Female Employment, Marriage, and Childcare*

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Abstract

Childcare and women's employment decisions are intimately linked. I develop a dynamic model designed to analyse how childcare subsidies affect labour supply, fertility, marriage, and childcare decisions in a collective setting. In the model, marriage allows for specialisation in household production, which becomes more important when children are present. However, this specialisation can reduce work experience and lead to long-term income loss upon divorce, as couples cannot commit to insure one another against the lower wages associated with household specialisation. I estimate the model using the Panel Study of Income Dynamics in the United States to evaluate the impact of childcare subsidy programs on various life-cycle outcomes of women and men. Offering a 10 percent childcare subsidy increases the labour supply of single mothers by 3.2 percent, while married mothers, and higher-educated single mothers, respond much less. Finally, I show that childcare subsidies encourage women to have children earlier, which increases the gains from marriage through specialisation and leads to an increase in the married fraction of the sample.

Keywords: female labour supply, childcare, collective household models
JEL classification codes: J24, J22, J12, J13, D13

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1 Introduction

Over the past 50 years many countries, including the United States, have experienced large increases in women's participation in the labour force. In response to this trend and the growing need for policies that balance family and work life for mothers, the Biden-Harris administration in the United States has taken actions to reduce childcare costs through the American Rescue Plan (ARP) and the 2024 proposed budget is expected to lower the childcare expenses, with one of its primary goals being to support a better family-work life balance (White House Statement, 2024).

Evidence in the literature shows that lowering childcare costs can increase mother's employment,[1] and the studies that compare the employment responses of single and married mothers often find that single mothers are particularly responsive to child care subsidies.[2] However, the literature often overlooks a critical aspect: reducing the cost of childcare can have unintended consequences on marital decisions. The main channel is through the change in mothers' labor supply.

Lowering childcare costs increases the price of staying out of the labour market, which could encourage more mothers to either work more hours or to participate in the labour market (substitution effect). This can lead to fewer marriage-specific investments, reducing the marital gains for both partners and potentially increasing divorce rates. On the other hand, lower childcare costs increase net household income and might reduce the labour supply of mothers who are already in the labour market (income effect). If the substitution effect dominates, there will be fewer marriage-specific investments and higher divorce rates. However, if the income effect dominates, there will be greater gains from specialization, and we expect a reduction in divorce rates. Therefore, the impact of these subsidies on household specialization and marital gains remains ambiguous.

The increase in labour supply could also occur for other reasons: lower childcare costs can make single parenthood more financially viable, which might encourage divorce. In anticipation of divorce, women might invest more in their own human capital by working more to either offset the potential loss of spousal income upon divorce or to have more

[1] See e.g. Cascio (2009), and Gelbach (2002) studying the expansion public school kindergarten in the US, Baker et al. (2008), and Lefebvre and Merrigan (2008) evaluating the provision of subsidized child care in Canada, Haan and Wrohlich (2011), and Müller and Wrohlich (2018) for Germany, Givord and Marbot (2015) studying the increase in childcare subsidies in France, Nollenberger and Rodríguez-Planas (2015) studying the provision of public childcare in Spain, and Brewer et al. (2022) evaluating childcare subsidies in the United Kingdom.

[2] See e.g. Bauernschuster and Schlotter (2015); Bettendorf et al. (2015); Cascio (2009); Fitzpatrick (2012), and Goux and Maurin (2010).

income to make marriage feasible through monetary transfers. This mechanism could lead to an increase in labour supply but does not necessarily lead to higher divorce rates.

Given that single and married women respond differently to policies that reduce cost of childcare and that these policies could change marital decisions, evaluating the impact of childcare policies on employment decisions without considering their effect on marital choices fails to account for an essential channel of policy implications. The main objective of this paper is to provide empirical evidence on how universal subsidies towards childcare costs affect employment of single and married women in the United States. To do this, I develop a rich discrete choice dynamic programming model in a collective framework. In the model, wages, employment, childcare take-up, fertility, and marital decisions are endogenously determined. Household decisions are modelled using a Nash bargaining framework, where outside options are specified as the values that spouses obtain from making decisions as single individuals.

There are five distinctive features in this framework which allow me to study the lifetime impacts of childcare subsidy programmes on the labour market outcomes and wages of single and married individuals: i) marriage allows for specialization either in household production or the labour market. Specializing in household production can result in reducing working hours or complete withdrawal from the labour market; ii) since children require parental time, specialization in household production becomes more important when children are present enabling married couples to further benefit from household specialisation; iii) part-time and full-time work experiences are endogenously determined and affect wages differently, therefore the decision to not to work or to work part-time affects wages and future income through lower work experiences; iii) couples cannot commit to insure one another upon divorce against the lower income associated with reducing their labour supply. To the extent that the decision to reduce labour supply upon marriage in order to gain from specialisation could have long-term consequences on their future income upon divorce; iv) children are considered a private household good (or a public good when the parents are married), produced both with parents' time and childcare services. Jointly modelling child care take-up and labour supply decisions allows me to understand how subsidising childcare services affects household specialisation, the outside option to marriage, i.e., the value of divorce, and therefore marital decisions.

I estimate the model using the Panel Study of Income Dynamics (PSID) in the United States. Based on these estimates, I evaluate the impact of childcare subsidy programmes on employment, wages and marital decisions. I conduct several policy experiments with varying levels of subsidies. The first result from these experiments is that childcare subsidies increase childcare take-up. A 10 percent decrease in the cost of childcare increases take-up

of single mothers[3] by 18.7 percent and that of married mothers by 9 percent. However, despite large increases in take-up, the labour supply of mothers are not very responsive with a 10 percent child care subsidy increasing participation rate of single mothers by 1.4 percent and that of married mothers by 0.8 percent. These results imply employment elasticities with respect to the cost of childcare of -0.14 and -0.08 for single and married mothers, respectively which are closer to the lower bound of the previously estimated elasticities in the United States.[4] Furthermore, the increase in participation rate is mostly observed among lower educated mothers and particularly among lower educated single mothers with a 10 percent decrease in the cost of childcare increasing participation rates of lower educated single mothers by 3.2 percent.

The second finding from these policy exercises is that while more generous subsidies are associated with higher participation rates of lower educated single mothers, reducing the costs beyond 55 percent of childcare costs does not further increase participation rate of married mothers. These results are in line with Lundin et al. (2008), who studied further reductions in the price of childcare in Sweden, and Havnes and Mogstad (2011a), who studied the expansion of subsidized childcare in Norway. Both studies found that these policies had small effects on mothers' labour supply. My findings indicate that the threshold at which mothers stop responding to childcare subsidies varies depending on marital status.

The third result is that these policies alter the timing childbirth of both higher and lower educated women. However, since the labour supply of higher educated mothers is less responsive to these subsidies, they experience a decline in their life-time work experience and income. The decline is due to earlier childbirth, which prolongs their exposure to care-giving responsibilities. On the other hand, the labour supply of lower educated mothers is more responsive to childcare policies, which in turn increases their life-time work experience and income. In a scenario where 50 percent of childcare cost is subsidised, the life-time income of lower educated mothers increases by 6.2 percent while that of higher educated mothers decreases by 3.9 percent.

The fourth result from these policy experiments shows that childcare subsidies increase the proportion of married individuals, as long as the subsidy remains below 60 percent of childcare costs for lower-educated mothers and below 45 percent for higher-educated

[3]Throughout this paper, I refer to single individuals as those who have never married or are divorced.

[4]While the estimated range of elasticities reviewed by Blau (2000) is larger, ranging between 0.06 and -0.34, a more recent review by Morrissey (2017) reports elasticities between -0.025 and -1.1. Furthermore, the studies that estimate the elasticities for single and married mothers, find larger (in absolute value) elasticities for single mothers (See e.g. Han and Waldfogel (2001), Anderson and Levine (1999), and Kimmel (1998)). My estimates are closer to the lower bound of these elasticities.

mothers. A subsidy covering 10 percent of childcare costs reduces the fraction divorced among lower educated women by -0.3 percentage points (or 0.8 percent). For higher-educated mothers, the reduction is smaller at -0.115 pp (or 0.3 percent). This effect is driven by increased gains from specialisation linked to earlier childbirth. However, when subsidies exceed 60 percent of costs for lower educated mothers and 45 percent for higher educated mothers, more parents can purchase childcare as single individuals. Consequently, the benefits of specialization within marriage diminish, which in turn leads to a decrease in the married fraction in the sample.

This paper is related to three strands of literature. First, this paper builds on the long history of female labour supply literature and specifically that which addresses the issues related to part-time and full-time human capital in a dynamic life-cycle framework (see for example Francesconi (2002), Keane and Wolpin (2010), Blundell et al. (2016), Adda et al. (2017), and Chan and Liu (2018)).[5] The dynamic labour supply literature estimating the welfare and labour supply gains from childcare or tax reforms has mainly focused on single or married women.[6] For example, Blundell and Shephard (2012) and Ho and Pavoni (2020) study the optimal design of tax reforms and childcare reforms for single women. Attanasio et al. (2008) and Bick (2016) study the the role of childcare costs on participation rates of married women in the United States and West Germany, respectively. Domeij and Klein (2013), Guner et al. (2020), and Wang (2022) focus on the labour supply responses to child related programmes of both single and married women but in these models the marital decisions of the parents are not explicitly modelled.

Secondly, this paper contributes to the existing literature on life cycle analyses of female labour supply and marital status (Van der Klaauw (1996), Swann (2005), and Fernández and Wong (2014)) and those modelling household employment decisions and marital decisions in a dynamic collective framework such as Mazzocco et al. (2007), Gemici and Laufer (2011), Eckstein et al. (2016), Yamaguchi et al. (2014), Voena (2015), Low et al. (2018), and Doepke and Kindermann (2019). I contribute to this body of literature by adding the choice of childcare to the household decision-making process. This set-up allows me to incorporate women's considerations regarding the consequences of specialisation in household production and not using childcare; i.e. lower work experience and therefore lower income upon divorce, in the household decision-making process. My results indicate that even though return to work experience is high and the lack of insurance through limited

[5]For a survey on Discrete Choice Dynamic Programming literature, see Keane et al. (2011).

[6]Estimating labour supply responses to childcare programmes goes back to Heckman (1974). Ribar (1995), Apps et al. (2016), and Gong and Breunig (2017) are among the papers that study the choice of childcare and labour supply in a static framework. Del Boca (2002) and Haan and Wrohlich (2011) model fertility and labour supply decisions but they do not explicitly model human capital formation.

commitment cannot protect women against the child penalty associated with working less after having a child, childcare subsidy programmes do not have substantial impacts on labour supply of married mothers. They do, however, lead to earlier childbirth which increases the gains from specialisation and ultimately result in an increase in the fraction of married individuals. Conversely, I find that childcare subsidies increase the labour supply of lower-educated single women.

Thirdly, this paper is also related to the empirical literature on the impact of family policies on marital decisions and stability. Previous studies have explored various aspects of this topic: Dahl et al. (2016) examined the expansion of maternity leave in Norway and found no significant effect on the probability of marriage or divorce, whereas Brainerd and Malkova (2023) reported a persistent decrease in divorce rates over a decade as a result of the expansion of maternity benefits in the Baltic countries. Danzer et al. (2022) analysing the expansion of paid leave in Austria, observed no impact on divorce but did find an increase in marriage rates among women with access to formal childcare. In the United States, Pihl (2022) found that the Head Start program increased the marriage rate among non-white mothers. Avdic and Karimi (2018) studied paternity leave in Sweden and found that the reform led to a higher probability of separation, whereas Cygan-Rehm et al. (2018) and Olafsson and Steingrimsdottir (2020), examining paid paternal leave in Germany and Iceland respectively, found a decrease in separation rates. My paper contributes to this body of research by studying how childcare policies influence marital decisions, particularly when life-time decisions such as the timing of childbirth are allowed to adjust in response to such policies.

The remainder of the paper is organised as follows. Section 2 describes the model. Section 3 explains the PSID data used in the estimation. Section 4 covers the estimation and discusses how the model fits the patterns observed in the data. The results and a discussion about identification are included in Section 5. In Section 6, I discuss the results of policy experiments and explain which features of the model contribute to obtaining these results. Section 7 concludes.

2 Model

This paper aims to develop a life-cycle model to understand how childcare subsidies affect the labour supply of both single[7] and married individuals. The model incorporate five key elements to capture the different responses of married versus single individuals to these subsidies. First, marriage allows for specialization either in household production or the

[7]Throughout this paper, I refer to single individuals as those who have never married or are divorced.

labour market. Specializing in household tasks can lead to reducing working hours or periods of work interruptions. Second, during these work interruptions, individuals will not gain work experience potentially resulting in lower future wages. Third, since children require parental time, specialization in household tasks becomes more important when children are present in the household. Fourth, in the event of divorce, spouses cannot financially protect each other against income loss resulting from reduced work experience due to household specialization. This lack of insurance can have long-term repercussions on future earnings. Fifth, parents may choose childcare services over spending time directly with the child. This choice could be influenced by the financial consequences of the divorce, especially if one partner specialises in caring for the child and may face lower earning potential as a result. Therefore, in this framework, the lack of insurance between partners in divorce becomes an important factor in deciding whether to use childcare services instead of personal time with the child.

2.1 The Setup

In each period, individuals choose labour supply, whether to have a child, how many hours of childcare to purchase, and whether to stay single, get married or if married whether to get divorced. I model the decisions of both women w and men m. Individual $j \in \{w, m\}$, starts her/his finite life as never married, with no work experience and without a child. I start by modelling the behaviour of below-college educated individuals and college graduates at age $a = 18$ and $a = 22$, respectively. The decision horizon ends at age $A = 50$, an age after which there are no fertility decisions for most people.[8] Time is discrete, a period lasts for one year, and I consider individuals in the age range 18-50.

2.2 Time Constraint

Individual j is endowed with a fixed amount of time T, which can be allocated to labour market hours l_a^j and housework hours h_a^j. The time constraint in each period a is

$$l_a^j \; + \; h_a^j \; = \; T$$

2.3 Choices

Labour supply. In the model both men and women choose how many hours to work. I record the choice of women's working hours in the variable l_a^w and men's choice of working hours in the variable l_a^m. (See section 2.8 for details on how these hours are empirically

[8] The terminal value at age 50 is set to zero.

implemented). These working hours are translated into three different employment status denoted by $k \in \{f, p, o\}$, representing full-time (f) and part-time (p) employment, and not working (o). I assume that men only work full-time but can work different hours within full-time employment.[9]

Fertility. A child can be born to single and married individuals. Single individual j's fertility choice is recorded in variable $n_a^j = \{0, 1\}$. Each period single individual j receives a child preference shock ($\epsilon_{ch,a}^j$). These shocks are independent and identically distributed (iid). If individual j decides to have a child, i.e. $n_a^j = 1$, a child is born to her/him in the next period and the state of having a child, N_{a+1}^j, is updated to 1 and individual j will become a parent in their remaining life-cycle.[10] If individual j decides to not have a child, i.e. $n_a^j = 0$, the state of having a child in the next period remains zero ($N_{a+1}^j = 0$) and the individual will decide whether to have a child in the following period. I assume that individuals can have only one child, therefore, the state of having a child, N_a^j, can only take values of zero or one implying that households either have a child or not. Married men and women receive the same child preference shocks ($\epsilon_{ch,a}$) and their fertility choice is recorded in variable n_a. If the spouses decide to have a child, the state of having a child in the next period, N_{a+1}, is updated to 1.[11]

Marriage, and divorce. At the beginning of each period a, never married individual j meets a potential spouse of opposite sex with probability ω. When a meeting occurs, the characteristics of the potential spouse are determined by a random draw from the distribution of potential spouses. The characteristics of a potential spouse at the time of meeting consists of their education, whether they have a child, years of full-time experience and years of part-time experience. These characteristics are discretely uniformly distributed. I assume that individuals always meet a potential spouse of the same age.[12] The probability of meeting a potential spouse of certain characteristics is fixed over the life cycle of the individual and does not depend on the stock of single individuals in the marriage market.

After meeting a potential spouse, the matched couple decide to marry or not by solving a Nash bargaining problem. If the value of marriage for both is larger than the value of remaining single, they marry. Otherwise, they remain single and continue to search in the next period (See section 2.7.2 for how these decisions are made). If they marry, the marriage lasts for at least one year and the state of having a child at the time of marriage

[9] I assume this to avoid tracking men's work experience and to make the state space smaller.

[10] Note that this assumption is made to avoid keeping track of age of children and therefore reducing the size of the state space.

[11] Modelling the choice of having multiple children is important as it would allow one to incorporate the economy of scale into the model. This choice of modelling the decision of having a child or not, although restrictive, is made to reduce the size of the state space.

[12] I assume men only work full-time, so their age determines their work experience.

will be equal to $N_a = max\{N_a^w, N_a^m\}$.

Each period, married individuals receive a shock to the utility of being married ($\epsilon_{mar,a}$). Each spouse receives the same marriage shock and these shocks are independent and identically distributed (iid). They then decide whether to continue being married or get divorced. The divorce decision is also determined by solving a Nash bargaining problem and divorce happens when both partners value divorce higher than marriage. If divorce happens, divorced individuals enter the marriage market in the next period and continue to search for a potential spouse along with never married individuals. If married spouses have a child, upon divorce, they both leave the marriage with a child: an assumption which implies joint custody.

Child care. If single individuals or couples have a child, i.e. $N_a^j = 1$ or $N_a = 1$, they can purchase hours of formal childcare $H_{CC,a}$, or allocate housework hours h_a^j, or use both to look after the child. The choice of hours of formal childcare of individual j is recorded in the variable $H_{CC,a}^j$ and for couples in $H_{CC,a}$.[13] (See section 2.8 for details on how these hours are empirically implemented).

2.4 Work Experience and Wages

While working individuals accumulate work experience. Work experience is part-time or full-time specific. The stock of full-time work experience ($X_{f,a-1}$) is accumulated by one unit for each year of working full-time and the stock of part-time work experience ($X_{p,a-1}$) is accumulated by one unit for each year of working part-time. The laws of motions are:

$$X_{f,a}^j = X_{f,a-1}^j + 1 \times 1\{l_a^j = f\} \qquad X_{p,a}^w = X_{p,a-1}^w + 1 \times 1\{l_a^w = p\}$$

Part-time and full-time hourly wages of women - $y_{p,a}^w$ and $y_{f,a}^w$- depend on full-time work experience, part-time work experience, and education:

$$\begin{aligned} log(y_{k,a}^w) &= \beta_{0,k}^w + \beta_{1,k}^w X_{f,a-1} + \beta_{2,k}^w (X_{f,a-1})^2 \\ &+ + \beta_{3,k} X_{p,a-1} + \beta_{4,k} (X_{p,a-1})^2 + \beta_{5,k}^w S^w + \epsilon_{k,a}^w \end{aligned}$$

Wage offers also differ in terms of wage levels ($\beta_{0,k}$), which reflects wage differences that cannot be attributed to work experience but other factors that differentiate part-time and

[13] I only model the choice of hours of formal child care and this choice is not tied to labour supply, i.e. it could be the case that the parent/s works but does not purchase formal childcare. This assumption allows me to estimate the degree of substitutability between formal child care and housework hours. In the case that parent/s is/are working and not purchasing formal child care, it is assumed that the child is looked after in informal child care. See section 2.8.2 for details on how formal child care enters the model.

full-time employment, such as differences in job characteristics. $S^w \in \{0,1\}$ is equal to 1 if the individual has some college education and is equal to 0 if she has a lower level of education. $\epsilon^w_{f,a}$ and $\epsilon^w_{p,a}$ are independent and identically distributed (iid) shocks to full-time and part-time log wages of women, respectively.

Since men only work full-time, their wages depend only on full-time experience, and education:

$$log(y^m_{f,a}) \;=\; \beta^m_{0,f} \;+\; \beta^m_{1,f}\, X_{f,a-1} \;+\; \beta^m_{2,f}\, (X_{f,a-1})^2 + \beta^m_{3,f}\, S^m \;+\; \epsilon^m_{f,a}$$

$\epsilon^m_{f,a}$ is independent and identically distributed (iid) shocks to full-time log wages of men.

2.5 Budget Constraint

The budget constraint of single individual j is given by

$$y^j_{f,a}\, l^j_a \times 1\{l^j_a = f\} \;+\; y^w_{p,a}\, l^w_a \times 1\{l^w_a = p\} \;=\; c^j_a \;+\; (\pi_{CC} \;+\; \epsilon^j_{CC,a})\, H^j_{CC,a} \times N^j_a$$

The equation states that the income from full-time and part-time employment of individual j on the left hand side has to be equal to expenses on the right hand side.[14] Note that the income from part-time employment is only indexed for women, i.e. $y^w_{p,a}\, l^w_a \times 1\{l^w_a = p\}$, because men are assumed to always work full-time albeit different hours within full-time employment. The expenses include consumption c^j_a and the cost of child care if individual j has a child, i.e. $N^j_a = 1$. The cost of child care comprises of hourly cost of childcare π_{CC} and an independent and identically distributed (iid) shock to the hourly cost of childcare $\epsilon^j_{CC,a}$. The choice of hours of child care $H^j_{CC,a}$ determines the total cost of child care.

When married the budget constraint is given by

$$\sum_{j=m,w} y^j_{f,a}\, l^j_a \times 1\{l^j_a = f\} \;+\; y^w_a\, l^w_a \times 1\{l^w_a = p\} = \sum_{j=m,w} c^j_a \;+\; (\pi_{CC} \;+\; \epsilon_{CC,a})\, H_{CC,a} \times N_a$$

The equation states that the income from employment of both spouses $j \in \{w,m\}$ on the left hand side has to be equal to expenses on the right hand side.[15] The expenses

[14] Excluding assets could lead to an overestimation of labour supply elasticities due to the lack of saving as a means of consumption smoothing (Blundell et al., 2016). However, incorporating savings into the model alongside labour supply, marital decisions and fertility decisions is computationally challenging.

[15] The income from part-time employment is only indexed for women because men are assumed to always work full-time albeit different hours within full-time employment.

include the sum of individual consumption of both spouses c_a^j and the household's cost of child care.

2.6 State Space

At the start of each period a, individual takes as given the variables that comprise their state space Ω_a.

The state space of a single man (Ω_a^m) comprises education, full-time experience, having a child (N_a^m), wage shocks ($\epsilon_{f,a}^m$), shocks to the utility of having a child ($\epsilon_{ch,a}^m$), and childcare cost shocks ($\epsilon_{CC,a}^m$).

$$\Omega_a^m = \{S^m, X_{f,a-1}^m, N_a^m, \epsilon_{f,a}^m, \epsilon_{ch,a}^m, \epsilon_{CC,a}^m\}$$

State space for a single woman (Ω_a^w) contains all the above variables, as well as her part-time experience and shocks to her part-time wage.

$$\Omega_a^w = \{S^w, X_{f,a-1}^w, X_{p,a-1}^w, N_a^w, \epsilon_{f,a}^w, \epsilon_{p,a}^w, \epsilon_{ch,a}^w, \epsilon_{CC,a}^w\}$$

When married, the state of a couple (Ω_a) includes shocks to utility of marriage ($\epsilon_{mar,a}$), in addition to the union of the above state variables. Each partner receives the same marriage and child preference shocks. The state of having a child at the time of marriage is equal to $N_a = max\{N_a^w, N_a^m\}$.

$$\Omega_a = \left\{S^m, S^w, X_{f,a-1}^m, X_{f,a-1}^w, X_{p,a-1}^w, N_a, \epsilon_{f,a}^m, \epsilon_{f,a}^w, \epsilon_{p,a}^w, \epsilon_{ch,a}, \epsilon_{mar,a}, \epsilon_{CC,a}\right\}$$

Since education is exogenous, its value remains the same in the entire life-cycle. I assume that individuals have no previous labour-market experience at the age that they finish schooling, implying that initial part-time and full-time experiences are zero. The evolution of state variables over the life-cycle depends on fertility and employment decisions. The chosen hours of childcare and marital decisions also affect the state variables, but only through affecting employment and fertility decisions.

2.7 The Individuals problem and the Couples Problem

In the model, single and married individuals face different choice sets, state spaces, and constraints. I start by explaining the behaviour of single individuals in period $A-1$ and in the following section will explain the behaviour of the couples. The problem in the terminal period A is similar to period $A-1$ excluding the continuation values. The continuation value at age 50 is set to zero.

