Online Theoretical Appendix to Accompany "Why Have Divorce Rates Fallen? The Role of Women's Age at Marriage"

Dana Rotz

Mathematica Policy Research

May 2015

Abstract

In this appendix, I develop an integrated model of the marriage market to demonstrate that monotone decreases in the gains to marriage (due to changes in laws, technology, and labor markets) can produce both the increase in age at marriage and the rise and fall of divorce rates observed in the U.S. since 1950.

B.1 Understanding the Rise and Fall of Divorce

Past work on the family suggests that various factors relating to decreases in the gains to marriage (e.g., increased access to birth control or a women's growing role in the labor market) led to increases in age at marriage.[1] The empirical evidence in Rotz (2014) further indicates that these increases in age drove down divorce rates. Within the literature, these results therefore

[1]For example, see Becker (1973, 1974, 1991) on female labor force participation and Goldin and Katz (2002) on the pill.

imply that decreases in the gains to marriage lead to lower rates of divorce, via increases in age at marriage. However, this hypothesis is potentially at odds with trends earlier in the century. Most of the variables associated with the gains to marriage evolved monotonically from 1960 to 2004. But the earlier part of this period is characterized by increasing divorce rates. Similar changes in the gains to marriage thus appear to imply very different changes in the divorce rate before and after 1980.

To better understand how decreases in the relative value of marriage could lead to an inverted U-shaped trend in divorce, I consider a simple, one-sided search model. I assume that women search for potential husbands, distinguished only by their wage rates. Search is costly, and once married, the cost of looking for a (different) husband increases. Women benefit from being married because of household income sharing and economies of scale. This workhorse search model is augmented with an initial period of endogenous educational attainment. The framework abstracts from the search behavior of men and several other complications but allows for a rich relationship between age at marriage and marital stability.[2]

In a world with gains from marriage but without any frictions, a woman will always wed the best man in the population willing to marry her. Requiring women to search for a husband adds frictions to the marriage market in a straightforward and tractable manner. These frictions then lead to marriage delay and, occasionally, divorce.[3]

[2]For a review of modern search models, see Mortensen and Pissarides (1999). Two-sided models yield predictions similar to those of the one-sided model developed in this section under certain household sharing rules, wherein a change in women's circumstances elicits a larger reaction from women than men.

[3]Indeed, my model captures several important facts that other search models cannot. In particular, models in which divorce occurs due to learning about match quality or shocks to match quality (e.g., Jovanovic 1979) cannot replicate the fact that divorce decreases in probability as age at marriage increases without implying that higher reservation values lead to higher divorce rates conditional on age. Further, more complex models of learning about one's own perfect mate can imply an untenable decrease in the importance of age at marriage over time or require a high degree of non-stationarity or implausibly large discount factors (c.f., Neeman, Newman, and Olivetti 2008). Finally, models that focus on temporal uncertainty about the common value of a partner (e.g., Bergstrom and Bagnoli 1993) speak to the relationship between quality and age at marriage but do not produce interesting dynamics in divorce unless one adds complex frictions or restrictions to the matching function.

The key distinguishing prediction of this particular search model is that changes in the gains to marriage asymmetrically impact current and future marital stability. A decrease in the relative value of marriage leads to a higher divorce rate among women married at the time of a change. But the same change induces single women to be pickier about whom they marry and to wait longer to marry. These effects imply that a decrease in the value of marriage first leads to higher divorce rates but eventually causes marriages to become more stable. The asymmetry allows this relatively simple model to predict that monotone changes in the gains to marriage can produce an inverted U-shaped trend in divorce rates over time.

Three features of my model lead to this key finding.[4] First, search for a higher-earning spouse while currently married provides the mechanism for divorce.[5] Second, the model applies a fixed sharing rule to the incomes of husband and wife, making utility nontransferable.[6] These two elements allow negative shocks to the value of marriage to imply contemporaneously higher divorce rates, while increasing the stability of future marriages. Third, I assume that women can only search for a spouse for a finite time. All three assumptions together lead marriages beginning later in life to be more stable, even conditional on the characteristics of both spouses.

