Marriage and Cohabitation *

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Abstract

Despite the large occurrence of cohabitation and its strong link to important behavioral outcomes, it has received little attention in the literature. We use data from the Panel Study of Income Dynamics to document the labor supply, housework hours, and fertility patterns of cohabiting partners. The data suggests that in comparison to marriage, cohabitation is associated with a lower degree of household specialization, higher relationship instability, and greater degree of positive assortative mating. We develop and estimate a dynamic model of household formation and dissolution, fertility and labor supply and use the estimated model to perform policy experiments that investigate the welfare implications of different institutional arrangements regarding divorce regulations. In a dynamic model of the household with limited commitment, marriage leads to equilibrium outcomes that are closer to the efficient allocation when there are gains from specialization. On the other hand, cohabitation enables partners to insure themselves against uncertainty regarding the match quality of the relationship. Each match has different gains from either living arrangement, depending on their observable characteristics, and match quality. Cohabitation provides a tradeoff between the advantages and disadvantages of getting married and remaining single. Our goal is to use the estimated model to assess the welfare implications of inefficiencies that may arise in co-residential relationships due to lack of commitment.

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1 Introduction

The number of unmarried couples living together has increased significantly between 1960 and 2000. Today, there are 9.7 million Americans living with an unmarried different-sex partner. More importantly, empirical evidence from the Panel Study of Income Dynamics shows that marital stability, labor supply, and fertility of men and women differ considerably by whether they are cohabiting or legally married. This suggests that cohabitation constitutes a separate state of union to marriage, either in terms of the different characteristics of couples who choose to cohabit, or as a different institutional framework that changes the way in which partners interact. For example, it is legally more difficult for married partners to separate than cohabiting partners. Moreover, married couples face a different tax schedule than single and cohabiting individuals do.

In this paper, we study the welfare implications of family policies, such as divorce regulations and marriage tax benefits (or penalties), on intra-household allocations, fertility, household formation and dissolution patterns.

Using the Panel Study of Income Dynamics, we find that in comparison to marriage, cohabitation is associated with a lower degree of household specialization, higher relationship instability and higher degree of positive assortative matching. In other words, married women work less than single women, but that the difference between cohabiting women and single women’s labor supply is statistically insignificant. A similar analysis for men reveals that both cohabiting and married men tend to work more than single men, with married men working more than those cohabiting. Patterns of marital sorting are quite different for cohabiting unions compared to married unions. For example, in cohabiting unions correlation between the labor incomes of partners is much higher, compared to partners in married unions.\(^1\) We also look at how marriage and cohabitation patterns have changed using comparisons between multiple cohorts in the Panel Study of Income Dynamics. We distinguish between two different groups of cohorts. The first group consists of individuals born in 1955-1965, and the second group consists of individuals born in 1966-1976. We find that proportion of high school graduates who are married in the older cohorts is approximately 69 percent, while it is 53 percent for the younger cohorts. We also find that the proportion of high school graduates who are married in the older cohorts is approximately 30 percent, while it is 47 percent. A similar comparison holds for college graduates as well.

This paper contributes to a growing literature in economics and demography on marriage and cohabitation in relation to household formation, dissolution and labor supply.\(^2\) The goal

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\(^1\)A detailed exposition of these empirical facts including the controls included in these analyses can be found in the data section.

\(^2\)Brien, Lillard and Stern (2006) study cohabitation decisions and find that individuals cohabit in order to learn about their potential partners and hedge against future bad relationship specific shocks. Choo and Siow (2005) investigate marriage and cohabitation behavior in Canada. Blau and van der Klaauw
of this paper is to assess the implications of family policies, such as divorce regulations and marriage tax benefits (or penalties), on intra-household allocation, fertility, household formation and dissolution patterns. In order to do this, we develop and estimate a dynamic model of household formation and dissolution, fertility and labor supply and use the estimated model to perform policy experiments that investigate the welfare implications of different institutional arrangements regarding divorce regulations. The point of departure from the previous literature is that we take into account the intermediate stage of non-marital cohabitation. In other words, for many couples the choice is not just between being married and remaining single, but there is a third option that is non-marital cohabitation, which offers a different combination of the advantages and disadvantages associated with getting married and remaining single.

There are various ways in which cohabitation may differ from legal marriage. For example, there are significant differences in the legal regulations unmarried cohabitants and married couples face in the United States. The first important distinction is that unmarried cohabitants do not need to follow strict procedures to dissolve the living arrangement. This leads to an important feature of cohabitation, which is that it enables partners to take advantage of the benefits of living together, without the commitment that legal marriage requires. For example, Brien, Lillard and Stern (2006) show that the lower cost of separation makes co-residential relationships attractive for couples, as it gives the opportunity to hedge against future bad shocks to the relationship quality while taking advantage of benefits of living together such as joint consumption of a public good, returns to specialization, and children. However, the lack of commitment in a cohabiting relationship relative to marriage has disadvantages, as the increased chance of dissolution may prevent the couple from fully realizing some of these benefits. Therefore, the option of cohabiting rather than being married and remaining single has advantages and disadvantages relative to the other options. The second distinction is that cohabiting partners face a tax schedule that is different from married couples. Married couples are taxed based on their joint income, which, depending on the income levels, may lead to higher or lower tax payments than the two partners would pay separately. Cohabiting couples on the other hand face the same tax schedule as single individuals does.

In the model, in each period a single individual meets a potential partner with an exogenous

probability and decides whether he/she is going to continue being single, start cohabiting with the partner, or get married. In addition to their relationship, the agents choose in each period how to divide their time between housework, labor market work and leisure, and whether to have children or not. Working at a given period increases their human capital, and hence future wages. The presence of children increase the marginal utility of the public good and therefore increase the relationship surplus. Agents face uncertainty regarding their earnings, their match quality if they are in a relationship, and whether they will have children. In order to characterize the allocations chosen by married/cohabiting individuals, we employ the collective household model in a dynamic framework with no commitment so that couples cooperate but they are unable to commit to future allocations as in Mazzocco and Yamaguchi (2007). For the couple’s problem, we make the assumption that the outcomes to the household’s allocation problem are constrained efficient so that the solution to the couple’s problem is obtained by using a Pareto problem with participation constraints. Due to lack of commitment, the share of the total household resources that a partner receives is subject to change depending on his/her outside option each period. In addition, the partners are not able to commit to not separate in the future, and face uncertainty regarding future marital instability. This gives rise to inefficiencies within the relationship since (1) Household members cannot contract over transfers to be made in the future periods of the relationship, (2) Household members cannot make conditional transfers for future separation states. The potential for inefficiencies is higher for higher levels of probability of separation. Holding everything else constant, this probability is higher for a cohabiting couple as their cost of separation is lower. The size of the efficiency concerns depend on the home production technology and preferences. We consider different specifications for the home production technology.