2.7.1 Single individuals

A single individual's problem at age $a < A$ is to maximise the instantaneous utility as well as the expected discounted value of life-time utility. The individual's problem in period a is characterised as follows:

$$V_a^j(\Omega_a^j) \;=\; \max_{\{l_a^j, n_a^j, H_{CC,a}^j\}} \; U(c_a^j,\; Q_{1,a}^j,\; Q_{2,a}^j,\; \epsilon_{ch,a}^j) \;+\; \delta \begin{cases} E[V_{a+1}^j(\Omega_{a+1}^j)|\Omega_a^j], & \text{if single} \\ E[W_{a+1}^j(\Omega_{a+1})|\Omega_a], & \text{if married} \end{cases}$$

$$\text{s.t.} \qquad y_{f,a}^j \; l_a^j \times 1\{l_a^j = f\} \;+\; y_{p,a}^w \; l_a^w \times 1\{l_a^w = p\} \;=\; c_a^j \;+\; (\pi_{CC} \;+\; \epsilon_{CC,a}^j)\; H_{CC,a}^j \times N_a^j$$

$$Q_{1,a}^j = f(h_a^j) \qquad\qquad Q_{2,a}^j = f(h_a^j, H_{CC,a}^j) \times N_a^j \qquad\qquad l_a^j + h_a^j = T$$

$V_a^j(\Omega_a^j)$ is the value function for individual j at state Ω_a^j when j is single. δ is the discount factor. and E is the expectation operator conditional on information in period a. The expectation of the individual is over the future preferences, wage and child care shocks. In each period, single individual j meets a potential partner, they can decide to marry, which affects their value functions at age $a+1$. The value functions of married individuals, W_{a+1}^j, for $a+1 < A$, will be explained in Section 2.7.2. For single individuals in period a the problem will involve calculations of the expected future values from marriage. Therefore, expected future values of life-time utility for single individuals include the expected values from future possibilities of getting married as well as remaining single.

In each period a, individual j chooses how many hours to work in the labour market (l_a^j), whether to have a child (n_a^j) and if individual j has a child, she/he decides on how many hours of childcare to purchase ($H_{CC,a}^j$).

Individuals gain utility from employment status l_a^j, consumption of a private good (c_a^j) and household goods. There are two different types of household goods: $Q_{1,a}^j$ and $Q_{2,a}^j$. $Q_{1,a}^j$ represents value of goods produced at home such as a meal or a clean house. $Q_{2,a}^j$ serves as the child's qualities as valued by the parent (e.g. cognitive skills as well as non-cognitive skills such as a child's kindness, honesty or self-discipline).

Parents enjoy $Q_{2,a}$ in addition to $Q_{1,a}$ while individuals without a child only gain utility from $Q_{1,a}^j$. Housework hours of individual j (h_a^j) is used in the production of Q_1^j; however, parents can use both childcare $H_{CC,a}^j$ and housework hours to produce child qualities. If single individual j purchases childcare in the market, he/she has to pay for the cost of childcare. On the other hand, using housework hours in production of child qualities Q_2 is associated with less time in the labour market and therefore lower consumption in the current period as well as lower human capital and lower wages and consumption in the

future.

2.7.2 Couples

The value of marriage is determined by solving a Nash bargaining problem in which the outside options are defined as the values that each partner obtains from remaining/becoming single. The outside option (threat point) $V_a^j(\Omega_a^j)$ is given by the utility of an individual in case negotiations break, i.e. the value of divorce or the value of remaining single.[16] The outside options in period $a < A$ also include the possibilities of possible future marriages. The outcome of this Nash bargaining is characterised by the solution to the following maximisation problem:

$$\max_{\{c_a^j, l_a^j, H_{CC,a}, n_a\}} \left(U(c_a^m, Q_{1,a},\ Q_{2,a},\ \epsilon_{ch,a}, \epsilon_{mar,a}) \ +\ \delta \begin{cases} E[V_{a+1}^m(\Omega_{a+1}^m)|\Omega_a^m], \text{ if single} \\ E[W_{a+1}^m(\Omega_{a+1})|\Omega_a], \text{ if married} \end{cases} - \ V_a^m(\Omega_a^m) \right)^{\theta}$$

$$\left(U(c_a^w,\ Q_{1,a},\ Q_{2,a},\ \epsilon_{ch,a}, \epsilon_{mar,a}) \ +\ \delta \begin{cases} E[V_{a+1}^w(\Omega_{a+1}^w)|\Omega_a^w], \text{ if single} \\ E[W_{a+1}^w(\Omega_{a+1})|\Omega_a], \text{ if married} \end{cases} - \ V_a^w(\Omega_a^w) \right)^{(1-\theta)}$$

$$\text{s.t.} \qquad \sum_{j=m,w} y_{f,a}^j \, l_a^j \times 1\{l_a^j = f\} \ + \sum_{j=m,w} y_a^j \, l_a^j \times 1\{l_a^j = p\}$$
$$= \sum_{j=m,w} c_a^j \ + \ (\pi_{CC} \ + \ \epsilon_{CC,a}) \, H_{CC,a} \times N_a$$

$$Q_{1,a} = f(G_a) \qquad Q_{2,a} = f(G_a,\ H_{CC,a}) \times N_a$$

$$G_a \ = \ f(h_a^m,\ h_a^w) \qquad l_a^j \ + \ h_a^j \ = \ T, \qquad j = m, w$$

θ determines the bargaining power of each spouse. G_a is a composite good produced at home with the housework hours of men h_a^m and women h_a^w. The composite good will be used in the production of household goods $Q_{1,a}$ and $Q_{2,a}$. $W_a^j(\Omega_a)$, $j = m, w$, denotes the value functions for both partners corresponding to the couple's optimal choice obtained

[16] McElroy and Horney (1990) and Manser and Brown (1980) are the first papers to model the household decision-making process in a joint static framework. The bargaining problem in these papers is formulated as a Nash bargaining problem. The collective models developed in Chiappori (1988) and Chiappori (1992) rely on Pareto efficiency and allow for any type of efficient decision making. For models that use non-cooperative outcomes as a threat point see Lundberg and Pollak (1993), Chen and Woolley (2001), and Rasul (2008).

from Nash bargaining, which is the choice that provides the household with the highest marriage surplus.

This is a no commitment model in which individuals cannot commit to the allocation of future resources.[17] The optimal necessary transfers through the allocation of per period private consumption c_a^j are determined by solving the above maximisation problem for each alternative in the choice set $\{l_a^m, l_a^w, H_{CC,a}, n_a\}$. The solution to the Nash bargaining problem implies that each spouse receives their outside option; i.e. the expected life-time utility of being single as well as a share of the marriage surplus determined by θ. The bargaining parameter (θ, or sharing rule) remains fixed and does not change based on the decisions made in the household (See Gemici (2011), Tartari (2015), and Doepke and Kindermann (2019) for similar models). Although the sharing rule in each period is fixed, the consequences of choices in each period influence the optimal choice made in the current period through altering expected utility. For example, the decision of not working today decreases future wages by lowering work experiences and subsequently affects future outside options through lower consumption. Anticipation of lower consumption in the future affects per-period optimal choices made in the household.[18]

The solution to the above problem, entails all values of possible future marriages and future values of remaining single. The optimal transfers and optimal choice within marriage will be determined, in consideration of possibilities of future marriages and divorces. The marriage decision of individual j at age a affects the value functions at age $a+1$. If individual j decides to get divorced, his/her value function in period $a+1$ will be a single individual's value function and if she/he decides to stay married, his/her value function in period $a+1$ will be a married individual's value function.

2.8 Empirical Implementations

To make the model computationally feasible, I make five assumptions. First, men only work full-time but can choose to work different hours within full-time employment. This assumption is not very restrictive as the observed proportions of non-working and part-time employed men are low in the data (See Table 1 in Section 3). The working hours of men and women are $l_a^m = \{7, 9\}$, $l_a^w = \{0, 3, 5, 7, 9\}$ per day, respectively. 0 represents not

[17] Mazzocco (2007) rejects intra-household commitment in a dynamic framework.

[18] This framework has the computational advantage that the sharing rule does not enter as a variable in the state space. However it has the shortcoming that the bargaining outcome changes instantly once the threat point - value of divorce - changes. Basu (2006) examines inter-temporal models in which the bargaining parameter is endogenously determined. Mazzocco et al. (2007), Gemici and Laufer (2011), and Voena (2015) are examples of papers that allow for gradual changes in the bargaining parameter depending on the decisions made in the household.

working, 3 and 5 are part-time working hours and 7 and 9 are full-time working hours. Secondly, I assume a static budget constraint which does not allow for consumption smoothing through savings over the life-cycle which could lead to an overestimation of labour supply elasticities (Blundell et al., 2016). However, incorporating savings into the model alongside labour supply, marital decisions and fertility decisions increases the state space and adds considerable computational burden to the solution of the model.

The third assumption is that the individual's total time endowment is spent on home production and labour-market work. This assumption is made to reduce the size of the choice sets. Fourthly, to avoid tracking number of children and to reduce the size of the state space, I assume that individuals can only have one child. Fifthly, I only model the choice of hours of formal child care and this choice is not tied to labour supply, i.e. it could be the case that the parent/s works but does not purchase formal childcare. This is an identification assumption which allows me to estimate the degree of substitutability between formal child care and housework hours. In the case that parent/s is/are working and not purchasing formal child care, it is assumed that the child is looked after in informal child care. The hours of formal child care are $H_{CC} = \{0, 7, 12\}$ per day.

2.8.1 Preferences

The instantaneous utility function of a single individual j at age a is:

$$\begin{aligned} U_a^j \;=\; \alpha_c\, c_a^j \;+\; \alpha_{q1}\, Q_{1,a}^j \;+\; \Big(\alpha_{q2}\, Q_{2,a}^j \;+\; \alpha_n \;+\; \epsilon_{ch,a}^j\Big) \times N_a^j \\ +\; \alpha_p^w \times 1\{l_a^w = p\} \;+\; \alpha_o^w \times 1\{l_a^w = o\} \end{aligned}$$

α_c is the marginal utility of consumption goods. α_{q1} and α_{q2} represent the marginal utility of household goods Q_1 and Q_2, which are private goods for single households. α_n is the direct utility from having a child and $\epsilon_{ch,a}^j$ is the per period shock to the utility of having a child. α_p^w, α_o^w are the direct utility/disutility from working part-time and not working of women. I assume that marginal utility of consumption α_c, and household goods α_{q1} and α_{q2}, are the same for men and women and $\alpha_c + \alpha_{q1} + \alpha_{q2} = 1$. On the other hand, utilities from different working hours are female-specific.

The instantaneous utility function of married individual j at age a is:

$$\begin{aligned} U_a^j \;=\; \alpha_c\, c_a^j \;+\; \alpha_{q1}\, Q_{1,a} \;+\; \Big(\alpha_{q2}\, Q_{2,a} \;+\; \alpha_n \;+\; \epsilon_{ch,a}\Big) \times N_a \;+\; \epsilon_{mar} \\ +\; \alpha_p^w \times 1\{l_a^w = p\} \;+\; \alpha_o^w \times 1\{l_a^w = o\} \end{aligned}$$

An important feature of the above specification is that the preferences of single and married individuals are the same. This is an identification restriction, which allows me to use the observed labour market and housework behaviour of single individuals to identify preference parameters. In terms of preferences, the only difference between a single and married person is the shock to the utility of marriage, ϵ_{mar}. A detailed discussion of the identification of preference parameters can be found in Section 4.2.

2.8.2 Household Production

The two household goods Q_1 and Q_2 are produced using housework hours and formal childcare. Households without a child produce only Q_1 while those with a child produce Q_1 and Q_2.

The production technology for household good Q_1 of single individual j is:

$$Q^j_{1,a} = \lambda h^j_a$$

h^j_a represents housework hours and λ represents its marginal productivity. If single individual j has children, she also produces household good Q_2:

$$Q^j_{2,a} = \lambda\Big((h^j_a)^\gamma + (H^j_{CC,a})^\gamma\Big)^{\frac{1}{\gamma}}$$

I assume a Constant Elasticity of Substitution (CES) production technology in which a combination of housework hours h^j_a and formal childcare hours $H^j_{CC,a}$ is used to produce household good Q_2. The elasticity of substitution parameter γ is important in the model since it governs the ability of individuals and households to substitute childcare with housework hours. A detailed discussion of these mechanisms is included in Section 6.

For a married couple, the production technology for Q_1 is:

$$Q_{1,a} = \lambda G_a$$

G_a is a composite good which combines housework hours of the husband h^m_a and housework hours of the wife h^w_a:

$$G_a = h^m_a + h^w_a$$

The housework hours of husband and wife are assumed to be perfect substitutes and have the same marginal productivities.

Similar to the case of single individuals, households with children produce Q_2 in addition to Q_1 according to the following CES production technology:

$$Q_{2,a} = \lambda\Big(G_a^{\gamma} + (H_{CC_a})^{\gamma}\Big)^{\frac{1}{\gamma}}$$

Similar to the case of preferences, I restrict the parameters of home production technologies so that they are the same for both single and married households.

In the empirical implementation of the model, I do not take a stance on how Q_1 and Q_2 map into the data. Some examples of Q_1 are a clean house and meals. On the other hand, Q_2 could be viewed as any aspect of having children that provides utility to the parents, such as the child's cognitive skills as well as her/his non-cognitive skills such as empathy, sociability, honesty, etc. By not using a strict mapping between Q_2 and a measure of child outcomes from the data, I refrain from putting restrictions on which of the child's qualities give utility to the parents. There are advantages and disadvantages to this approach. One of the advantages is that it allows me to avoid measurement issues arising from using data on child outcomes. For purposes of tractability, the literature usually treats these child outcomes as one-dimensional and focuses only on either cognitive or non-cognitive measures. However, the importance of both skills has been highlighted in Cunha et al. (2010), Attanasio et al. (2020b), Attanasio et al. (2020a), and Andrew et al. (2024). Furthermore, the impact of preschool has been shown to affect various dimensions of children's development Berlinski et al. (2009), Heckman et al. (2013) , citetkline2016evaluating).

Another implication of this modelling is that the identification of parameters in the production technologies of Q_1 and Q_2 relies on the functional forms specification of the household production technologies. Section 4.2 includes a detailed discussion of the identification of these parameters. In this paper I abstract away from modelling how parental time with a child and the time that a child spends in childcare maps into child outcomes.[19] Modelling cognitive and non-cognitive child development, which have both shown to be important for children's later life outcomes (see Heckman and Rubinstein (2001)), is beyond the scope of this paper. I take a different approach: following Del Boca et al. (2014) and Agostinelli and Sorrenti (2018), who found that both parental time and money inputs are important for children's cognitive development, I assume that both time in childcare and parental time are inputs into household good production. I then estimate the substitutability between these two inputs using data on childcare usage and parental housework

[19]The evidence from the literature on whether parental time with the child could be substituted with childcare services is mixed. For example, Bernal (2008), Baker et al. (2008), and Bernal and Keane (2011) find that higher female labour supply accompanied with more childcare in early years has a negative impact on children's cognitive and non-cognitive outcomes. On the other hand, Griffen (2018) finds that childcare programmes such as Head Start improve children's cognitive abilities. Similar results are found by Havnes and Mogstad (2011b) on adult outcomes from the expansion of childcare programmes and on children's cognitive and non-cognitive outcomes (Felfe and Lalive, 2018).

hours.[20]

3 Data

The data used in this study are taken from 30 waves (1968 to 1997) of the Panel Study of Income Dynamics (PSID). PSID started collecting labour-market information on individuals for the previous year from 1969 onwards. Therefore, the effective years of data are 29 periods (1968 - 1996). Individuals have been interviewed biennially since 1997. Since in my model each period is defined as a year, I do not use the data collected from 1997 onwards.

3.1 Sample

PSID consists of a core sample, a sample of low income households known as SEO (Survey of Economic Opportunity sample), a Latino sample (first interviewed in 1990 or 1992), and an immigrant sample (first interviewed in 1997). The individuals in SEO, Latino, and immigrant samples are endogenously selected based on their income, ethnicity or immigration status. I drop these oversampled individuals to overcome any potential biases resulting from sample selection. The sample is further restricted to household residents who are either head or wife and were interviewed at least 3 times between 1968 and 1997. Since I model the behaviour of individuals aged 18 to 50, all the descriptive statistics and subsequent analyses are reported for a sample of 18- to 50- year-olds. The unit of observation, therefore, is 18- to 50- year-old men and women who were surveyed for at least 3 periods.

Table 1 reports the descriptive statistics of the sample. The unbalanced sample consists of 4,298 men and 4,600 women with women representing 52 percent of the sample. Around 44 percent of women and 48 percent of men in the sample have schooling above 12 or more years of education and I classify them as college-graduates. Around 70 percent of individual-year observations in the sample are married, 7 percent are single and about 23 percent are divorced.[21] 75 and 78 percent of men and women in the sample (calculated at person-year observations) are observed to have at least one child. The average age of both men and women in the sample is 33 years old.

[20] Blundell et al. (2018) estimate a home production function in which the elasticity of substitution between parental childcare hours is estimated. They find that these two inputs are close substitutes. In this paper, I assume that parental housework hours are perfect substitutes but I estimate the elasticity of substitution between housework hours and time spent in childcare.

[21] I classify cohabiting individuals as married.

Table 1: Descriptive statistics of the sample

	Men		Women	
Variable	Mean	SD	Mean	SD
I. Education				
College-graduates	0.478	0.500	0.445	0.497
II. Demographics				
Single	0.069	0.253	0.070	0.256
Married	0.707	0.455	0.689	0.463
Divorced	0.224	0.417	0.240	0.427
Have at least one child	0.751	0.432	0.782	0.413
Age	33.601	8.700	33.109	8.757
III. Labour market				
Full-time employed	0.872	0.334	0.410	0.492
Part-time employed	0.102	0.303	0.271	0.444
Years of full-time employed	8.423	6.415	3.735	4.448
Years of part-time employed	0.980	1.550	2.899	3.180
Log full-time hourly wage	2.177	0.730	1.923	0.694
Log part-time hourly wage	2.057	0.823	1.732	0.789
N	4,298		4,600	
N × T	73,051		78,017	

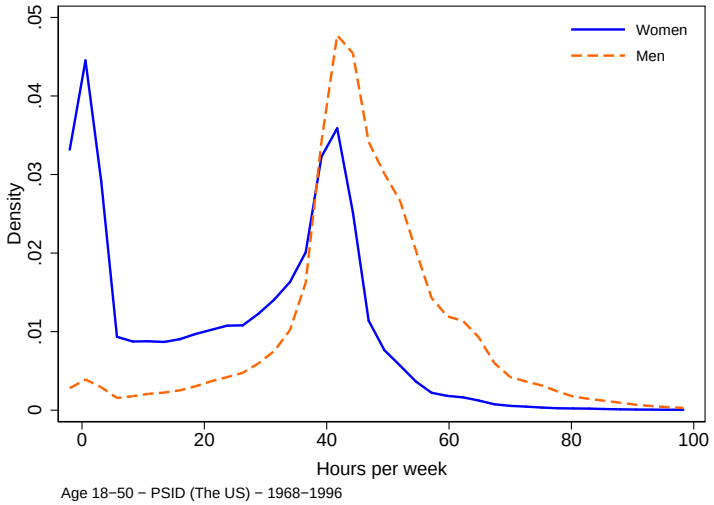
Wages are CPI adjusted to 1984 US dollars. College graduates are defined as individuals having more than 12 years of schooling and those having a lower level of education are classified as below-college educated. Data Source: PSID (waves 1968-1997).

3.2 Part-time Employment - definition and prevalence

The kernel density of labour-market hours in Figure 1 shows that working hours are clustered around certain hours and women are more likely to work fewer hours and to stay out of the labour market. The left tail of the density of hours of work is thicker for women and many women tend to work between 10 and 35 hours. Based on this figure, I define part-time employment as those working 10 or more hours but below 35 hours per week.[22] Those working between 0 and 10 hours are categorised as out of the labour market. The remaining women work 35 hours or more and are classified as full-time employed. PSID data are collected annually, therefore the data on annual hours of work might not necessarily reflect part-time employment. This is because the beginning and end of a spell cannot be identified from the data. Therefore, those who do not work for half a year and are full-time

[22] Francesconi (2002) and Blank (1994) also use the same definition for part-time employment.

Figure 1: Kernel density estimates of hours of work, men vs. women



employed in the second half of the year are considered part-time workers.[23]

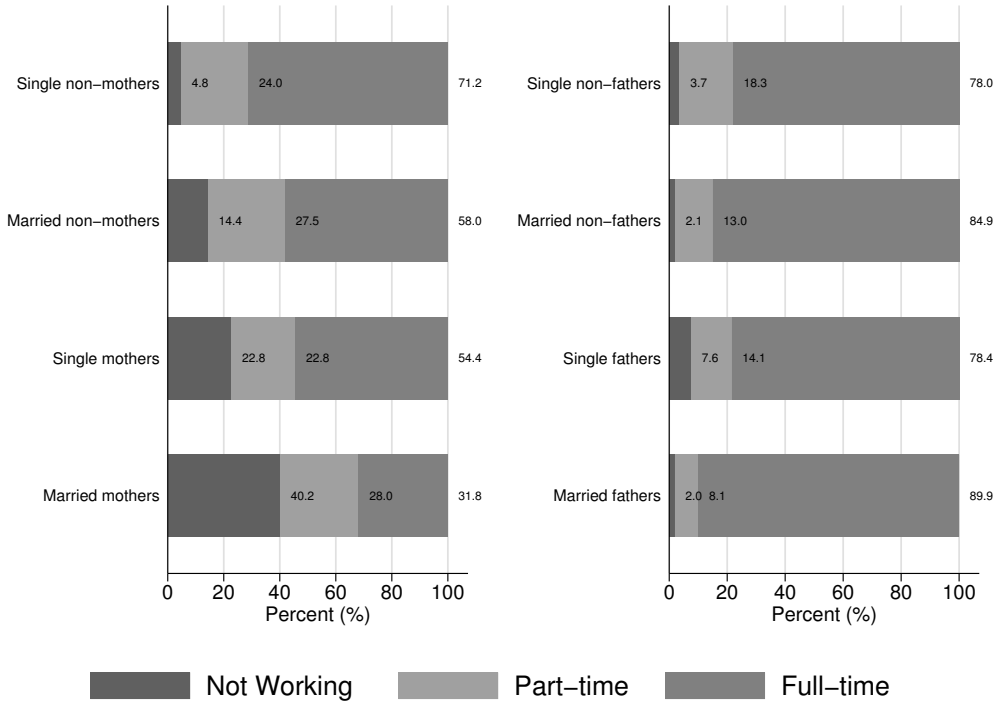
Using this definition approximately 10% and 87% of men, and 27% and 41% of women in the sample work part-time and full-time, respectively (See the third panel in Table 1). On average, women have about 3.7 years of full-time experience and 2.9 years of part-time experience. Since men work less part-time and are less likely to be out of the labour market, their average full-time work experience is higher at 8.4 years, and they have, on average, less than 1 year of part-time experience.

Figure 2 gives evidence on how family formation and parenthood are strongly linked to part-time employment in the data. We can see that the employment patterns of men and women are very similar when they do not have a child with full-time employment at around 70 percent and part-time employment at around 20 percent. When married, women reduce their labour supply along both the intensive and extensive margins of labour supply. Among married non-mothers only 58 percent work full-time, which is about 18 percent lower than for single non-mothers. The proportion of part-time employed married non-mothers is also about 10 percent larger than single non-mothers. In contrast, married non-fathers are more likely to work, with 84 percent of them being in full-time employment. Therefore, by the time women start to have children, there will already be large differences in their labour-supply behaviour and work experiences compared to men.

Married women's labour supply decreases even more when they become mothers with 40 percent of married mothers not working and 47 percent of those who are employed working

[23]In labour supply models there is no distinction between not working and unemployed individuals. It is a common assumption in modelling labour supply that everyone who seeks a job finds one immediately.

Figure 2: Employment by marital status - parents and non-parents



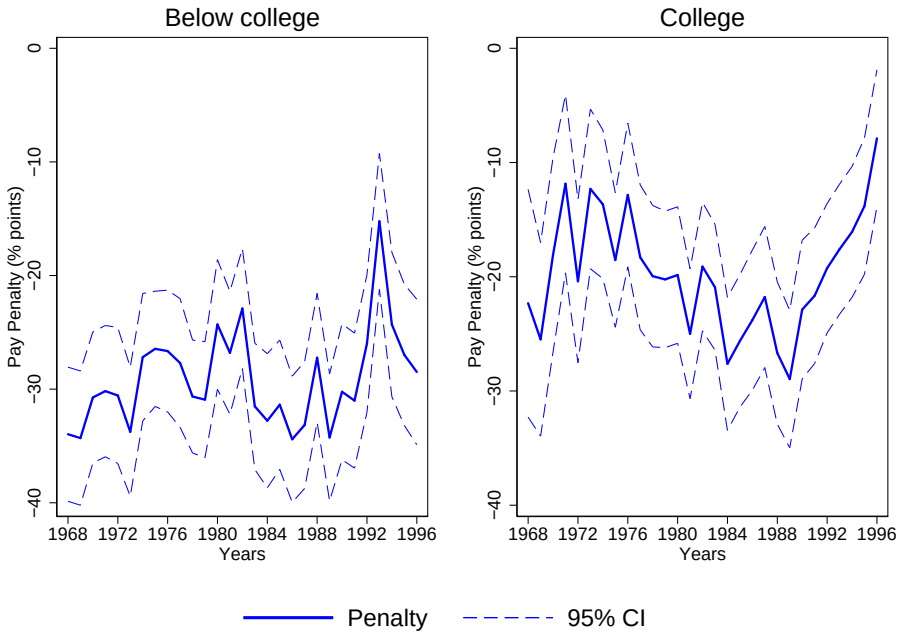
Part-time employment is defined as those working 10 hours or more but less than 35 hours. Full-time employment is defined as individuals working 35 hours or more. Not working individuals are those working below 10 hours. Single individuals could be either divorced, separated or never married. Data Source: PSID (waves 1968-1997).

part-time. In contrast, married fathers work more and longer with only 2 percent of them being out of the labour market. The labour market behaviour of mothers and fathers is completely different when they are single (divorced or never married). The participation rate for single mothers is 28 percent higher than for married mothers, and they are less likely to work part-time. The labour supply behaviour of single fathers is also different from that of married fathers- they participate less in the labour market and also work fewer hours.