B.2 Setup

Formally, the model begins as a woman exits high school with a known offer of marriage. Men are distinguished only by their (constant) wage rates drawn from the commonly known

[4]See Burdett (1978) for the model on which this is based. This model is also similar to that of Neeman, Newman, and Olivetti (2008), who demonstrate that learning combined with nontransferable utility can imply that women who are more attached to the labor force will divorce less often conditional on age at marriage.

[5]Note this assumption implies that in steady state, remarriage directly follows divorce. In the SIPP, many women quickly remarry following divorce (about one-half of women who remarry do so within three years of divorce). However, one cannot distinguish divorces due to search behavior from those due to parameter shifts, making it difficult to address the precise relationship between search-based divorce and remarriage.

[6]See Legros and Newman (2007) for a discussion of the effects of nontransferable utility on union formation and matching.

distribution $F(w)$. The first potential husband a woman meets after high school receives wage $w_h \geq 0$. A woman can accept this man's proposal, decline and enter the workforce, or decline and go to college. Each period a woman is not in school she can earn z, either in actual income or imputed from home production. Going to college increases this wage and the value of a woman's first offer of marriage after graduation.[7]

After her schooling is complete, a woman chooses one of three states each period: single and searching for a spouse, married and searching for a better spouse, or married and not searching. Such decisions are relevant to all women until they reach a certain age T.[8]

Searching for a spouse costs $kc < z$ when single and c when married, where $k < 1$.[9] If search occurs, a woman receives a recallable offer of marriage with probability λ.[10] For simplicity, I assume no savings instrument and risk neutral agents. When single, a woman enjoys flow benefit z and when married to a man with wage $w > 0$, she gets flow benefit $(z + w)/2^{\phi}$, where $\phi \in (0, 1)$ represents the degree of scale economies a family can achieve.

The value of getting an offer of marriage from a man with wage w' at time t is thus $\psi_t(w') = \max\{V_{St}(w'), V_{Lt}(w'), V_{Mt}(w')\}$, where the values of being single (V_{St}), married and looking for a new spouse (V_{Lt}), and married and not searching (V_{Mt}) may be written respectively

[7] I assume that, with certainty, women meet a mate after college with a wage greater than w_h. One could alternatively assume that female college graduates draw potential mates from a distribution that first order stochastically dominates the distribution of the wages of the potential spouses of non-graduates.

See Chiappori, Iyigun, and Weiss (2009) for a discussion of the returns to education in the marriage market.

[8] One can think of T as a woman's age at death but more nuanced interpretations for T as some date of exit from the marriage market are also possible. For example, if men only propose to fertile women, the relevant time frame for marriage could be far shorter than the lifetime.

[9] Women in college also pay kc to search but receive an offer of marriage with certainty.

[10] All offers of marriage are recallable, in that once a woman has found a man with a given wage rate willing to marry her, she can do so again costlessly. This allows for easier exposition, as it makes the expected gross gains from search while single and while married the same. If offers were not recallable, the relative gains to marriage would increase, as marriage with search would essentially allow a woman to hold a given offer while still looking for a better mate. Under certain conditions about the relative importance of this motivation to marry, the model without recall will produce similar comparative statics.

as

$$
\begin{aligned}
V_{St}(w') &= z - kc + \beta\lambda(1 - F(w'))(E[\psi_{t+1}(w)|w > w'] - \psi_{t+1}(w')) \quad \text{(B.1)} \\
&\quad +\beta\psi_{t+1}(w') \\
V_{Lt}(w') &= \frac{z + w'}{2^{\phi}} - c + \beta\lambda(1 - F(w'))(E[\psi_{t+1}(w)|w > w'] - \psi_{t+1}(w')) \quad \text{(B.2)} \\
&\quad +\beta\psi_{t+1}(w') \\
V_{Mt}(w') &= \frac{z + w'}{2^{\phi}} + \beta\psi_{t+1}(w'). \quad \text{(B.3)}
\end{aligned}
$$

