The value of remarriage: welfare effects of divorce legalization

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PRELIMINARY AND INCOMPLETE, DO NOT CITE

Abstract

Until 2004, divorce in Chile was illegal and separated women, representing 12% of all married women, were unable to remarry. This paper examines how the option of exiting the relationship and remarrying has changed the bargaining power in married and separated households. Using longitudinal survey data, we first document the effects of the reform on couples formation and separation, and on the labor force participation and labor supply decisions of married, separated, cohabiting and single women. We then use this variation in the data to structurally estimate a dynamic collective model of marriage, remarriage and household labor force participation and estimate the welfare impacts of the reform on men and women.

JEL Classification: J240, J260, E210, E260, O170

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1 Introduction

In this paper, we explore the aggregate and distributional welfare impacts of allowing married couples to divorce using longitudinal data collected before and after the introduction of divorce in Chile in 2004. We first document the changes in household formation and break-up, female labor supply and marital sorting caused by the law. In order to provide a welfare interpretation to these changes, we then specify and estimate a life cycle equilibrium model with endogenous marital transitions and labor supply decisions using the data variation caused by the law as a source of model validation. Lastly, we use the estimated model to conduct policy experiments on divorce law design.

What are the welfare implications of legalizing divorce? The economic gains from marriage listed in Weiss (1997) can be divided into two groups. Gains from economies of scale in joint home production and joint consumption require cohabitation but not necessarily a lasting mutual support commitment. On the other hand, gains from specialization in home or market production, gains from risk-sharing and gains from in-house credit provision can be achieved without living together, but necessitate the assurance of a lasting partnership. Tying these two sources of economic gains together would likely lead to an overstatement of the impact of divorce. Our model recognizes that marriage is neither a necessary nor a sufficient condition for joint residency, by allowing unmarried couples to cohabit and married couples to live separately. In addition, we capture that divorce generally does not imply a complete termination of mutual support obligations by modeling alimony.

Another crucial aspect of divorce captured in our model is the possibility of remarriage for separated couples. This might have welfare repercussions

not only for separated men and women, but also for married couples as good remarriage prospects might imply receiving a higher share of the marriage surplus. Remarriage considerations might improve incentives to specialize in home production, or reduce them by making marriages less stable.

The model is estimated using a simulated method of moments estimator.[1] The data moments are extracted from a longitudinal survey ("Encuesta de Proteccion Social", or EPS) administered to a representative sample of the Chilean population, which includes retrospective employment and relationship histories dating back from 1980, as well as spousal schooling and labor supply, and household labor earnings in 2002, 2004, 2006 and 2009. The moments used for estimation include the fraction of men and women in each possible marital status (married, cohabiting, separated, single), the fraction of women transiting between marital statuses, female labor force participation levels and transitions, age and schooling differentials within partnerships.

Our estimation strategy makes use of the unique exogenous variation introduced by the reform. The structural parameters in the model are policy invariant except for those in the household utility weights and the cost of divorce. We estimate all the model parameters using the pre-divorce data, not allowing agents to divorce and remarry, and assess the within sample model fit. We then use the post-reform data to estimate the new utility weights and the cost of divorcing, keeping all other parameters at their pre-reform value. In this second stage, the model is strongly overidentified, so that the model fit constitutes a convincing evaluation of model validity.

[ADD ESTIMATION RESULTS HERE]

[1] See McFadden (1989), Gourieroux and Monfort (1996)