These differences between the labour supply of single and married women highlights the importance of marital status in the employment decisions of women. The model developed here addresses these issues by modelling marital, fertility, and labour-supply decisions simultaneously.

3.3 Part-time Employment and Wages

Figure 3: Part-time pay penalty for women - by education



Part-time pay penalty is defined as the difference between the median hourly wages of full-time and part-time workers. Part-time employment is defined as working between 10 and 35 hours and full-time as working 35 hours or more. All wages are CPI adjusted to 1984 US dollars. Source: PSID (wave 1968-1997).

Part-time hourly wages for both men and women are lower than full-time employed individuals (See the third panel in Table 1). Wages are CPI adjusted to 1984 US dollars. It is well-known in the literature that part-time employed individuals receive lower wages compared to those working full-time, which is known as the part-time pay penalty (see Hirsch (2005) in the US and Manning and Petrongolo (2008) in the UK). Figure 3 shows

the difference between the median log hourly wages of part-time and full-time working women between 1968 and 1996.[24] We can see that the hourly wages of part-time employed individuals with below-college level of education were around 30 percent lower than those of full-time workers.

This observed pay penalty is lower when I take into account college education, but educated workers still earn on average around 20 percent less than full-time workers. Such wage differences could be attributed to the different occupations of part- and full-time employed individuals (Manning and Petrongolo, 2008), differences in the process of human capital accumulation (Blundell et al., 2016; Francesconi, 2002) or discrimination against part-time workers. This paper tries to understand whether the skills and work experiences obtained from part-time work are similar to the those obtained from full-time work. I intend to do this to understand whether choosing to work part-time in order to spend more time at home and with children has long-term consequences on the future wages and employment of women.

3.4 Childcare and Parental Employment

To obtain data on costs and hours of childcare, I use the PSID's Child Development Supplement (CDS). In 1997, PSID collected data on a sample of children born between 1984-1997. 2,394 families were surveyed about the childcare arrangements used for their 3,563 children. I match the CDS sample to my main sample from PSID using the Family Identification Mapping System (FIMS), which maps the parents of these children to PSID's core sample. I can match 1,079 children to their parents in my sample, providing information on hours and costs of childcare used by 1,029 mothers and 1,004 fathers.

The matched CDS and PSID sample is used to construct the childcare usage of parents by employment status. PSID's Child Development Supplement reports 9 different childcare arrangements used by families since the birth of their children. Therefore, the childcare cost and hours are constructed using the first 4 types of arrangement. I use data on the childcare used for the first child because it is the behaviour of parents for the first child born into the household that is considered in the model. Note that I keep all the families irrespective of the number of children in the household but I use the information on childcare usage of the first child. Furthermore, I only construct hours and cost of childcare from the birth of the child until the child turns 5 years old, since in many states children attend schools at the age of 5.[25] CDS reports various types of childcare used since the birth of the child. Since

[24] I would like to thank Alan Manning and Barbara Petrongolo for sharing their Stata code to plot graphs similar to the Part-time Penalty graph in their paper.

[25] The age that a child must be in kindergarten in the United States varies across states. In 1998, the

Table 2: Hours of formal childcare by parental employment status

Employment status	Not working		Part-time		Full-time		No of obs.	
	Mean	SD	Mean	SD	Mean	SD	N	N×T
Mothers								
Hours in formal care per day	0.395	1.340	1.864	2.780	3.586	3.783	1,029	4,761
Fathers								
Hours in formal care per day	1.210	2.581	1.427	2.626	1.885	3.062	1,004	4,571

Part-time employment is defined as those working 10 hours or more but less than 35 hours. Full-time employment is defined as individuals working 35 hours or more. Out of labour force are those working below 10 hours. Data Source: PSID (waves 1968-1997) and Child Development Supplement (wave 1997).

only a few mothers use more than four types of arrangement, childcare cost and hours are constructed using the first 4 types of arrangement.

These arrangements can be categorized into formal and informal types of childcare. Informal childcare is defined as care provided by a relative in the child's home or in the relatives' home. Care that is provided by non-relatives in or out of the child's home including the Head Start programmes, childcare centres, and before- or after- school program are classified as formal care. In this paper I consider formal childcare to be the only form of childcare that can be subsidised by the government. The implication of using only formal childcare in estimating the model is that only formal childcare enters the household production function implying that informal childcare does not have a role in the production of household good (child quality). Bick (2016), Gong and Breunig (2017), and Brilli (2022) are among the papers that model informal and formal care. Chan and Liu (2018) show that informal childcare, as opposed to formal childcare, has a negative effect on child outcomes.

Table 3: Cost of formal childcare

	Mean	SD	N × T
Log hourly cost of formal childcare (in US dollars)	1.125	0.959	3,871

Data Source: PSID (waves 1968-1997) and Child Development Supplement (wave 1997).

Table 2 reports the hours of formal childcare used by parents. We can see that the hours of childcare used vary depending on the employment status of mothers rather than fathers. Part-time employed mothers on average use fewer hours of childcare than full-time workers, and non-working mothers use even fewer hours. Table 3 reports the hourly cost

obligatory entry age was between 5 to 8 years old. See Table 3 in (Datar, 2006).

of childcare in US dollars. The mean estimated hourly cost of childcare is 1.125 log dollars and there is a large variance in the cost of childcare.

Since the number of hours that the child spends in formal childcare is related to the mothers' employment, I categorize its usage into 3 different states which correspond to the mothers' employment status. I define full-time childcare usage as when more than 7 hours of formal daily childcare is used and part-time childcare is defined as when the child spends fewer than 7 hours per day in formal care. Lastly, no childcare is when no formal childcare is used. Table 4 reports how this constructed childcare usage variable corresponds to the mother's employment status. In general, only 12 percent of mothers use full-time formal childcare and among them around 73 percent are full-time employed mothers (see Column 1 in Table 4). Around 60 percent of mothers do not use formal childcare but only 21 percent of these mothers are full-time employed (see Column 3 in Table 4). These statistics indicate that although many mothers in the United States do not rely on formal childcare, they are more likely to use it when they are working and even more likely to use more hours of formal childcare when they are working full-time.

Table 4: Formal childcare usage by mother's employment status

		Formal childcare			
		Full-time	Part-time	No childcare	Total
Employment status		(1)	(2)	(3)	
Full-time	% of col	73.211	34.322	21.320	31.316
	% of row	29.630	28.822	41.549	
Part-time	% of col	21.963	44.186	29.751	32.560
	% of row	8.549	35.687	55.764	
NotWorking	% of col	4.825	21.492	48.929	36.124
	% of row	1.693	15.645	82.662	
Total	% of row	12.674	26.297	61.029	100
N×T					4,742

Part-time employment is defined as those working 10 hours or more but less than 35 hours. Full-time care is defined as individuals working 35 hours or more. Out of labour force are those working below 10 hours. Full-time care is defined as 7 or more hours of formal childcare per day and part-time care as between zero and 7 hours of formal care per day. Data Source: PSID (waves 1968-1997) and Child Development Supplement (wave 1997).

The patterns in the data suggest that the reduction in the labour supply of women along the intensive and extensive margins of labour supply is associated with marriage and to a larger degree with motherhood. One explanation for why married mothers work fewer hours is specialisation in household good production which becomes even more important when there is a child in the household. The high cost of childcare could deter mothers from

working and gaining work experience to the extent that even the loss of current wages and lower expected future wages do not push women into employment. In the next section, I explain the estimation method and discuss how the model replicates these observed patterns in the data.

4 Estimation

4.1 Method

McFadden (1989) proposes to use the Method of Simulated Moments in estimating models that require numerical integrations. I use the following method of moment estimator:

$$\arg\min_{\theta} \qquad g(\theta)' W g(\theta)$$

The simulated method of moments searches for the values of θ (a vector that contains all the unknown parameters) that minimise the distance between the moments calculated from the simulated data and the moments calculated from the actual data. W are the weights, which are the inverse of the estimated variances obtained from the actual data, divided by the number of individuals that contribute to each moment. $g(\theta)$ is defined as:

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

where $(\bar{m}_1, .., \bar{m}_k)$ corresponds to the data moments, and $(\mu_1(\theta), .., \mu_1(\theta))$ are the corresponding model moments. N denotes the number of individuals in the sample.

4.2 Moments and Identification

The full list of moments used to identify the model is displayed in Table B.1 in Appendix B. In what follows, I discuss which features of the data help in identifying the main parameters of the model. Since the model is estimated using the Simulated Method of Moments, a formal identification of its parameters is not possible; instead I discuss the most relevant features that can contribute to identifying a parameter. When discussing the identification of the parameters it is important to mention that various features of the data help in identifying a single parameter. However, since some moments are more closely related to a particular parameter, In Appendix D, I show how holding all parameters constant and varying a particular parameter affects the target moments. Note that the bargaining parameter (θ) and the discount factor are set to 0.5 and 0.9., respectively and are not estimated.

The wage distribution parameters $(\beta^w_{0,k} - \beta^w_{5,k})$, $(\beta^m_{0,full} - \beta^m_{3,full})$ and $(\epsilon^j_f, \epsilon^w_p)$ are identified using the first and second moments of wages conditional on work experiences and education, together with employment choices conditional on life-cycle choices, such as fertility and marital decisions at different ages.

Since only the relative marginal utility is important in the decision problem, I assume $\alpha_c + \alpha_{q1} + \alpha_{q2} = 1$ and only estimate parameters α_{q1} and α_{q2}. Among the various features of the data that help in identifying the preference parameters are the proportions of part-time, full-time and non-working women across the life-cycle, conditional on having a child. In general, the employment decisions of individuals without a child identifies the parameter α_{q1} and the difference in the labour supply of individuals with and without a child identifies the parameter α_{q2}. For example, consider a case that two women are identical in all characteristics except that one is having a child and the other one does not, then differences in their labour supply identifies the parameters α_{q2}. If the mother supplies less labour than the woman without a child, then it must be that the marginal utility from household good Q2, α_{q2}, is larger than the marginal utility from household good Q1, i.e. α_{q1}. In this case we should observe in the data that women work more part-time or stop working after having a child, and that more individuals in the data opt to have a child. Figure D.1 in Appendix D shows the impact of varying parameters α_{q1} on labour supply decisions and figure D.2 shows how varying parameter α_{q2} affects labour supply and fertility decisions of women.

The direct utility from working part-time (α^w_p), or not working (α^w_{nw}) are identified by the proportion of women working part-time, and those who are not working relative to full-time working women. The impact of varying these parameters are shown in Figure D.3 in Appendix D.

The marginal productivity of housework hours of single and married individuals λ is identified by the extent to which the proportion of individuals who work part-time or are out of the labour market differs between married and single individuals together with the proportion of married individuals. Since both $Q1$ and $Q2$ are public goods shared in the household, the larger the parameter λ is, the larger is the gain from specialization in the household. For example, consider a case that two women are identical in all characteristics except that one is married and the other one is not, then differences in their labour supply identifies the parameters λ. If the observed labour supply of married woman is lower than her single counterpart, then it must be that the value of λ is large because upon marriage, both members of the household benefit from the joint consumption of the public goods, i.e. (Q_1) and (Q_2), and therefore there are incentives for the married woman to work fewer hours. In addition, we should also observe that a larger proportion of individuals in the

data get married to gain from specialisation in the household as λ gets larger. Figure D.4 in Appendix D shows the impact of varying parameter λ.

The degree of substitutability between formal childcare and housework hours (γ) is identified using the estimated childcare cost (π_{CC}) and employment patterns of women, together with the choice of childcare. To explain this, consider the case that two mothers are identical except for the fact that one is working full-time and the other is not working, then keeping fixed childcare cost, differences in formal childcare usage among them identifies the degree of substitutability. To see why, notice that, given the separate identification of preference parameters discussed above, if the full-time employed mother uses more formal childcare than the non-working mother, then it must be because her housework hours are substitutable with formal childcare. The larger the differences in formal childcare usage between these two groups of women is, the stronger the substitutability must be. Figure D.5 shows how the covariance between housework hours and formal childcare usage changes when varying the degree of substitutability. Childcare take-up and the first and second moments of cost of childcare at different employment states, together with employment patterns, after having a child, help in identifying the childcare cost (π_{CC}) parameter and the variance of childcare cost (σ^2_{CC}).

The probability of meeting (ω) and the variance in the utility of marriage (σ^2_{mar}) are identified by transitions into marriage and transitions into divorce, respectively. Figure D.6 in Appendix D shows the impact of varying these two parameters. The parameters α_n and σ^2_{ch} are jointly identified using the fraction of men and women in the data who have children at different ages. Figure D.7 in Appendix D shows the impact of varying these two parameters.

4.3 Model Fit

In this section I discuss how the model captures the patterns observed in the data for a selected number of moments. Please refer to Table B.1 in Appendix B for the full list of moments I utilize in the estimation. I calculate moments at different ages, ranging from 18 to 50, which are conditioned on various outcomes such as fertility and marital status as well as transition into marriage/divorce and transitions to parenthood.

Employment and Wages: Figures A.1a - A.2c show how the model fits the employment patterns of single and married mothers compared to non-mothers. The model does a very good job in matching the life-cycle employment patterns of women. In general, single women are more likely to work compared to married women and they are also more likely to work full-time. Motherhood is associated with a reduction in labour supply and this

observed decrease is larger for married mothers compared to single mothers. The change in labour supply due to motherhood is observed in both intensive and extensive margins of employment.

Figure A.3 shows the employment parents by education. The model captures the observation in the data that college-graduate women have higher extensive and intensive margins of labour supply and are unlikely to be out of the labour market. However, the model overstates the proportion of non-working women from lower education backgrounds. Figures A.4 - A.6 show that the the model does a good job in fitting the wages of both full-time and part-time employed women by education and work experience. The average wages with respect to part-time and full-time experiences also match the data well. Figures A.7 - A.8 show that the model does a good job in replicating the wage patterns for men but understates the wages of college-graduates.

Marital Status and Fertility: The marriage and divorce fractions and transition into and out of marriage generated by the model also match the data well. However, the fraction of married individuals is understated (See Figures A.9 to A.10). With respect to timing of first birth, the model fits the fraction of single and married men with a child but lower educated women start to have the first child earlier than the time observed in the data (see Figure A.11).[26]

Childcare Take-up and Cost: Table A.1 reports the variation in childcare usage by employment status. Full-time working single mothers use more full-time formal childcare compared to part-time working mothers and non-working mothers. The same patterns are observed for married mothers. In line with the data married mothers in general use more formal childcare compared to single mothers. Table A.2 shows how the model fits the distribution of childcare costs. In general, the estimated mean and variance of childcare cost are higher than the moments observed in the data. One explanation for the observed low cost of childcare in the data is that the PSID childcare cost data are not very well reported and the problem with its values has been mentioned by Lee and Seshadri (2019).

5 Parameter Estimates

Wages and Employment: Table 5 reports the estimated wage equations' parameters. The larger intercepts of the log hourly wages of men and full-time working women shows the

[26]Note that the educated mothers' behaviour is modelled at age 22, therefore there is a sharp drop in the fraction with a child at age 22 when I start modelling the behaviour of college-graduates.

Table 5: Log Hourly Wage Parameters

Model parameters	Description	Estimated value	Standard errors
Wage parameters (full-time employment, male)			
$\beta^m_{0,full}$	Intercept	1.444	(0.104)
$\beta^m_{1,full}$	Return to full-time experience	0.034	(0.000)
$\beta^m_{2,full}$	Dec/inc return to full-time experience	-0.000	(0.000)
$\beta^m_{3,full}$	Return to education	0.173	(0.001)
σ^{2m}_f	Variance of ϵ^m_f	1.062	(0.056)
Wage parameters (full-time employment, female)			
$\beta^w_{0,part}$	Intercept	1.154	(0.067)
$\beta^w_{1,part}$	Return to full-time experience	0.030	(0.000)
$\beta^w_{2,part}$	Dec/inc return to full-time experience	-0.000	(0.000)
$\beta^w_{3,part}$	Return to part-time experience	0.032	(0.000)
$\beta^w_{4,part}$	Dec/inc return to part-time experience	-0.001	(0.000)
$\beta^w_{5,part}$	Return to college	0.487	(0.012)
σ^{2w}_p	Variance of ϵ^w_f	0.576	(0.017)
Wage parameters (part-time employment, female)			
$\beta^w_{0,full}$	Intercept	1.172	(0.069)
$\beta^w_{1,full}$	Return to full-time experience	0.021	(0.000)
$\beta^w_{2,full}$	Dec/inc return to full-time experience	-0.001	(0.000)
$\beta^w_{3,full}$	Return to part-time experience	0.017	(0.000)
$\beta^w_{4,full}$	Dec/inc return to part-time experience	-0.000	(0.000)
$\beta^w_{5,full}$	Return to college	0.391	(0.008)
σ^{2w}_f	Variance of ϵ^w_p	0.420	(0.009)

difference in wages which cannot be explained by experience or education. The intercept for men's full-time wages is about 30 percent larger than that of women. This difference in the intercepts can be attributed to factors which are not specifically modelled, such as selection of men into higher-paid occupations or gender discrimination in the labour market.

The estimated male wage equation shows that one year of full-time experience increases men's hourly wages by 3.4% and the returns to full-time experience exhibits a concave form. Male college graduates experience a 17% higher hourly wage compared to the below-college educated men. For women, the college wage premium is 49% and 39% for full-time and part-time employment, respectively.

The estimated parameters of the wage equations show that full-time experience increases full-time earnings by 3% in the first year (part-time experience constant) and part-time experience increases full-time wages by 3.1% in the first year. Due to larger curvature in part-time experience as compared to full-time experience of full-time wage, additional years

of part-time work experience add less to full-time wages. For example, 3 years of part-time experience add 8.7% to full-time wages (full-time experience constant) while 3 years of full-time experience add 8.9% to full-time hourly wages (part-time experience constant). The estimated parameters of the returns to experience of full-time employed women are similar to Francesconi (2002).

Turning to part-time wage equation, full-time experience increases part-time wages by 2% in the first year and part-time experience increases part-time wages by 1.7% in the first year. Since the curvature in returns to full-time experience is steeper than the returns to part-time experience, additional years of part-time work experience add less to part-time wages. For example, 8 years of full-time experience add 11.2% to part-time wages (part-time experience constant) while 8 years of part-time experience add 12.1% to part-time hourly wages (full-time experience constant).

The estimated part-time and full-time wage equations for women demonstrate two important results. First, cross-experience effects are larger than own-experience effects in the full-time and part-time wage equations. However, due to the curvature in returns to part-time and full-time experiences of both wage equations this pattern gets reversed with additional years of experience. For example, while one year of part-time experience increases wages more than one year of full-time experience, three years of full-time experience adds more to full-time hourly wages than three years of part-time experience. This reversion for part-time wages happens at higher years of experience; i.e. eight years. This result indicates that if a woman has accumulated seven years of full-time experience and no year of part-time experience, her hourly wages would be higher compared to a similar woman with seven years of part-time experience and no full-time experience. But the part-time hourly wages of a woman with eight years of full-time experience and no year of part-time experience would be lower than a similar woman with eight years of part-time experience and no full-time experience.

Second, at any level of experience the return to part-time and full-time experience of full-time hourly wages is larger than part-time wages. This result indicates that irrespective of type of accumulated years of experience, i.e. full-time or part-time, switching from part-time employment to full-time employment is always associated with higher hourly wages. This result indicates that if women have accumulated fewer years of full-time work experience as a consequence of marriage or motherhood, there will be no penalty in their return to experience once they switch to full-time employment.

The estimated variance of wage shocks σ_f^{2m}, σ_f^{2w}, and σ_p^{2w} are 1.0625, 0.5758, and 0.4195, respectively. These variances are larger than those estimated by Francesconi (2002). It is worth mentioning that while the estimated full-time wage equation here is similar to

Table 6: Preferences, Household Production, Marriage and Childcare Parameters

Model parameters	Description	Values	Standard errors
Preference parameters			
α_c	Marginal utility of consumption (not estimated)$\star$	0.098	-
α_{q1}	Marginal utility of household good	0.220	(0.033)
α_{q2}	Marginal utility of child quality	0.682	(0.188)
α_{nw}^w	Utility of not working (women)	0.634	(0.0201)
α_p^w	Disutility of working part-time (women)	-0.091	(0.000)
α_n	Disutility of having a child	-6.402	(2.049)
σ_{ch}^2	Variance of child preference shock (ϵ_{CC})	0.385	(0.007)
Household production			
γ	Degree of substitutability between childcare and housework hours	0.623	(0.019)
λ	Marginal productivity of housework hours	0.963	(0.046)
Marriage			
ω	Probability of meeting a potential partner	0.218	(0.081)
σ_{mar}^2	Variance of marriage shock (ϵ_{CC})	53.838	(2.899)
Childcare cost			
π_{CC}	Log hourly childcare cost	1.939	(0.188)
σ_{CC}^2	Variance of childcare cost shock (ϵ_{CC})	0.731	(0.027)
	Parameters that are not estimated		
δ	Discount factor (not estimated)	0.954	-
θ	Bargaining weight in Nash product (not estimated)	0.500	-

$\star$ Marginal utility of consumption is not estimated and its value is obtained through $\alpha_c + \alpha_{q1} + \alpha_{q2} = 1$.

Francesconi (2002), the estimated parameters of part-time wage is different. One possible explanation for discrepancies in our estimated wage equations is the differences between our samples. Francesconi (2002) estimates the model using a sample of always-married women while the parameters here are estimated using a sample of single and married women who can marry/remarry and also divorce. Always-married women might have unobserved characteristics that are correlated with the women's decision to work part-time or full-time. The parameters estimated in this paper are corrected for such biases by modelling employment decisions together with marital decisions, and are consequently expected to be different.

Preference Parameters and Production Function The first two panels in Table 6 report the estimated preferences and household production parameters. Note that the

discount factor and bargaining weight in Nash product are not estimated. The annualised discount factor is fixed at 0.954 and I assume that the bargaining weight in Nash product is equal for both men and women and is therefore set to 0.5. Note that an equal bargaining weight implies that spouses obtain an equal share of the household's surplus. However, lack of commitment allows me to capture the consequences of household specialization and lower future income through the value of outside option, i.e. divorce.

The marginal utility of household goods (α_{q1}) and (α_{q2}) are 0.220 and 0.682, respectively.[27] These parameter estimates imply that household good (Q_2), i.e. the qualities related to child, is valued more by the households than any other goods. Del Boca et al. (2014) also find that households value child quality more than any other goods. The estimated parameters on utility of not working and disutility of working part-time are 0.634 and -0.091, respectively. These estimates indicate that participation in the labour market decreases utility. The disutility from having children (α_n) is -6.402 and can be interpreted as cost of having a child and is important in deriving the choice of having a child.

The degree of substitutability between childcare and housework hours (γ) is estimated at 0.623, implying an elasticity of substitution of 2.6. This estimate indicates that housework hours and childcare hours are close substitutes. The high degree of substitutability implies that a relative decline in the cost of childcare, while keeping the opportunity cost of home production (wages) constant, should increase the use of childcare and decrease housework hours (or increase labour supply). The marginal productivity of housework hours of single and married individuals (λ) is estimated at 0.963.

Marriage Parameters and Cost of Childcare The probability of meeting a potential partner (ω) is 22 percent, implying that one in 5 individuals meet a potential partner. The variance in the shock of marriage (σ^2_{mar}) is estimated to be 53.838. This high variance in the marriage shock increases the risk to marriage to the extent that negative marriage shocks have large effects on the utility of being married. However, marriage is still an attractive option because of the production of public goods and the gain from specialisation in such production. π_{CC} and σ^2_{CC} report the estimated mean and variance of the cost of childcare. The estimated hourly cost of child care is larger than an hour's return to both full-time and part-time employment for an individual (men or women) with no work experience, irrespective of having a college degree. Therefore, women with lower work experience and education might prefer to stay home and look after their child. At this cost of childcare it is expected that women work fewer hours and increase housework hours, as long as the discounted expected future wages, due to lower work experience, do not deter them from

[27] Note that only the marginal utilities of household goods are estimated by assuming $\alpha_c + \alpha_{q1} + \alpha_{q2} = 1$.

spending more time in household production.