Each value function combines current utility flows, the net expected value of any search, and the discounted (using factor β) future value of optimal decision making.[11]

Women with higher wages will prefer to remain single longer because they must give their spouse part of their earnings when they marry. The effect is tempered by higher economies of scale within marriage, as a woman will effectively lose less of her income to her spouse when this multiplier increases. A woman will choose to search for a different mate when she has higher expected net returns to doing so, because of low costs, a high arrival rate, low discount rate, or high expected benefit to finding a better spouse. Further, as a potential mate's wage increases, the value of being married and not searching increases at a faster rate than the value of bring married and continuing to search, which in turn rises quicker than the value of being single.

[11] Many of the model's assumptions can be relaxed to some degree. For example, one can add a match-specific component to marriage, so long as the common value of a husband (his wage) remains an important determinant of divorce. With this addition, factors other than rent-seeking can lead to divorce and some divorces will be welfare-improving for both ex-spouses. Women who do not search for a mate can receive unsolicited offers from potential spouses with some (small) probability. Further, children and other factors giving women a preference for marriage or stability may be incorporated. One can also add a degree of flexibility to the household income-sharing rule. I omit these extensions for easier exposition and to focus on the ability of this simple model to replicate the trend in divorce from 1950 to 2004 using only unidirectional shocks.

B.3 Marriage and Divorce in a Search Framework

Similar analysis then implies the following convenient property.

Proposition 1 *Each period, a woman's decision process exhibits the reservation wage property. That is, for any pair of options j and k (among remain single, marry but continue to look for a better mate, and marry and stop searching) at time t, there exists some unique w_{jkt} where a woman is indifferent between options j and k for $w' = w_{jkt}$, strictly prefers one option when $w' > w_{jkt}$, and strictly prefers the other alternative when $w' < w_{jkt}$.*[12]

Therefore, a woman's pairwise preferences can be determined by comparing her best offer of marriage to w_{LSt}, w_{MSt}, and w_{LMt}, the points of indifference between marriage with search and singlehood, marriage without search and singlehood, and the two different marriage options. Being married and searching is preferred to being single if and only if

$$w' \geq w_{LSt} = z(2^{\phi} - 1)/2^{\phi} + c(1 - k). \qquad \text{(B.4)}$$

A woman is thus more likely to prefer marriage with search to singlehood if she has lower wages, if the costs of search while married and while single are similar, or if economies of scale are large.

Likewise, a woman will prefer marriage without search to singlehood if and only if

$$w' \geq w_{MSt} = z(2^{\phi} - 1)/2^{\phi} - kc + \beta\lambda \int_{w_{MSt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{MSt}))f(w)dw. \qquad \text{(B.5)}$$

Thus, a woman will be more likely to want to marry and stop searching, rather than stay single, as her wage falls, the cost of search increases, or the expected gain from finding a man with a higher wage decreases.

[12] The proof for this and all other propositions can be found in Section B.5.

Similarly, a married woman will prefer not to search for a better mate if and only if $w' \geq w_{LMt}$, implicitly defined by

$$c = \beta\lambda \int_{w_{LMt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{LMt}))f(w)dw. \tag{B.6}$$

Put simply, a married woman (whose husband earns w') will search if the costs of search (c) are low or the expected gains from search ($\beta\lambda \int_{w'}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w'))f(w)dw$) are high.

A woman's choice of marital status then rests on the ordering of these cutoff values, restricted by the following proposition in a convenient manner.