1.1 Related literature

A large body of research has exploited institutional variation in divorce laws to examine whether relaxing the requirements to obtain a divorce leads to higher break-up rates (see Friedberg (1998) and Wolfers (2006)) and higher female labor supply (Johnson and Skinner (1986), Parkman (1992), Gray (1998), Stevenson (2008)). Bargain et al. (2010) use data on the legalization of divorce in Ireland in 1996, showing that the rate of marriage break-up (including separations and divorces) increased after the law was passed. The usual interpretation is that marital instability and remarriage considerations reduces incentives to specialize in home production, leading more women to participate in the labor market. We contribute to that literature by documenting the effect of divorce legalization in Chile in 2004, which has received very little attention,[2] on household formation, break-up and labor supply, and using this variation to validate a structural model. In doing so we tightly link the theory and the data which allows us to isolate remarriage considerations, provide a welfare interpretation and explore policy experiments. Our empirical model borrows from a number of structural empirical studies that model both marital status choice and labor supply in a life cycle framework, including Van der Klaauw (1996), Keane and Wolpin (2010), and particularly Seitz (2009), whose model we extend to allow cohabitation without marriage and marriage without cohabitation. Her equilibrium model itself borrows from the macro labor search literature (see Aiyagari et al. (2000), Greenwood et al. (2003), and more recently Jacquemet and Robin (2011)). Our paper also contributes to the growing literature on non-marital cohabitation by fully decoupling the decision to live together from

[2] an exception is Heggeness (2010) who that school enrollment was positively impacted by the legalization of divorce

the mutual support commitment. We borrow from Gemici and Laufer (????), Brien et al. (2006) in that cohabitation might be less costly to break-up relative to marriage, but we explicitly model another distinguishing feature of marriage, namely alimony. We also allow couples to live separately while still being married, a feature which is essential in order to accurately capture the pre- divorce legalization choice set of couples. Contrary to these studies, we exploit institutional variation in the data to validate the model and incorporate equilibrium effects on the marriage market.

2 Background: The introduction of divorce in Chile

[TO BE COMPLETED]

3 The model

Agents of two genders $g = \{m, f\}$ live for T periods. Age is denoted as $t \in \{1, ...T\}$. Besides gender, individuals are characterized by a vector $z = (s, t, x, a)$, where s is their marital status, $x \in \mathcal{X}^g$ is their productivity or potential earnings, t is age and a is nonlabor income.

In a given period, agents can be living with someone or not, and married to someone or not. The combination of these two characteristics define four marital states (s): S (single), C (cohabiting), M (married), X (separated). In addition, cohabiting individuals might still be legally married to a previous partner so the cohabiting state encompasses two situations: C_s (cohabiting

and unmarried) and C_m (cohabiting and married to a previous partner).

The information set which determines agents' decisions is denoted as $\Omega_t = \{\theta, z, z^+, \gamma\}$ where θ represents the quality of the relationship, and $(^+)$ identifies characteristics pertaining to the current partner, and γ represents the information about the marriage market.

3.1 Agents: Preferences

The per-period utility depends on private consumption c, public good consumption Q, and the match quality θ:

$$U(c^g, Q, \theta) = u(c^g, Q) + \theta$$

Agents are assumed to maximize the expected sum of per-period utility until period T, discounted by a factor $\beta \in [0, 1]$. They first choose their marital status and then their labor supply. Let us denote as $\widetilde{v}_s^g(.)$ value function containing the expected lifetime utility to be maximized by an agent of gender g at the beginning of the period, before marital status decisions have been made. Also, we denote as $V_s^g(.)$ the value function to be maximized by an agent of gender g after marital status decisions and before the labor supply decision has taken place.

3.2 Marital state decisions

At the beginning of each period, single and separated agents draw a potential new partner, characterized by a vector $z^+ = \{S^+, t^+, a^+, x^+\}$ and a match

quality θ. A single agent might decide to remain single, cohabit with or marry the potential partner. A separated agent can only remain separated or cohabit with the potential partner. In order for a couple to cohabit, they must both prefer cohabitation to remaining single. We assume that both partners must be willing to cohabit and to marry in order for them to get married.