Gains from living together in the model are: (1) Joint consumption of a public good, (2) Specialization in home production and market work, (3) A match-specific benefit, which is observable to the partners, but is subject to change as the relationship progresses and (4) the ability to have children. The extent to which each of these gains are realized depends on whether the couple chooses to cohabit or get married. The tradeoff that the couple faces in making this choice is as follows. Cohabitation allows the partners to benefit from living together, without the requirement to face legal separation costs in the event of negative match specific shocks. Marriage makes future separation more costly, and this enables the agents to fully specialize. This also has implications on the degree of positive assortative mating for cohabiting unions in comparison to marital unions. This is because the substitution possibilities in the time inputs of the spouses in the household production function translates into different mating patterns depending on the degree of commitment. In this case, patterns of marital sorting observed in the data are strongly linked to the intra-household decision process, as in Del Boca and Flinn (2006). This paper is also closely linked to Greenwood and Guner (2008) who look at the role
of technological progress on marriage and labor market outcomes since World War II.

We are interested in the welfare implications of partners’ inability to make binding agreements. Inefficiencies may arise in relationships due to lack of access to a commitment technology. However, more importantly, individuals can choose the degree of commitment they have access to in their relationship, through choosing between marriage and cohabitation. These choices depend on their observable and unobservable characteristics, the characteristics of their potential matches, the quality of their match, as well as preferences and the home production technology. In this paper, we develop a framework that allows us to control for such selectivity into different living arrangements (marriage, cohabitation, remaining single).

We structurally estimate the model using data from the Panel Study of Income Dynamics (PSID), which have detailed information on relationship and wage histories, as well as labor market and housework hours of partners. The model is estimated by simulated method of moments, which minimizes a weighted average distance between a set of sample moments and moments simulated from the model. We jointly estimate the model for two groups of cohorts in order to decompose the changes marriage, cohabitation and labor market outcomes into different contributing factors. In the estimation, we allow preferences as well as technology and wages that the younger and older cohorts face to be different.

The paper is organized as follows. In Section 2, we present a two-period version of the full model in order to analyze the main channels at work. In Section 3, we present the details of the full model. Section 4 presents the data. Section 5 gives the estimation method. Section 6 presents the estimation results. Section 7 concludes.

2 A Two-Period Model of Marriage, Cohabitation and Labor Supply

In this section, we solve a two-period version of the full dynamic model in order to demonstrate the main channels at work. Consider an economy made up of individuals who live for two periods. Each individual is endowed with a wage $w_i$. In each period, the agents get utility from their private leisure, $l_i$, and the consumption of a public good $Q$. Agents who choose to live together also get utility from their match specific quality, $\theta$, which is revealed to them in the second period.

Utility in the first and second period is strongly separable in the private leisure and public

\[ u_i(l_i, Q) = u_i(l_i) + u_i(Q) \]

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good, and is given by,

\[ u_{i,1}(l_{i,1}, Q) = \frac{l_{i,1}^{1-\sigma_l}}{1-\sigma_l} + \frac{Q_l^{1-\sigma_Q}}{1-\sigma_Q} \quad i = m, f \]

\[ u_{i,2}(l_{i,2}, Q) = \frac{l_{i,2}^{1-\sigma_l}}{1-\sigma_l} + \frac{Q_l^{1-\sigma_Q}}{1-\sigma_Q} + \theta \quad i = m, f \]

where \( \theta \) is the quality of the couple-specific match. The public good \( Q \) is produced with a household production technology which uses the time inputs of the spouses, \( d_m, d_f \), and a good, \( g \), purchased in the market at a price normalized to 1. Expenditure on the market good \( g \) is given by the sum of the total income of the household, so that \( g = w_m h_m + w_f h_f + Y \), where \( Y = Y_m + Y_f \) is the household’s total non-labor income. The agents divide their time between market work and housework, and leisure. The home production technology is,

\[ Q = (d_m^\nu + d_f^\nu)^{\frac{1}{\nu}} g \]

so that the home production technology exhibits increasing returns to scale. In the following section, we consider the implications different specifications for the production technology, with varying values of \( \nu \) which govern the different substitution possibilities between the time inputs \( (d_m \text{ and } d_f) \) of the partners. When the agent lives alone, \( Q \) is produced with the following home production technology,

\[ Q^S = d_i^S g^S \quad i = m, f \]

The timing of the two period model is as follows. Each individual \( i \) starts the first period as a single agent endowed with wage \( w_i \). At the beginning of the period each agent meets a partner with a wage endowment \( w_j \) with an exogenous probability \( P_w(w_j) \). The potential partners then decide whether they are going to cohabit together, get married or remain single for that period. At the beginning of the second period, if they are married or cohabiting, they observe their couple-specific match quality and decide whether they are going to stay together or separate. If they start the second period as single agents (which happens if they choose to not match with the partner they met at the beginning of the first period), they only make decisions regarding how to divide their time between market work, home production and leisure in the second period.

We solve the model backwards, starting with the decision problem in the second period. First consider individuals who are single agents in the second period. They can be in the single state in the second period through one of the following ways: (1) They started the period as single, (2) They started the period in a relationship, but chose to separate after observing the match quality \( \theta \). The value of being a single agent for person \( i \) in period 2 is determined by the solution
to the following problem,

\[
\max_{h_{i,2}^S, d_{i,2}^S} \quad u(l_{i,2}^S, Q_{i,2}^S)
\]

s.t.

\[
Q_{i,2}^S = d_{i,2}^S g_{i,2}^S
\]

\[
g_{i,2}^S = w_i h_{i,2}^S + Y_i
\]

\[
T = h_{i,2}^S + d_{i,2}^S + l_{i,2}^S
\]

Now consider individuals who are in a relationship (cohabiting or married) in the second period. Once the match quality is realized, the time allocation of the partners is determined as the solution to the following problem,

\[
\max_{h_{m,2}, d_{m,2}, h_{f,2}, d_{f,2}, \xi} \quad \mu u(l_{m,2}, Q_2) + (1 - \mu) u(l_{f,2}, Q_2)
\]

s.t.

\[
Q_2 = Q = (d''_{m,2} + d''_{f,2}) g_2
\]

\[
g_2 = w_{m,2} h_{m,2} + w_{f,2} h_{f,2} + Y_i
\]

\[
T = h_{i,2} + d_{i,2} + l_{i,2} \quad i = m, f
\]

\[
u(l_{i,2}, Q_2) + \theta \geq u(l_{i,2}^S, Q_2^S) + \kappa
\]

where \( \kappa \) is the separation penalty (with \( \kappa < 0 \)), and is equal to \( \kappa_C \) if cohabiting and \( \kappa_R \) for married couples. Given the Pareto weight from the previous period, \( \mu \), the couple maximizes the above problem with respect to their labor market and housework hours as well as relationship status \( \xi \). Let \( \Omega_2 = \{\mu, w_{m,2}, w_{f,2}\} \), so that the optimal solution is \( \{h_{i,2}^*(\Omega_2), d_{i,2}^*(\Omega_2), Q^*(\Omega_2), \xi^*(\Omega_2)\} \).