Proposition 2 *$w_{LSt} > w_{MSt}$ if and only if $w_{MSt} > w_{LMt}$.*

The proposition allows one to rule out certain counterintuitive preferences (e.g., a woman cannot choose marriage without search for some value of w but then prefer marriage with search for a higher value of w). Proposition 2 also indicates that the only possible orderings of $\{w_{MSt}, w_{LSt}, w_{LMt}\}$ are (i) $w_{LMt} > w_{MSt} > w_{LSt}$ and (ii) $w_{LSt} > w_{MSt} > w_{LMt}$. If ordering (i) occurs, a woman will stay single if $w' < w_{LSt}$, marry but continue to search if $w_{LSt} \leq w' < w_{LMt}$, and marry and stop searching if $w' \geq w_{LMt}$. Women with ordering (i) can be called "divorce-prone," as certain values of w' will induce them to search for a new spouse while married. If ordering (ii) holds, a woman optimally stays single if $w' < w_{MSt}$ or otherwise marries and does not search. Thus, women with ordering (ii) will not divorce in steady state. Women with higher wages, lower scale economies in marriage, lower relative costs of search when single, and higher costs of search during marriage (holding kc constant) are less likely to be categorized as divorce-prone.

In a fully stationary model, a woman's reservation values would not change over time and she would either be divorce-prone or not throughout her entire life. But since this model involves a marriage market of finite length, the triplet $\{w_{MSt}, w_{LSt}, w_{LMt}\}$ varies over time and women may switch classifications. In particular,

Proposition 3 *If $w_{LMt} > w_{MSt} > w_{LSt}$, then w_{LM} decreases with age. Otherwise, w_{MS} decreases. w_{LS} is constant across all ages in both cases.*

To see the implications of this statement, first consider a woman not prone to divorce at age t. Propositions 2 and 3 then imply that she will not choose to seek divorce in any subsequent period. That is, a woman who is not divorce-prone will not become divorce-prone.

The propositions are more interesting when applied to the initially divorce-prone woman. At age t, she accepts all offers of marriage from men with wages above w_{LSt} but continues to look for a new spouse when w is relatively close to this threshold. If she is still divorce-prone at age $t + 1$, she will still accept the same set of marriage proposals but will now search over a more limited range of w. In essence, there is some group of marriages that involve search when a woman is t, but not at $t + 1$, years of age. The restriction in search to a smaller measure of values then implies lower divorce rates. Alternatively, the woman might switch her ordering of cutoff values so that she in no longer divorce-prone at age $t + 1$, also decreasing the expected probability of divorce as her age at marriage increases.

Lemma 1 *Increases in age at marriage decrease divorce rates, conditional on a wife's education and a husband's wage rate.*

To close the model, note that more women seek education when the return in either the labor market or the marriage market increases. Additionally,

Proposition 4 *Women who go to college marry at later ages (for sufficiently large λ). Women who go to college are also less likely to divorce, both overall and holding spousal earnings and age at marriage constant.*

Increases in education cause women to marry later for two reasons. First, in my model (and in most data) women complete their education before marrying. Thus, college mechanically increases age at marriage. Second, an increase in education increases a woman's wages, making her more selective about whom she marries and leading her to search longer for a suitable husband. Furthermore, higher wages will cause college women to search less within marriage (see Proposition 5 for details). Thus, women with more education divorce less often, even conditional on a husband's wage and a wife's age at marriage.

B.4 Comparative Statics

Like the results for age at marriage and education, the key comparative statics of the model rely on three components of the framework: search during marriage, nontransferable utility, and a time limit on search. These assumptions together imply that shocks to many variables can lead to both higher current rates of divorce and lower future rates of divorce. For example, a decrease in the costs of search while single due to legalized abortion will lead to higher rates of divorce among those married when the law changes. But the women who marry after the reform will have lower divorce rates because they have higher standards for a spouse, marry later, and obtain more education. Given this, shocks to reproductive rights and other variables from the 1960s through the 1990s can imply both an increase in age at first marriage and an inverted U-shaped pattern in divorce. Formally,

Proposition 5 *Consider (i) an increase in a woman's wages* (z)*, (ii) a decrease in her cost of search while single* (k)*, (iii) an increase in her return to education, or (iv) a decrease in economies of scale (increase in* ϕ*). All of these changes lead to higher contemporaneous divorce rates but lower divorce rates for future marriages (both conditional and unconditional on age at marriage and education). (i)-(iv) also lead unmarried women to obtain more education and marry later.*

