Female labor supply and marital instability

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> "A divorcée is a woman who got married so she didn't have to work,
> but now works so she doesn't have to get married."
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A simple model of labor supply among married women in the face of marital instability is presented. This predicts that a woman's labor supply response to a given change in the probability of divorce is determined by her discount factor and the degree to which her wage is affected by past hours of work. Data from the National Longitudinal Survey of Youth 1979 are then used to test these predictions. Married women are found to work longer hours when they face a high probability of divorce in the following year. Consistent with theory, this magnitude of this response is found to be biggest among women with high returns to work hours. However, a woman's discount factor is not found to have a significant effect on her labor supply responsiveness in most specifications. Similar relationships are found when a woman's happiness with her marriage is used as a proxy for divorce risk.

1. Introduction

Previous research has largely attributed the post-war increase in female participation in the United States labor market to growth in the real wage offered to women. However, empirical studies suggest that wage growth can only explain around half of the total increase in female participation rates. Furthermore, trends in labor supply and wages have frequently diverged, as seen in Figure 1. Shapiro and Shaw (1983) noted that during the 1970s, labor force participation by married women continued to grow, despite a stagnant real wage. More recently, Blau and Kahn (2007) presented evidence that married women's labor supply function shifted significantly to the right in the 1980s, with little movement in the 1990s, and that the difference in this shift accounted for the dramatic growth in female labor supply during the former decade.

Given that divorce rates were increasing prior to the 1980s and fell leading into the 1990s, it is possible that these puzzles may at least in part be explained by a reaction of women to changes in marital instability. Empirical research suggests that married men earn more than unmarried men because they are able to specialize in labor market work and, hence, acquire more human capital, while their wives perform the bulk of unpaid tasks within the household. In this case, divorce should have major economic consequences for both husband and wife. Divorced men are likely to experience declining wages relative to men who remain married, as their accumulated

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human capital gradually depreciates. Women are likely to be forced to enter the labor market or increase their hours of work after divorce and be paid less than single women, who have more human capital. However, if women make labor supply decisions optimally, taking into account the probability of their marriage dissolving, then they may choose to devote more time to market work while still married, in order to boost their future earnings capacity in the event of divorce. Presumably, the higher the probability of divorce is, the more hours a married woman will want to work. This phenomenon should be observed both across groups with different divorce rates and over time, as couples assess the quality of their match and decide whether to continue their marriage.

Apart from a strand of literature investigating the effect of divorce law reform, few previous studies have examined the effect that the threat of divorce has on the labor supply decisions of married couples and none has presented any theory to explain this behavior or examined the degree to which the relationship varies across women. As Lundberg and Pollak (1996) noted, if "the analysis of marriage and divorce is awkward, the analysis of marital decisions in the shadow of divorce is even more so" (p. 143).

To explore the labor market effects of marital instability, this paper presents a model of labor supply by married women in the face of divorce. This allows for the possibility that women can raise their future wages by working more in the current period. The model indicates that the probability of divorce should be positively related to labor supply, but that the magnitude of the effect should vary according to both a woman's discount rate and how much she stands to gain from working while still married. Using data from the National Longitudinal Survey of Youth (NLSY) 1979 for 1979-2004, these predictions are then tested.

2. Background

Numerous previous studies have established that married men have higher earnings than never-married men. Although it continues to be the subject of debate, one persuasive explanation for this is that married men are more productive because they are able to devote more time to labor market activities and, hence, accumulate more human capital, while their wives specialize in household production.[1] If intra-marriage specialization is important, one should also expect

[1] Korenman and Neumark (1991), Daniel (1992), Blackburn and Korenman (1994), Gray (1997), Chun and Lee (2001) and Cohen (2002) all found support for the so-called "productivity hypothesis", whereas Jacobsen and

adjustments to wages and labor supply for both men and women after marriages dissolve. In general, studies indicate that divorce tends to result in higher labor force participation rates and work hours for women (Johnson and Skinner 1988; Bedard and Deschênes 2005) and lower wages for men (Gray 1997; Ahituv and Lerman 2007).

If women are able to anticipate divorce, it is possible that they may wish to at least partly adjust their labor supply *before* divorce actually occurs. One reason for this might be to establish new social networks and to spend more time away from their husbands. Alternatively, women might wish to gain (or regain) labor market experience in order to raise their post-divorce wage offers. However, while the social explanation is likely to apply to all women, the economic explanation should apply only to those women who stand to gain large wage increases from labor market experience.

Relatively few authors have explicitly examined the effect anticipated risk of divorce has on labor supply among married women. Greene and Quester (1982) used United States Census Bureau data to create predicted divorce probabilities for women based on their demographic characteristics, using a model of marital dissolution developed earlier by Orcutt *et al*. (1976). They found that among married women, labor supply increases with divorce risk. Johnson and Skinner (1986) estimated a two-stage model of future divorce probability and labor force participation among married woman using PSID data for 1972. They reported that women increase their labor force participation in the three years prior to separation, noting that the increases in the divorce rate may explain one-third of the increase in female labor supply over the past half-century. Subsequent studies have reported similar findings (Gray 1995; Montalto and Gerner 1998; Sen 2000; Austen 2004; Bremmer and Kesselring 2004).

