intact minus utility in divorce, which is positive. Hence the third term is positive and so $\frac{\partial V_i^{UNI}(M|\sigma)}{\partial \sigma} > 0$. ■

*Proof of Proposition 4.* Subtracting (19) from (17);

$$\begin{aligned}
&\frac{1-\beta}{\beta}(V_i^{MC}(M|\sigma) - V_i^{UNI}(M|\sigma)) \\
&\quad = (1 - G(\phi_h^*, \phi_w^*|\sigma))\left[\begin{array}{c} \int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \\ -\int_{\underline{\phi}}^{\phi_h^*} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \end{array}\right] \\
&\qquad - (1 - S(\phi_h^*, \phi_w^*|\sigma)) \int_{\phi_h^*}^{\bar{\phi}} \int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \\
&\qquad + (G(\phi_h^*, \phi_w^*|\sigma) - S(\phi_h^*, \phi_w^*|\sigma))u(\phi_i^*, 0). \qquad \text{(A4)}
\end{aligned}$$

Divorce is more likely to occur under unilateral divorce so that $G(\phi_h^*, \phi_w^*|\sigma) \leq S(\phi_h^*, \phi_w^*|\sigma)$ so the final term above is negative.

Hence although under mutual consent the marriage is more likely to remain intact, conditional on it remaining intact, the expected utility in marriage is lower than under a unilateral divorce regime. To establish which of these effects dominates, rewrite (A4) as;

$$\begin{aligned}
&\frac{1-\beta}{\beta}(V_i^{MC}(M|\sigma) - V_i^{UNI}(M|\sigma)) = ((1 - G(\phi_h^*, \phi_w^*|\sigma) \\
&\quad - (1 - S(\phi_h^*, \phi_w^*|\sigma))\left(\begin{array}{c} \int_{\phi_h^*}^{\bar{\phi}} \int_{\phi_w^*}^{\bar{\phi}} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \\ -u(\phi_i^*, 0) \end{array}\right) \\
&\quad + (1 - G(\phi_h^*, \phi_w^*|\sigma))\left\{\begin{array}{c} \int_{\underline{\phi}}^{\phi_h^*} u(.)g(\phi_h|\sigma)d\phi_h \\ -\int_{\underline{\phi}}^{\phi_h^*} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \end{array}\right\} \\
&\quad \times (1 - G(\phi_h^*, \phi_w^*|\sigma))\left\{\begin{array}{c} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_w|\sigma)d\phi_w \\ -\int_{\underline{\phi}}^{\phi_h^*} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w \end{array}\right\}. \qquad \text{(A5)}
\end{aligned}$$

Note that $G(\phi_h^*, \phi_w^*|\sigma) \leq S(\phi_h^*, \phi_w^*|\sigma)$ is positive, and the term;

$$\int_{\underline{\phi}}^{\phi_h^*} u(.)g(\phi_h|\sigma)d\phi_h - \int_{\underline{\phi}}^{\phi_h^*} \int_{\underline{\phi}}^{\phi_w^*} u(.)g(\phi_h, \phi_w|\sigma)d\phi_h d\phi_w$$

is the difference between the husband's expected utility if has lower benefits in marriage than in divorce, and his expected utility if both he and his wife have lower benefits in marriage than divorce. The class of utility functions studied assumes spousal benefits in marriage are weak complements so that $u_{12} \geq 0$. The husband can therefore never expect to be worse off as his wife becomes better off. Hence this term is non–negative. A similar argument applies to the final term in (A5). ■

*Proof of Proposition 5.* Consider first the expected lifetime value of remaining single for any individual under regime $r$ at the two extreme values of the reservation signal;

$$V_i^r(S, \underline{\sigma}) = -s + \beta V_i^r(M)$$
$$V_i^r(S, \bar{\sigma}) = \frac{-s + \beta V_i^r(M|\bar{\sigma}) f(\bar{\sigma})}{1-\beta} = -\frac{s}{1-\beta}$$

where the second equality follows from $\lim_{\sigma = \bar{\sigma}} f(\sigma) = 0$. Now consider the expected lifetime utility of marrying under both divorce regimes, again evaluated at the extreme values of the reservation signal. Evaluating (17) at $\sigma = \underline{\sigma}$ and using the normalization $\int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\underline{\sigma}) d\phi_h d\phi_w = 0$ and $G(\phi_h^*, \phi_w^*|\underline{\sigma}) = 1$;

$$V_i^{MC}(M|\underline{\sigma}) = \frac{\beta}{1-\beta} u(\phi_i^*, 0).$$

Hence $V_i^{MC}(M|\underline{\sigma}) < V_i^{MC}(S, \underline{\sigma})$ if $\frac{\beta}{1-\beta} u(\phi_i^*, 0) < -s + \beta V_i^{MC}(M)$, which is ensured by assumption 6. Similarly, in a unilateral divorce regime, evaluating (19) at $\sigma = \underline{\sigma}$ and using the normalization $\int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) \times g(\phi_h, \phi_w|\underline{\sigma}) d\phi_h d\phi_w = 0$ and $S(\phi_h^*, \phi_w^*|\underline{\sigma}) = 1$;

$$V_i^{UNI}(M|\underline{\sigma}) = \frac{\beta}{1-\beta} u(\phi_i^*, 0).$$

Hence $V_i^{UNI}(M|\underline{\sigma}) < V_i^{UNI}(S, \underline{\sigma})$ if $\frac{\beta}{1-\beta} u(\phi_i^*, 0) < -s + \beta V_i^{UNI}(M)$, which is ensured by assumption 6.

Given that $\int_{\underline{\phi}}^{\bar{\phi}} \int_{\underline{\phi}}^{\bar{\phi}} u(\phi_h, \phi_w) g(\phi_h, \phi_w|\underline{\sigma}) d\phi_h d\phi_w = 0$ and that by assumption 4, signals can be ordered such that the distribution of utility in marriage generated by higher signals stochastically dominate the distributions given by lower signals;

$$V_i^r(S, \bar{\sigma}) = -\frac{s}{1-\beta} V_i^r(M|\bar{\sigma}) < 0 \leq V_i^r(M|\bar{\sigma}).$$

Hence $V_i^r(M|\underline{\sigma}) < V_i^r(S, \underline{\sigma})$, and $V_i^r(S, \bar{\sigma}) < V_i^r(M|\bar{\sigma})$. Hence by continuity of $V_i^r(S, \sigma)$ and $V_i^r(M|\sigma)$ in $\sigma$, there exists a marriage market signal $\sigma_{iR}^{r*}$, such that $V_i^r(M|\sigma_{iR}^{r*}) = V_i^r(S, \sigma_{iR}^{r*})$ for men and women in both divorce regimes. ■

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