6 Policy Experiments: Childcare Cost Subsidies

In this section, I study how providing households with universal childcare subsidies, which range from 5 to 95 percent of the cost of childcare, affect take-up, marital decisions, timing of birth, employment, and wages.[28] These policy experiments are universal and are independent of employment status or income. I evaluate the impact of these policies on single and married individuals separately. In doing so, I make use of the model's endogenous marital decisions' feature which makes the model a good fit for such an exercise. In each section, I explain several of the model's mechanisms which contribute to observing different behavioural responses. The reader should bear in mind that various aspects of the model simultaneously play a part in observing these results, and to explain one mechanism in isolation would be to simplify the each factor's contribution.

6.1 Childcare Take-up and Housework Hours

Figures 4a and 4b show the simulated childcare take-up and housework hours of mothers in response to childcare subsidies, respectively. We can see that more generous childcare subsidies are positively associated with its take-up. A 10 percent decrease in the cost of childcare increases childcare take-up of single mothers from an average of 2.23 hours to 2.65 hours per day (or by 18.7% percent). For married mothers these elasticities are smaller. For example, A 10 percent decrease in the cost of childcare increases childcare take-up of married mothers from an average of 6.03 hours to 6.63 hours per day (or by 9.9 percent).[29] However, despite the close substitutability between childcare and housework hours, the substitution between the two input happens at a much slower rate with a 10 percent childcare subsidy decreasing housework hours of single mothers by -0.019 hours per day (or by -0.16 percent) and that of married mothers by -0.003 hours per day (or by -0.02 percent).

To explain these results, let us first focus on the income and substitution effects arising from childcare subsidies. Since childcare and housework hours are close substitutes, by substituting formal childcare with housework hours, households should obtain similar

[28] Child care subsidies can be provided through different mechanisms, such as funding specific spots in government-supported child care centres or offering vouchers that households can apply toward their child care expenses (Hotz and Wiswall, 2019). In the context of this exercise, the subsidy involves the government covering a portion of the costs for whichever child care option the household selects.

[29] The numbers related to these figures are reported in Table C.1 in Appendix C.

amount of child quality (Q2 in the model), a higher consumption, but a lower Q1 because this household good is produced by housework hours only. We expect to observe a decrease in housework hours (increase in labour supply) as long as the life-time utility from working is larger than the forgone household good production. This is the so called substitution effect. On the other hand, childcare subsidies increase household income by decreasing the cost of childcare, to the extent that by working fewer hours households could obtain higher levels of consumption and/or household goods. This is the so called income effect.

The fact that housework hours remain relatively unchanged in response to policy exercises indicates that the substitution and income effects for housework hours offset each other. To explain this, note that decreasing housework hours would lead to an increase in consumption (through increased labour market income) and a decrease in the production of both Q1 and Q2, keeping all else constant. However, since the marginal utility of Q1 is larger than marginal utility of consumption, i.e. 0.22 versus 0.098 (See Table 6), the marginal gain from decreasing housework hours and increasing employment is essentially offset by the marginal loss from foregone household good production, i.e. Q1 and Q2. While housework hours can be substituted by childcare for the production of Q2, there are no such substitution possibilities for the production of Q1, which explain why the housework hours remain relatively unchanged in response to childcare subsidies.

Figure 4b illustrates that single mothers are more responsive to childcare subsidies compared to married women. A 10% child care subsidy decreases the housework hours of married mothers by -0.02 percent and that of single mothers by -0.16 percent. In general, the two opportunity costs arising from substituting housework hours with childcare, i.e. forgone household good production (Q1) and child quality (Q2), are larger for married mothers, because these goods are used publicly within the household, which explains why the decrease in the housework hours of married mothers is less than for single women.

As a result of the reduction in the housework hours of single mothers, we would expect the production of household good (Q1) - which is produced with housework hours only - to decrease. For married mothers the reduction in the production of Q1 is expected to be smaller because the housework hours of both married fathers and mothers remain relatively unchanged (The results for married fathers are discussed in Table **??** in Appendix C). Indeed, Figure 4d shows that this is the case, so that Q1 of single mothers falls more than that of married women. On the other hand, as depicted in Figure 4a, there is an increase in childcare take-up for both single and married mothers. Hence, we expect to observe an increase in the household good (Q2) of both single and married mothers and Figure 4c shows that despite the reduction in housework hours, the household good (Q2) increases. This result have implications for gains from marriage which will be discussed

later.

Another interesting feature in Figures 4a and 4b is that the decrease in housework hours reverses after a certain threshold. This threshold is at 60 and 90 percent childcare subsidies for married and single mothers, respectively. To explain this result, let us turn to the non-linearity aspect of the child quality production function. The estimated elasticity of substitution between childcare and housework hours is 2.6, implying that childcare and housework hours are close substitutes; nevertheless, there is some complementarity between the two inputs. This complementarity implies that, keeping the total amount of the two inputs constant, a more equal proportion of both inputs produces a higher child quality in contrast to a disproportionate amount. Therefore, at lower levels of childcare subsidies, when the proportion of hours of formal childcare to housework hours is smaller, we observe that households have higher incentives to reduce housework hours and work more to purchase childcare. On the other hand, when childcare subsidies are very generous, households have incentives to purchase a larger amount of childcare but simultaneously want to spend more time at home with the child due to the existing complementarity between the two inputs, as a result, there is a smaller impact of policies on housework hours.

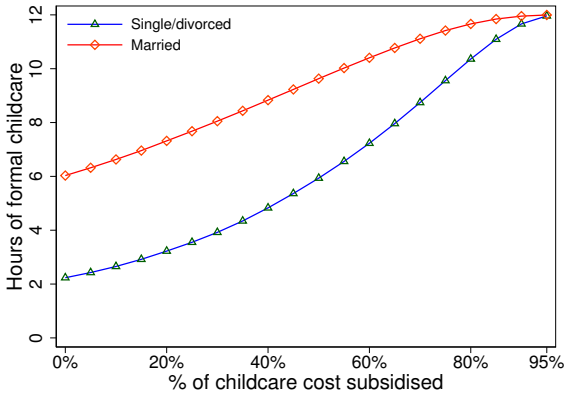
The implication of this complementarity on housework hours of married and single mothers is different because within marriage both parents could spend time with the child; therefore, the housework hours spent with the child within marriage could be larger than for single mothers. Hence, the impact of this complementarity on housework hours is expected to kick in earlier for married mothers than single mothers. As we can see in Figure 4b, we observe that married mothers have higher incentives to increase their housework hours earlier (at 60 percent subsidies or above) while the impact of this complementarity kicks in much later for single mothers (at 85 percent subsidies or above).

6.2 Employment

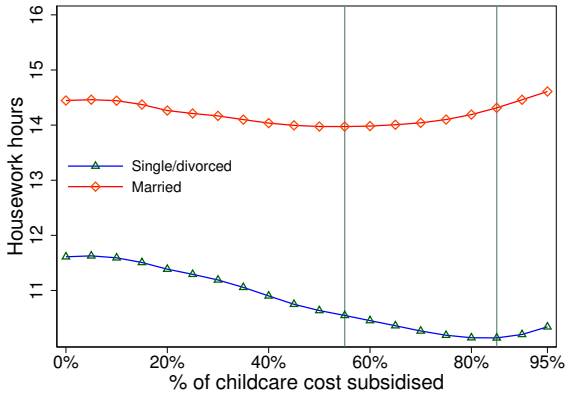
Figure 5 shows how the reduction in housework hours of mothers, discussed in section 6.1, is translated into changes in the intensive and extensive margins of labour supply.[30] The first observation from these figures is that, in line with the impact on houseworks hours, while married mothers' labour supply remains relatively unchanged, subsides have significant impacts on the employment rate of single mothers (See Figures 5a and 5b). For example, a 10% child care subsidy increases employment of single mothers by 1 pp (or 1.4 percent) while married mothers' employment increases by 0.3 pp (or 0.8 percent). Furthermore, the employment rates of single mothers increases irrespective of the level of subsidies, while the employment rate of married mothers starts to decline as subsidies reach 60% of childcare

[30]The numbers related to this figure are reported in Tables C.2 and C.3

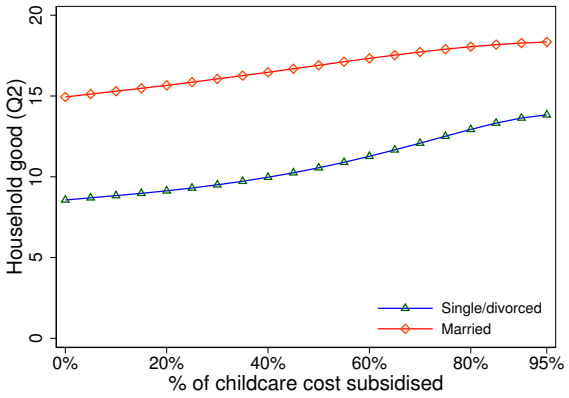
Figure 4: Effects of subsidies on home production of single/divorced and married mothers



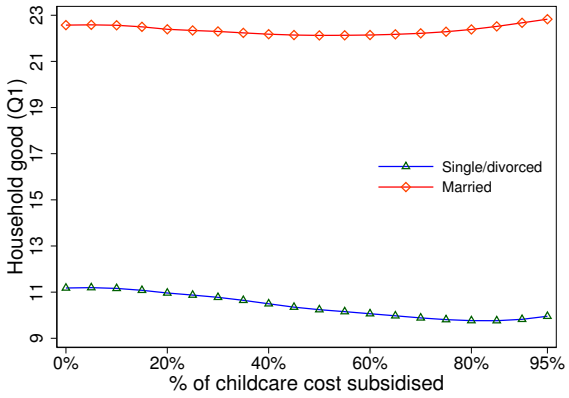
(a) Childcare take-up



(b) Housework hours



(c) Household good (Q2)



(d) Household good (Q1)

costs.

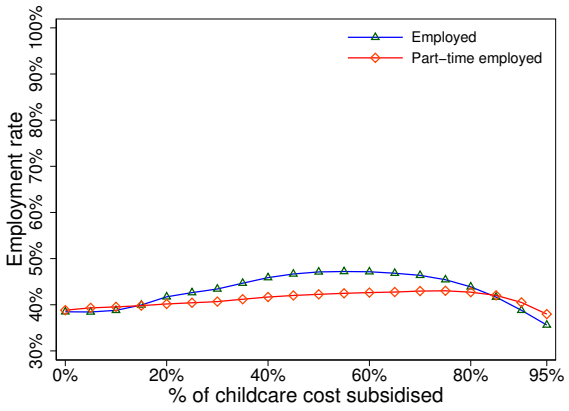
To explore the heterogeneity in employment responses, Figures 5c-5f report the impacts by education and marital status. The first observation from these exercises is that the increase in employment of mothers is mostly observed among lower educated mothers (See figures 5c and 5e). For example, a 10% child care subsidy increases employment of lower educated single mothers by 2.1 pp (or 3.2 percent) and that of lower educated married mothers by 0.9 pp (or 4.1 percent). For higher educated single mothers these policy responses are smaller (See Figures 5d and 5f). For example, A 10 percent child care subsidy increases employment rate of single higher educated mothers by 0.06 pp (or 0.06 percent) and that of married mothers by 0.2 pp (or 0.2 percent).

The third observation from these exercise is that lower educated single mothers are the most responsive group to these subsidies. They not only always increase their participation rate as subsidies get more generous but also the increase in their labour supply is always largely concentrated in full-time employment. For higher educated single mothers the

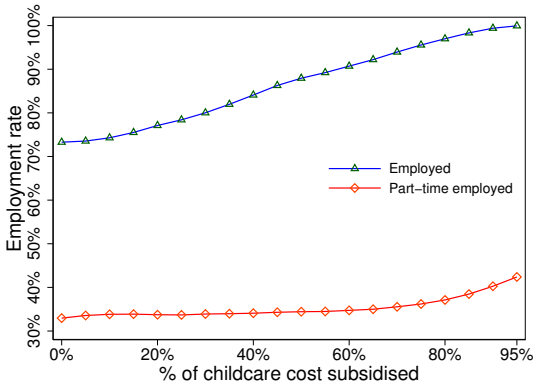
participation responses are in general smaller and the increase in labour supply becomes mostly concentrated in part-time employment as subsidies reach 40 percent and above. For lower educated married mothers, irrespective of the level of subsidy, the increase in employment is mostly concentrated in part-time employment and as subsidies becoem more generous, i.e. at 85 percent or above the participation rates decline. Similar patterns are observed for higher educated married mothers but in general this group have the smallest increase in both the intensive and extensive margins of employment.

The differences in responses of higher and lower educated mothers can be explained by large hourly wage returns to college education which is about 48 and 39 percent for full-time and part-time employment respectively. This indicates that higher educated mothers have larger income effects as compared to lower educated mothers which explains why their intensive and extensive margins of labour supply are less responsive to childcare subsidies. Furthermore, as discussed in section 6.1 married mothers respond less to childcare policies than single mothers. As a result, we observe that single lower educated mothers are the most responsive to these subsidies compared to married and higher educated single mothers.

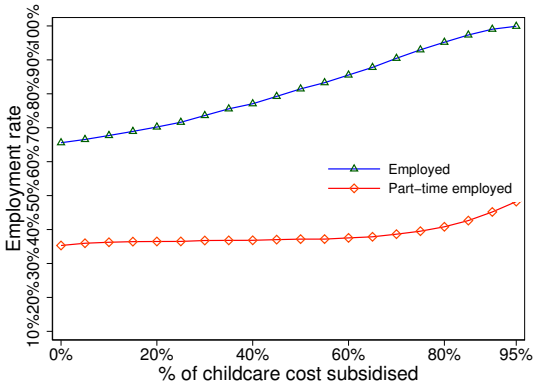
Figure 5: Childcare subsidies and labour supply of mothers



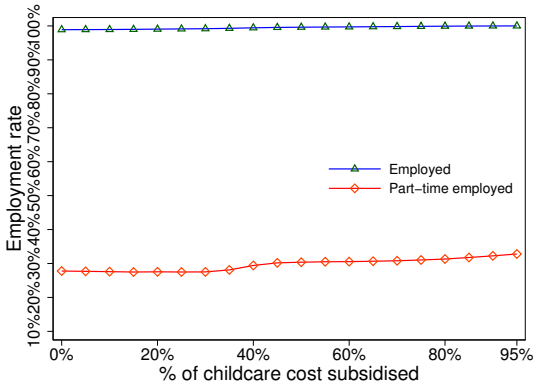
(a) Married



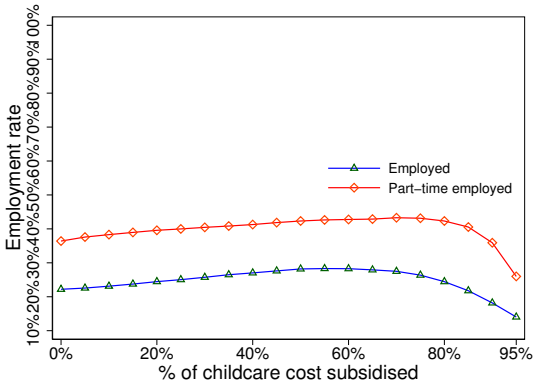
(b) Single or Divorced



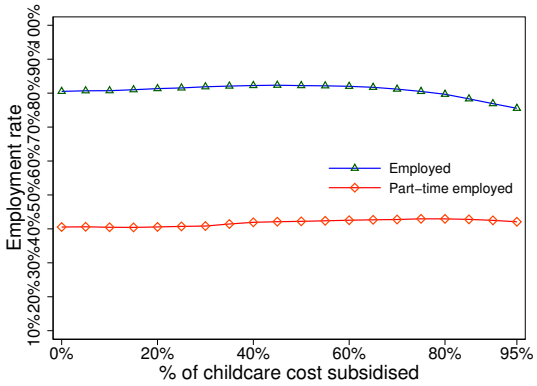
(c) Single or Divorced: below-college educated



(d) Single or Divorced: college-graduates



(e) Married: below-college educated



(f) Married: college-graduates

This figure shows the simulated intensive and extensive labour supply responses to childcare subsidy programmes. Single individuals include never-married and divorced individuals.

6.3 Marital Decisions and Timing of Birth

Figures 6a and 6b show the impact of childcare subsidies on marital status by women's education (See Table C.4 in Appendix C for the corresponding numbers related to these

Figures). These numbers can be interpreted as the proportion of periods that higher and lower educated mothers are married or divorced. Subsidising 10 percent of childcare costs decreases the fraction divorced among lower educated women by -0.3 percentage points (or by 0.8 percent). For higher-educated mothers the reduction is smaller at -0.115 pp (or 0.3 percent). As subsidies get more generous, the fraction of divorced individuals decreases further and reaches its minimum at 60 percent among lower educated mothers, which is -0.8 percentage points (or -2.1 percent) lower than the benchmark. For higher educated mothers the fraction divorced reaches its minimum at 45 percent childcare subsidies where it is 2 percentage points (or -5.6 percent) lower than the benchmark.[31] For both lower and higher educated mothers, the fraction divorced starts to increase after these thresholds.

To better understand the reasons behind changes in marital decisions, Figures 6c and 6d depict the proportion of periods women have a child in their life-time in response to childcare subsidies. A comparison between Figure 6a with Figure 6c and Figure 6b with Figure 6d reveals that marital patterns closely follow the patterns observed in timing of birth; i.e. as women start to have a child earlier, the fraction divorced declines. As subsidies become more generous, a larger number of lower educated mothers start to have a child earlier and the largest increase happens up to the 15 percent childcare subsidy and thereafter it plateaus. On the other hand, for college graduate mothers subsidies below 20 percent have minimal impact on timing of birth, however, as subsidies become more generous more higher educated mothers start to have a child earlier.

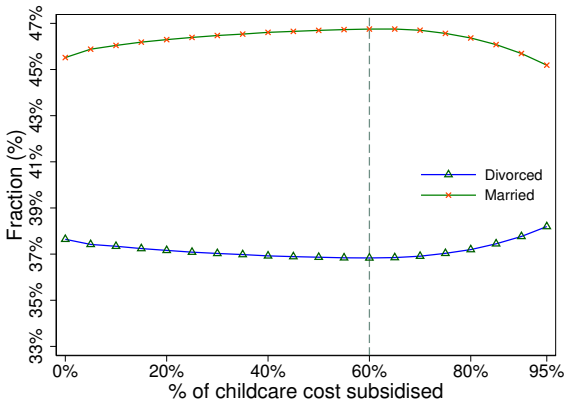
To explain these results, remember from Figure 4c that childcare subsidies increase the value of household good Q2 (or child quality). Since this household good has a larger marginal utility compared to marginal utility of Q1, more women start to have a child earlier in order to enjoy the value of this household good longer. In addition, recall that one of the gains from marriage is the utility from children enjoyed as a public good and that marriage facilitates the production of this household good by allowing for specialisation in household good production. So we expect that as childcare gets subsidised and more individuals have children, the gains from marriage to become larger.

However, the gains from marriage is expected to be larger when childcare subsidies are lower. Recall from Figure 4a that childcare subsidy programmes increase the child care take-up of both married and single mothers but the increase in childcare take-up of single mothers is larger than that of married mothers. This is because at lower levels of subsidies, not all single mothers can purchase childcare to substitute it with their housework hours. Therefore, at lower levels of subsidies the gains from marriage are larger and we see an

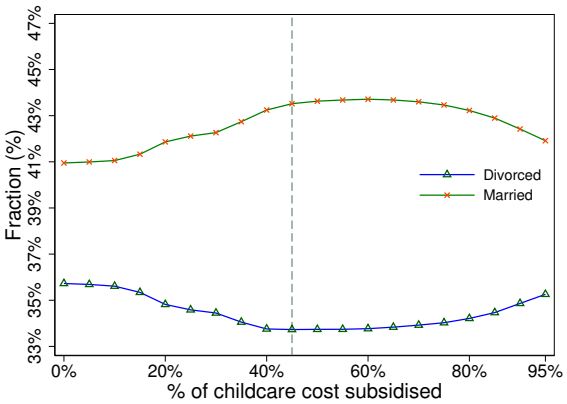
[31] Similar patterns are observed in the fraction of single individuals (See Table C.4 in Appendix C for the results for single individuals.)

increase in the fraction married. On the other hand, as subsidies get more generous the child care take-up of single mothers approaches that of married mothers (See Figure 4a). As a result, the difference in Q2 between single and married women becomes smaller which improves the outside option to marriage; i.e. utility from divorce, and increases the fraction of divorced individuals.[32]

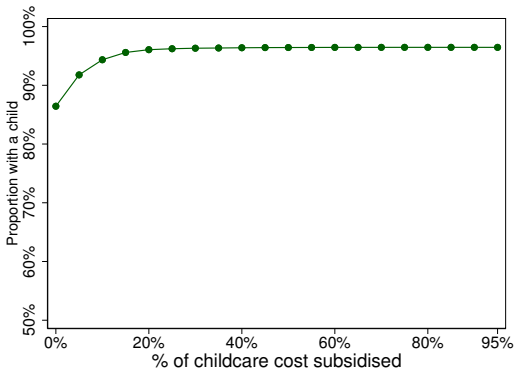
Figure 6: Effects of childcare subsidies on marital decisions



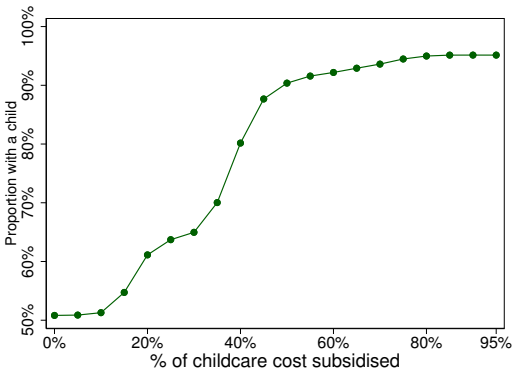
(a) Below-college educated



(b) College-graduates



(c) Below-college educated



(d) College-graduates

[32]Note that the results for married men are similar, i.e. as childcare subsidies become more generous the difference in Q2 between single and married fathers becomes smaller because more single fathers can purchase childcare as single individuals (see Table C.6 in Appendix C

6.4 Life-time Employment, and Earnings

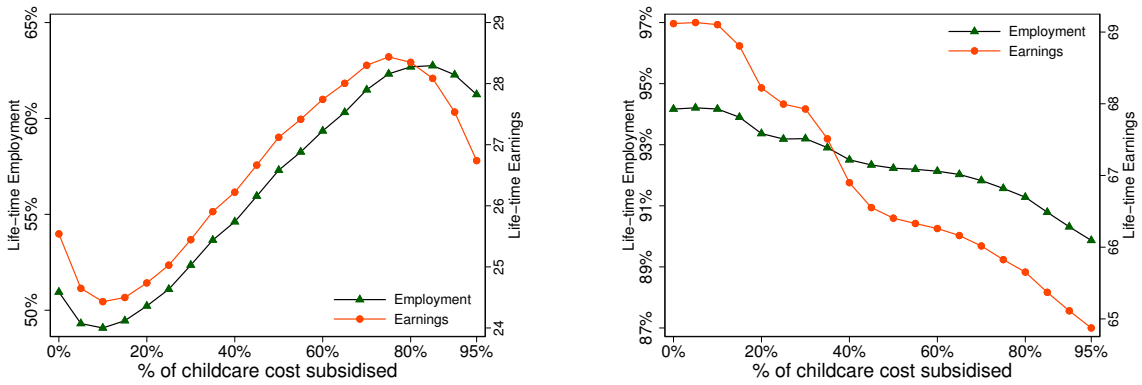
In sections 6.1 and 6.2 the implications of childcare subsidies on employment decisions of *mothers* were discussed. However, as discussed in section 6.3, childcare subsidies also change the timing of the birth as well as marital decisions. Therefore, the overall impact of these subsidies on labour market outcomes of women is not fully understood if marital and timing of the birth decisions are not taken into account. Figure 7 depicts the impact of these policy experiments on life-time employment and earnings of lower and higher educated women.[33]

In figure 7a, it is evident that subsidising less than 15 percent of childcare costs results in a sharp decline in the life-time employment and earnings of lower-educated women compared to the benchmark. This result is directly related to the marital and birth decisions of women discussed in section 6.3 where we observed a notable rise in earlier first birth of lower educated mothers when subsidies are below 15 percent which also increase the fraction married over the life-cycle. Since mothers and specifically married mothers have a lower labour supply, both in terms of extensive and intensive margins of employment, we observe a drop in lower educated women's life-time employment and earnings at lower levels of childcare subsidies. However, as subsidies become more generous, more women start to work because higher subsidies do not change timing of the birth significantly but facilitate the participation of lower educated women in the labour market by increasing the opportunity cost of not working. Hence, we observe an increase in life-time employment and earnings of lower educated women as more than 15 percent of cost of childcare is subsidised.

Turning to the results for higher educated women, it can be seen that the subsidies lower the life-time employment and earnings of higher educated women (See Figure 7b). Similar to lower educated women, the drop in life-time employment, and earnings follows the pattern of timing of the first birth (See Figure 6d). However, in contrast to the results for lower educated women, more generous subsidies lead to lower employment and earnings of higher educated women. Higher educated mothers have larger extensive and intensive margins of labour supply and also earn and as a result the income effect from these subsidies are larger for them than the substitution effect. Therefore, childcare subsidies, irrespective of their generosities, do not increase higher educated women's labour supply. On the other hand, as subsidies become more generous the substitution effect for lower educated mothers dominates the income effect and we therefore observe an increase in their labour supply. These results are in line with the findings of in line with the findings of Adda et al. (2017).