In addition to these studies, a strand of literature has exploited exogenous changes in divorce laws to examine the effect the costs associated with divorce have on the labor supply decisions of married women, circumventing the usual problems associated with the endogeneity of these variables. These papers rely on a natural experiment, whereby states implemented "no-fault" divorce legislation at different times. No-fault laws are assumed to reduce the costs associated with divorce and their introduction has been found to lead to significant increases in labor force

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Rayack (1996), Loh (1996) and Hersch and Stratton (2000) concluded that productivity differences cannot explain the marriage premium. In addition, Nakosteen and Zimmer (1987), Cornwell and Rupert (1997) and Millimet *et al*. (2004) reported evidence in favor of the rival "selection hypothesis", whereby men who are more productive in the labor market also tend to be more likely to marry.

participation rates among married women (Peters 1986; Parkman 1992; Gray 1998; Chiappori *et al*. 2002). Their effect on the incidence of divorce is less clear-cut, although there may be at least a short-run positive relationship (Allen 1992; Friedberg 1998; Wolfers 2006).

3. A simple model of labor supply and marital instability

Consider a model consisting of women who live for two periods and are initially all married. In each period, a woman's utility is strictly concave in consumption, *C*, and weakly concave in home production, *H*:

$$u(C,H) = \ln C + \delta H \; , \; \delta > 1 . \tag{1}$$

Utility is assumed to be time separable and individuals are assumed to have the same discount factor, *β*, so that lifetime expected utility is given by:

$$U(C_1, C_2, H_1, H_2) = u(C_1, H_1) + \beta E(u(C_2, H_2)) . \tag{2}$$

Consumption is derived from one's own earnings, which are the product of wages, *w*, and hours of work, *n*, and the earnings of one's husband, $\tilde{w}\tilde{n}$. Earnings are divided evenly between spouses. Home production is equal to the total hours spent at home by the married couple. Following previous authors, it is assumed to be a public good (Browning *et al*. 2014). Leisure is not modeled and the total hours to be devoted by each person to work and home production is normalized to be 1.

A married woman's indirect utility in each period, *t*, is then given by:

$$u^M(w_t, \tilde{w}_t, n_t, \tilde{n}_t) = \ln\left(\frac{w_t n_t + \tilde{w}_t \tilde{n}_t}{2}\right) + \delta(2 - n_t - \tilde{n}_t) \; , \tag{3}$$

and an unmarried woman's single-period utility is:

$$u^U(w_t, n_t) = \ln(w_t n_t) + \delta(1 - n_t) . \tag{4}$$

It is assumed that men always earn more than their wives. Given the choice of utility function, this ensures that married men spend all their time at work, regardless of their wives' labor supply decisions.[2] A woman's log wages are assumed to be equal to her accumulated stock of human capital. Between periods, this depreciates at rate *ρ* but is augmented by the amount θn_1 , where $0 < \theta < 1$, so that:

[2] A more complete model would consider how spouses make their work decisions jointly. Nonetheless, the assumption that men are irresponsive to the work decisions of their wives is consistent with previous empirical research (Devereux 2004).

$$\ln w_2 = (1-\rho)\ln w_1 + \theta n_1 . \tag{5}$$

Moreover, between periods 1 and 2 there is a possibility that the pair will separate. This happens with fixed probability γ.

In each period, a woman chooses her work hours in order to maximize lifetime utility, taking all other variables as given. The choice of hours in the first period determines the second period's wage. In other words, n is the control variable and w is a state variable.

In the second period, all unmarried women will choose to supply $\frac{1}{\delta}$ hours of labor and all married women will choose to not to work, since there is no future period in which divorce can occur. Hence, the Pareto optimal allocation of labor will be achieved within each household. In the first period, married women must consider the effects of their work decisions on their future utility. The lifetime utility of a married woman in the first period is given by:

$$U^M(w_1,\tilde{w}_1,n_1,w_2,\tilde{w}_2) = \ln(\frac{w_1 n_1 + \tilde{w}_1}{2}) + \delta(1-n_1)$$
$$+ \beta((1-\gamma)(\ln(\frac{\tilde{w}_2}{2}) + \delta) + \gamma(\ln(\frac{w_2}{\delta}) + \delta(1-\frac{1}{\delta}))) . \tag{6}$$

The labor supply function in period 1 is then equal to:

$$n_1^M = \max\{\frac{1}{\delta - \beta\theta\gamma} - \frac{\tilde{w}_1}{w_1}, 0\} . \tag{7}$$