The wages in the second period are determined by the human capital that is accumulated in the first period. For an agent that works for \( h_{i,1} \) hours in the first period, his second period wages are augmented by that amount,

\[
w_{i,2} = w_{i,1} + \gamma h_{i,1}
\]

In the beginning of the second period, for married/cohabiting partners, the value of match quality \( \theta \) is revealed and each partner decides, given the current weight \( \mu \) determined in the first period, whether or not to stay in the relationship, or to separate. If they separate, each partner becomes single and receives utility from consumption of leisure and the public good as a single person, and also incurs the separation penalty denoted by \( \kappa_M \), if they are married, and \( \kappa_C \) if they are cohabiting.

If the participation constraint binds for both of the partners, they separate. If the participation constraint binds for only one partner, the planner weight for that partner is increased to
the point where he or she is indifferent between staying and leaving, as in Marcet and Marimon (1998) and Mazzocco and Yamaguchi (2007). If there is no weight that satisfies both participation constraints, the couple separates. This occurs whenever the total surplus generated outside the relationship, minus the separation penalties, is larger than what can be achieved within it.

The planner solves the second period time allocation problem using updated Pareto weight $\mu$, which is determined by the following rule,

$$
\begin{align*}
\tilde{\mu} = & \begin{cases} 
\mu & \text{if } u(l_{i,2}^*, Q_{i,2}) + \theta > u(l_{i,2}^S, Q_{i,2}^S) \ i = m, f \\
\mu & \text{if } u(l_{i,m,2}^*, Q_{i,2}^S) + \theta < u(l_{i,m,2}^S, Q_{i,2}^S) + \kappa \\
\overline{\mu} & \text{if } u(l_{i,f,2}^*, Q_{i,2}^S) + \theta < u(l_{i,f,2}^S, Q_{i,2}^S) + \kappa 
\end{cases}
\end{align*}
$$

where $\mu$ is the weight at which the solution to the planner’s problem is solved with a binding participation constrain for the male,

$$
u(l_{m,2}, Q_2) + \theta = u(l_{m,2}^S, Q_2^S) + \kappa
$$

and $\overline{\mu}$ is the weight at which the solution to the planner’s problem is solved with a binding participation constrain for the female,

$$
u(l_{f,2}, Q_2) + \theta = u(l_{f,2}^S, Q_2^S) + \kappa.
$$

Now we specify the agent’s problem in the first period. Every agent in the economy starts the first period as single. They meet a partner with wage $\check{w}$ with an exogenous probability denoted by $P_w(w_j)$. An individual with $w$ then solves the following problem to decide whether he/she is going to get together with the person she meets (either through cohabiting or getting married). Consider an agent who is endowed with wage $w_i$ and meets a partner with wage $w_j$. In the first period, the solution to the following problem characterizes the optimal hours allocation of the couple conditional on forming a relationship, either cohabiting or married. If setting the Pareto weights in the first period at $\mu = \frac{1}{2}$ induces both partners to enter the relationship rather than remain single, then we set $\mu = \frac{1}{2}$. Otherwise, we increase the weight on the agent who would prefer to remain single until the point at which he or she is indifferent between remaining single and entering into the relationship. Having determined the weight $\mu$, the planner solves the following problem:
The couple maximizes the above problem with respect to their labor market and housework hours as well as relationship status $\xi$. So that:

$$V_{i,1}(w_m, w_f) = u(l_{i}^*(w_{m,1}, w_{f,1}), Q_{i}^*(w_{m,1}, w_{f,1})) + \theta + \beta V_{i,2}(\mu, w_{m,1}, w_{f,1}) \quad i = m, f$$

The couple does not observe their match specific quality $\theta$ until the beginning of the second period, so $\theta$ does not enter their problem in the first period.

For a fixed Pareto weight, it is straightforward to derive the closed form solution to the hours choices of the couple in terms of their wages and the parameters of the mode. However, the participation constraints in the second period make the analytical solution less tractable, so we solve the above two period model numerically by discretizing the choice variables of hours.

Our main goal here is to demonstrate the implications of limited commitment and household specialization concerns on sorting and living arrangement patterns for different parameter values and different specifications for the home production technology. The parameters of the two period model and the values used for plotting the decision rules are displayed in Table 1. These are not estimated parameters. We plot the decisions rules for the agents for different functional forms for the production technology that specify different substitution possibilities between the time inputs of the spouses into home production. Before we go on to the solution of the two period model, we briefly outline the channels at work in the model.

In the model, the gain from marriage/cohabitation stems from joint consumption of a public good in the household, increasing returns to scale property of the home production technology and potential gains from specialization due to comparative advantage of the spouses in the labor market if they have differing wages. These generate positive economic gains from marriage in the sense that the output the partners generate together is greater than the sum of the outputs that the partners can obtain separately. However, the extent to which each of these gains are realized depends on whether the couple chooses to cohabit or get married. The tradeoff that the couple faces in making this choice is as follows. The couple faces uncertainty regarding their match quality, and this uncertainty is resolved at the beginning of the second period: (1) Cohabitation
provides an opportunity to hedge against a possibly negative match quality in the second period. Therefore, cohabitation allows the partners to benefit from the advantages of living together, without the requirement to face legal separation costs in the event of negative match specific shocks, (2) Marriage makes future separation more costly, and this might enable the agents to achieve a higher level of total surplus through full specialization. The reason for this is the fact that the couple cannot commit to not separate in the second period. However, legal marriage can be viewed as a device to make separation more costly for the partners.