To explore this result, consider an increase in women's wages (z) holding the distribution of male wages $(F(w))$ constant. As the gender gap in wages falls, the relative gains to being single increase, and a man must earn a higher wage for a woman to choose to marry him. This leads to higher contemporaneous divorce rates, as some women no longer find their husbands' wages adequate. Divorce-prone women who are not yet married will increase the minimum wage that they require from a potential mate but not the range of w over which they choose marriage without search. The probability that these women search given they marry, and thus their probability of eventual divorce, then declines. Furthermore, the change in cutoff values can lead a previously divorce-prone woman to become non-divorce-prone. This will also increase the eventual marital stability of those unmarried when z increased. Essentially, women married to the most marginal group of husbands will choose to become single after a decrease in the gender gap in wages, raising the divorce rate. But women who are single at the time of the change will never marry men from this marginal group, lowering their eventual rates of divorce.

Additionally, increases in a husband's minimum wage will lead women to search longer for a sufficiently high-earning spouse, increasing age at marriage. This increase then further decreases the likelihood that these women's eventual marriages will end in divorce. Finally, the increase in women's wages raises the absolute returns to attending college and increases enrollment. Proposition 4 then implies further increases in both age at marriage and marital stability. Therefore, as the gender gap in wages closes, some current marriages will end but the stability of new marriages will increase both conditional and unconditional on women's education and age at marriage.

Figure 1 shows a graphical representation of the effect of the increase in z (given $F(w)$) on divorce-prone women who remain divorce-prone after the change. Before the gender gap narrowed, married, divorce-prone women (whose choice sets are depicted in Panel A) could be married to any man with wages greater than w_{LS}. When these women's wages increase, w_{LS} increases to w'_{LS}. The women married to men with wages between w_{LS} and w'_{LS} were previously content to stay married, albeit while continuing to search for a better spouse. But after the shock to z, these women no longer find their husbands adequate and leave their marriages. Thus, a decrease in the gender gap in wages will increase divorce rates.

The changes in the reservation values associated with an increase in z are the same for single and married women; however, their interpretation is different. Before the shock, if a single, divorce-prone woman (whose choice sets are depicted in Figure 1B) met a man with wages between w_{LS} and w'_{LS}, she would have married him. Such marriages would have been likely to end in divorce, as women married to these men continue searching for new mates. After the change in the gender gap in wages, these unions never form. As the change in z does not influence the relative value of marriage with and without search (w_{LM} does not change), search decreases within these women's eventual marriages. Moreover, as the group of men a woman is willing to marry shrinks, it takes her longer to find a suitable mate, increasing her age at marriage. Thus, the divorce rate will decrease for these women both directly because of the narrowing of the gender gap and because the change in wages leads these women to marry later, which in turn strengthens their eventual marriages.

Though my empirical work focuses on the importance of this latter, indirect effect, the model allows either effect to be the dominant force behind the decline in divorce. Altogether, the model demonstrates that decreases in the gains to marriage will temporarily push the divorce rate up. Women who are single at the time of a shock will then marry later and become less likely to search during marriage, eventually bringing the divorce rate back down.

Many of the variables related to the gains to marriage (and listed in Proposition 5) changed in the 1970s and 1980s. For example, female real earning power (z) grew rapidly. Expanding access to birth control and abortion likely decreased the relative costs of marital search while single. Increases in female labor force participation and decreases in household specialization could have reduced household economies of scale (increased ϕ). Moreover, a woman's increasing role in the market implies greater returns to her education. Within the model, changes in all of these factors would imply higher rates of divorce for couples married before a change and lower rates of divorce for couples marrying afterward. Thus, one can easily reconcile monotone increases in age at marriage from 1970 to 2004 with both the rise in divorce in the 1950s, 1960s, and 1970s and the fall in divorce thereafter.