Equation 7 states that work hours are positively related to the probability of divorce before the next period and to own wages but negatively related to husband's wages. In order to generalize this equation to the case where women (indexed by i) must decide their work hours in multiple periods (indexed by t), conditional on their contemporaneous perceived probability of separating before the next period, the first argument can be linearized around the means of γ, w and $\tilde{w}$ (denoted $\bar{\gamma}$, $\bar{w}$ and $\bar{\tilde{w}}$, respectively), as follows:[3]

$$n_{it}^M = \frac{1}{\delta - \beta\theta\bar{\gamma}} - \frac{\beta\theta\bar{\gamma}}{(\delta - \beta\theta\bar{\gamma})^2} - \frac{\bar{\tilde{w}}\ln\bar{w}}{\bar{w}} + \frac{\beta\theta}{\delta - \beta\theta\bar{\gamma}}\gamma_{it} + \frac{\bar{\tilde{w}}}{\bar{w}}\ln w_{it} - \frac{1}{\bar{w}}\tilde{w}_{it} . \tag{8}$$

The strength of the relationship between work hours and divorce probability in equation 8 is determined by the discount factor and the intertemporal returns to work hours. These factors are

[3] This is equivalent to assuming that people always consider only the current period and the following period. Husband's wages are not logged in equation 8, as this will be interpreted as husband's total earnings (which may be zero) in the regression analysis.

likely to vary across individuals. To allow for heterogeneity in the effects of divorce probability, equation 8 is further linearized around the means of β and θ (denoted $\bar{\beta}$ and $\bar{\theta}$, respectively), as follows:

$$n_{it}^{M} = \frac{1}{\delta - \bar{\beta}\bar{\theta}\bar{\gamma}} - \frac{\bar{\beta}\bar{\theta}\bar{\gamma}}{(\delta - \bar{\beta}\bar{\theta}\bar{\gamma})^{2}} - 4(\bar{\beta}\bar{\theta}\bar{\gamma})^{2} - \frac{\bar{\tilde{w}}\ln\bar{w}}{\bar{w}} - 2\bar{\beta}\bar{\theta}^{2}\bar{\gamma}^{2}\beta_{i} - 2\bar{\beta}^{2}\bar{\theta}\bar{\gamma}^{2}\theta_{i} -$$

$$\left(\frac{-2\bar{\beta}\bar{\theta}(\delta + \bar{\beta}\bar{\theta}\bar{\gamma})}{(\delta - \bar{\beta}\bar{\theta}\bar{\gamma})^{3}} + \frac{\bar{\theta}(\delta + \bar{\beta}\bar{\theta}\bar{\gamma})}{(\delta - \bar{\beta}\bar{\theta}\bar{\gamma})^{3}}\beta_{i} + \frac{\bar{\beta}(\delta + \bar{\beta}\bar{\theta}\bar{\gamma})}{(\delta - \beta\theta\bar{\gamma})^{3}}\theta_{i}\right)\gamma_{it} + \frac{\bar{\tilde{w}}}{\bar{w}}\ln w_{it} - \frac{1}{\bar{w}}\tilde{w}_{it} . \quad (9)$$

Equation 9 implies that the labor supply effect of a given change in divorce probability will vary according to a person's discount factor or returns to hours. The parameters on both $\beta\gamma$ and $\theta\gamma$ are positive, implying that women are most responsive to the risk of divorce if they are relatively future-oriented and stand to benefit from large future wage increases if they work longer hours. The regression analysis will focus on equations 8 and 9.

A similar relationship is found if a woman's decision to work is considered rather than her work hours. For example, suppose, conditional on their wives' wages, husbands' log wages are uniformly distributed on the interval $[\ln w_1, \ln w_1 + \omega]$, where $\omega > 0$. Then, the probability of a woman working according to equation 7 is:

$$\frac{\partial P(n_1^{M} > 0)}{\partial \gamma} = \frac{\beta\theta}{\omega(\delta - \beta\theta\gamma)} > 0 . \quad (10)$$

4. Data

The empirical analysis uses data for 1979-2004 from the NLSY 1979, which is a nationally representative sample of men and women who were 14-22 years old when first surveyed in 1979. These individuals were interviewed annually until 1994 and subsequently on a biennial basis. The regression sample includes observations on women aged 18 and over who are married and not currently separated and excludes the military over-sample and the low-income white over-sample, which were discontinued in 1986 and 1991, respectively. This leaves a sample of 2,748 women, containing 23,605 annual observations.

The NLSY questionnaire contains detailed information on the timing of past changes in marital status, allowing the creation of a complete marital history for each person. Full details of the construction of all variables are given in the appendix. The annual earnings and hours worked by a survey respondent and her husband during the year prior to each interview are available and a wage variable was constructed from these. For those who did not work in a given year or who had missing or invalid data, an imputed wage rate is used. All monetary values are expressed in 2000 dollars, using the National Income and Product Account price index for personal consumption expenditures.