The following indicators denote whether the potential partner would rather cohabit with or marry the agent:

$I_C^{-g}(\theta, z, z^+) = 1$ if $V_S^g(\theta, z, 0) \leq V_C^g(\theta, z, z^+)$, 0 otherwise

$I_M^{-g}(\theta, z, z^+) = 1$ if $V_S^g(\theta, z, 0) \leq V_M^g(\theta, z, z^+)$, 0 otherwise (with divorce)

$I_{Mx}^{-g}(\theta, z, z^+) = 1$ if $V_X^g(\theta, z, 0) \leq V_M^g(\theta, z, z^+)$, 0 otherwise (without divorce)

The marital state decision of a single/never married individual of gender g with characteristics z, a potential partner z^+, and potential match quality θ solves the following optimization problem:

$$\begin{aligned}
&\widetilde{v}_S^g(\theta, z, z^+) = \\
&I_C^{-g}(\theta, z^+, z) \cdot I_M^{-g}(\theta, z^+, z) \cdot (\max\{V_S^g(\theta, z, 0), V_C^g(\theta, z, z^+), V_M^g(\theta, z, z^+)\}) \\
&I_C^{-g}(\theta, z^+, z) \cdot (1 - I_M^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0), V_C^g(\theta, z, z^+)\}) \\
&(1 - I_C^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0)\})
\end{aligned}$$

Similarly a separated individual of gender g with characteristics z, a potential partner z^+, and potential match quality θ solves the following problem:

$$\begin{aligned}
&\widetilde{v}_X^g(\theta, z, z^+) = \\
&I_C^{-g}(\theta, z^+, z) \cdot I_M^{-g}(\theta, z^+, z) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}, V_X^g(\theta, z', 0), V_C^g(\theta, z, z^+), V_M^g(\theta, z', z^+) - \kappa_{MS}\}) \\
&I_C^{-g}(\theta, z^+, z) \cdot (1 - I_M^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}, V_X^g(\theta, z', 0), V_C^g(\theta, z, z^+)\}) \\
&(1 - I_C^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}, V_X^g(\theta, z', 0)\})
\end{aligned}$$

We assume that cohabitation and marriage are incompatible with new partner search. The stochastic match quality follows a Markov process with transition matrix Γ. We normalize $\theta = 0$ for $s \in S_n$. After a separation or a divorce, a (positive or negative) transfer $\varphi_s(x, x^+)$ representing alimony is permanently subtracted from the husband's non-labor income and added to the wife's.[3]

Dissolution of a couple carries a utility cost $\kappa_s s'$, and depends on whether $s = C, s' = S$ (end of cohabitation), $s = M, s' = X$ (separation), or $s = M, s' = S$ (divorce).

The problem of a married individual of gender g with characteristics z, partner z^+, and new match quality θ reads:[4]

$$\begin{aligned}\widetilde{v}_M^g(\theta, z, z^+) &= I_X^{-g}(\theta, z^+, z) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}, V_X^g(\theta, z', 0) - \kappa_{MX}, V_M^g(\theta, z, z^+)\}) \\ & \quad (1 - I_X^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}, V_X^g(\theta, z', 0) - \kappa_{MX}, \})\end{aligned}$$

Problem of a cohabiting individual of gender g with characteristics z, partner z^+, and new match quality θ:

$$\begin{aligned}\widetilde{v}_C^g(\theta, z, z^+) &= I_C^{-g}(\theta, z^+, z) \cdot I_M^{-g}(\theta, z^+, z) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{CS}, V_M^g(\theta, z, z^+), V_M^g(\theta, z, z^+)\}) \\ & \quad I_C^{-g}(\theta, z^+, z)) \cdot (1 - I_M^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS} V_M^g(\theta, z, z^+), \}) \\ & \quad (1 - I_C^{-g}(\theta, z^+, z)) \cdot (\max\{V_S^g(\theta, z, 0) - \kappa_{MS}\})\end{aligned}$$

[3]The implicit assumption that transfers do not cease upon remarriage allow us not to carry the past spouse's characteristics after separation or marriage takes place.