B.5 Proofs

Proof. (Proposition 1) Taking the derivative of the definitions in (B.1)-(B.3) with respect to w' leads to the conclusion that

$$\frac{\partial V_{Mt}}{\partial w'} > \frac{\partial V_{Lt}}{\partial w'} > \frac{\partial V_{St}}{\partial w'}.$$

Increasing w' then increases the value of marriage faster than the value of marriage and search, which in turn increases faster than the value of being single. Thus, if marriage without search (marriage with search) is weakly preferred to either option (singlehood) at w', it will continue to be preferred for $w > w'$. Conversely, if singlehood (marriage with search) is preferred to either option (marriage without search) at w', it will continue to be preferred for $w < w'$. ■

Proof. (Proposition 2) Suppose $w_{LSt} > w_{MSt}$ and $w_{MSt} < w_{LMt}$. Then by the definitions of the cutoff points $V_{St}(w_{MSt}) > V_{Lt}(w_{MSt})$ from the first statement and $V_{Lt}(w_{MSt}) > V_{Mt}(w_{MSt})$ from the second, implying $V_{St}(w_{MSt}) > V_{Mt}(w_{MSt})$, a contradiction of (B.5). Therefore $w_{LSt} > w_{MSt}$ implies $w_{MSt} > w_{LMt}$. Likewise, suppose that $w_{MSt} > w_{LMt}$ and $w_{MSt} > w_{LSt}$. Then $V_{Lt}(w_{MSt}) > V_{St}(w_{MSt}) > V_{St}(w_{MSt})$ which also contradicts (B.5). Therefore, $w_{LSt} > w_{MSt}$ if and only if $w_{MSt} > w_{LMt}$. ■

Proof. (Proposition 3)

Part 1: If $w_{LMt} > w_{MSt} > w_{LSt}$, then w_{LM} decreases over time.

Suppose $w_{LMt} > w_{LMt-1}$. Then if a woman met a man with wage w_{LMt} at $t-1$, she would strictly prefer to marry him and stop searching. Eq. (B.6) then implies

$$\beta\lambda \int_{w_{LMt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{LMt}))f(w)dw > \beta\lambda \int_{w_{LMt}}^{\infty} (\psi_t(w) - \psi_t(w_{LMt}))f(w)dw.$$

Using $\psi_t(w) = V_{Mt}(w)$ for $w \geq w_{LMt}$ and rearranging the above then yields

$$\int_{w_{LMt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{LMt}))f(w)dw > \frac{1}{1-\beta} \int_{w_{LMt}}^{\infty} \frac{w - w_{LMt}}{2^{\phi}} f(w)dw.$$

This can only hold if $T \to \infty$. Thus, in a model with a finite time horizon, $w_{LMt-1} > w_{LMt}$.

Part 2: Otherwise, w_{MS} decreases over time.

Similarly, suppose $w_{MSt} > w_{MSt-1}$. Then if a woman met a man with wage w_{MSt} at $t-1$, she would strictly prefer to marry him and stop searching. Eq. (B.5) then implies

$$\beta\lambda \int_{w_{MSt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{MSt}))f(w)dw > \beta\lambda \int_{w_{MSt}}^{\infty} (\psi_t(w) - \psi_t(w_{MSt}))f(w)dw.$$

Using $\psi_t(w) = V_{Mt}(w)$ for $w \geq w_{MSt}$ and rearranging the above then yields

$$\int_{w_{MSt}}^{\infty} (\psi_{t+1}(w) - \psi_{t+1}(w_{MSt}))f(w)dw > \frac{1}{1-\beta} \int_{w_{MSt}}^{\infty} \frac{w - w_{MSt}}{2^{\phi}} f(w)dw.$$

As before, this can only hold if $T \to \infty$. Thus, in a model with a finite time horizon, $w_{MSt-1} > w_{MSt}$.

Part 3: w_{LSt} does not change over time.