The measure of discount factor that is used is based on a question included in the NLSY in 2006. Women's intertemporal returns to work hours are likely to vary principally according to their occupation. To obtain an estimate of this, equation 5 is estimated separately for 32 occupational groups using longitudinally-matched CPS data on married women from the March supplements of 1978-1981. Since women are likely to make occupational choices conditional on the current state of their marriage, women in the NLSY sample are assigned the coefficient on work hours corresponding to their last reported occupation *before* marriage.

Table 1 reports average hours for a sample of divorcées at different times before and after divorce. Among women who divorce, annual hours are seen to increase sharply, from 1,569 three years before the separation to 1,797 two years after it. Almost half of this adjustment occurs before divorce. There appears to be wide variation in behavior between women, however, and this appears to follow the predictions of the model presented earlier. Among women whose discount factor is in the lowest quartile, much less labor supply adjustment occurs over the five-year period spanning divorce than among those women with discount factors in the highest quartile. However, among the former group the majority of the adjustment takes place after divorce, whereas among the latter group the adjustment takes place entirely before divorce. Similarly, among those women with the lowest work hours coefficients, most labor supply adjustment takes place after divorce, whereas among those with the highest coefficients, over half takes place before divorce. The next section will assess whether these results remain after controlling for other factors that influence work hours and also controlling for the possibility that divorce may be endogenous to the labor supply decision.

5. Results

a. Analysis using predicted divorce probability

To begin, a two-stage approach is taken to estimating equation 8. In the first stage, a dummy variable for whether a woman divorced in the following year is regressed on a set of economic and demographic controls and other determinants of divorce.[4] The predicted divorce probability from this is then calculated and included in a work hours regression, alongside the economic and demographic variables. To reflect the fact that the divorce probability is an estimated variable, bootstrapped standard errors are calculated for this equation.[5]

Both equations include controls for own log wage, husband's annual income, family non-wage income, age, education, race/ethnicity, husband's age, husband's highest grade completed, region, urban status and year. In addition, following Johnson and Skinner (1986), a woman's work hours in the year before she married are included, to control for differences in inherent preferences for work.[6] The local unemployment rate is included in the work hours equation only. Dummies for years of marriage, whether a woman is remarried and whether a woman's parents separated before she turned 18, Rotter's Internal-External Locus of Control Scale and Rosenberg's Self-Esteem Scale are included in the divorce equation only. These variables capture factors that are expected to influence a woman's likelihood of divorce, but not her labor supply decision. The years of marriage dummies are included since the likelihood of divorce is known to be highly dependent on the length of marriage. The remarriage and parental divorce dummies capture the fact that women with a personal or family history of divorce are more likely to divorce in the future. The Rotter and Rosenberg scales capture psychological aspects of a woman's personality that might affect her tendency to divorce. These variables are found to be highly jointly significant in the divorce equation.

The results of the work hours regression are reported in the first column of Table 2. As expected, a woman's log wages have a positive effect on her work hours and her husband's income has a negative effect. The divorce probability is found to have a significant positive effect on hours, consistent with theory. A 10 percentage point increase in the probability of divorce raises annual work hours by 362. At the mean, this implies an elasticity of 0.08. The effect of predicted divorce is considerably larger than that found by Johnson and Skinner (1986),

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[4] A linear probability model is used, rather than probit, to ensure consistent estimates of the second-stage regression (Angrist and Pischke 2008).

[5] Johnson and Skinner (1986) noted that since women do not know with certainty whether they will become divorced in the following year at the time they make their labor supply decisions, the regular standard errors are only biased to the extent that the person's subjective probability explains more than the predicted divorce probability. The regular standard errors would be correct if the individual had no more knowledge than the econometrician.

[6] Although the NLSY is a panel, it is not possible to control for individual fixed effects because there are no plausible time-varying exogenous determinants of divorce.

who used data from 1972 and found that a 10 percentage point increase in divorce probability yields a 58 hour increase in labor supply.

To examine the exogeneity of divorce risk, a dummy for actual divorce within one year was added to the regression, alongside predicted divorce. The predicted divorce variable was significant at the 1% level, indicating that the probability of divorce is indeed endogenous. Nevertheless, as in Johnson and Skinner, there is little evidence that labor supply affects divorce: when hours of work was added to the first-stage divorce equation it had an insignificant coefficient.

In the second column of Table 2, equation 9 is estimated, whereby the estimated divorce probability is interacted with a person's discount factor and work hours coefficient. Consistent with theory, both interaction terms are found to be positively related to work hours, although only the divorce probability-hours coefficient term has a significant effect. Holding the work hours coefficient equal to its mean, the estimated coefficient on divorce probability varies between 2,544 (when the discount factor is 0.000999) and 4,048 (when the discount factor is 1). Holding the discount factor equal to its mean, the estimated coefficient on divorce probability varies between –5,262 (when the work hours coefficient is –0.0005791) and 6,462 (when the work hours coefficient is 0.0003214).