The \textit{ex ante} efficient solution entails full specialization within the household when the partners have different wages. If the couple is unable to make binding commitments to not separate in the future, then they will adjust their period 1 behavior to reflect an expected future separation. The partners’ time in period 1 is divided between market work, and production of a household public good. If they cannot commit to a division of second-period household surplus that compensates the home worker for foregone earnings power, then the family will choose an inefficient level of specialization, and produce too little of the public good. Cohabitation makes this intertemporal commitment more difficult. The lower degree of commitment in a cohabiting relationship can therefore be expected to lead to increased employment rates of women and lower household specialization. On the other hand, the increased labor market opportunities of women might also contribute to increased cohabitation rates, as the equalization of men and women in the labor market means the decline of comparative advantages and hence lower gains from specialization. Marriage moves the family to a more efficient level of production, however this benefit of marriage diminishes with decreasing comparative advantages in the labor market.

2.1 Solution of the Two-Period Model

There are two important predictions of the model that we investigate looking at the decision rules of the agents: (1) Labor market hours, (2) Living arrangements (marriage, cohabitation or living alone), (3) Sorting patterns in terms of the wage endowments of males and females. Depending on the parameter values, the prediction of the model is that all three are strongly influenced by the differing degrees of commitment between marriage and cohabitation, as well as the choice of whether to live alone or with a partner. All decision rules considered are those pertaining to the first period and their arguments are the wage pair of the potential match that meets at the beginning of the period, $w_m, w_f$. In the model, each agent with $w_i$ meets a potential partner with wage $w_j$. They then choose hours of work as well as whether they will cohabit, get married or remain single.
2.1.1 Specification 1

We first consider a home production technology where: (1) Housework hours of partners are perfect substitutes, (2) The technology exhibits increasing returns to scale so that, for example, doubling the inputs of home production and market purchases raises the output by a factor more than two. The home production technology is,

\[ Q = (d_m + d_f)g \]

Given this home production technology, the efficient allocation for a couple with differing wages is for the higher wage partner to specialize labor market, and the lower wage person to specialize in home production. However, under limited commitment, this efficient allocation might not be achieved. For example, in a match in which the female has the lower wage, the efficient outcome would have her work in home production. However, when she works at home in the first period, she foregoes higher wages in the second period, decreasing the value of her outside option. Without commitment, the male is not able to compensate her for this with future period transfers. Because of the high separation penalty, marriage is associated with a greater degree of commitment and more specialization.

In Figure 1 we plot labor market and housework hours for the male partner against his wage in the first period, averaging over the possible values of female wage. In this parameterization, the cohabitation penalty is fixed at zero and the marriage separation penalty is sufficiently high that no married couples end up divorcing in the second period. This higher level of commitment for married couples allows a higher degree of specialization in the first period. The male partner specializes in housework at low wages and labor market work at high wages. On the other hand, for those couples who choose to cohabit, the degree of specialization is lower, with much less variation in hours for different wages.

In Figure 2 we plot their decision rules regarding relationship status after they meet in the first period against the wage pairs of each potential match. The plot shows that couples who end up cohabiting are those with similar wage endowments, who stand to benefit less from specialization. Matches with larger wage differentials choose to marry instead to take advantage of the increased specialization that comes with stronger commitment. When both partners have very high wages, neither wishes to forego the benefits of working in the labor market so the gains to specialization are smaller and we see a widening of the region in which the couple chooses to cohabit.
2.1.2 Specification 2

The decision rules discussed above are sensitive to our specification of the home production technology in this specification. To illustrate this we consider an alternative home production technology. The second specification we consider is the following:

\[ Q = (d^\nu_m + d^\nu_f)^{1/\nu} g \]

where \( g = w_m h_m + w_f h_f + Y \) and \( \nu \) governs the elasticity of substitution between the housework time inputs of the spouses in the production technology. Compared to the previous specification, this specification nests different degrees of substitution possibilities between the time inputs of the spouses, so that we allow for concavity and some complementarity between partners’ time use depending on the value of \( \nu \). In this case the optimal allocation of hours in the household does not necessarily entail full specialization, and interior solutions will arise. The partner with high wages will still work more in the market. However, in this case, the gains from specialization are smaller. Figure 4 contains the graph of the matches formed given the wage pairs under this home production technology. Compared to the previous specification, there is far more cohabitation and far less marriage. Only for those couples with very large wage differentials do the gains from specialization outweigh the utility loss from being less able to dissolve a match that turns out to be of low quality.

In Figure 3, we plot the hours for male partner against his wage in the first period in this specification of the model, again averaging over the possible values of female wage. For cohabiting couples, for most wage values, labor market hours simply increase in response to increasing wage, with a simultaneous decrease in housework hours. For married couples, the time allocation is dominated by the selection effect. Since the only couples that marry are those with large wage differentials, we see a sudden jump in labor market hours and a corresponding decrease in housework hours as we pass from a region of low-wage males and high high-wage females to one in which high-wage males are paired with very low-wage females.

3 Full Model

Agents make decisions regarding relationship status, employment, and fertility in each period. At each age \( a \), a single individual chooses the following: hours of labor market work (\( h_a \)), hours of housework (\( d_a \)), and whether to cohabit or marry (if he/she meets a potential partner) or continue search as a single person. When married, the individuals jointly choose: hours of labor market work and housework of both spouses, whether to become pregnant or not (if at a fecund age), and whether to stay married or separate. When cohabiting, individuals face the same
alternatives as when they are married, with the addition of the decision to get married or not.

In the model, differences in latent types lead to differences in wages as well as their marriage utilities.

### 3.1 Preferences

The individual’s utility flow depends on his/her private leisure, public good consumption (produced by a intra-household production process with domestic labor supplies of the partners as inputs if married or cohabiting, private if single), number of children, and match quality (if married). The utility function of an individual of latent type $j$ is given by,

$$u(l_i, Q, n_{i0}, n_{i1}, \theta_{ia}, \xi_a, j) =$$

$$\alpha \log(l_i) + (1 - \alpha)(1 + a_0n_{i0} + a_1n_{i1}) \log(Q + \zeta) + 1\{\xi_a = c \text{ or } \xi_a = m\} \theta_{ia}$$

$$+ u_{MAR}(j)1\{\xi_a = m\}$$

$$+ 1\{\xi_{a-1} = m, \xi_a = s\}\kappa_m + 1\{\xi_{a-1} = c, \xi_a = s\}\kappa_c$$

where $l_i$ is leisure, $Q$ the quantity of the public good produced in the household, $\theta_a$ the match specific quality, The utility of marriage relative to cohabiting, $u_{MAR}(j)$, is allowed to depend on the latent type. $\xi$ denotes the relationship status and takes on three values: marriage, cohabitation, and being single. $\kappa_M$ and $\kappa_C$ indicate the cost of separating for a married couple and a cohabiting couple, respectively, so that the separation cost is determined by the relationship status in the preceding period ($\xi_{a-1}$).