This follows directly from inspection of eq. (B.4). ■

Proof. (Lemma 1) Proposition 3 shows that over time women are less likely to search for a new mate while married. Thus, older women will be less likely to get divorced, regardless of their current marital status and conditional on both education and (future) spouse's wage. ■

Proof. (Proposition 4) To show that age at marriage increases with education, one must consider those who would marry after high school, those who would marry after college, and those who do neither. First take those who would marry their high school sweetheart. Going to college necessarily delays marriage and thus can only increase age at marriage. Additionally, those that marry neither their college nor their high school sweethearts marry later when they go to college. To see this, one can differentiate the value functions after education to find that

$$\frac{\partial V_{St}}{\partial z} \geq \frac{\partial V_{Lt}}{\partial z} = \frac{\partial V_{Mt}}{\partial z} > 0$$

implying that an increase in z (which occurs in college) increases w_{LSt} and w_{MSt}, leaving w_{LMt}

unchanged. Therefore, the effect of college on earnings implies later marriage. Further, entering the marriage market later will mechanically lead to later marriage.

Finally, suppose that if a woman goes to college she will marry directly afterwards but she would not marry directly after high school. One can show that if the probability a woman will meet a suitable spouse between high school and college is greater than one half, these women will marry later if they go to college than if they do not. So long as the arrival rate is substantially large, this condition will hold.

One can finally see that marital stability increases with education by differentiating a woman's value functions with respect to z, as above, and noting the relative changes in cutoff values. ■

Proof. (Proposition 5)

Part 1: One can differentiate the various value functions to find that

$$\frac{\partial V_{St}}{\partial z} \geq \frac{\partial V_{Lt}}{\partial z} = \frac{\partial V_{Mt}}{\partial z} > 0$$

implying that an increase in z increases w_{LSt} and w_{MSt}, leaving w_{LMt} unchanged. All women thus have higher marriage standards and it takes them longer to marry if currently single. This also causes some already married women to choose to become single. The increase in w_{MSt} over w_{LMt} further leads some previously divorce-prone women to no longer be divorce-prone; however, the previously married women who make this change will either divorce in favor of singlehood or were not previously looking for a spouse (increasing divorce rates for the set of switchers who were married before the change). To see this last conclusion, denote the cutoff values after an increase in z with a $''$ symbol. Then, initially $w_{LM} > w_{MS} > w_{LS}$. If this change occurs $w''_{LS} > w''_{MS} > w''_{LM} = w_{LM}$. If those who switch orderings previously looked for a new partner, they will divorce as $w''_{LS} > w_{LM} > w$.

Finally, to see that education increases, note that the increase in z leads to an increase in the absolute return to education. Thus, holding search behavior constant, women will seek more education. Moreover, an increase in z leads women to be single for a longer period, further increasing the returns to education and supporting the result which holds search constant. Therefore, education must increase in response to an increase in z.

Parts 2 and 3: One can again differentiate to find that

$$
\begin{aligned}
0 &= \frac{\partial V_{Lt}}{\partial k} = \frac{\partial V_{Mt}}{\partial k} > \frac{\partial V_{St}}{\partial k}. \\
0 &> \frac{\partial V_{St}}{\partial \phi} > \frac{\partial V_{Lt}}{\partial \phi} \\
0 &> \frac{\partial V_{St}}{\partial \phi} > \frac{\partial V_{Mt}}{\partial \phi}
\end{aligned}
$$

Steps similar to those above then give the conclusions for divorce and age at marriage.

For education, slightly different logic is required. In these cases, the relative value of being married decreases compared to that for being single. But as my model restricts marriage to those finished with their education, this will lead to an increase in the value of schooling versus search in the marriage market, thus increasing female college attendance.

Part 4: With a higher return to education, single women will obtain more schooling (increasing age at marriage and the eventual stability of marriage, see Proposition 4) and the wage a woman can earn will increase. Part 1 then implies that an increase in women's returns to education increases age at marriage, educational attainment, and marital stability for singles and increases divorce for married women. ■

Analysis of additional comparative statics for the model (with respect to λ and c) available upon request.