If most labor supply adjustment among married women takes the form of entry to and exit from the labor market, the work hours regressions will be inappropriate. Therefore, the two specifications are repeated using a dummy for whether a woman worked at least one hour during a year as the measure of labor supply. The results from these are presented in the final two columns of Table 2. The same relationship between labor supply and divorce risk is found in both cases.

b. Robustness checks

Controls for children are not included in Table 2 because it is likely that the decision to have children will be made endogenously with the decision of how much to work. However, as a robustness check, the number of children in the household and a dummy variable for the presence of a child aged under 6 are added to both the first-stage divorce equation and the work hours equation. As reported in the first column of Table 3, this reduces the coefficient on the divorce probability-hours coefficient interaction term, but it remains positive and significant.

An additional concern is that some young women may take into account the hours they expect to work once they are married when choosing their occupation *prior* to marriage. In this case, the work hours coefficient used in Table 2, despite being predetermined, may nonetheless be endogenous. To examine the robustness of the results to this potential problem, the sample is restricted to those women who are most likely to have established a career prior to marriage, independent of any marital expectations. In the second column of Table 3, equation 8 is estimated among only those women who were 22 or older when they married. The interaction of divorce probability and returns to work hours remains significant and similar, albeit slightly smaller in magnitude than in Table 2. Since women do not know their future marital state for certainty when making career decisions, in the third column, the sample is restricted to those women who said they expected to marry after age 20 (or not to marry at all) when asked in 1979. In addition, in the final column, the sample is restricted to women who tended to espouse non-traditional views of gender roles when asked in 1982 (specifically, they had a value of 0.5 or less for an aggregate gender roles index, as detailed in the appendix). Again, in both cases, the effect of divorce probability interacted with returns to hours is significant.

c. Variation by length of marriage

The model in Section 3 assumes that people are only married for a maximum of two periods. In practice, labor supply responses to divorce risk are likely to change over the course of a marriage. To examine this, the work hours regressions were estimated separately for women who have been married less than 5 years and women who have been married 5 or more years. The results (reported in Table 4) indicate that the discount probability-work hours coefficient is larger for those who have been married more than 5 years, although it is significant in both groups. Conversely, the discount probability-discount factor interaction term is only significant among those who have been married less than 5 years. Hence, early in a marriage, women who are particularly future oriented are likely to respond to changes in the probability of divorce, whereas later on (when women are likely to have more warning of imminent divorce) the only important factor is a woman’s occupation.

d. Analysis using self-reported marital happiness

The identification of the coefficient on the probability of divorce in the previous tables depends crucially on the exclusion of variables from the labor supply equation that are relevant to the likelihood of divorce occurring. Given the absence of any clearly exogenous shocks to divorce probability, there is a risk that some of these variables have an independent effect on labor supply. An alternative approach is to rely on a respondent's own evaluation of the state of his/her marriage. This has three advantages over the use of predicted divorce. Firstly, it allows the identification of individuals who anticipate divorces that never transpire and *vice versa*. Secondly, if satisfaction with marriage is evaluated in the same period as hours, it circumvents the problem of reverse causality encountered when using divorce in the future as a measure of divorce risk (although estimates may still be susceptible to endogeneity bias if marital satisfaction and work hours are jointly determined by unobserved variables). Finally, by using fixed effects estimation to compare happiness in multiple years, it is possible to control for differences in inherent likelihood of divorce.

The NLSY includes questions on whether respondents were "very happy", "fairly happy" or "not too happy" with their current marriage. Unfortunately, these were only asked of women every two years from 1988 onwards, except 1992. Marital satisfaction appears to predict divorce strongly: 4.1% of women who were not too happy with their marriage divorced within a year, while 1.2% of women who were fairly happy and only 0.5% of women who were very happy divorced within that time. Since marital satisfaction is measured as of the interview date, whereas hours of work pertain to the previous calendar year, the level of marital satisfaction from two years prior to a given interview is used, as this should be exogenous to the current labor supply decision.

Table 5 presents the results of estimating the labor supply equation using the 8 years of data the happiness variable was available for. The measures of divorce risk are a dummy for those who responded that they were very happy with their marriage and those who responded that they were not happy (meaning that fairly happy is the omitted category). The first column of the table reveals that those who are not happy with their marriages work 136 hours more than the baseline group, a difference that is significant. When the interacted specification is estimated in the second column, it is uncovered that the only people who adjust their work hours when unhappy with their marriage are those with large work hours coefficients, consistent with the findings of the two-stage approach. Adding controls for the number and age of children makes little difference to the results (as seen in the third column). Restricting the sample to those who were

22 or older when they married increases the coefficient on the not happy dummy-hours coefficient interaction term.