[4]This corresponds to the case of unilateral divorce

3.3 The Labor supply decision

Agents have H hours per period to be spent in labor supply or production of the home public good. Labor earnings y are a function of hours worked h, productivity x, and the market wage per efficiency unit of labor w:

$$y = wxh$$

Current hours of work affect future productivity:

$$x' = g(x, h) = x + (xh)^{\delta}$$

The labor supply decision of a single or separated individual of gender g solves the following optimization problem:

$$\begin{aligned}
V_s^g(\theta = 0, z, z^+ = 0) &= \max_h \; u(c, Q) + \beta E_{\theta', z^+} \left[\widetilde{v}_s^g(\theta', z', z^+) \right] \\
s.t. & \\
c &= wxh \\
Q &= \widetilde{Q}(x, 1 - h) \\
z' &= (t + 1, g(x, h), a)
\end{aligned}$$

In a couple, decisions are inter-dependent because of the investment in the public good, and the productivity dynamics. We assume that couples are assumed to maximize the weighted sum of the partners's value functions. The weight $\omega(z, z^+, \gamma)$ is a function of each partner's age, productivity and nonlabor

income as well as marriage market conditions γ. The labor supply decision of a cohabitating/married couple solves the following optimization problem:

$$\begin{aligned} V_s^m(\theta, z^m, z^f) &= u(c^{m*}, Q(x, 1-h^{m*})) + \beta E_{\theta'}\left[\widetilde{v}_s^m(\theta', z'^m, z'^f)\right] \\ V_s^f(\theta, z^f, z^m) &= u(c^{f*}, Q(x, 1-h^{f*})) + \beta E_{\theta'}\left[\widetilde{v}_s^f(\theta', z'^f, z'^m)\right] \end{aligned}$$

where

$$\begin{aligned} z'^m &= (t+1, g(x, h^{*m}), a^m) \\ z'^f &= (t+1, g(x, h^{*f}), a^f) \end{aligned}$$

and

$$\begin{aligned} (c^{m*}, h^{m*}, c^{f*}, h^{f*}) &= argmax\left[V_s^m(\theta, z^m, z^f) + \omega(z^m, z^f, \gamma) \cdot V_s^f(\theta, z^m, z^f)\right] \\ s.t. & \\ c^f + c^m &= wx^m h^m + wx^f h^f + a^m + a^f \end{aligned}$$

where a are transfers from an ex-spouse if the agent was in a previous long-term relationship

3.4 Equilibrium on the marriage market

Agents search randomly for a match within the available pool of single and separated agents. The fraction of available partners of a given type (i.e. the probability of drawing a match of that type) is determined by the number of single and separated agents who chose not to marry or cohabit, and the number of married and cohabiting agents who separate or divorce from their partners in the previous period.

[TO BE COMPLETED]

4 Data and Estimation

4.1 Sample selection

[TO BE COMPLETED]

4.2 Moments of interest

The model must be able to fit the following dimensions of the data: marital status (stocks and transitions before and after divorce legalization), joint age and schooling characteristics of couples, earnings and labor supply by marital status. We are particularly interested in the distribution of the impact of the law across schooling attainments and over the life cycle. We define three schooling attainments (less than high school, some high school, high school and college graduates) and 5-year age bins on which to condition mean outcomes. The following is the list of moments used in estimation:

1. Fraction in each marital status, by gender, age, schooling attainment and year.

2. Transitions between marital statuses by gender, age group and schooling.

3. Female labor force participation, by gender, marital status, age group, own-schooling and partner's schooling.

4. Fraction in each schooling attainment combination for married and cohabiting couples.

5. Fraction in each age group combination for married and cohabiting couples.

6. Earnings by gender, schooling attainment, age group and year.

5 Descriptive statistics and reduced form evidence

5.1 Marital status frequencies: women

We present some descriptive statistics illustrating key features of the data to be captured by the model. The first set of figures show the marital status reported by women in each of the four survey rounds (2002, 2004, 2006, 2009). The 2004 survey was being collected at the time when the law was passed, in November 2004. Around 86% of the interviews where completed by January 2005, and 99% by April 2005. We recognize that some behavioral changes might have occurred as a result of the reform by the time the interview was conducted.

However we believe it is more accurate to interpret the 2004 numbers as pre-reform, since both marital status and labor force participation responses are likely to take longer than a few month to fully take place.