[33]Earnings is calculated as life-time earnings from employment. The income for non-working individuals is set to be zero.

Figure 7: Childcare subsidies, life-time employment, and earnings



(a) Below-college educated

(b) College-graduates

6.5 Welfare Implications

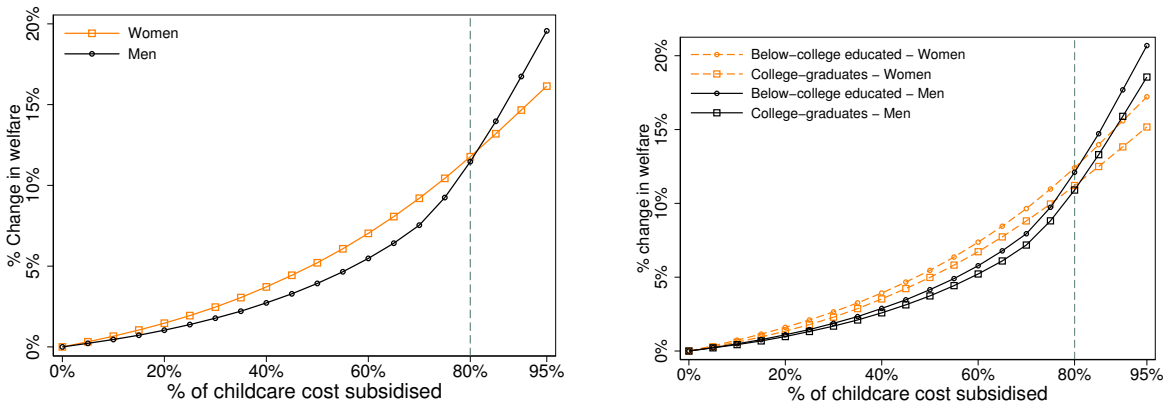
Figure 8 depicts the implications of childcare subsidies for the overall welfare where welfare is defined as the expected life-time utility at the beginning of the life-cycle. Recall from Figure 4c that childcare subsidies increase the value of household good (Q2) or child quality, and are therefore expected to increase welfare. Figure 8a shows that more generous subsidies are associated with an increase in total welfare of men and women. Furthermore, as depicted in figure 8b, the increase in welfare is larger for lower educated women and men compared to their higher educated counterparts. Interestingly, any subsidy above 80 percent of the childcare cost increases the welfare of men more than women. To explain these results recall that subsidies above 60 percent increase the fraction divorced and any subsidy above 80 percent increases the housework hours of men. Therefore as proportion of single/divorced men increases and they reduce their housework hours and use more childcare, they have a larger increase in the production of both household goods relative to single mothers. As a result, we observe a larger growth in the welfare of men compared to women.[34]

7 Conclusion

In this paper I develop and estimate a dynamic model of employment, fertility, marital, and childcare decisions in order to evaluate the impact of childcare subsidies on various life-time

[34]Note that in all these policy exercises the value of household goods for mothers is larger than fathers but the growth in household goods for men becomes larger than women as subsdies becoem more generous. See columns 6, 10, and 14 in Table 16 for the results for fathers and columns 6, 10, and 14 for the results for mothers.

Figure 8: Welfare implications of childcare subsidies



(a) Welfare - by gender

(b) Welfare - by education

outcomes for men and women. In the model, labour supply, fertility, and marital decisions are endogenously determined. Household decisions are modelled in a Nash bargaining framework, where outside options are specified as the values spouses obtain from making decisions as single individuals. Household members cannot commit to insure against the child penalty associated with the lower labour supply of women. The model is estimated using the 1968-1996 waves of PSID, thereafter the estimated model is used for counterfactual analyses.

There are three important take-aways from these policy experiments: first, childcare subsidies increase its take-up but, despite the close substitutability between childcare and housework hours, the labour supply of married mother is hardly affected. However, single mothers and specifically those form lower-education backgrounds are considerably more responsive to these programmes. Secondly, I show that the increase in the labour supply of lower-educated women expands their life-time income substantially. Thirdly, I show that the increase in childcare take-up due to childcare subsidies affects the fraction of married individuals. Childcare as an input into production of household good improves the value of the household public good produced within marriage and increases the fraction of married individuals. The fourth take-away from these exercises is that childcare subsidies increase overall welfare by improving the value of the household good produced in the household.

To conclude, the model estimated in this paper studies the implications of childcare subsidies in a dynamic collective framework. However, due to computational limits, I abstract away from modelling child development and savings. Adding both cognitive and non-cognitive child development to the model is beyond the scope of this paper. Furthermore, I do not model savings and wealth formation which could have implications for household consumption smoothing behaviour. Lastly, my estimates represent 1968-1997

data in which wages and the proportion of female college graduates were different from those of present-day US. Therefore, the estimated parameters are expected to be different if recent US data are to be used.

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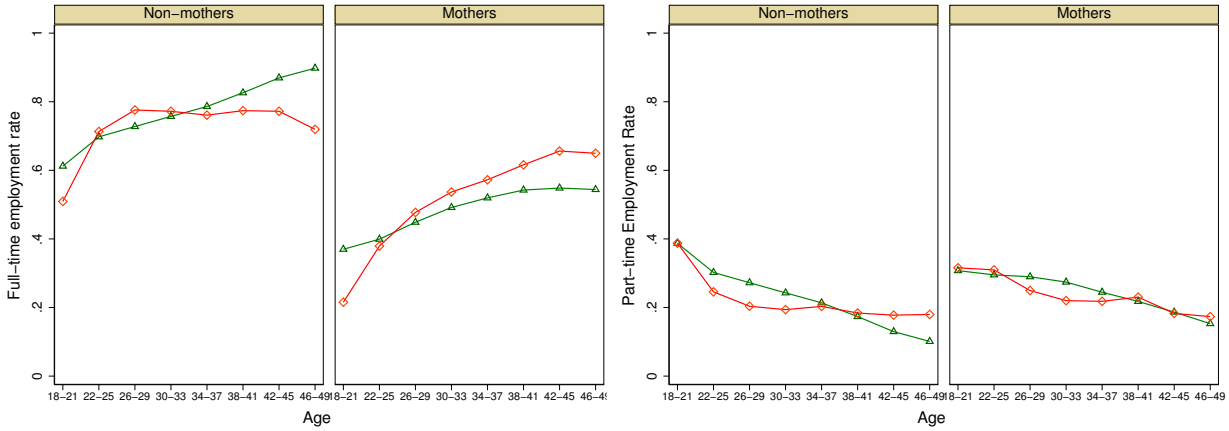
Appendix

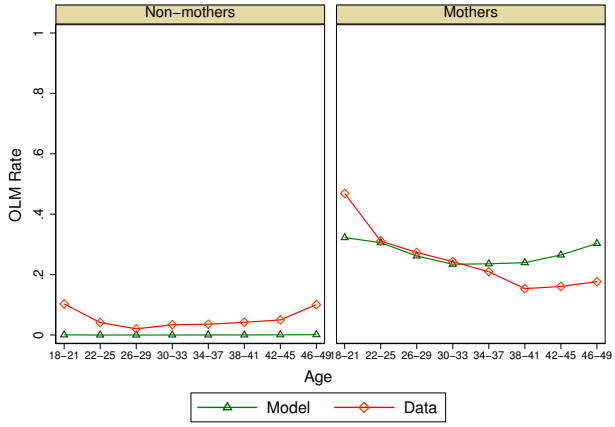
A Appendix: Model Fit

Figure A.1: Employment of single mothers and single non-mothers



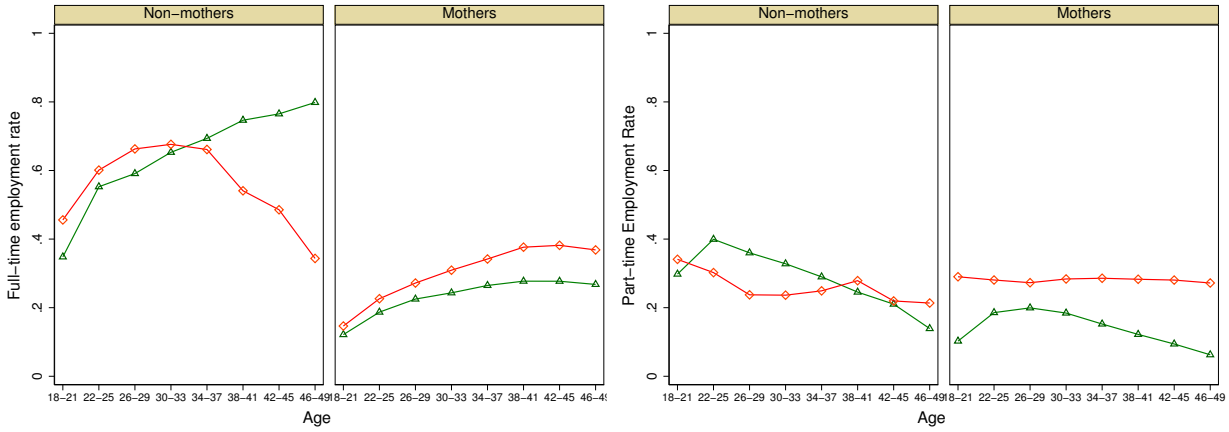
(a) Full-time employment

(b) Part-time employment



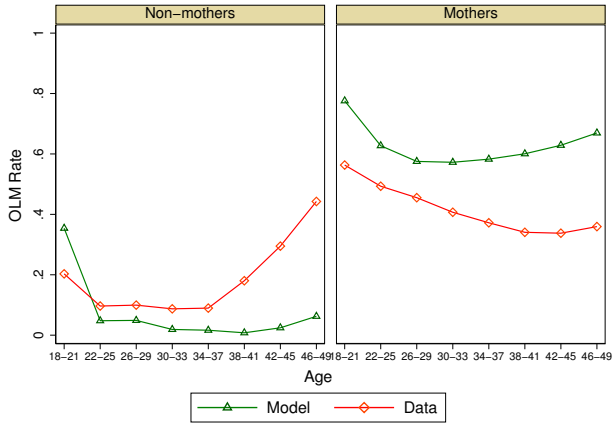
(c) Not working

Figure A.2: Employment of married mothers and married non-mothers



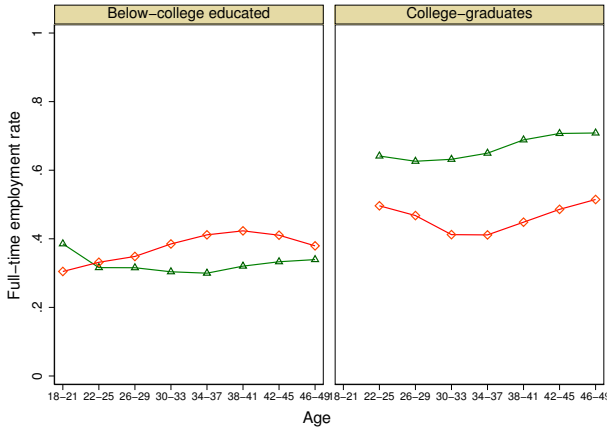
(a) Full-time employment

(b) Part-time employment

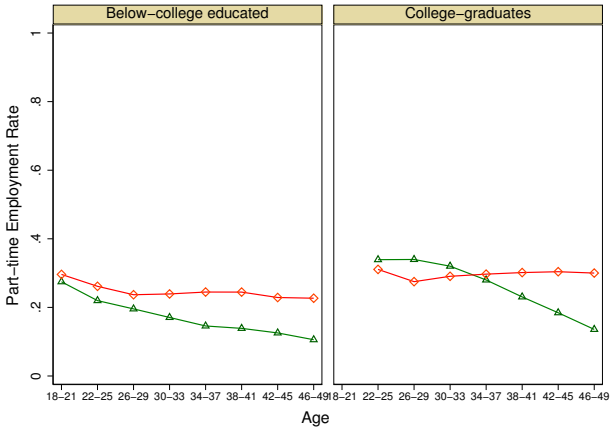


(c) Not working

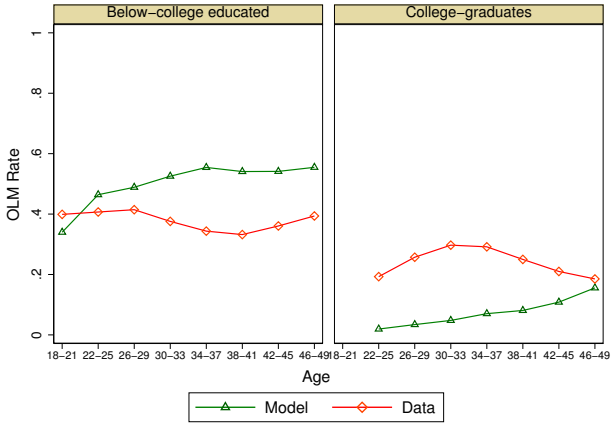
Figure A.3: Employment status of women, by education



(a) Full-time employment

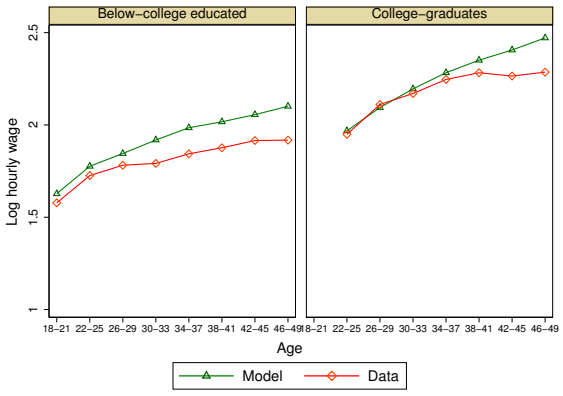


(b) Part-time employment

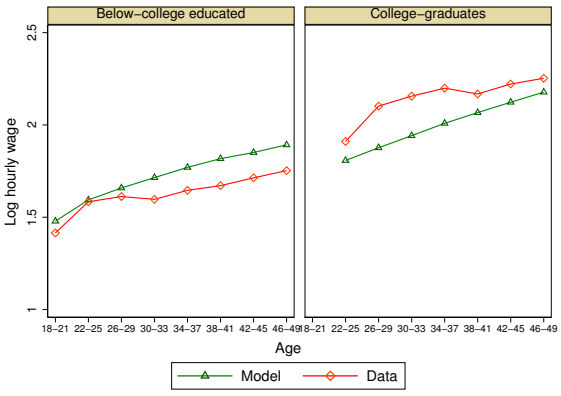


(c) Not working

Figure A.4: Women log hourly wage, by education

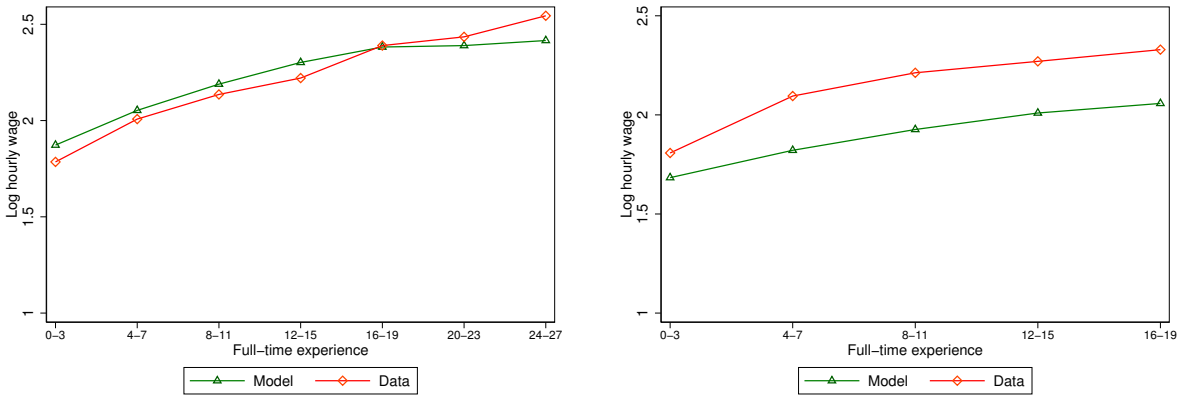


(a) Full-time employed



(b) Part-time employed

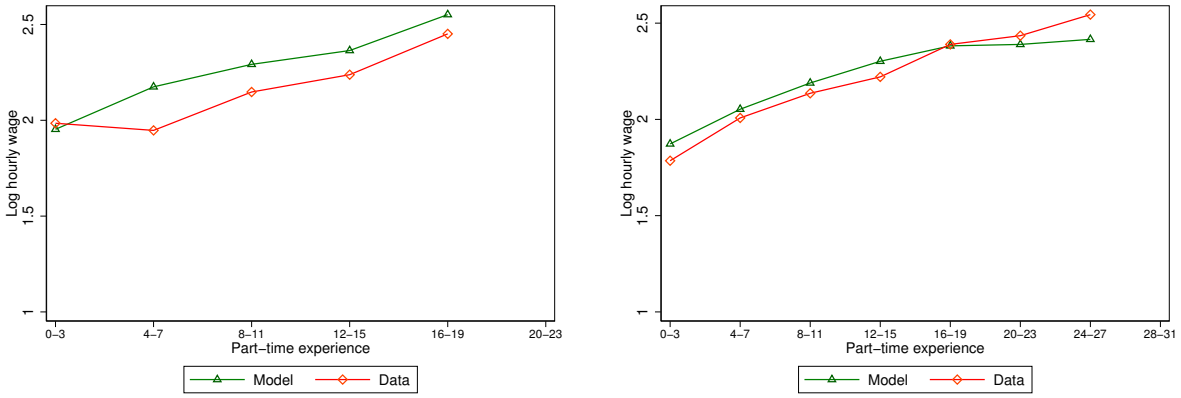
Figure A.5: Growth in women log hourly wage by full-time experience



(a) Full-time employed

(b) Part-time employed

Figure A.6: Growth in women log hourly wage by part-time experience



(a) Full-time employed

(b) Part-time employed

Figure A.7: Men's full-time log hourly wages, by education

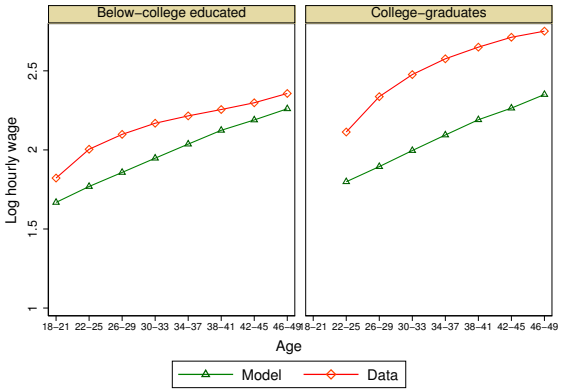


Figure A.8: Men's log hourly wage, by full-time experience

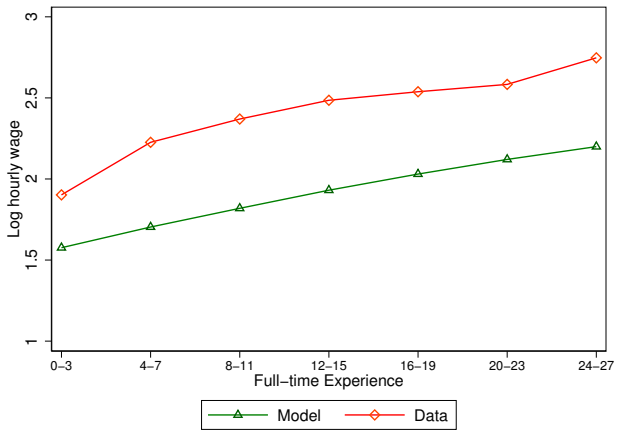
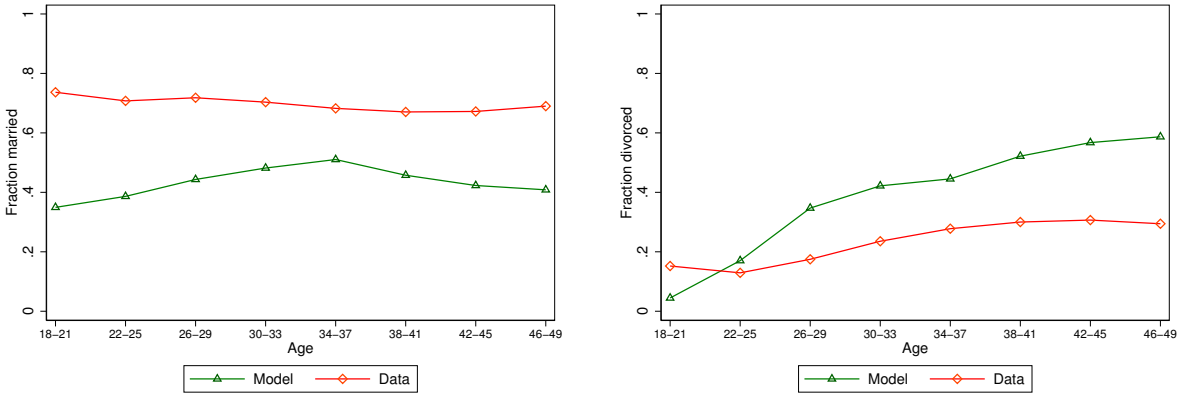


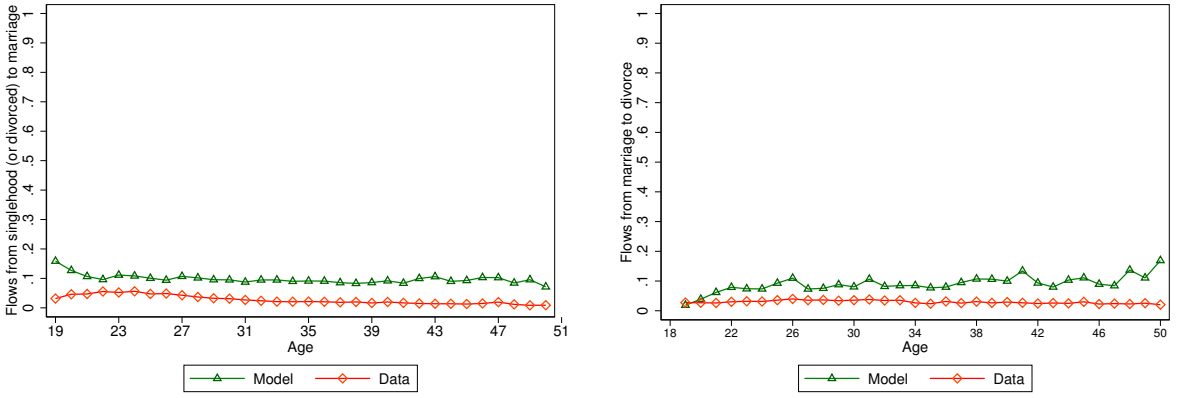
Figure A.9: Marital status



(a) Married

(b) Divorced

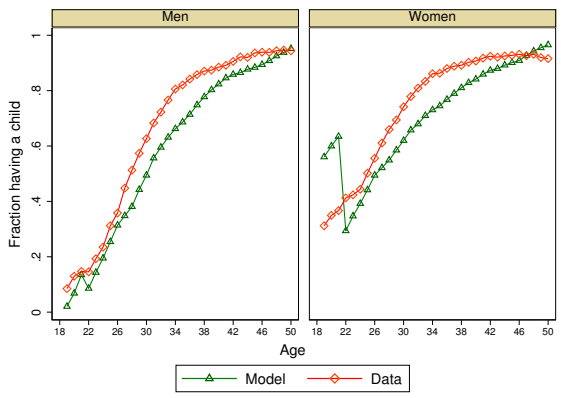
Figure A.10: Transitions to divorce and marriage by age



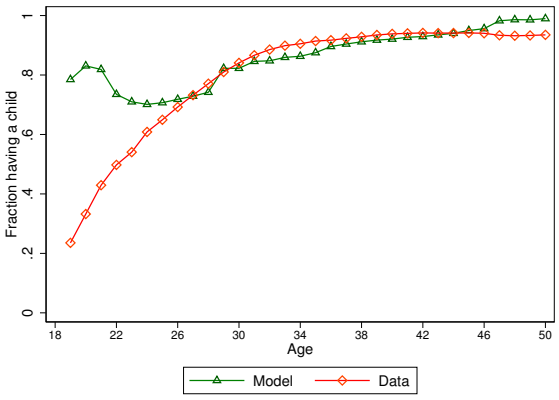
(a) Transition to marriage

(b) Transition to divorce

Figure A.11: Fraction having children by marital status



(a) Single



(b) Married

Table A.1: Hours of childcare used by men and women

Gender	Marital status	Employment status	Childcare hours	Model	Data
Women	Single	Full-time	No CCare	0.612	0.487
			Part-time	0.264	0.277
			Full-time	0.124	0.235
		Part-time	No CCare	0.710	0.548
			Part-time	0.201	0.339
			Full-time	0.089	0.113
		Not working	No CCare	1.000	0.907
			Part-time	0.000	0.074
			Full-time	0.000	0.019
Men	Single	Full-time	No CCare	0.724	0.686
			Part-time	0.190	0.224
			Full-time	0.087	0.090
Women	Married	Full-time	No CCare	0.237	0.409
			Part-time	0.356	0.289
			Full-time	0.407	0.302
		Part-time	No CCare	0.224	0.558
			Part-time	0.434	0.358
			Full-time	0.341	0.083
		Not working	No CCare	0.461	0.821
			Part-time	0.245	0.162
			Full-time	0.294	0.017