We also make a distinction between the number of children each individual had prior to meeting their current partner, and the number of children they have with their current match. The child utility is different depending on the current living arrangement of the parents. $n_{i0}$ represents the number of children the agent has from a previous relationship but does not live with, $n_{i1}$ the number of children the agent does live with, either from the current relationship or a previous one. Parents’ valuation of children is different by whether they are living with the parent of their child. This takes into account the fact that parents spend less time with their children when they are separated or divorced, as they share the time with the other parent.

### 3.2 Fertility and Children

Each period, married and cohabiting couples determine whether they want to try to have a child. Whether they do have an additional child the following period is a random event whose probability is determined by this choice.
3.3 Marriage Market and Match Quality

Every period, with probability $p$, a single individual meets a potential partner. Once a potential partner is drawn, the potential couple then draws a match quality of the partnership, given by $\theta$. The couple then decides whether to marry/cohabit or whether to remain single and continue search. The problem that the couple faces when they are making this decision is outlined below in the household’s problem section. If they decide to get married or cohabit, their match quality follows a Markov process during the course of their relationship, so that in each period they draw a new match quality conditional on the match quality in the previous period. As in Brown and Flinn (2006), we have a finite number of match quality values $\theta_1,\ldots,\theta_M$. The probability of a match quality of $\theta_j$ increasing to $\theta_{j+1}$ is given by $P^+_\theta$ if $j < M$. The probability of a match quality of $\theta_j$ decreasing to $\theta_{j-1}$ is given by $P^-\theta$ if $j > 1$.

3.4 Home Production Technology

There is a public good that is domestically produced using the domestic labor supplies of the partners as inputs. The intra-household production technology is given by $Q(d_m, d_f, g)$, where $d_m, d_f$ are the partners’ number of housework hours and $g$ is the amount of goods purchased in the market for the production of the public good. The output of the intra-household production process is not observable and is not marketable. At age $a$, the public good is produced according to the following technology:

$$Q_a = (D_a^\sigma + g_a^\sigma)^{1/\sigma}$$

where $g_a$ is the amount of market purchased goods, and $D_a$ is the effective housework hours. $D_a$ is defined as,

Single Males: $D_a = \delta_md_{ma}$

Single Females: $D_a = \delta_fd_{fa}$

Couples: $D_a = ((\delta_md_{ma})^{\nu} + (\delta_fd_{fa})^{\nu})^{1/\nu}$

3.5 Budget Constraint

The couple’s labor income is given by the sum of their earnings, $w^m_a h^m_a + w^f_a h^f_a$. For a single individual, labor income is given by $wh$. Single individuals and cohabiting couples face a tax
rate of $\tau_s$, while married individuals face a tax rate of $\tau_m$.

Single Males: \[ g_a = (1 - \tau_s)w_{ma}h_{ma} \]
Single Females: \[ g_a = (1 - \tau_s)w_{fa}h_{ma} \]
Cohabiting: \[ g_a = (1 - \tau_s)(w_{ma}h_{ma} + w_{fa}h_{ma}) \]
Married: \[ g_a = ((1 - \tau_m)(w_{ma}h_{ma} + w_{fa}h_{ma}) \]

3.6 Household’s Problem

The problem of a cohabiting/married couple is as follows. The first best allocation to the couple’s problem can be derived by solving the following social planner’s problem:

$$\max_{h_{m,a}, h_{f,a}, l_{m,a}, l_{f,a}, p_a} \mu_m \sum_a \beta^a u(l_{m,a}, Q_{m,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{m,a}, \Omega_{m,a}, j)$$
$$+ (1 - \mu_m) \sum_a \beta^a u_f(l_{f,a}, Q_{f,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{f,a}, \Omega_{f,a}, j)$$

The couple chooses the male and female labor market hours ($h_m, h_f$) as well as their housework hours ($d_m, d_f$), and whether to get pregnant that period or not ($p$). The couple does not have access to a commitment technology, therefore we formulate the Pareto problem with participation constraints so that the problem becomes:

$$\max_{h_{m,a}, h_{f,a}, l_{m,a}, l_{f,a}, p_a} \mu_m \sum_a \beta^a u(l_{m,a}, Q_{m,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{m,a}, \Omega_{m,a}, j)$$
$$+ (1 - \mu_m) \sum_a \beta^a u_f(l_{f,a}, Q_{f,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{f,a}, \Omega_{f,a}, j)$$

s.t. \[ \sum_{r=a}^{A} \beta^{r-a} u(l_{m,a}, Q_{m,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{m,a}, \Omega_{m,a}, j) \geq \bar{V}_{m,a} \]
\[ \sum_{r=a}^{A} \beta^{r-a} u(l_{f,a}, Q_{f,a}, n_a, n_{m,a}, n_{f,a}, p_a, \theta_a; \varepsilon_{f,a}, \Omega_{f,a}, j) \geq \bar{V}_{f,a} \]

We can reformulate this problem in its recursive form using the approach of Marcet and Marimon (2000) and Mazzocco and Yamaguchi (2006) where they expand the set of state of variables by including a new state variable, $M_{ia}$ that denotes the Pareto weight plus the cumulative sum of the Lagrange multipliers on the participation constraints at all periods from 1 to $t$. Hence, whenever spouse $i$’s participation constraint binds, the weight on this utility function is increased. Divorce
is an efficient outcome in this problem and it occurs whenever there are no more gains to staying married.

When a couple first meets, the initial Pareto weight is determined by a Nash bargaining problem that assigns both potential partners equal bargaining weight, where the outside option for both potential partners is to remain single.

4 Data

The core PSID sample consists of two independent samples: a cross-sectional national sample, known as the SRC (Survey Research Center) sample, and a national sample of low-income families, known as the SEO (Survey of Economic Opportunities) sample. This core sample originated in 1968 and the individuals from families in the core sample were interviewed from 1968 to 1996 every year and every two years after 1996. In 1990 and 1997, a supplemental sample of Latino households and Immigrant families were added to the core PSID sample. The estimation sample used in this paper includes only those individuals who are associated with families from the SRC.