The data on marital status frequencies reveals a downward break in the fraction of women married after reform (2006 and 2009, vs 2002 and 2004). The effects becomes less pronounced as we consider older women (5 to 10 percentage points for women between 25 and 35 years old, 3 to 5 percentage points between 35 and 45, undiscernible effect thereafter) as illustrated in figures 1 and 2. For younger women we see a transfer from married to cohabiting, while for the 35-45 agegroup it is the number of separated women that seems to have increased.

As we further group women into schooling attainment bins, we observe that the decrease in the frequency of married women is very strong for women with no high school education (figure 1). Cohabitation is especially prevalent in that category. The decrease in number of married women is delayed age-wise for highly educated women and shows up in the 35-45 but not in the 25-35 agegroup (see figures 3, 4 and 5).

5.2 Transitions

A decrease in the stock of married women can be due to lower inflows (from singlehood or cohabitation) or larger outflows (separations and divorces). To determine which it is, we turn to the transitions between the four survey rounds (2002, 2004, 2006 and 2009), reported in tables 1, 2, 3. The mode in the distribution of interview completions for each round is respectively: June 2002, December 2004, December 2006, and June 2009. This means that the 2002-2004 and 2006-2009 transitions matrix should be fairly comparable given that

the time elapsed between rounds is very similar (about 30 months). The 2004 and 2006 rounds were administered closer together (24 months), so we should expect mechanically that the diagonal elements in the 2004-2006 transition matrix will be higher ceteris paribus. We interpret the 2002-2004 and 2006-2009 as the pre and post divorce legalization "steady states", while the 2004-2006 corresponds to the "transition" following the legal change. In particular the three years separation requirement in order to file for unilateral divorce means that someone who separated from their spouse the day the law was passed would not be able to get a divorce by the time the 2006 survey was administered.

The first remark is that the fraction of separated women in 2006 who get a divorce by 2009 is 5% (see table 3). A decomposition of transition tables by age and education (not reported here) shows that younger and more educated women account for most divorces). Comparing tables 1 and 3 shows a reduction of inflows into marriage (from the single, separated and cohabiting states). By contrast, inflows of single and separated women into cohabitation increases strongly.

Marriages also become less stable, exhibiting more outflows into separation (perhaps as a way to meet the separation requirements and obtain a divorce).

5.3 Female employment

We now look at labor force participation rates by marital status, age and schooling reported in the 2002, 2004, 2006 and 2009 surveys. Note that given the changes in marital status documented above, there could be important compositional effects (women with higher work propensity might be more likely

to switch marital status due to the reform). In addition, effects are hard to pin down from descriptive statistics, given that time effects might be confounded with the effect of the reform itself. In this section we just indicate the changes that could potentially be attributed to the reform, before investigating them more thoroughly in the next section.

There is no clear overall change in labor force participation corresponding to the time of the reform (figure **??**). There is a disproportionate decrease in the labor force participation of younger married women, especially compared to the corresponding single women whose labor force participation increased during the period (figure **??**). A further decomposition by schooling reveals that the effect is limited to highly educated women (figures 8 and 9).

5.4 Matching and sorting

[TO BE COMPLETED]

6 Reduced form evidence

[TO BE COMPLETED]

7 Estimation results

[TO BE COMPLETED]

8 Conclusion

[TO BE COMPLETED]

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Figure 1: Marital status frequencies, women ages 25 to 35