Table A.2: Hourly cost of childcare

	Model	Data
Log hourly childcare cost	1.407	1.125
Log hourly childcare cost squared	2.250	2.186

B Appendix: List of Moments

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
Transitions into and out of marriage by age							
1	Transitions from single (or divorced) to marriage age 19	0.159	0.032	0.133	0.031	33,565	3,104
2	Transitions from single (or divorced) to marriage age 20	0.127	0.046	0.111	0.044	33,565	3,409
3	Transitions from single (or divorced) to marriage age 21	0.106	0.047	0.095	0.045	33,474	3,738
4	Transitions from single (or divorced) to marriage age 22	0.096	0.055	0.087	0.052	33,285	4,110
5	Transitions from single (or divorced) to marriage age 23	0.111	0.052	0.099	0.050	61,488	4,419
6	Transitions from single (or divorced) to marriage age 24	0.108	0.056	0.097	0.053	61,061	4,731
7	Transitions from single (or divorced) to marriage age 25	0.101	0.047	0.090	0.045	60,382	4,957
8	Transitions from single (or divorced) to marriage age 26	0.094	0.049	0.085	0.046	59,528	5,151
9	Transitions from single (or divorced) to marriage age 27	0.107	0.043	0.096	0.041	58,653	5,291
10	Transitions from single (or divorced) to marriage age 28	0.102	0.037	0.091	0.035	57,729	5,407
11	Transitions from single (or divorced) to marriage age 29	0.096	0.033	0.086	0.031	56,756	5,443
12	Transitions from single (or divorced) to marriage age 30	0.095	0.031	0.086	0.030	55,363	5,437
13	Transitions from single (or divorced) to marriage age 31	0.088	0.027	0.080	0.026	54,222	5,454
14	Transitions from single (or divorced) to marriage age 32	0.095	0.024	0.086	0.023	52,913	5,421
15	Transitions from single (or divorced) to marriage age 33	0.095	0.021	0.086	0.021	51,387	5,361
16	Transitions from single (or divorced) to marriage age 34	0.090	0.021	0.082	0.020	49,777	5,260
17	Transitions from single (or divorced) to marriage age 35	0.091	0.021	0.083	0.021	48,188	5,169
18	Transitions from single (or divorced) to marriage age 36	0.091	0.021	0.083	0.020	46,417	5,066
19	Transitions from single (or divorced) to marriage age 37	0.086	0.019	0.078	0.018	44,625	4,938
20	Transitions from single (or divorced) to marriage age 38	0.083	0.020	0.076	0.020	42,756	4,806
21	Transitions from single (or divorced) to marriage age 39	0.086	0.016	0.078	0.016	40,922	4,676
22	Transitions from single (or divorced) to marriage age 40	0.092	0.020	0.083	0.019	39,102	4,545
23	Transitions from single (or divorced) to marriage age 41	0.084	0.017	0.077	0.016	37,002	4,418
24	Transitions from single (or divorced) to marriage age 42	0.100	0.015	0.090	0.014	34,790	4,214
25	Transitions from single (or divorced) to marriage age 43	0.106	0.014	0.095	0.014	32,746	4,034
26	Transitions from single (or divorced) to marriage age 44	0.090	0.014	0.082	0.014	30,744	3,851
27	Transitions from single (or divorced) to marriage age 45	0.093	0.013	0.084	0.013	28,658	3,656
28	Transitions from single (or divorced) to marriage age 46	0.103	0.015	0.092	0.015	26,831	3,500
29	Transitions from single (or divorced) to marriage age 47	0.103	0.019	0.092	0.019	24,990	3,350
30	Transitions from single (or divorced) to marriage age 48	0.084	0.012	0.077	0.012	23,233	3,232
31	Transitions from single (or divorced) to marriage age 49	0.096	0.009	0.086	0.008	21,399	3,057
32	Transitions from single (or divorced) to marriage age 50	0.071	0.009	0.066	0.009	19,565	2,795
33	Transitions from marriage to divorce age 19	0.019	0.027	0.018	0.027	33,565	3,104
34	Transitions from marriage to divorce age 20	0.039	0.027	0.037	0.026	33,565	3,409
35	Transitions from marriage to divorce age 21	0.062	0.026	0.058	0.026	33,474	3,738
36	Transitions from marriage to divorce age 22	0.079	0.030	0.073	0.029	33,285	4,110
37	Transitions from marriage to divorce age 23	0.074	0.032	0.069	0.031	61,488	4,419
38	Transitions from marriage to divorce age 24	0.073	0.031	0.068	0.030	61,061	4,731
39	Transitions from marriage to divorce age 25	0.093	0.036	0.084	0.034	60,382	4,957
40	Transitions from marriage to divorce age 26	0.110	0.040	0.098	0.038	59,528	5,151
41	Transitions from marriage to divorce age 27	0.073	0.036	0.068	0.034	58,653	5,291
42	Transitions from marriage to divorce age 28	0.076	0.036	0.070	0.035	57,729	5,407
43	Transitions from marriage to divorce age 29	0.088	0.034	0.080	0.033	56,756	5,443
44	Transitions from marriage to divorce age 30	0.081	0.036	0.074	0.034	55,363	5,437
45	Transitions from marriage to divorce age 31	0.106	0.038	0.095	0.037	54,222	5,454
46	Transitions from marriage to divorce age 32	0.082	0.034	0.075	0.033	52,913	5,421
47	Transitions from marriage to divorce age 33	0.085	0.035	0.077	0.034	51,387	5,361
48	Transitions from marriage to divorce age 34	0.085	0.026	0.078	0.026	49,777	5,260
49	Transitions from marriage to divorce age 35	0.077	0.024	0.071	0.023	48,188	5,169
50	Transitions from marriage to divorce age 36	0.080	0.031	0.073	0.030	46,417	5,066
51	Transitions from marriage to divorce age 37	0.095	0.026	0.086	0.025	44,625	4,938
52	Transitions from marriage to divorce age 38	0.107	0.031	0.096	0.030	42,756	4,806
53	Transitions from marriage to divorce age 39	0.106	0.027	0.095	0.026	40,922	4,676
54	Transitions from marriage to divorce age 40	0.100	0.029	0.090	0.028	39,102	4,545
55	Transitions from marriage to divorce age 41	0.134	0.027	0.116	0.026	37,002	4,418
56	Transitions from marriage to divorce age 42	0.094	0.024	0.085	0.024	34,790	4,214
57	Transitions from marriage to divorce age 43	0.080	0.026	0.074	0.025	32,746	4,034
58	Transitions from marriage to divorce age 44	0.103	0.025	0.093	0.024	30,744	3,851
59	Transitions from marriage to divorce age 45	0.111	0.030	0.099	0.029	28,658	3,656
60	Transitions from marriage to divorce age 46	0.089	0.023	0.081	0.022	26,831	3,500
61	Transitions from marriage to divorce age 47	0.084	0.024	0.077	0.024	24,990	3,350
62	Transitions from marriage to divorce age 48	0.137	0.023	0.118	0.022	23,233	3,232
63	Transitions from marriage to divorce age 49	0.111	0.026	0.098	0.025	21,399	3,057
64	Transitions from marriage to divorce age 50	0.169	0.020	0.140	0.020	19,565	2,795

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
Fraction married or divorced by age							
65	Fraction Married age 18 - 21	0.349	0.737	0.227	0.194	134,169	14,401
66	Fraction Married age 22 - 25	0.386	0.708	0.237	0.207	244,874	19,603
67	Fraction Married age 26 - 29	0.443	0.718	0.247	0.202	232,666	22,173
68	Fraction Married age 30 - 33	0.482	0.703	0.250	0.209	213,885	22,294
69	Fraction Married age 34 - 37	0.510	0.682	0.250	0.217	189,007	20,982
70	Fraction Married age 38 - 41	0.458	0.670	0.248	0.221	159,782	18,991
71	Fraction Married age 42 - 45	0.423	0.672	0.244	0.220	126,938	16,178
72	Fraction Married age 46 - 49	0.408	0.690	0.242	0.214	96,453	13,472
73	Fraction Divorced age 18 - 21	0.045	0.152	0.043	0.129	134,169	14,401
74	Fraction Divorced age 22 - 25	0.170	0.129	0.141	0.113	244,874	19,603
75	Fraction Divorced age 26 - 29	0.347	0.175	0.227	0.144	232,666	22,173
76	Fraction Divorced age 30 - 33	0.422	0.235	0.244	0.180	213,885	22,294
77	Fraction Divorced age 34 - 37	0.445	0.278	0.247	0.201	189,007	20,982
78	Fraction Divorced age 38 - 41	0.522	0.300	0.250	0.210	159,782	18,991
79	Fraction Divorced age 42 - 45	0.567	0.307	0.245	0.213	126,938	16,178
80	Fraction Divorced age 46 - 49	0.587	0.294	0.242	0.208	96,453	13,472
Employment status of women by marital status, having a child, and age							
81	Women: fraction full-time employed, single or divorced, without a child, age 18 - 21	0.612	0.509	0.237	0.250	27,309	699
82	Women: fraction full-time employed, single or divorced, without a child, age 22 - 25	0.698	0.713	0.211	0.205	48,274	1,262
83	Women: fraction full-time employed, single or divorced, without a child, age 26 - 29	0.728	0.776	0.198	0.174	30,430	982
84	Women: fraction full-time employed, single or divorced, without a child, age 30 - 33	0.757	0.772	0.184	0.176	18,739	588
85	Women: fraction full-time employed, single or divorced, without a child, age 34 - 37	0.786	0.761	0.168	0.182	11,294	364
86	Women: fraction full-time employed, single or divorced, without a child, age 38 - 41	0.826	0.774	0.144	0.175	7,213	261
87	Women: fraction full-time employed, single or divorced, without a child, age 42 - 45	0.869	0.772	0.113	0.176	4,184	180
88	Women: fraction full-time employed, single or divorced, without a child, age 46 - 49	0.898	0.719	0.092	0.202	1,919	139
89	Women: fraction full-time employed, single or divorced, with a child, age 18 - 21	0.370	0.216	0.233	0.169	18,878	399
90	Women: fraction full-time employed, single or divorced, with a child, age 22 - 25	0.399	0.379	0.240	0.235	27,796	749
91	Women: fraction full-time employed, single or divorced, with a child, age 26 - 29	0.449	0.477	0.247	0.249	35,073	926
92	Women: fraction full-time employed, single or divorced, with a child, age 30 - 33	0.492	0.537	0.250	0.249	37,278	1,004
93	Women: fraction full-time employed, single or divorced, with a child, age 34 - 37	0.520	0.573	0.250	0.245	35,194	1,055
94	Women: fraction full-time employed, single or divorced, with a child, age 38 - 41	0.543	0.616	0.248	0.237	36,482	1,068
95	Women: fraction full-time employed, single or divorced, with a child, age 42 - 45	0.548	0.656	0.248	0.226	32,480	989
96	Women: fraction full-time employed, single or divorced, with a child, age 46 - 49	0.544	0.650	0.248	0.228	26,500	888
97	Women: fraction part-time employed, single or divorced, without a child, age 18 - 21	0.387	0.388	0.237	0.237	27,309	699
98	Women: fraction part-time employed, single or divorced, without a child, age 22 - 25	0.302	0.246	0.211	0.185	48,274	1,262
99	Women: fraction part-time employed, single or divorced, without a child, age 26 - 29	0.272	0.204	0.198	0.162	30,430	982
100	Women: fraction part-time employed, single or divorced, without a child, age 30 - 33	0.243	0.194	0.184	0.156	18,739	588
101	Women: fraction part-time employed, single or divorced, without a child, age 34 - 37	0.214	0.203	0.168	0.162	11,294	364
102	Women: fraction part-time employed, single or divorced, without a child, age 38 - 41	0.174	0.184	0.143	0.150	7,213	261
103	Women: fraction part-time employed, single or divorced, without a child, age 42 - 45	0.130	0.178	0.113	0.146	4,184	180
104	Women: fraction part-time employed, single or divorced, without a child, age 46 - 49	0.101	0.180	0.091	0.148	1,919	139
105	Women: fraction part-time employed, single or divorced, with a child, age 18 - 21	0.308	0.316	0.213	0.216	18,878	399
106	Women: fraction part-time employed, single or divorced, with a child, age 22 - 25	0.295	0.310	0.208	0.214	27,796	749
107	Women: fraction part-time employed, single or divorced, with a child, age 26 - 29	0.290	0.249	0.206	0.187	35,073	926
108	Women: fraction part-time employed, single or divorced, with a child, age 30 - 33	0.274	0.220	0.199	0.172	37,278	1,004
109	Women: fraction part-time employed, single or divorced, with a child, age 34 - 37	0.245	0.218	0.185	0.170	35,194	1,055
110	Women: fraction part-time employed, single or divorced, with a child, age 38 - 41	0.218	0.230	0.170	0.177	36,482	1,068
111	Women: fraction part-time employed, single or divorced, with a child, age 42 - 45	0.187	0.183	0.152	0.150	32,480	989
112	Women: fraction part-time employed, single or divorced, with a child, age 46 - 49	0.153	0.173	0.130	0.143	26,500	888
113	Women: fraction not working, single or divorced, without a child, age 18 - 21	0.000	0.103	0.000	0.092	27,309	699
114	Women: fraction not working, single or divorced, without a child, age 22 - 25	0.000	0.041	0.000	0.040	48,274	1,262
115	Women: fraction not working, single or divorced, without a child, age 26 - 29	0.000	0.020	0.000	0.020	30,430	982
116	Women: fraction not working, single or divorced, without a child, age 30 - 33	0.000	0.034	0.000	0.033	18,739	588
117	Women: fraction not working, single or divorced, without a child, age 34 - 37	0.000	0.036	0.000	0.034	11,294	364
118	Women: fraction not working, single or divorced, without a child, age 38 - 41	0.000	0.042	0.000	0.040	7,213	261
119	Women: fraction not working, single or divorced, without a child, age 42 - 45	0.001	0.050	0.001	0.047	4,184	180
120	Women: fraction not working, single or divorced, without a child, age 46 - 49	0.001	0.101	0.001	0.091	1,919	139
121	Women: fraction not working, single or divorced, with a child, age 18 - 21	0.323	0.469	0.219	0.249	18,878	399
122	Women: fraction not working, single or divorced, with a child, age 22 - 25	0.306	0.311	0.212	0.214	27,796	749
123	Women: fraction not working, single or divorced, with a child, age 26 - 29	0.262	0.273	0.193	0.199	35,073	926
124	Women: fraction not working, single or divorced, with a child, age 30 - 33	0.234	0.243	0.179	0.184	37,278	1,004
125	Women: fraction not working, single or divorced, with a child, age 34 - 37	0.236	0.209	0.180	0.166	35,194	1,055
126	Women: fraction not working, single or divorced, with a child, age 38 - 41	0.240	0.154	0.182	0.130	36,482	1,068
127	Women: fraction not working, single or divorced, with a child, age 42 - 45	0.265	0.161	0.195	0.135	32,480	989
128	Women: fraction not working, single or divorced, with a child, age 46 - 49	0.303	0.177	0.211	0.146	26,500	888
129	Women: fraction full-time employed, married, without a child, age 18 - 21	0.348	0.456	0.227	0.248	3,350	1,428
130	Women: fraction full-time employed, married, without a child, age 22 - 25	0.553	0.601	0.247	0.240	10,944	2,362
131	Women: fraction full-time employed, married, without a child, age 26 - 29	0.591	0.663	0.242	0.223	10,878	1,688
132	Women: fraction full-time employed, married, without a child, age 30 - 33	0.653	0.676	0.227	0.219	7,637	871
133	Women: fraction full-time employed, married, without a child, age 34 - 37	0.694	0.661	0.213	0.224	5,526	558

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
134	Women: fraction full-time employed, married, without a child, age 38 - 41	0.747	0.541	0.189	0.248	3,015	416
135	Women: fraction full-time employed, married, without a child, age 42 - 45	0.765	0.486	0.180	0.250	1,635	346
136	Women: fraction full-time employed, married, without a child, age 46 - 49	0.798	0.344	0.161	0.226	496	323
137	Women: fraction full-time employed, married, with a child, age 18 - 21	0.122	0.147	0.107	0.125	21,898	1,685
138	Women: fraction full-time employed, married, with a child, age 22 - 25	0.187	0.226	0.152	0.175	38,951	4,364
139	Women: fraction full-time employed, married, with a child, age 26 - 29	0.225	0.272	0.174	0.198	42,668	6,131
140	Women: fraction full-time employed, married, with a child, age 30 - 33	0.243	0.309	0.184	0.214	45,364	6,711
141	Women: fraction full-time employed, married, with a child, age 34 - 37	0.265	0.342	0.195	0.225	43,564	6,317
142	Women: fraction full-time employed, married, with a child, age 38 - 41	0.277	0.376	0.200	0.235	33,923	5,669
143	Women: fraction full-time employed, married, with a child, age 42 - 45	0.277	0.382	0.200	0.236	25,373	4,869
144	Women: fraction full-time employed, married, with a child, age 46 - 49	0.268	0.368	0.196	0.233	19,098	4,014
145	Women: fraction part-time employed, married, without a child, age 18 - 21	0.298	0.341	0.209	0.225	3,350	1,428
146	Women: fraction part-time employed, married, without a child, age 22 - 25	0.399	0.302	0.240	0.211	10,944	2,362
147	Women: fraction part-time employed, married, without a child, age 26 - 29	0.360	0.238	0.230	0.181	10,878	1,688
148	Women: fraction part-time employed, married, without a child, age 30 - 33	0.328	0.237	0.220	0.181	7,637	871
149	Women: fraction part-time employed, married, without a child, age 34 - 37	0.290	0.249	0.206	0.187	5,526	558
150	Women: fraction part-time employed, married, without a child, age 38 - 41	0.245	0.279	0.185	0.201	3,015	416
151	Women: fraction part-time employed, married, without a child, age 42 - 45	0.210	0.220	0.166	0.171	1,635	346
152	Women: fraction part-time employed, married, without a child, age 46 - 49	0.139	0.214	0.120	0.168	496	323
153	Women: fraction part-time employed, married, with a child, age 18 - 21	0.103	0.290	0.092	0.206	21,898	1,685
154	Women: fraction part-time employed, married, with a child, age 22 - 25	0.186	0.281	0.151	0.202	38,951	4,364
155	Women: fraction part-time employed, married, with a child, age 26 - 29	0.199	0.273	0.160	0.198	42,668	6,131
156	Women: fraction part-time employed, married, with a child, age 30 - 33	0.184	0.284	0.150	0.203	45,364	6,711
157	Women: fraction part-time employed, married, with a child, age 34 - 37	0.152	0.286	0.129	0.204	43,564	6,317
158	Women: fraction part-time employed, married, with a child, age 38 - 41	0.122	0.283	0.107	0.203	33,923	5,669
159	Women: fraction part-time employed, married, with a child, age 42 - 45	0.094	0.281	0.085	0.202	25,373	4,869
160	Women: fraction part-time employed, married, with a child, age 46 - 49	0.063	0.272	0.059	0.198	19,098	4,014
161	Women: fraction not working, married, without a child, age 18 - 21	0.354	0.203	0.229	0.162	3,350	1,428
162	Women: fraction not working, married, without a child, age 22 - 25	0.048	0.097	0.046	0.087	10,944	2,362
163	Women: fraction not working, married, without a child, age 26 - 29	0.049	0.100	0.047	0.090	10,878	1,688
164	Women: fraction not working, married, without a child, age 30 - 33	0.019	0.087	0.019	0.080	7,637	871
165	Women: fraction not working, married, without a child, age 34 - 37	0.016	0.090	0.016	0.082	5,526	558
166	Women: fraction not working, married, without a child, age 38 - 41	0.008	0.180	0.008	0.148	3,015	416
167	Women: fraction not working, married, without a child, age 42 - 45	0.024	0.295	0.024	0.208	1,635	346
168	Women: fraction not working, married, without a child, age 46 - 49	0.063	0.443	0.059	0.247	496	323
169	Women: fraction not working, married, with a child, age 18 - 21	0.776	0.563	0.174	0.246	21,898	1,685
170	Women: fraction not working, married, with a child, age 22 - 25	0.627	0.493	0.234	0.250	38,951	4,364
171	Women: fraction not working, married, with a child, age 26 - 29	0.575	0.455	0.244	0.248	42,668	6,131
172	Women: fraction not working, married, with a child, age 30 - 33	0.572	0.407	0.245	0.241	45,364	6,711
173	Women: fraction not working, married, with a child, age 34 - 37	0.583	0.372	0.243	0.234	43,564	6,317
174	Women: fraction not working, married, with a child, age 38 - 41	0.601	0.341	0.240	0.225	33,923	5,669
175	Women: fraction not working, married, with a child, age 42 - 45	0.629	0.338	0.233	0.224	25,373	4,869
176	Women: fraction not working, married, with a child, age 46 - 49	0.669	0.359	0.221	0.230	19,098	4,014
Employment status of women by education and age							
177	Women: fraction full-time employed, educ: below college, age 18 - 21	0.385	0.305	0.237	0.212	71,435	2,927
178	Women: fraction full-time employed, educ: below college, age 22 - 25	0.316	0.332	0.216	0.222	69,720	4,535
179	Women: fraction full-time employed, educ: below college, age 26 - 29	0.316	0.349	0.216	0.227	66,416	4,596
180	Women: fraction full-time employed, educ: below college, age 30 - 33	0.304	0.385	0.212	0.237	62,020	4,351
181	Women: fraction full-time employed, educ: below college, age 34 - 37	0.300	0.412	0.210	0.242	55,895	4,101
182	Women: fraction full-time employed, educ: below college, age 38 - 41	0.320	0.423	0.218	0.244	49,175	3,986
183	Women: fraction full-time employed, educ: below college, age 42 - 45	0.333	0.410	0.222	0.242	40,880	3,810
184	Women: fraction full-time employed, educ: below college, age 46 - 49	0.339	0.380	0.224	0.235	33,502	3,660
185	Women: fraction full-time employed, educ: college, age 22 - 25	0.641	0.496	0.230	0.250	56,245	4,324
186	Women: fraction full-time employed, educ: college, age 26 - 29	0.626	0.468	0.234	0.249	52,633	5,169
187	Women: fraction full-time employed, educ: college, age 30 - 33	0.632	0.412	0.233	0.242	46,998	4,840
188	Women: fraction full-time employed, educ: college, age 34 - 37	0.650	0.411	0.228	0.242	39,683	4,215
189	Women: fraction full-time employed, educ: college, age 38 - 41	0.688	0.448	0.214	0.247	31,458	3,445
190	Women: fraction full-time employed, educ: college, age 42 - 45	0.707	0.486	0.207	0.250	22,792	2,585
191	Women: fraction full-time employed, educ: college, age 46 - 49	0.709	0.515	0.207	0.250	14,511	1,706
192	Women: fraction part-time employed, educ: below college, age 18 - 21	0.275	0.296	0.199	0.208	71,435	2,927
193	Women: fraction part-time employed, educ: below college, age 22 - 25	0.220	0.262	0.171	0.193	69,720	4,535
194	Women: fraction part-time employed, educ: below college, age 26 - 29	0.196	0.237	0.157	0.181	66,416	4,596
195	Women: fraction part-time employed, educ: below college, age 30 - 33	0.171	0.239	0.142	0.182	62,020	4,351
196	Women: fraction part-time employed, educ: below college, age 34 - 37	0.146	0.245	0.125	0.185	55,895	4,101
197	Women: fraction part-time employed, educ: below college, age 38 - 41	0.139	0.245	0.120	0.185	49,175	3,986
198	Women: fraction part-time employed, educ: below college, age 42 - 45	0.126	0.229	0.110	0.176	40,880	3,810
199	Women: fraction part-time employed, educ: below college, age 46 - 49	0.106	0.227	0.095	0.175	33,502	3,660
200	Women: fraction part-time employed, educ: college, age 22 - 25	0.339	0.311	0.224	0.214	56,245	4,324
201	Women: fraction part-time employed, educ: college, age 26 - 29	0.340	0.275	0.224	0.199	52,633	5,169
202	Women: fraction part-time employed, educ: college, age 30 - 33	0.320	0.291	0.218	0.206	46,998	4,840
203	Women: fraction part-time employed, educ: college, age 34 - 37	0.280	0.297	0.202	0.209	39,683	4,215