6. Conclusion

This paper has examined whether labor supply among married women is affected by their level of marital instability and to what extent this relationship varies across different groups of women. A simple model of work hours in the face of uncertainty about future marital state is presented. This predicts that a given probability of divorce should have a larger effect on a woman's hours if she has a high discount factor and if her work hours are likely to raise future wages substantially. These predictions are then tested with data from the National Longitudinal Study of Youth 1979. Overall, a significant positive relationship is found between a woman's predicted probability of divorce within a year and her current work hours. However, this relationship is most pronounced among those women who work in occupations with the strongest link between wages and past work hours. A woman's discount factor is not found to affect her labor supply response to the risk of divorce in most cases. Similar results are found when self-reported marital happiness is used as the measure of divorce probability.

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Appendix: Details of variables constructed

For those who did not work in a given year, had missing income or work hours data, received self-employment income or had a wage less than $2 or greater than $200, an imputed log wage is used, calculated as follows. For women who have a valid wage in some years, the log wage is either interpolated using information on the person's wage rate in previous and future periods or the nearest valid observation is used. For women who never have a valid wage, the prediction from a regression of log wage on age, age squared, highest grade completed, race/ethnicity dummies (3 categories), region dummies (4 categories), a metropolitan area dummy and year dummies (20 categories) is used. Along the lines of Blau and Kahn (2007), separate regressions are performed for women who worked less than 20 weeks (including zero weeks) or 20 or more weeks.

Other control variables that are used include race/ethnicity (white non-Hispanic, black non-Hispanic and Hispanic); age; highest schooling grade completed; family rent, dividend and interest income; region of residence (north-east, north central, south, west); urban status; local unemployment rate; number of children in the household; whether a child aged under 6 was present in the household; length of marriage (each year up to 14 years plus 15 or more years); whether a woman was married previously; whether a woman's parents separated before she turned 18; Rotter's Internal-External Locus of Control Scale (which is constructed from 8 individual questions); and Rosenberg's Self-Esteem Scale (which is constructed from 10 individual questions).

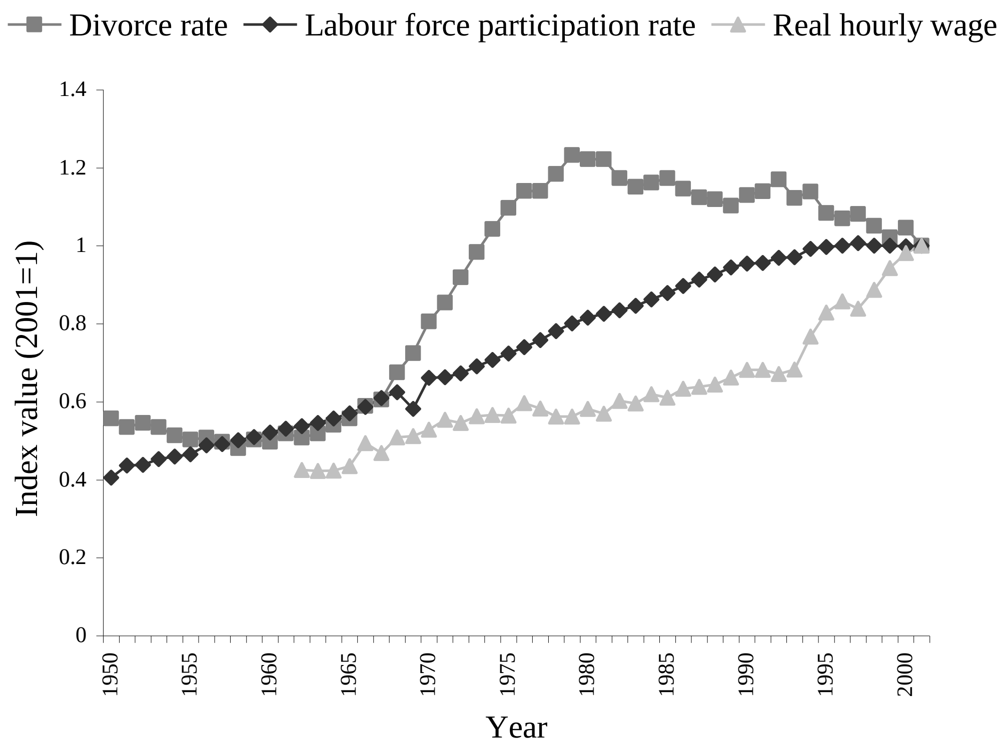
An index measuring attitudes towards the roles of men and women was constructed from eight questions asked of the respondent during the 1982 interview. The statements the respondents were asked to evaluate on a four-point scale were: (1) "a woman's place is in the home, not in the office or shop", (2) "a wife who carries out her full family responsibilities doesn't have time for outside employment", (3) "a working wife feels more useful than one who doesn't hold a job", (4) "employment of wives leads to more juvenile delinquency", (5) "employment of both parents is necessary to keep up with the high cost of living", (6) "it is much better for everyone concerned if the man is the achiever outside the home and the woman takes care of the home and family", (7) "men should share the work around the house with women, such as doing dishes, cleaning and so forth" and (8) "women are much happier if they stay at home and take care of their children". The scores are added (with the responses to questions 3, 5 and 7 reversed) and rescaled so that the values lie between 0 and 1, where 1 indicates the strongest preference for a traditional domestic arrangement.