References

Becker, Gary S. 1973. "A Theory of Marriage: Part I." *Journal of Political Economy*, 81(4), pp. 813-46.

____. 1974. "A Theory of Marriage: Part II." *Journal of Political Economy,* 82(2), pp.

S11-S26.

____. 1991. *A Treatise on the Family: Expanded Edition.* Cambridge, MA: Harvard University Press.

Bergstrom, Theodore C. and Mark Bagnoli. 1993. "Courtship as a Waiting Game." *Journal of Political Economy*, 101(1), pp. 185-202.

Burdett, Kenneth. 1978. "A Theory of Employee Job Search and Quit Rates." *American Economic Review*, 68(1), pp. 212-20.

Goldin, Claudia and Lawrence Katz. 2002. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *Journal of Political Economy*, 110(4), pp. 730-70.

Jovanovic, Boyan. 1979. "Job Matching and the Theory of Turnover." *Journal of Political Economy*, 87 (5), pp. 972-90.

Legros, Patrick and Andrew F. Newman. "Beauty is a Beast, Frog is a Prince: Assortative Matching with Nontransferabilities." *Econometrica,* 75(4), pp. 1073-1102.

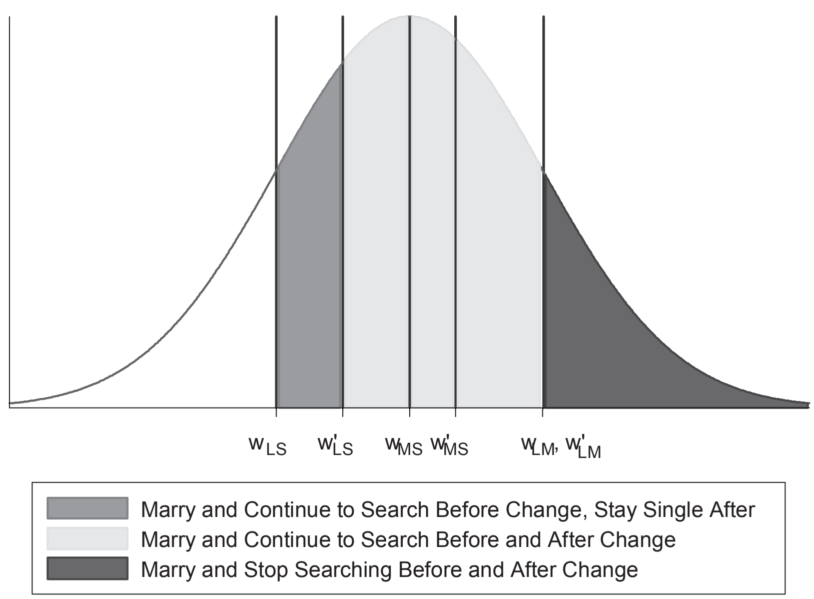
Mortensen, Dale T. and Christopher A. Pissarides, 1999. "New Developments in Models of Search in the Labor Market." In *Handbook of Labor Economics Vol. 3B*, eds. O. Ashenfelter and D. Card. Amsterdam, North-Holland: Elsevier.

Neeman, Zvika, Andrew F. Newman and Claudia Olivetti. 2008. "Are Career Women Good for Marriage?" Boston University, *Institute for Economic Development Working Paper Series DP-167.*

Rotz, Dana. 2014. "Why Have Divorce Rates Fallen? The Role of Women's Age at Marriage." Unpublished manuscript.

Figure 1: Change in Divorce and Search Following an Increase in Female Wages
Holding the Distribution of Male Wages Constant
Panel A: Married, Divorce-Prone Woman

Panel B: Single, Divorce-Prone Woman



Notes: Case where divorce-prone woman does not become non-divorce-prone. Change in female wages (z) holding distribution of male wages $(F(w))$ constant.