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
204	Women: fraction part-time employed, educ: college, age 38 - 41	0.231	0.302	0.177	0.211	31,458	3,445
205	Women: fraction part-time employed, educ: college, age 42 - 45	0.184	0.304	0.150	0.212	22,792	2,585
206	Women: fraction part-time employed, educ: college, age 46 - 49	0.136	0.300	0.117	0.210	14,511	1,706
207	Women: fraction not working, educ: below college, age 18 - 21	0.340	0.399	0.224	0.240	71,435	2,927
208	Women: fraction not working, educ: below college, age 22 - 25	0.464	0.407	0.249	0.241	69,720	4,535
209	Women: fraction not working, educ: below college, age 26 - 29	0.489	0.414	0.250	0.243	66,416	4,596
210	Women: fraction not working, educ: below college, age 30 - 33	0.525	0.376	0.249	0.235	62,020	4,351
211	Women: fraction not working, educ: below college, age 34 - 37	0.554	0.344	0.247	0.226	55,895	4,101
212	Women: fraction not working, educ: below college, age 38 - 41	0.541	0.332	0.248	0.222	49,175	3,986
213	Women: fraction not working, educ: below college, age 42 - 45	0.541	0.361	0.248	0.231	40,880	3,810
214	Women: fraction not working, educ: below college, age 46 - 49	0.555	0.394	0.247	0.239	33,502	3,660
215	Women: fraction not working, educ: college, age 22 - 25	0.019	0.193	0.019	0.156	56,245	4,324
216	Women: fraction not working, educ: college, age 26 - 29	0.034	0.257	0.033	0.191	52,633	5,169
217	Women: fraction not working, educ: college, age 30 - 33	0.048	0.297	0.046	0.209	46,998	4,840
218	Women: fraction not working, educ: college, age 34 - 37	0.070	0.292	0.065	0.207	39,683	4,215
219	Women: fraction not working, educ: college, age 38 - 41	0.081	0.250	0.074	0.187	31,458	3,445
220	Women: fraction not working, educ: college, age 42 - 45	0.108	0.210	0.097	0.166	22,792	2,585
221	Women: fraction not working, educ: college, age 46 - 49	0.156	0.185	0.131	0.151	14,511	1,706
Log wage of women by employment status, education, and age							
222	Women: log wage - full-time employed, educ: below college, age 18 - 21	1.627	1.578	0.195	0.189	27,528	875
223	Women: log wage - full-time employed, educ: below college, age 22 - 25	1.776	1.726	0.179	0.205	22,035	1,476
224	Women: log wage - full-time employed, educ: below college, age 26 - 29	1.845	1.782	0.174	0.214	20,964	1,574
225	Women: log wage - full-time employed, educ: below college, age 30 - 33	1.919	1.792	0.169	0.243	18,846	1,647
226	Women: log wage - full-time employed, educ: below college, age 34 - 37	1.985	1.844	0.168	0.240	16,756	1,659
227	Women: log wage - full-time employed, educ: below college, age 38 - 41	2.017	1.876	0.165	0.264	15,753	1,652
228	Women: log wage - full-time employed, educ: below college, age 42 - 45	2.056	1.916	0.165	0.245	13,617	1,540
229	Women: log wage - full-time employed, educ: below college, age 46 - 49	2.101	1.918	0.159	0.240	11,372	1,361
230	Women: log wage - full-time employed, educ: college, age 22 - 25	1.968	1.949	0.202	0.169	36,076	2,131
231	Women: log wage - full-time employed, educ: college, age 26 - 29	2.094	2.111	0.199	0.209	32,953	2,388
232	Women: log wage - full-time employed, educ: college, age 30 - 33	2.195	2.170	0.197	0.283	29,695	1,966
233	Women: log wage - full-time employed, educ: college, age 34 - 37	2.283	2.246	0.200	0.294	25,781	1,717
234	Women: log wage - full-time employed, educ: college, age 38 - 41	2.351	2.283	0.206	0.265	21,657	1,518
235	Women: log wage - full-time employed, educ: college, age 42 - 45	2.406	2.265	0.206	0.271	16,117	1,237
236	Women: log wage - full-time employed, educ: college, age 46 - 49	2.471	2.286	0.208	0.284	10,281	862
237	Women: log wage - part-time employed, educ: below college, age 18 - 21	1.479	1.415	0.145	0.272	19,625	833
238	Women: log wage - part-time employed, educ: below college, age 22 - 25	1.594	1.584	0.124	0.298	15,325	1,141
239	Women: log wage - part-time employed, educ: below college, age 26 - 29	1.659	1.612	0.114	0.321	12,994	1,038
240	Women: log wage - part-time employed, educ: below college, age 30 - 33	1.715	1.597	0.109	0.329	10,587	1,010
241	Women: log wage - part-time employed, educ: below college, age 34 - 37	1.770	1.646	0.112	0.373	8,153	966
242	Women: log wage - part-time employed, educ: below college, age 38 - 41	1.817	1.671	0.102	0.328	6,829	934
243	Women: log wage - part-time employed, educ: below college, age 42 - 45	1.851	1.714	0.102	0.323	5,134	855
244	Women: log wage - part-time employed, educ: below college, age 46 - 49	1.892	1.753	0.106	0.333	3,544	806
245	Women: log wage - part-time employed, educ: college, age 22 - 25	1.808	1.911	0.146	0.316	19,076	1,327
246	Women: log wage - part-time employed, educ: college, age 26 - 29	1.876	2.102	0.145	0.382	17,882	1,401
247	Women: log wage - part-time employed, educ: college, age 30 - 33	1.942	2.156	0.142	0.461	15,049	1,385
248	Women: log wage - part-time employed, educ: college, age 34 - 37	2.009	2.199	0.138	0.504	11,111	1,221
249	Women: log wage - part-time employed, educ: college, age 38 - 41	2.067	2.168	0.142	0.465	7,255	1,016
250	Women: log wage - part-time employed, educ: college, age 42 - 45	2.123	2.222	0.131	0.498	4,203	765
251	Women: log wage - part-time employed, educ: college, age 46 - 49	2.178	2.253	0.116	0.492	1,972	499
Log wage of men by education and age							
252	Men: log wage, educ: below college, age 18 - 21	1.668	1.822	0.841	0.215	57,678	1,228
253	Men: log wage, educ: below college, age 22 - 25	1.769	2.004	0.881	0.213	57,740	2,827
254	Men: log wage, educ: below college, age 26 - 29	1.858	2.098	0.916	0.238	55,775	3,346
255	Men: log wage, educ: below college, age 30 - 33	1.948	2.169	0.940	0.249	52,335	3,206
256	Men: log wage, educ: below college, age 34 - 37	2.037	2.215	0.969	0.262	47,380	2,912
257	Men: log wage, educ: below college, age 38 - 41	2.124	2.255	0.984	0.267	40,822	2,645
258	Men: log wage, educ: below college, age 42 - 45	2.189	2.298	1.002	0.291	33,687	2,407
259	Men: log wage, educ: below college, age 46 - 49	2.260	2.357	1.022	0.325	27,552	2,436
260	Men: log wage, educ: college, age 22 - 25	1.799	2.113	0.884	0.225	53,863	2,724
261	Men: log wage, educ: college, age 26 - 29	1.895	2.337	0.929	0.227	52,378	4,306
262	Men: log wage, educ: college, age 30 - 33	1.996	2.476	0.953	0.278	48,584	4,429
263	Men: log wage, educ: college, age 34 - 37	2.094	2.576	0.981	0.321	43,242	4,060
264	Men: log wage, educ: college, age 38 - 41	2.191	2.650	1.010	0.345	36,261	3,505
265	Men: log wage, educ: college, age 42 - 45	2.264	2.712	1.027	0.355	28,307	2,800
266	Men: log wage, educ: college, age 46 - 49	2.350	2.751	1.028	0.369	20,065	1,936
Log wage by employment status, sex, and work experience							
267	Men: log wage - full-time employed, full-time experience: 0 - 3	1.731	2.030	0.866	0.252	111,541	2,237
268	Men: log wage - full-time employed, full-time experience: 4 - 7	1.829	2.289	0.908	0.269	110,118	2,488
269	Men: log wage - full-time employed, full-time experience: 8 - 11	1.922	2.404	0.938	0.330	104,359	1,979
270	Men: log wage - full-time employed, full-time experience: 12 - 15	2.014	2.505	0.964	0.322	95,577	1,483
271	Men: log wage - full-time employed, full-time experience: 16 - 19	2.103	2.553	0.993	0.372	83,641	1,011

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
272	Men: log wage - full-time employed, full-time experience: 20 - 23	2.181	2.597	1.006	0.326	69,129	545
273	Men: log wage - full-time employed, full-time experience: 24 - 27	2.249	2.751	1.018	0.306	53,752	170
274	Men: log wage - full-time employed, full-time experience: 28 - 31	2.276	2.827	1.025	0.198	31,071	11
275	Women: log wage - full-time employed, full-time experience: 0 - 3	1.873	1.785	0.214	0.238	121,075	2,941
276	Women: log wage - full-time employed, full-time experience: 4 - 7	2.053	2.008	0.205	0.218	93,466	2,415
277	Women: log wage - full-time employed, full-time experience: 8 - 11	2.189	2.136	0.209	0.260	59,907	1,432
278	Women: log wage - full-time employed, full-time experience: 12 - 15	2.302	2.221	0.221	0.261	32,258	739
279	Women: log wage - full-time employed, full-time experience: 16 - 19	2.382	2.390	0.223	0.197	13,860	331
280	Women: log wage - full-time employed, full-time experience: 20 - 23	2.389	2.435	0.237	0.209	3,235	126
281	Women: log wage - full-time employed, full-time experience: 24 - 27	2.416	2.544	0.249	0.140	173	26
282	Women: log wage - part-time employed, full-time experience: 0 - 3	1.683	1.808	0.157	0.419	73,466	4,058
283	Women: log wage - part-time employed, full-time experience: 4 - 7	1.821	2.095	0.146	0.423	48,675	860
284	Women: log wage - part-time employed, full-time experience: 8 - 11	1.926	2.212	0.145	0.402	24,598	277
285	Women: log wage - part-time employed, full-time experience: 12 - 15	2.010	2.270	0.147	0.639	9,619	92
286	Women: log wage - part-time employed, full-time experience: 16 - 19	2.058	2.329	0.142	0.444	2,992	21
287	Women: log wage - full-time employed, part-time experience: 0 - 3	1.953	1.985	0.225	0.265	187,404	5,882
288	Women: log wage - full-time employed, part-time experience: 4 - 7	2.175	1.947	0.226	0.269	118,019	1,516
289	Women: log wage - full-time employed, part-time experience: 8 - 11	2.292	2.148	0.224	0.287	18,248	445
290	Women: log wage - full-time employed, part-time experience: 12 - 15	2.364	2.238	0.234	0.246	304	126
291	Women: log wage - full-time employed, part-time experience: 16 - 19	2.551	2.451	0.000	0.196	1	36
292	Women: log wage - part-time employed, part-time experience: 0 - 3	1.722	1.770	0.158	0.396	109,920	2,714
293	Women: log wage - part-time employed, part-time experience: 4 - 7	1.925	1.895	0.141	0.451	44,983	1,667
294	Women: log wage - part-time employed, part-time experience: 8 - 11	2.076	2.107	0.134	0.432	4,827	616
295	Women: log wage - part-time employed, part-time experience: 12 - 15	2.209	2.335	0.143	0.339	86	217
296	Women: log wage - part-time employed, part-time experience: 16 - 19	2.597	2.487	0.084	0.381	2	81
297	Women: log wage - part-time employed, part-time experience: 20 - 23	0.000	2.608	0.000	0.409	-	18
Employment status of women by work experience							
298	Women: Fraction full-time employed, part-time experience: 0 - 3	0.417	0.456	0.243	0.248	449,001	13,113
299	Women: Fraction full-time employed, part-time experience: 4 - 7	0.489	0.376	0.250	0.235	241,412	4,112
300	Women: Fraction full-time employed, part-time experience: 8 - 11	0.566	0.389	0.246	0.238	32,262	1,166
301	Women: Fraction full-time employed, part-time experience: 12 - 15	0.564	0.362	0.246	0.231	539	351
302	Women: Fraction full-time employed, part-time experience: 16 - 19	0.200	0.300	0.160	0.210	5	120
303	Women: Fraction full-time employed, part-time experience: 20 - 23	0.000	0.217	0.000	0.170	-	23
304	Women: Fraction part-time employed, part-time experience: 0 - 3	0.245	0.214	0.185	0.168	449,001	13,113
305	Women: Fraction part-time employed, part-time experience: 4 - 7	0.186	0.418	0.152	0.243	241,412	4,112
306	Women: Fraction part-time employed, part-time experience: 8 - 11	0.150	0.534	0.127	0.249	32,262	1,166
307	Women: Fraction part-time employed, part-time experience: 12 - 15	0.160	0.624	0.134	0.235	539	351
308	Women: Fraction part-time employed, part-time experience: 16 - 19	0.400	0.675	0.240	0.219	5	120
309	Women: Fraction part-time employed, part-time experience: 20 - 23	0.000	0.783	0.000	0.170	-	23
310	Women: Fraction full-time employed, full-time experience: 0 - 3	0.395	0.254	0.239	0.190	306,189	11,804
311	Women: Fraction full-time employed, full-time experience: 4 - 7	0.427	0.644	0.245	0.229	218,735	3,800
312	Women: Fraction full-time employed, full-time experience: 8 - 11	0.504	0.784	0.250	0.170	118,925	1,858
313	Women: Fraction full-time employed, full-time experience: 12 - 15	0.597	0.839	0.241	0.135	54,032	895
314	Women: Fraction full-time employed, full-time experience: 16 - 19	0.669	0.921	0.221	0.073	20,720	366
315	Women: Fraction full-time employed, full-time experience: 20 - 23	0.738	0.949	0.193	0.049	4,382	136
316	Women: Fraction part-time employed, full-time experience: 0 - 3	0.240	0.354	0.182	0.229	306,189	11,804
317	Women: Fraction part-time employed, full-time experience: 4 - 7	0.223	0.231	0.173	0.178	218,735	3,800
318	Women: Fraction part-time employed, full-time experience: 8 - 11	0.207	0.151	0.164	0.128	118,925	1,858
319	Women: Fraction part-time employed, full-time experience: 12 - 15	0.178	0.104	0.146	0.093	54,032	895
320	Women: Fraction part-time employed, full-time experience: 16 - 19	0.144	0.066	0.124	0.061	20,720	366
321	Women: Fraction part-time employed, full-time experience: 20 - 23	0.104	0.044	0.093	0.042	4,382	136
Log wage squared by education, sex, and age							
322	Women: log wage squared - part-time employed, Educ: college, 22 - 25	3.413	3.966	1.960	4.151	19,076	1,327
323	Women: log wage squared - part-time employed, Educ: college, 26 - 29	3.667	4.801	2.101	6.129	17,882	1,401
324	Women: log wage squared - part-time employed, Educ: college, 30 - 33	3.913	5.109	2.175	8.647	15,049	1,385
325	Women: log wage squared - part-time employed, Educ: college, 34 - 37	4.174	5.341	2.253	9.862	11,111	1,221
326	Women: log wage squared - part-time employed, Educ: college, 38 - 41	4.413	5.164	2.409	8.126	7,255	1,016
327	Women: log wage squared - part-time employed, Educ: college, 42 - 45	4.639	5.435	2.397	10.029	4,203	765
328	Women: log wage squared - part-time employed, Educ: college, 46 - 49	4.858	5.567	2.264	9.515	1,972	499
329	Women: log wage squared - part-time employed, Educ: below college, 18 - 21	2.332	2.275	1.287	2.315	19,625	833
330	Women: log wage squared - part-time employed, Educ: below college, 22 - 25	2.664	2.807	1.296	3.099	15,325	1,141
331	Women: log wage squared - part-time employed, Educ: below college, 26 - 29	2.865	2.920	1.280	3.446	12,994	1,038
332	Women: log wage squared - part-time employed, Educ: below college, 30 - 33	3.049	2.880	1.315	3.428	10,587	1,010
333	Women: log wage squared - part-time employed, Educ: below college, 34 - 37	3.245	3.082	1.407	4.357	8,153	966
334	Women: log wage squared - part-time employed, Educ: below college, 38 - 41	3.405	3.121	1.376	4.282	6,829	934
335	Women: log wage squared - part-time employed, Educ: below college, 42 - 45	3.527	3.259	1.389	4.376	5,134	855
336	Women: log wage squared - part-time employed, Educ: below college, 46 - 49	3.686	3.404	1.464	4.499	3,544	806
337	Women: log wage squared - full-time employed, Educ: college, 22 - 25	4.077	3.968	3.477	2.376	36,076	2,131
338	Women: log wage squared - full-time employed, Educ: college, 26 - 29	4.586	4.665	3.837	3.429	32,953	2,388
339	Women: log wage squared - full-time employed, Educ: college, 30 - 33	5.017	4.994	4.136	4.849	29,695	1,966
340	Women: log wage squared - full-time employed, Educ: college, 34 - 37	5.412	5.340	4.485	5.879	25,781	1,717

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
341	Women: log wage squared - full-time employed, Educ: college, 38 - 41	5.732	5.475	4.914	5.180	21,657	1,518
342	Women: log wage squared - full-time employed, Educ: college, 42 - 45	5.996	5.402	5.163	5.067	16,117	1,237
343	Women: log wage squared - full-time employed, Educ: college, 46 - 49	6.316	5.510	5.486	5.149	10,281	862
344	Women: log wage squared - full-time employed, Educ: below college, age: 18 - 21	2.843	2.679	2.325	1.692	27,528	875
345	Women: log wage squared - full-time employed, Educ: below college, age: 22 - 25	3.334	3.183	2.466	2.303	22,035	1,476
346	Women: log wage squared - full-time employed, Educ: below college, age: 26 - 29	3.579	3.389	2.562	2.518	20,964	1,574
347	Women: log wage squared - full-time employed, Educ: below college, age: 30 - 33	3.850	3.453	2.679	2.700	18,846	1,647
348	Women: log wage squared - full-time employed, Educ: below college, age: 34 - 37	4.107	3.639	2.822	2.966	16,756	1,659
349	Women: log wage squared - full-time employed, Educ: below college, age: 38 - 41	4.233	3.784	2.917	3.410	15,753	1,652
330	Women: log wage squared - full-time employed, Educ: below college, age: 42 - 45	4.392	3.915	3.044	3.474	13,617	1,540
351	Women: log wage squared - full-time employed, Educ: below college, age: 46 - 49	4.574	3.917	3.031	3.331	11,372	1,361
352	Men: log wage squared - full-time employed, Educ: college, 22 - 25	4.120	4.690	14.889	3.580	53,863	2,724
353	Men: log wage squared - full-time employed, Educ: college, 26 - 29	4.519	5.688	17.084	4.553	52,378	4,306
354	Men: log wage squared - full-time employed, Educ: college, 30 - 33	4.937	6.411	18.939	6.288	48,584	4,429
355	Men: log wage squared - full-time employed, Educ: college, 34 - 37	5.367	6.958	20.917	8.313	43,242	4,060
356	Men: log wage squared - full-time employed, Educ: college, 38 - 41	5.809	7.366	23.444	9.778	36,261	3,505
357	Men: log wage squared - full-time employed, Educ: college, 42 - 45	6.154	7.712	24.790	10.660	28,307	2,800
358	Men: log wage squared - full-time employed, Educ: college, 46 - 49	6.552	7.936	26.268	10.457	20,065	1,936
359	Men: log wage squared - full-time employed, Educ: below college, age: 18 - 21	3.624	3.535	12.792	2.631	57,678	1,228
360	Men: log wage squared - full-time employed, Educ: below college, age: 22 - 25	4.010	4.229	14.550	3.266	57,740	2,827
361	Men: log wage squared - full-time employed, Educ: below college, age: 26 - 29	4.367	4.641	16.293	3.747	55,775	3,346
362	Men: log wage squared - full-time employed, Educ: below college, age: 30 - 33	4.734	4.953	18.041	4.199	52,335	3,206
363	Men: log wage squared - full-time employed, Educ: below college, age: 34 - 37	5.117	5.169	19.770	4.636	47,380	2,912
364	Men: log wage squared - full-time employed, Educ: below college, age: 38 - 41	5.495	5.354	21.466	5.049	40,822	2,645
365	Men: log wage squared - full-time employed, Educ: below college, age: 42 - 45	5.796	5.572	22.811	5.630	33,687	2,407
366	Men: log wage squared - full-time employed, Educ: below college, age: 46 - 49	6.130	5.880	24.610	6.787	27,552	2,436
Child care usage by employment status, marital status, and sex							
367	Women: fraction using no Child Care, if full-time employed, single or divorced	0.612	0.487	0.237	0.250	126,062	119
368	Women: fraction using part-time Care, if full-time employed, single or divorced	0.264	0.277	0.194	0.200	126,062	119
369	Women: fraction using full-time Care, if full-time employed, single or divorced	0.124	0.235	0.108	0.180	126,062	119
370	Women: fraction using no Child Care, if part-time employed, single or divorced	0.710	0.548	0.206	0.248	61,974	115
371	Women: fraction using part-time Care, if part-time employed, single or divorced	0.201	0.339	0.161	0.224	61,974	115
372	Women: fraction using full-time Care, if part-time employed, single or divorced	0.089	0.113	0.081	0.100	61,974	115
373	Women: fraction using no Child Care, if not working, single or divorced	1.000	0.907	0.000	0.084	68,565	108
374	Women: fraction using part-time Care, if not working, single or divorced	0.000	0.074	0.000	0.069	68,565	108
375	Women: fraction using full-time Care, if not working, single or divorced	0.000	0.019	0.000	0.018	68,565	108
376	Men: fraction using no Child Care, if full-time employed, single or divorced	0.724	0.686	0.200	0.215	200,966	156
377	Men: fraction using part-time Care, if full-time employed, single or divorced	0.190	0.224	0.154	0.174	200,966	156
378	Men: fraction using full-time Care, if full-time employed, single or divorced	0.087	0.090	0.079	0.082	200,966	156
379	Women: fraction using no Child Care, if full-time employed, married	0.237	0.409	0.181	0.242	64,378	1,366
380	Women: fraction using part-time Care, if full-time employed, married	0.356	0.289	0.229	0.206	64,378	1,366
381	Women: fraction using full-time Care, if full-time employed, married	0.407	0.302	0.241	0.211	64,378	1,366
382	Women: fraction using no Child Care, if part-time employed, married	0.224	0.558	0.174	0.247	40,862	1,429
383	Women: fraction using part-time Care, if part-time employed, married	0.434	0.358	0.246	0.230	40,862	1,429
384	Women: fraction using full-time Care, if part-time employed, married	0.341	0.083	0.225	0.076	40,862	1,429
385	Women: fraction using no Child Care, if not working, married	0.461	0.821	0.248	0.147	168,257	1,605
386	Women: fraction using part-time Care, if not working, married	0.245	0.162	0.185	0.136	168,257	1,605
387	Women: fraction using full-time Care, if not working, married	0.294	0.017	0.208	0.017	168,257	1,605
Mean child care cost and its square							
388	Log hourly child care cost	1.407	1.125	0.269	0.920	449,198	3,871
389	Log hourly child care cost squared	2.250	2.186	1.910	10.017	449,198	3,871
Covariance between child care and house work hours by marital status							
390	Covariance between child care hours and house work hours, Married	-3.244	-6.499	304.072	246.124	273,497	4,400
391	Covariance between child care hours and house work hours, Single or Divorced	-4.902	-5.977	127.700	214.808	256,601	342
Fraction having a child, by marital status and sex							
392	Men: fraction having kids, Single or divorced, age 19	0.021	0.085	0.020	0.078	10,562	306
393	Men: fraction having kids, Single or divorced, age 20	0.068	0.130	0.064	0.113	9,219	393
394	Men: fraction having kids, Single or divorced, age 21	0.135	0.147	0.117	0.125	8,584	483
395	Men: fraction having kids, Single or divorced, age 22	0.086	0.145	0.079	0.124	20,189	550
396	Men: fraction having kids, Single or divorced, age 23	0.143	0.193	0.123	0.156	18,897	622
397	Men: fraction having kids, Single or divorced, age 24	0.195	0.235	0.157	0.180	17,751	668
398	Men: fraction having kids, Single or divorced, age 25	0.254	0.312	0.190	0.215	17,351	689
399	Men: fraction having kids, Single or divorced, age 26	0.314	0.358	0.215	0.230	17,619	673
400	Men: fraction having kids, Single or divorced, age 27	0.348	0.448	0.227	0.247	16,385	643
401	Men: fraction having kids, Single or divorced, age 28	0.381	0.513	0.236	0.250	15,239	624
402	Men: fraction having kids, Single or divorced, age 29	0.443	0.574	0.247	0.245	14,775	638
403	Men: fraction having kids, Single or divorced, age 30	0.494	0.627	0.250	0.234	13,977	627
404	Men: fraction having kids, Single or divorced, age 31	0.556	0.683	0.247	0.216	14,204	644
405	Men: fraction having kids, Single or divorced, age 32	0.596	0.722	0.241	0.201	13,608	663
406	Men: fraction having kids, Single or divorced, age 33	0.631	0.766	0.233	0.179	13,033	676
407	Men: fraction having kids, Single or divorced, age 34	0.662	0.806	0.224	0.156	12,457	649