The measure of the discount factor that is used is based on a question included in the NLSY in 2006. This instructed respondents to imagine they had won a prize of $1,000 and asked them what the smallest amount of money in addition to the $1,000 they would have to receive one year later to convince them to wait rather than claim the prize immediately. A woman's discount factor is set equal to 1,000 divided by her answer to this question plus 1,000.

The measure of intertemporal returns to work hours draws on longitudinally-matched CPS March supplement data for 1978-1981, which corresponds to the period many of the NLSY participants entered the workforce. The sample is restricted to married women aged 25-54. Log wages are regressed on log wages in the previous year (imputed where necessary), work hours in the previous year, age, age squared, education dummies (4 categories), region dummies (9 categories) and year dummies (4 categories), separately for the 48 occupation subgroups contained in the 1970 census occupation classification. Where there were fewer than 100 women in a particular occupation, data for the 8 broad occupation groups were used instead. This applied to 16 occupations. The coefficient on lagged work hours is merged into the dataset, based on a woman's last occupation before marriage. For women who never reported a pre-marriage occupation, the average work hours coefficient of women with the same education level is used. The five occupations with the largest work hours coefficients are: teachers, except college and university; clerical and unskilled workers; sales workers; craftsmen and kindred workers; and mechanics and repairmen. The five occupations with the smallest coefficients (all negative) are: farm laborers and farm foremen; farmers and farm managers; teachers, college and university; cleaning service workers; and receptionists. Overall, 7.5% of women in the regression sample have negative coefficients.

Figure 1

Trends in labor force participation, divorce and wages among married women



Sources: Divorce rate (divorces per married women aged 15 and over): Clarke (1995) and author's calculations, based on data from National Center for Health Statistics; labor force participation rate: United States Census Bureau (2003), based on Current Population Survey data; wage rate: author's calculations based on March Current Population Survey data.

Table 1

Average annual hours for divorcées

Year relative to divorce	All women	Low discount factor	High discount factor	Low work hours coefficient	High work hours coefficient
–3	1,569	1,586	1,653	1,644	1,474†††
–2	1,622	1,597	1,712	1,677	1,512†††
–1	1,670*	1,619	1,764	1,699	1,650**
0	1,798***	1,795***	1,921***	1,816**	1,797**
1	1,768	1,702	1,857	1,743	1,767
2	1,797	1,805	1,763	1,809	1,793

Notes: The full sample consists of those who were observed both 3 years before and 2 years after their marriage ended. The low discount factor sample includes women with a discount factor in the first quartile (less than 0.4); the high discount factor sample includes women with a discount factor in the fourth quartile (greater than 0.7692308). The low hours coefficient sample includes women with an hours coefficient in the first quartile (less than 0.0000762); the high hours coefficient sample includes women with an hours coefficient in the fourth quartile (greater than 0.0001441).

All means are weighted using the 1979 sample weights. *, ** and *** denote significance from the previous year at the 10%, 5% and 1% level, respectively. †, †† and ††† denote significance from the other group of women at the 10%, 5% and 1% level, respectively.

Table 2
Regression results using predicted divorce probability

Variable	Annual hours of work		Whether worked	
	(i)	(ii)	(iii)	(iv)
Divorce probability	3,623.413**	1,414.658	1.587**	1.297*
	(1,791.181)	(2,337.414)	(0.707)	(0.721)
Discount factor	–	-23.022	–	0.031
		(70.220)		(0.027)
Annual hours coefficient (×1,000,000)	–	-0.329	–	–
		(0.260)		
Worked coefficient	–	–	–	-0.075*
				(0.040)
Divorce probability × discount factor	–	1,505.404	–	0.134
		(1,306.623)		(0.478)
Divorce probability × annual hours coefficient (×1,000,000)	–	13.019***	–	–
		(4.056)		
Divorce probability × worked coefficient	–	–	–	2.107**
				(1.026)
Annual hours at time of marriage	0.272***	0.267***	0.000***	0.000***
	(0.018)	(0.020)	(0.000)	(0.000)
Log wage	159.614***	151.629***	0.109***	0.106***
	(19.789)	(22.573)	(0.007)	(0.009)
Husband’s income	-0.003***	-0.004***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-wage income	-0.052	-0.053	-0.000	-0.000
	(0.830)	(0.898)	(0.000)	(0.000)
Age	90.092***	84.140**	0.006	0.009
	(35.089)	(37.277)	(0.012)	(0.014)
Age squared	-1.292**	-1.159**	-0.000	-0.000
	(0.511)	(0.546)	(0.000)	(0.000)
Highest grade completed	47.620***	46.244***	0.012***	0.011***
	(6.065)	(7.115)	(0.002)	(0.003)
Black	71.531	85.741	0.005	0.008
	(50.701)	(52.767)	(0.020)	(0.017)
Hispanic	56.481	75.803*	0.002	0.014
	(43.155)	(40.640)	(0.016)	(0.017)
Husband’s age	-28.198*	-20.776	-0.008	-0.005
	(16.367)	(16.529)	(0.006)	(0.006)
Husband’s age squared	0.348	0.295	0.000	0.000
	(0.214)	(0.227)	(0.000)	(0.000)
Husband’s highest grade completed	6.791	9.692	0.006	0.007*
	(9.838)	(13.367)	(0.004)	(0.004)
Local unemployment rate	-909.634**	-826.711	-0.273	-0.249
	(449.415)	(525.968)	(0.176)	(0.197)
Metropolitan area	7.721	12.675	-0.010	-0.006
	(30.893)	(34.951)	(0.013)	(0.014)
Constant	-1,933.234***	-1,154.787	0.179	0.150
	(762.458)	(892.379)	(0.256)	(0.305)
R-squared	0.220	0.227	0.109	0.110
Number of observations	23,605	19,841	23,605	19,841