For the years 1968-1977, the PSID does not make the distinction between marriage and permanent cohabitation, and identifies a respondent in either kind of relationship as “married.”. Starting in 1978, the survey records the legal marital status of the head, which can be used to distinguish between those who are legally married and those who are cohabiting. After 1993, the survey asks only for the legal marital status so it is no longer possible to distinguish a respondent who is single from one who is cohabiting using these questions. Alternatively, starting in 1983, the PSID records in greater detail the relationship of each member of the household to the head. First-year cohabiters are identified by a special code, as are “permanent cohabiters,” defined as those cohabiters who have been in the household long enough to have appeared in an earlier wave of the survey. (Information such as hours worked that is collected for wives is also collected for permanent cohabiters.) From the relationship code assigned to the head’s wife or partner, we are able to construct an alternative measure of the relationship’s status.

For our tabulations, we use both approaches to identify married and cohabiting couples, using one if the other is ambiguous, and discarding the few observations where the two measures contradict each other. When we report transition probabilities by the duration of the relationship in its current status, we keep only observations where we can clearly identify the start of the relationship.4 Because the PSID is administered only once per year, there is a limit to the

4 We can do this either if we see one spouse in a particular wave and then the other spouse enters the household the following wave, or if we explicitly see the status of relationship change from cohabiting to married, or if the cohabiter is coded as first-year cohabiter. In addition, there are cases where a partner appears for the first time, but is not identified as a first-year cohabiter, but is coded as permanent
precision with which we can identify the length of a relationship. For example, a relationship that is observed in one wave and has dissolved or changed status by the next wave is assumed to have lasted for one year. Similarly, this holds for a relationship that is observed for longer. The method by which we identify married and cohabiting couples does not let us clearly identify the relationship status of any observations before 1977. Therefore we do not use data collected prior to this year.

After 1997, the PSID switched to a biannual format. In order to maximize the number of observations for the later cohorts, we use available information on dates of marriage and divorce and the movements of individual household members to construct the relationship status of respondents during years in which data was not collected. This is particularly important for our analysis as information on labor income and hours worked are collected for the calendar year before the year of each survey, which is the “off-year” after the survey format changes. When we are able to do so, we assign to that year the relationship status as of the mid-point of the year.

Couples who were cohabiting or married in both the preceding and following year are assumed to have the same status during the intervening year. When a new marriage is observed in a year following one in which no data was collected, we use the marriage history to identify if the marriage began before or after the middle of the previous year. Similarly, when a new cohabiting relationship is observed, we use the dates on which the partner moved into the household to determine if they had begun to cohabit before or after that date. Using a combination of the marriage date and the move-in date, we are able to identify if a newly married couple had been living together un-married in the preceding year. For a relationship that ends between two survey waves, we use the same approach to assess the status of the relationship at the middle of the intervening year. In this case, we use dates of divorce or separation from the marriage history files as well as the move-out dates of former household members.

Over the course of the sample period, we observe the respondents in 3,667 relationships with distinct partners. In 25% of these, the couple lives together un-married, either before or without ultimately getting married. 65% of relationships are observed to eventually be married. Of all cohabiting relationships, 45% eventually result in marriage. Conversely, we observe that 18% of marriages begin as cohabiting relationships. The true number is likely higher as our tabulation excludes episodes of pre-marital cohabitation that were sufficiently short that respondent was not interviewed during the period.

In what follows, we summarize the main features of the sample used for the estimation. We consider two groups of birth cohort in our analysis. The first group consists of individuals who are born between 1955 and 1965. The second group consists of individuals who are born between 1966 and 1976. Figure 5 displays the proportion of individuals in each marital status by age cohabiter the following wave.
for the first cohort group. Table 4 compares marriage and cohabitation rates between the two cohort groups. It can be seen from these figures that marriage rates have fallen for all ages, while cohabitation rates have increased for all ages for the younger cohort group.

Table 5 shows the annual labor market and housework hours worked by marital status and presence of children in the household. Our model predicts that because cohabiting couples have a lower level of commitment and are more likely to dissolve the relationship, they are less able to specialize. Traditionally, the male partner specializes in labor-market production and the female partner in home-production, so we hypothesize that married or cohabiting women should work less in the labor force and more at home than single women, but that this effect should be stronger for married women. As a simple descriptive test of this hypothesis, we regress the number of hours worked by women on dummy variables for marital and cohabitation status, controlling for age and children and including person-specific fixed effects. The results of this regression are shown in Table 6. We find that married women do work less than single women, but the effect of cohabitation compared to being single is statistically insignificant. A similarly specified regression for men reveals that both cohabiting and married men tend to work more than single men, with married men working more than those cohabiting.

Having described the marriage and cohabitation patterns of our PSID sample, we consider the differences in housework hours between couples of different relationship status. In married couples with children, the wife performs an average of 20 hours of housework and the husband 8. The corresponding numbers for cohabiting couples with children are 18 hours for the female partner and 10 for the male partner, suggesting that cohabiting couples do engage in less traditional gender specialization than married couples. To be more careful about other factors that might affect the division of housework, we regress the hours of housework for both partners on dummies for the relationship status, controlling for number of children, hours worked in the labor market by both partners, and person-specific fixed effects. The results of this regression are shown in Table 7. We find that in legal marriages, compared to cohabitation, the wife works an additional 1.9 hours per week in the house and the husband 2.0 hours fewer. Thus our conclusion regarding the effect of the relationship status on specialization seems fairly robust.

5 Estimation Method

Estimation is carried out by simulated method of moments where the model parameters are chosen to minimize a weighted average distance between a set of sample moments and moments simulated from the model. The moments used in the estimation are listed below. Moments related to the couples’ labor supply behavior are as follows: 1) Hours worked and wages by gender, age, education (by cohort), 2) Variance of wages (by cohort), 3) Correlation between male and
female education level in a cohabiting and married union (by cohort), 4) Transition rates between different relationship states (single, cohabiting, married) by relationship length (by cohort), 5) Number of children by relationship status (by cohort), 6) Transition rates between relationship status, and having a child in subsequent periods (by cohort). The method of moments estimator used is defined as follows:

$$\min g(\theta)'Wg(\theta)$$

The weights are the inverse of the estimated variances obtained from the micro-data, divided by the number of individuals that contribute to each moment. \(g(\theta)\) is defined as follows:

$$g(\theta) = \frac{1}{N} \sum_{i=1}^{N} g_i(\theta) = [\bar{m}_1 - \mu_1(\theta), ..., \bar{m}_K - \mu_K(\theta)]$$

where \(\{\bar{m}_1, ..., \bar{m}_k, ..., \bar{m}_K\}\) correspond to each of the data moments defined above, and \(\{\mu_1(\theta), ..., \mu_k(\theta), ..., \mu_K(\theta)\}\) are the corresponding model moments. \(N\) denotes the number of individuals in the sample.