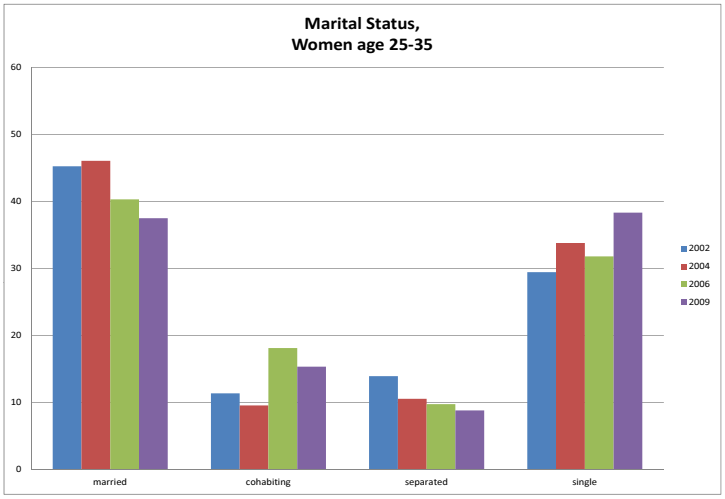

Table 1: Marital status transitions between 2002 and 2004 survey rounds

2002 Marital Status	2004 Marital Status					
	Married	Cohab.	Separ.	Single	Divorced	Total
Married	93.5	1.6	4.6	0.3	0.1	100
Cohabiting	17.8	55.3	9.2	17.7	0.0	100
Separated	15.4	2.9	67.6	13.9	0.3	100
Single	4.8	3.8	1.8	89.6	0.0	100
Total	51.9	8.9	13.5	25.6	0.1	100

Figure 2: Marital status frequencies, women ages 35 to 45

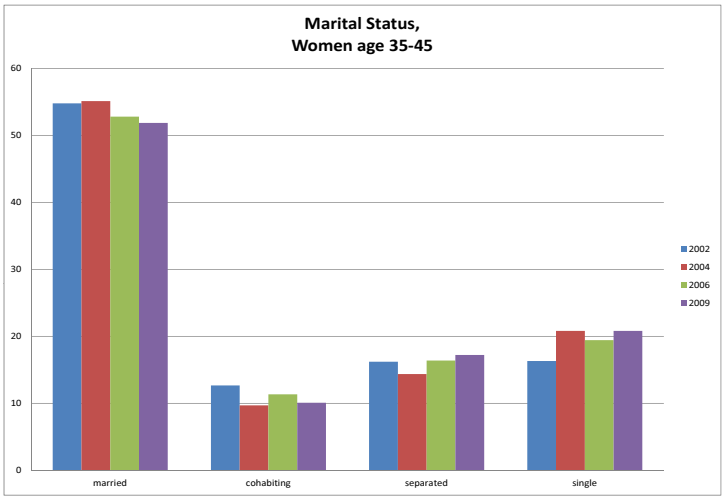

Figure 3: Marital status frequencies, women without high school education, ages 25 to 35