Notes: All models also include a full set of region and year dummies.
Bootstrapped standard errors are presented in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 3

Additional regression results using predicted divorce probability

Variable	Adding child controls	Married after 22	Did not expect to marry before 20	Liberal gender role attitudes
	(i)	(ii)	(iii)	(iv)
Divorce probability	-20.778	2,768.651	1,511.159	493.905
	(1,554.543)	(2,140.347)	(2,189.316)	(1,947.808)
Discount factor	-29.555	-50.520	-42.158	28.150
	(67.027)	(88.369)	(79.753)	(81.889)
Annual hours coefficient	-0.201	-0.380	-0.274	-0.475*
(×1,000,000)	(0.234)	(0.274)	(0.274)	(0.279)
Divorce probability × discount	1,368.932	3,399.454**	1,856.818	599.642
factor	(1,313.399)	(1,693.865)	(1,343.303)	(1,414.261)
Divorce probability × annual	9.492**	10.764**	12.224**	14.697***
hours coefficient (×1,000,000)	(4.295)	(5.108)	(5.029)	(4.819)
R-squared	0.288	0.237	0.220	0.226
Number of observations	19,767	13,843	18,133	16,344

Notes: All models also include all other control variables in the first column of Table 1. Bootstrapped standard errors are presented in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 4

Regression results by length of marriage

Variable	Less than 5 years of marriage		At least 5 years of marriage	
	(i)	(ii)	(iii)	(iv)
Divorce probability	849.443	-2,985.471	2,974.270	-475.729
	(2,299.494)	(2,273.772)	(1,985.138)	(2,210.141)
Discount factor	–	-171.039**	–	25.765
		(83.829)		(84.575)
Annual hours coefficient (×1,000,000)	–	-0.260	–	-0.212
		(0.332)		(0.281)
Divorce probability × discount factor	–	2,960.709*	–	2,612.209
		(1,629.371)		(1,978.728)
Divorce probability × annual hours coefficient (×1,000,000)	–	10.586*	–	13.328**
		(6.312)		(6.201)
R-squared	0.295	0.305	0.211	0.218
Number of observations	11,102	9,085	12,503	10,756

Notes: All models also include all other control variables in the first column of Table 1. Bootstrapped standard errors are presented in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 5

Regression results using marital happiness

Variable	Full sample			Married after 22
	(i)	(ii)	(iii)	(iv)
Very happy with marriage	-32.037	-51.647	-59.970	-97.709
	(23.319)	(64.990)	(64.392)	(76.335)
Not happy with marriage	136.243**	128.528	111.890	89.990
	(63.219)	(159.987)	(158.447)	(179.221)
Very happy with marriage × discount factor	–	27.737	25.973	116.914
		(94.412)	(93.442)	(112.174)
Not happy with marriage × discount factor	–	-240.016	-256.878	-233.142
		(247.532)	(244.677)	(289.512)
Very happy with marriage × annual hours coefficient (×1,000,000)	–	-0.158	-0.073	-0.076
		(0.268)	(0.265)	(0.325)
Not happy with marriage × annual hours coefficient (×1,000,000)	–	1.945**	1.932**	2.309***
		(0.767)	(0.763)	(0.804)
Child variables	No	No	Yes	No
R-squared	0.683	0.682	0.689	0.697
Number of observations	11,492	9,833	9,795	7,088

Notes: All models also include log wage, husband's income, non-wage income, age, age squared, husband's age, husband's age squared, husband's highest grade completed, local unemployment rate, metropolitan area and a full set of region, year and person fixed effects. The child variables include the number of children in the household and a dummy for the presence of a child aged under 6.

Standard errors are presented in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.