6 Estimation Results

Below we present the estimation results. We made a number of choices in the estimation in the interest of keeping the problem at a manageable size for computation.

We approximate the decision problem by using discrete distributions to represent distributions of the match quality \(\theta\), and wage shocks \(\varepsilon\). Following Kennan (2004), we specify a continuous distribution for each of the two shocks, and given the parameters of this distribution, we specify a discrete approximation to it. The estimation results are obtained by allowing for \(n_\theta = n_\varepsilon = 3\) support points for the discrete approximation. We find that especially marriage and cohabitation rates can be sensitive to higher number of support points for the match quality distribution.

We also discretize the decision variable for labor supply. In the model, there are three choices regarding labor supply and housework hours. For labor supply, choices for daily hours are 0, 4 and 8, which correspond to not working, working part-time, and full-time. For housework hours, choices for daily hours are 0, 3, 6, and 9. These numbers are then translated into their weekly or annual counterparts in the data.

We use a grid for the Pareto Weights, \(\mu\), also. The estimation results reported here are obtained by setting \(n_\mu = 5\). We find that simulated moments are sensitive to the number of grid points allowed for the Pareto weight as well, although to a less extent than they are to
the \( \theta \) specification. Unobserved heterogeneity in utility of marriage and wages is introduced by allowing for two types.

### 6.1 Parameter Estimates

Tables 8 through 11 report the parameter estimates. Table 8 displays the home production technology parameters. The key parameters are \( \sigma \) which governs the degree of substitutability between the market purchased goods and housework hours in the production of the public good.

Our estimates show that \( \sigma \) is 0.61 for the older cohorts and it is 0.68 for the younger cohorts. This shows that the degree of substitutability between market purchased goods and housework hours is higher for the younger cohorts. Parameter estimates also show that housework hours of the partners are close substitutes. In the data, both cohabiting and married men work fewer hours in the house than women. When the technology is such that the production technology allows for higher degree of substitution possibilities between the housework hours of men and women, the comparative advantage created by the higher wages of men translates into household allocations that entail specialization. With limited substitution possibilities, we should observe men working as much in the house as women do, despite the fact that they have higher productivity in the labor market. On the other hand, with a production technology that exhibits the property of perfect substitutability between the housework hours inputs of men and women, we should observe men to be not working in the house at all. Neither of the last two scenarios hold in the data; men work less than women in the house, but they do work on average about 10 hours per week.

The transition probabilities that govern the evolution of the match quality \( \theta \) is another key parameter in the model. In the data, the level of separation rates and also the pattern they follow over a relationship’s length are the key moments that identify the transition probabilities. Moreover, the degree of uncertainty faced in a relationship determines choices about whether to try to have children (since the partners get less utility from children they do not live with), as well as the degree of specialization partners can achieve in the household given their comparative advantages in the labor market and household. Table 9 shows that the probability of a positive match quality shock, \( p^+_\theta \), is estimated to be 23\%, while the probability of a negative match quality shock, \( p^-\theta \), is 23\%.

### 6.2 Model Fit

Below we present the within-sample fit for chosen moments in the estimation.

Figure 8 and Table 9 show that the model captures closely the age profile of hourly wages and number of hours worked in the labor market by gender and education. The model fits very well
the profiles for high school and college educated males, as well as high school females. However, for college educated females, the model understates the hourly wages.

Figure 6 and 7 show the marriage and cohabitation rates by age for males and females. The model fits well the marriage rates of females marriage rates of females by their education level for both groups of cohorts. Specifically, it captures the considerable fall in marriage rates and rise in cohabitation rates. This can be seen more clearly in Table 12 which shows the model fit for the conditional marriage and cohabitation rates for both cohorts.

7 Conclusion

The results from the two-period model indicate that choices about non-marital cohabitation have important implications for patterns of marital sorting, and degree of specialization in the household. As returns to specialization fall, the number of cohabiting couples increase, and the degree of positive assortative mating falls for cohabiting unions. The level of the divorce penalty is a strong determinant of these patterns.

More importantly, our results indicate that the patterns of marital sorting by type of union formed, can have important information about the home production technology as well as the degree of commitment the couple has access to in their relationship. The simple two period model is able to generate the differences in the labor supply, housework hours and patterns of marital sorting of members of cohabiting and married unions that we observe in the data. We next estimate the full dynamic model in order to perform policy experiments, and assess the welfare implications of inefficiencies that may arise in co-residential relationships.
References


Table 1: Parameters used for the Decision Rules in the Two-Period Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\kappa_C$</td>
<td>0</td>
</tr>
<tr>
<td>$\kappa_M$</td>
<td>-100</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>1</td>
</tr>
<tr>
<td>$\theta$</td>
<td>-60</td>
</tr>
<tr>
<td>$P_0(\theta)$</td>
<td>0.5</td>
</tr>
<tr>
<td>$P_0(\bar{\theta})$</td>
<td>0.5</td>
</tr>
<tr>
<td>$\lambda_m$</td>
<td>0.5</td>
</tr>
<tr>
<td>$\lambda_f$</td>
<td>0.5</td>
</tr>
<tr>
<td>$\nu$</td>
<td>2.25</td>
</tr>
<tr>
<td>$\sigma_l$</td>
<td>0.5</td>
</tr>
<tr>
<td>$\sigma_Q$</td>
<td>0.5</td>
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Table 2: Spouse Differences in Hours Worked by Relationship Choice

<table>
<thead>
<tr>
<th></th>
<th>Market Hours</th>
<th>Housework Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure 1: Hours by Wage and Relationship Choice in First Period
Figure 2: Sorting Patterns by Relationship Choice
DECISION RULES USING THE TWO-PERIOD MODEL - SPECIFICATION 2

Table 3: **Spouse Differences in Hours Worked by Relationship Choice**

<table>
<thead>
<tr>
<th></th>
<th>Market Hours</th>
<th>Housework Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Figure 3: **Hours by Wage and Relationship Choice in First Period**

![Labor Market Hours by Wage](image1)

![Housework Hours by Wage](image2)
Figure 4: Sorting Patterns by Relationship Choice
Figure 5: Marriage and Cohabitation Rates by Age
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High School:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion Married</td>
<td>69%</td>
<td>53%</td>
</tr>
<tr>
<td>Proportion Cohabiting</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td><strong>College:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion Married</td>
<td>69%</td>
<td>57%</td>
</tr>
<tr>
<td>Proportion Cohabiting</td>
<td>30%</td>
<td>42%</td>
</tr>
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</table>
Table 5: **Labor Market and Housework Hours by Gender and Relationship Status, 1955-1965 Cohorts**