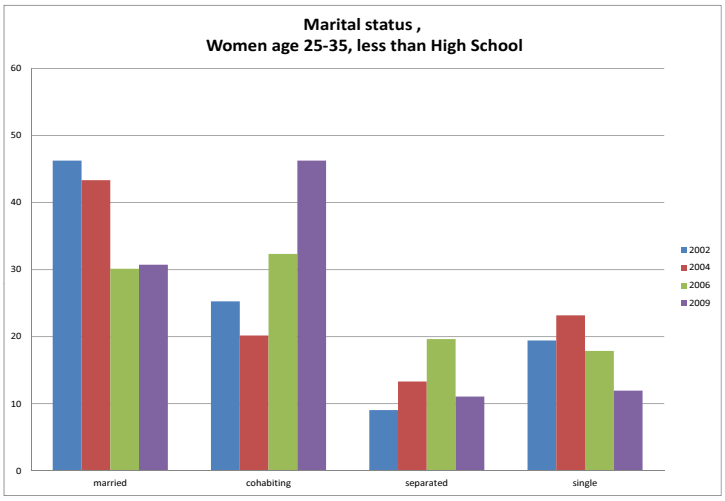

Figure 4: Marital status frequencies, college graduates ages 25 to 35

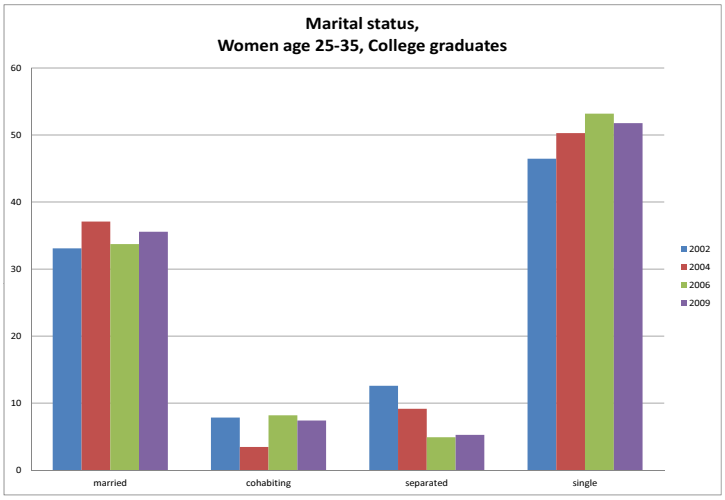

Figure 5: Marital status frequencies, college graduates ages 35 to 45

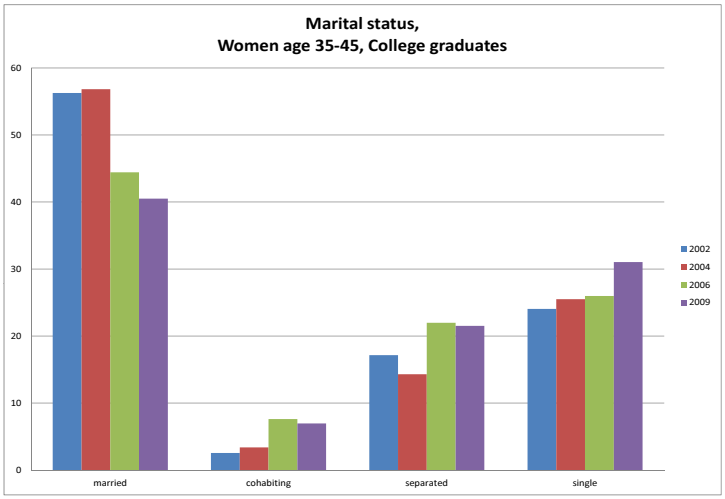

Table 2: Marital status transitions between 2004 and 2006 survey rounds

2004 Marital Status	2006 Marital Status					
	Married	Cohab.	Separ.	Single	Divorced	Total
Married	90.9	2.4	6.3	0.5	0.0	100
Cohabiting	9.9	75.2	7.4	7.3	0.2	100
Separated	7.1	14.6	72.4	4.3	1.6	100
Single	3.7	12.0	3.7	80.7	0.0	100
Divorced	43.7	0.0	56.3	0.0	0.0	100
Total	48.3	13.9	13.8	23.8	0.2	100

Table 3: Marital status transitions between 2006 and 2009 survey rounds

2006 Marital Status	2009 Marital Status					
	Married	Cohab.	Separ.	Single	Divorced	Total
Married	91.2	1.5	6.3	0.7	0.3	100
Cohabiting	11.6	56.9	9.4	21.3	0.8	100
Separated	11.7	8.0	66.9	8.3	5.1	100
Single	3.9	8.6	2.5	84.9	0.1	100
Divorced	0.0	0.0	64.8	0.0	35.2	100
Total	47.0	12.1	13.5	26.4	1.0	100