<table>
<thead>
<tr>
<th></th>
<th>Married</th>
<th>Cohabitng</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Market Hours:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males - No Children</td>
<td>2086</td>
<td>1907</td>
</tr>
<tr>
<td>Males - Children</td>
<td>2084</td>
<td>1886</td>
</tr>
<tr>
<td>Females - No Children</td>
<td>1574</td>
<td>1740</td>
</tr>
<tr>
<td>Females - Children</td>
<td>1046</td>
<td>1116</td>
</tr>
<tr>
<td>Housework Hours:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males - No Children</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Males - Children</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Females - No Children</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Females - Children</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>
Table 6: Regression of Hours Worked

Dependent variable is the total number hours spent working in the previous calendar year at all jobs. The regression includes dummies for married or cohabiting households, with singles the excluded category. Individual fixed effects are included. The regressions for men includes 55,760 observations of 2,997 distinct respondents. The regressions for women includes 59,599 observations of 3,107 distinct respondents. Standard errors are in parentheses.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>239 (3.2)</td>
<td>249 (3.3)</td>
</tr>
<tr>
<td>Age squared</td>
<td>-3.23 (.051)</td>
<td>-3.31 (.051)</td>
</tr>
<tr>
<td>one child</td>
<td>19.4 (13)</td>
<td>-416 (11)</td>
</tr>
<tr>
<td>two children</td>
<td>-7.1 (14)</td>
<td>-674 (12)</td>
</tr>
<tr>
<td>&gt;2 children</td>
<td>-33.8 (18)</td>
<td>-842 (16)</td>
</tr>
<tr>
<td>Married</td>
<td>168 (11.2)</td>
<td>-85.5 (9.0)</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>127 (15.6)</td>
<td>-9.32 (14.5)</td>
</tr>
<tr>
<td>constant</td>
<td>-2302 (46)</td>
<td>-2565 (47)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.19</td>
<td>.16</td>
</tr>
</tbody>
</table>
Table 7: Regression of Housework Hours

Dependent variable is weekly hours spent on household production, the answer to the question “About how much time do you [or does your spouse] spend on housework in an average week, I mean time spent cooking, cleaning and doing other work around the house.” The regression includes only married or cohabiting households, with cohabiting the excluded category. Household fixed effects are included. The regression for the wife’s hours includes 52,556 observations of 5,169 distinct households. The regression for the husbands’s hours includes 51,525 observations of 5,593 distinct households. Standard errors are in parentheses.

<table>
<thead>
<tr>
<th></th>
<th>Husband’s Hours</th>
<th>Wife’s Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>-2.04 (.17)</td>
<td>1.9 (.37)</td>
</tr>
<tr>
<td>Husband’s work hours</td>
<td>-.075 (.002)</td>
<td>.070 (.004)</td>
</tr>
<tr>
<td>Wife’s work hours</td>
<td>.029 (.002)</td>
<td>-.29 (.004)</td>
</tr>
<tr>
<td>one child</td>
<td>.60 (.09)</td>
<td>3.52 (.16)</td>
</tr>
<tr>
<td>two children</td>
<td>.93 (.10)</td>
<td>5.58 (.17)</td>
</tr>
<tr>
<td>&gt;2 children</td>
<td>1.35 (.13)</td>
<td>8.21 (.22)</td>
</tr>
<tr>
<td>constant</td>
<td>11.1 (.19)</td>
<td>23.3 (.21)</td>
</tr>
</tbody>
</table>

$R^2$ .05 .22
Table 8: **Parameter Estimates - Home Production Technology**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substitution between housework hours and market purchased good ($\sigma$)</td>
<td>0.61</td>
<td>0.68</td>
</tr>
<tr>
<td>Productivity of male housework hours ($\delta_m$)</td>
<td>0.86</td>
<td>0.85</td>
</tr>
<tr>
<td>Productivity of female housework hours ($\delta_f$)</td>
<td>1.80</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Table 9: **Parameter Estimates - Match Quality**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of positive match quality shock ($p^+_\theta$)</td>
<td>0.23</td>
</tr>
<tr>
<td>Probability of negative match quality shock ($p^-\theta$)</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Table 10: **Parameter Estimates - Fertility Process**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of having a child if decide to not try ($p_{\text{notry}}$)</td>
<td>0.24</td>
</tr>
<tr>
<td>Probability of having a child if decide to try ($p_{\text{try}}$)</td>
<td>0.87</td>
</tr>
<tr>
<td>Parameter Description</td>
<td>Estimate(s)</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Weight on leisure ($\alpha$)</td>
<td>0.49</td>
</tr>
<tr>
<td>Utility from children that are currently living with the parent ($a_t$)</td>
<td>1.19</td>
</tr>
<tr>
<td>Utility of being married Type I ($\varphi_m$)</td>
<td>0.16  0.16</td>
</tr>
<tr>
<td>Utility of being married Type II ($\varphi_m$)</td>
<td>0.22  0.16</td>
</tr>
</tbody>
</table>

Table 11: Parameter Estimates - Utility Function
Figure 6: Model Fit: Marriage and Cohabitation Rates, 1955-1965 Cohorts

Model Fit: Marriage Rates by Age – Male

Model Fit: Marriage Rates by Age – Female

Model Fit: Cohabitation Rates by Age – Male

Model Fit: Cohabitation Rates by Age – Female
Figure 7: Model Fit: Marriage and Cohabitation Rates, 1966-1976 Cohorts
Table 12: Marriage and Cohabitation Rates Conditional on Being Together

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Model</td>
<td>Data</td>
</tr>
<tr>
<td>High School:</td>
<td></td>
<td></td>
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<tr>
<td>Proportion Married</td>
<td>70%</td>
<td>69%</td>
</tr>
<tr>
<td>Proportion Cohabiting</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>College:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion Married</td>
<td>64%</td>
<td>69%</td>
</tr>
<tr>
<td>Proportion Cohabiting</td>
<td>36%</td>
<td>30%</td>
</tr>
</tbody>
</table>
Figure 8: Model Fit: Log Hourly Wages

Model Fit: Log Hourly Wages by Age – Male High School

Model Fit: Log Hourly Wages by Age – Male College

Model Fit: Log Hourly Wages by Age – Female High School

Model Fit: Log Hourly Wages by Age – Female College
Figure 9: Model Fit: Hours

Model Fit: Hours by Age – Male High School

Model Fit: Hours by Age – Male College

Model Fit: Hours by Age – Female High School

Model Fit: Hours by Age – Female College