Figure 6: Female labor force participation

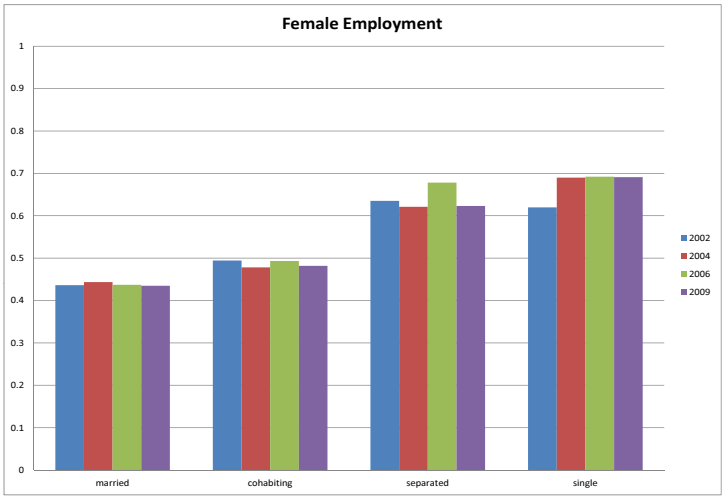

Figure 7: Female labor force participation, women ages 25 to 35

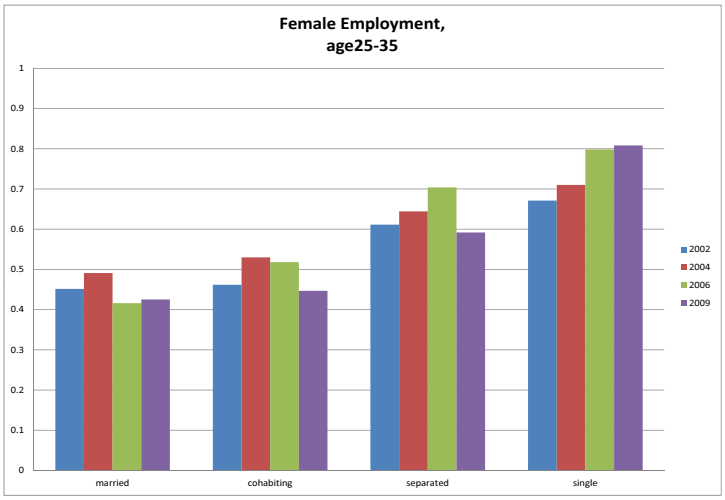

Figure 8: Female labor force participation, high school and college graduates, ages 25 to 35

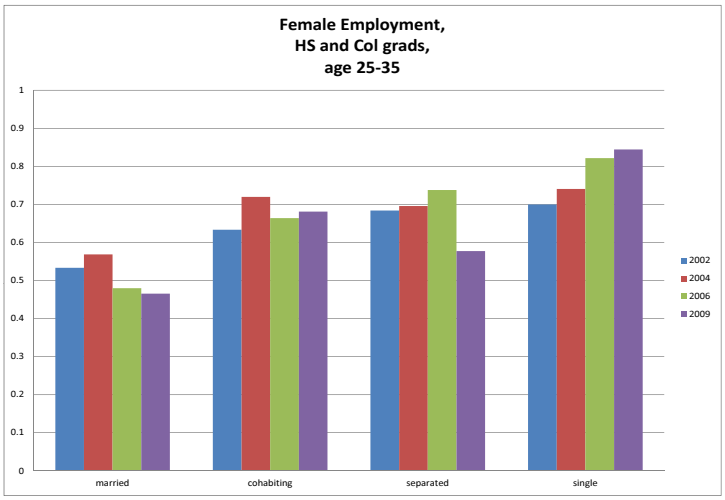
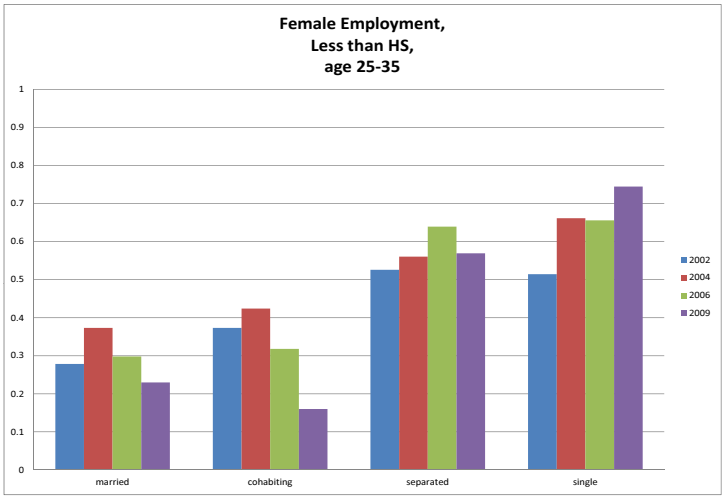
Figure 9: Female labor force participation, high school drop-outs or no schooling, ages 25 to 35