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
408	Men: fraction having kids, Single or divorced, age 35	0.686	0.821	0.215	0.147	11,762	652
409	Men: fraction having kids, Single or divorced, age 36	0.714	0.842	0.204	0.133	11,052	651
410	Men: fraction having kids, Single or divorced, age 37	0.748	0.858	0.188	0.122	10,775	641
411	Men: fraction having kids, Single or divorced, age 38	0.778	0.871	0.173	0.113	10,900	634
412	Men: fraction having kids, Single or divorced, age 39	0.803	0.874	0.158	0.110	10,817	628
413	Men: fraction having kids, Single or divorced, age 40	0.824	0.885	0.145	0.102	10,469	617
414	Men: fraction having kids, Single or divorced, age 41	0.846	0.892	0.130	0.097	10,797	609
415	Men: fraction having kids, Single or divorced, age 42	0.859	0.905	0.121	0.086	10,152	592
416	Men: fraction having kids, Single or divorced, age 43	0.865	0.922	0.117	0.072	9,200	576
417	Men: fraction having kids, Single or divorced, age 44	0.877	0.920	0.108	0.074	8,794	537
418	Men: fraction having kids, Single or divorced, age 45	0.884	0.936	0.103	0.060	8,433	532
419	Men: fraction having kids, Single or divorced, age 46	0.894	0.939	0.095	0.057	7,793	491
420	Men: fraction having kids, Single or divorced, age 47	0.908	0.938	0.084	0.058	7,022	438
421	Men: fraction having kids, Single or divorced, age 48	0.925	0.944	0.069	0.053	7,086	411
422	Men: fraction having kids, Single or divorced, age 49	0.938	0.947	0.058	0.051	6,737	393
423	Men: fraction having kids, Single or divorced, age 50	0.952	0.944	0.046	0.053	6,989	356
424	Women: fraction having kids, Single or divorced, age 19	0.561	0.312	0.246	0.215	11,952	452
425	Women: fraction having kids, Single or divorced, age 20	0.600	0.350	0.240	0.227	10,337	515
426	Women: fraction having kids, Single or divorced, age 21	0.635	0.367	0.232	0.232	9,423	586
427	Women: fraction having kids, Single or divorced, age 22	0.294	0.413	0.207	0.242	20,712	635
428	Women: fraction having kids, Single or divorced, age 23	0.347	0.424	0.227	0.244	19,427	701
429	Women: fraction having kids, Single or divorced, age 24	0.392	0.444	0.238	0.247	18,193	703
430	Women: fraction having kids, Single or divorced, age 25	0.441	0.502	0.247	0.250	17,738	725
431	Women: fraction having kids, Single or divorced, age 26	0.494	0.556	0.250	0.247	17,929	752
432	Women: fraction having kids, Single or divorced, age 27	0.521	0.611	0.250	0.238	16,644	748
433	Women: fraction having kids, Single or divorced, age 28	0.549	0.660	0.248	0.225	15,726	755
434	Women: fraction having kids, Single or divorced, age 29	0.585	0.694	0.243	0.212	15,204	765
435	Women: fraction having kids, Single or divorced, age 30	0.620	0.741	0.236	0.192	14,450	762
436	Women: fraction having kids, Single or divorced, age 31	0.658	0.779	0.225	0.172	14,655	773
437	Women: fraction having kids, Single or divorced, age 32	0.680	0.809	0.218	0.154	13,852	771
438	Women: fraction having kids, Single or divorced, age 33	0.710	0.834	0.206	0.139	13,060	787
439	Women: fraction having kids, Single or divorced, age 34	0.730	0.861	0.197	0.120	12,604	777
440	Women: fraction having kids, Single or divorced, age 35	0.745	0.863	0.190	0.118	11,807	751
441	Women: fraction having kids, Single or divorced, age 36	0.768	0.880	0.178	0.106	11,120	766
442	Women: fraction having kids, Single or divorced, age 37	0.790	0.888	0.166	0.099	10,957	770
443	Women: fraction having kids, Single or divorced, age 38	0.810	0.892	0.154	0.097	10,972	756
444	Women: fraction having kids, Single or divorced, age 39	0.829	0.902	0.142	0.088	10,952	738
445	Women: fraction having kids, Single or divorced, age 40	0.842	0.907	0.133	0.084	10,689	731
446	Women: fraction having kids, Single or divorced, age 41	0.859	0.918	0.121	0.076	11,082	703
447	Women: fraction having kids, Single or divorced, age 42	0.873	0.924	0.111	0.070	10,202	660
448	Women: fraction having kids, Single or divorced, age 43	0.880	0.921	0.106	0.073	9,155	631
449	Women: fraction having kids, Single or divorced, age 44	0.892	0.925	0.096	0.069	8,834	615
450	Women: fraction having kids, Single or divorced, age 45	0.901	0.927	0.089	0.067	8,473	579
451	Women: fraction having kids, Single or divorced, age 46	0.909	0.931	0.083	0.064	7,672	553
452	Women: fraction having kids, Single or divorced, age 47	0.927	0.926	0.068	0.068	6,959	515
453	Women: fraction having kids, Single or divorced, age 48	0.943	0.931	0.054	0.064	7,127	494
454	Women: fraction having kids, Single or divorced, age 49	0.955	0.919	0.043	0.074	6,661	472
455	Women: fraction having kids, Single or divorced, age 50	0.965	0.916	0.034	0.077	7,170	439
456	Fraction having kids, Married, age 19	0.785	0.235	0.169	0.180	11,051	2,133
457	Fraction having kids, Married, age 20	0.831	0.332	0.141	0.222	14,009	2,374
458	Fraction having kids, Married, age 21	0.819	0.429	0.148	0.245	15,467	2,662
459	Fraction having kids, Married, age 22	0.735	0.498	0.195	0.250	21,042	2,956
460	Fraction having kids, Married, age 23	0.710	0.541	0.206	0.248	23,164	3,193
461	Fraction having kids, Married, age 24	0.701	0.608	0.209	0.238	25,117	3,461
462	Fraction having kids, Married, age 25	0.707	0.649	0.207	0.228	25,293	3,653
463	Fraction having kids, Married, age 26	0.718	0.692	0.202	0.213	23,980	3,792
464	Fraction having kids, Married, age 27	0.729	0.732	0.198	0.196	25,624	3,936
465	Fraction having kids, Married, age 28	0.742	0.771	0.191	0.177	26,764	3,984
466	Fraction having kids, Married, age 29	0.822	0.810	0.146	0.154	26,777	4,012
467	Fraction having kids, Married, age 30	0.823	0.841	0.146	0.134	26,936	4,001
468	Fraction having kids, Married, age 31	0.846	0.866	0.130	0.116	25,363	3,953
469	Fraction having kids, Married, age 32	0.848	0.886	0.129	0.101	25,453	3,888
470	Fraction having kids, Married, age 33	0.859	0.899	0.121	0.091	25,294	3,772
471	Fraction having kids, Married, age 34	0.863	0.905	0.118	0.086	24,716	3,703
472	Fraction having kids, Married, age 35	0.875	0.914	0.109	0.078	24,619	3,650
473	Fraction having kids, Married, age 36	0.896	0.917	0.093	0.076	24,245	3,525
474	Fraction having kids, Married, age 37	0.904	0.923	0.087	0.071	22,893	3,416
475	Fraction having kids, Married, age 38	0.912	0.928	0.080	0.066	20,884	3,310
476	Fraction having kids, Married, age 39	0.917	0.935	0.076	0.061	19,153	3,216
477	Fraction having kids, Married, age 40	0.921	0.938	0.073	0.058	17,944	3,165
478	Fraction having kids, Married, age 41	0.927	0.940	0.068	0.056	15,123	3,025

Table B.1: List of Moments Used in the Estimation

No.	Name	Mean		Variance		No. of Obs.	
		Sim.	Data	Sim.	Data	Sim.	Data
479	Fraction having kids, Married, age 42	0.929	0.942	0.066	0.055	14,436	2,907
480	Fraction having kids, Married, age 43	0.935	0.941	0.061	0.056	14,391	2,777
481	Fraction having kids, Married, age 44	0.940	0.941	0.056	0.055	13,116	2,666
482	Fraction having kids, Married, age 45	0.950	0.942	0.048	0.055	11,752	2,516
483	Fraction having kids, Married, age 46	0.956	0.940	0.042	0.056	11,366	2,450
484	Fraction having kids, Married, age 47	0.982	0.934	0.017	0.062	11,009	2,425
485	Fraction having kids, Married, age 48	0.986	0.932	0.014	0.063	9,020	2,312
486	Fraction having kids, Married, age 49	0.986	0.933	0.014	0.062	8,001	2,107
487	Fraction having kids, Married, age 50	0.990	0.935	0.010	0.061	5,406	1,924

C Appendix: Results

Table C.1: Effects of childcare subsidies on childcare take-up and home production of single and married mothers

Childcare	Hours of Childcare				Housework Hours				Value of Q2				Value of Q1			
Subsidies	Single		Married		Single		Married		Single		Married		Single		Married	
(%)	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
0	2.235	0.000	6.031	0.000	11.611	0.000	14.447	0.000	8.563	0.000	14.940	0.000	11.180	0.000	22.573	0.000
5	2.428	0.193	6.320	0.289	11.628	0.016	14.461	0.015	8.697	0.134	15.120	0.179	11.195	0.016	22.585	0.012
10	2.654	0.419	6.629	0.599	11.592	-0.019	14.443	-0.003	8.833	0.270	15.301	0.360	11.161	-0.018	22.566	-0.007
15	2.919	0.684	6.958	0.928	11.507	-0.104	14.373	-0.073	8.975	0.412	15.476	0.536	11.080	-0.100	22.498	-0.075
20	3.225	0.989	7.319	1.288	11.386	-0.225	14.264	-0.183	9.129	0.566	15.659	0.718	10.963	-0.216	22.392	-0.181
25	3.552	1.316	7.679	1.648	11.293	-0.318	14.211	-0.236	9.305	0.742	15.855	0.915	10.873	-0.307	22.341	-0.232
30	3.921	1.686	8.051	2.021	11.191	-0.420	14.167	-0.279	9.503	0.940	16.059	1.119	10.775	-0.405	22.298	-0.275
35	4.344	2.109	8.435	2.405	11.056	-0.555	14.100	-0.347	9.722	1.159	16.263	1.323	10.645	-0.534	22.236	-0.337
40	4.830	2.594	8.832	2.802	10.901	-0.710	14.036	-0.410	9.970	1.407	16.472	1.531	10.496	-0.684	22.179	-0.394
45	5.364	3.128	9.230	3.199	10.749	-0.862	13.995	-0.452	10.246	1.683	16.685	1.745	10.350	-0.830	22.142	-0.431
50	5.935	3.699	9.631	3.601	10.636	-0.975	13.974	-0.472	10.554	1.991	16.904	1.964	10.240	-0.939	22.127	-0.446
55	6.556	4.320	10.024	3.993	10.547	-1.064	13.974	-0.473	10.898	2.335	17.121	2.181	10.155	-1.025	22.131	-0.442
60	7.230	4.995	10.405	4.374	10.453	-1.158	**13.982**	-0.464	11.267	2.704	17.330	2.390	10.065	-1.115	22.144	-0.429
65	7.962	5.726	10.771	4.740	10.360	-1.251	14.007	-0.440	11.664	3.102	17.533	2.592	9.975	-1.204	22.173	-0.400
70	8.743	6.508	11.112	5.081	10.265	-1.346	14.041	-0.406	12.080	3.517	17.723	2.783	9.883	-1.296	22.216	-0.357
75	9.557	7.322	11.417	5.387	10.188	-1.423	14.101	-0.346	12.511	3.948	17.900	2.959	9.809	-1.370	22.285	-0.288
80	10.359	8.124	11.663	5.632	10.143	-1.469	14.191	-0.255	12.933	4.370	18.052	3.112	9.766	-1.414	22.385	-0.188
85	11.094	8.858	11.845	5.814	10.139	-1.472	14.313	-0.134	13.322	4.759	18.179	3.239	9.762	-1.417	22.516	-0.057
90	11.664	9.429	11.954	5.923	**10.202**	-1.410	14.460	0.013	13.637	5.075	18.277	3.337	9.822	-1.357	22.672	0.099
95	11.961	9.725	11.996	5.965	10.340	-1.271	14.610	0.163	13.834	5.271	18.344	3.403	9.955	-1.224	22.829	0.256

Growth is defined as the change in level relative to the benchmark model.

Table C.2: The Effects of childcare subsidies on the intensive and extensive margins of mothers' employment, by marital status

	Single				Married			
Childcare	Employment rate (%)		Part-time employment (%)		Employment rate (%)		Part-time employment (%)	
Subsidies (%)	Level (%)	Change	Level (%)	Change	Level (%)	Change	Level (%)	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	73.280	0.000	32.959	0.000	38.479	0.000	38.827	0.000
5	73.539	0.259	33.560	0.601	38.434	-0.045	39.328	0.500
10	74.282	1.003	33.831	0.872	38.789	0.309	39.536	0.708
15	75.507	2.228	33.870	0.911	39.941	1.462	39.809	0.982
20	77.105	3.826	33.738	0.779	41.720	3.241	40.171	1.344
25	78.404	5.125	33.690	0.732	42.628	4.149	40.429	1.602
30	80.016	6.736	33.896	0.937	43.415	4.936	40.682	1.855
35	81.962	8.682	33.969	1.010	44.674	6.194	41.198	2.370
40	84.087	10.808	34.084	1.125	45.880	7.401	41.679	2.852
45	86.275	12.995	34.296	1.337	46.672	8.193	42.013	3.186
50	87.945	14.666	34.427	1.468	47.115	8.635	42.262	3.434
55	89.225	15.945	34.481	1.522	47.207	8.728	42.480	3.653
60	90.711	17.432	34.734	1.775	47.151	8.672	42.639	3.811
65	92.199	18.919	34.996	2.037	46.830	8.351	42.755	3.927
70	93.937	20.658	35.545	2.587	46.377	7.898	42.967	4.139
75	95.554	22.274	36.193	3.235	45.429	6.949	43.028	4.200
80	96.984	23.704	37.120	4.161	43.885	5.406	42.727	3.900
85	98.329	25.050	38.467	5.508	41.663	3.184	42.037	3.209
90	99.400	26.121	40.261	7.303	38.799	0.319	40.507	1.679
95	99.940	26.660	42.391	9.433	35.611	-2.869	37.975	-0.853

Growth is defined as the change in level relative to the benchmark model.

Table C.3: The Effects of childcare subsidies on the intensive and extensive margins of employment, by education and marital status

Childcare	Lower educated				Higher educated			
	Employment rate (%)		Part-time employment (%)		Employment rate (%)		Part-time employment (%)	
Subsidies (%)	Level	Change	Level	Change	Level	Change	Level	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Single or Divorced Mothers								
0	65.587	0.000	35.306	0.000	98.891	0.000	27.776	0.000
5	66.549	0.961	35.965	0.659	98.916	0.024	27.686	-0.090
10	67.716	2.129	36.256	0.951	98.947	0.056	27.596	-0.180
15	68.925	3.338	36.438	1.133	98.993	0.101	27.488	-0.287
20	70.214	4.627	36.482	1.176	99.061	0.170	27.541	-0.235
25	71.614	6.026	36.503	1.197	99.124	0.233	27.490	-0.285
30	73.604	8.016	36.768	1.463	99.181	0.290	27.525	-0.251
35	75.567	9.979	36.812	1.506	99.296	0.405	28.105	0.329
40	77.072	11.485	36.832	1.527	99.448	0.557	29.420	1.644
45	79.240	13.653	37.031	1.725	99.563	0.672	30.184	2.409
50	81.448	15.861	37.182	1.876	99.626	0.734	30.378	2.602
55	83.282	17.694	37.185	1.880	99.679	0.788	30.506	2.730
60	85.535	19.948	37.539	2.233	99.718	0.827	30.546	2.771
65	87.786	22.199	37.865	2.560	99.771	0.880	30.664	2.888
70	90.463	24.876	38.635	3.330	99.820	0.929	30.803	3.028
75	92.963	27.376	39.519	4.213	99.874	0.983	31.031	3.256
80	95.200	29.612	40.812	5.506	99.930	1.039	31.311	3.535
85	97.335	31.747	42.645	7.339	99.967	1.075	31.768	3.992
90	99.039	33.452	45.181	9.876	99.994	1.102	32.250	4.475
95	99.903	34.316	48.232	12.926	100.000	1.109	32.796	5.020
Married Mothers								
0	22.199	0.000	36.410	0.000	80.522	0.000	40.548	0.000
5	22.566	0.367	37.597	1.187	80.695	0.173	40.617	0.069
10	23.121	0.922	38.309	1.899	80.720	0.199	40.476	-0.072
15	23.746	1.547	38.960	2.550	81.010	0.488	40.440	-0.108
20	24.460	2.261	39.585	3.175	81.337	0.816	40.576	0.027
25	25.040	2.842	39.985	3.575	81.536	1.014	40.731	0.182
30	25.737	3.538	40.451	4.041	81.877	1.355	40.840	0.292
35	26.495	4.296	40.835	4.425	82.082	1.560	41.438	0.890
40	27.032	4.833	41.277	4.867	82.242	1.720	41.934	1.386
45	27.621	5.423	41.853	5.443	82.342	1.820	42.113	1.565
50	28.195	5.997	42.323	5.912	82.219	1.697	42.223	1.674
55	28.307	6.109	42.641	6.230	82.157	1.635	42.378	1.830
60	28.269	6.070	42.777	6.367	82.009	1.488	42.551	2.002
65	27.922	5.723	42.884	6.474	81.716	1.195	42.673	2.125
70	27.497	5.299	43.287	6.877	81.188	0.666	42.766	2.218
75	26.375	4.176	43.140	6.730	80.502	-0.020	42.960	2.412
80	24.445	2.247	42.325	5.915	79.675	-0.846	42.955	2.406
85	21.777	-0.422	40.545	4.135	78.316	-2.206	42.801	2.253
90	18.183	-4.016	35.914	-0.496	76.902	-3.620	42.514	1.965
95	14.031	-8.168	25.995	-10.415	75.534	-4.988	42.091	1.543

Growth is defined as the change in level relative to the benchmark model.

Table C.4: The Effects of childcare subsidies on marital decisions, by education

Childcare	Below-college								College-graduates							
	Single		Married		Divorced		Timing of Birth		Single		Married		Divorced		Timing of Birth	
Subsidies (%)	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
0	16.840	0.000	45.518	0.000	37.642	0.000	86.438	0.000	23.323	0.000	40.950	0.000	35.726	0.000	50.821	0.000
5	16.699	-0.141	45.881	0.363	37.420	-0.222	91.772	5.333	23.321	-0.003	40.993	0.043	35.686	-0.040	50.878	0.057
10	16.616	-0.224	46.044	0.526	37.340	-0.302	94.349	7.911	23.334	0.010	41.055	0.105	35.611	-0.115	51.286	0.464
15	16.572	-0.268	46.187	0.669	37.241	-0.401	95.593	9.154	23.327	0.004	41.330	0.379	35.343	-0.383	54.736	3.914
20	16.543	-0.297	46.296	0.778	37.161	-0.481	96.062	9.624	23.317	-0.006	41.863	0.913	34.819	-0.907	61.126	10.304
25	16.524	-0.316	46.391	0.873	37.085	-0.557	96.225	9.786	23.300	-0.023	42.115	1.165	34.585	-1.142	63.714	12.893
30	16.498	-0.342	46.473	0.956	37.029	-0.614	96.314	9.875	23.286	-0.037	42.266	1.316	34.448	-1.278	64.969	14.147
35	16.484	-0.356	46.536	1.018	36.980	-0.663	96.349	9.911	23.207	-0.116	42.739	1.789	34.054	-1.673	70.033	19.212
40	16.466	-0.374	46.610	1.092	36.924	-0.719	96.392	9.954	22.998	-0.325	43.245	2.295	33.756	-1.970	80.163	29.342
45	16.455	-0.384	46.653	1.135	36.891	-0.751	96.419	9.981	22.750	-0.574	43.520	2.569	33.731	-1.996	87.670	36.848
50	16.439	-0.401	46.696	1.178	36.865	-0.777	96.431	9.993	22.632	-0.691	43.628	2.678	33.740	-1.987	90.373	39.551
55	16.430	-0.410	46.730	1.212	36.840	-0.802	96.441	10.003	22.579	-0.744	43.678	2.728	33.742	-1.984	91.572	40.751
60	16.413	-0.426	46.753	1.235	36.834	-0.808	96.453	10.014	22.518	-0.806	43.713	2.763	33.769	-1.957	92.187	41.366
65	16.396	-0.444	46.755	1.237	36.850	-0.793	96.457	10.018	22.484	-0.839	43.681	2.730	33.835	-1.891	92.910	42.088
70	16.388	-0.451	46.702	1.184	36.910	-0.732	96.459	10.021	22.477	-0.847	43.600	2.650	33.923	-1.803	93.609	42.788
75	16.400	-0.439	46.566	1.048	37.034	-0.609	96.463	10.025	22.511	-0.812	43.463	2.513	34.026	-1.701	94.477	43.656
80	16.437	-0.402	46.367	0.849	37.196	-0.447	96.462	10.024	22.562	-0.761	43.226	2.275	34.212	-1.514	94.983	44.162
85	16.473	-0.366	46.080	0.562	37.447	-0.196	96.462	10.024	22.639	-0.685	42.896	1.945	34.466	-1.261	95.138	44.316
90	16.540	-0.299	45.694	0.176	37.765	0.123	96.461	10.023	22.715	-0.608	42.421	1.471	34.863	-0.863	95.143	44.322
95	16.617	-0.223	45.189	-0.329	38.194	0.552	96.459	10.021	22.828	-0.495	41.914	0.964	35.257	-0.469	95.140	44.318

Growth is defined as the change in level relative to the benchmark model.

Table C.5: The effects of childcare subsidies on life-time employment, wages, earnings, and timing of birth, by education (Women)

Childcare	Below-college						College-graduates					
	Employment		Earnings		Timing of Birth		Employment		Earnings		Timing of Birth	
Subsidies (%)	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0	50.950	0.000	25.540	0.000	86.438	0.000	94.167	0.000	69.118	0.000	50.821	0.000
5	49.307	-1.643	24.649	-0.891	91.772	5.333	94.208	0.040	69.133	0.014	50.878	0.057
10	49.076	-1.874	24.431	-1.110	94.349	7.911	94.169	0.002	69.104	-0.015	51.286	0.464
15	49.455	-1.495	24.499	-1.042	95.593	9.154	93.900	-0.267	68.807	-0.311	54.736	3.914
20	50.222	-0.728	24.737	-0.803	96.062	9.624	93.366	-0.802	68.222	-0.896	61.126	10.304
25	51.094	0.144	25.028	-0.512	96.225	9.786	93.187	-0.980	67.996	-1.123	63.714	12.893
30	52.354	1.404	25.445	-0.095	96.314	9.875	93.199	-0.969	67.927	-1.192	64.969	14.147
35	53.657	2.708	25.905	0.364	96.349	9.911	92.904	-1.263	67.511	-1.607	70.033	19.212
40	54.613	3.664	26.222	0.682	96.392	9.954	92.506	-1.661	66.900	-2.219	80.163	29.342
45	55.949	5.000	26.666	1.126	96.419	9.981	92.338	-1.830	66.553	-2.566	87.670	36.848
50	57.301	6.352	27.121	1.581	96.431	9.993	92.231	-1.937	66.405	-2.714	90.373	39.551
55	58.253	7.303	27.416	1.876	96.441	10.003	92.195	-1.972	66.330	-2.788	91.572	40.751
60	59.350	8.401	27.742	2.201	96.453	10.014	92.133	-2.035	66.261	-2.858	92.187	41.366
65	60.315	9.365	28.005	2.465	96.457	10.018	92.027	-2.141	66.162	-2.956	92.910	42.088
70	61.494	10.544	28.300	2.760	96.459	10.021	91.827	-2.340	66.017	-3.102	93.609	42.788
75	62.324	11.375	28.438	2.897	96.463	10.025	91.569	-2.598	65.826	-3.292	94.477	43.656
80	62.692	11.742	28.348	2.808	96.462	10.024	91.282	-2.885	65.653	-3.466	94.983	44.162
85	62.752	11.803	28.086	2.545	96.462	10.024	90.788	-3.379	65.371	-3.748	95.138	44.316
90	62.279	11.329	27.535	1.994	96.461	10.023	90.312	-3.855	65.113	-4.006	95.143	44.322
95	61.249	10.299	26.741	1.200	96.459	10.021	89.866	-4.301	64.873	-4.245	95.140	44.318

Table C.6: Effects of childcare subsidies on home production of single and married fathers

Childcare	Hours of Childcare				Housework Hours				Value of Q2				Value of Q1			
Subsidies	Single		Married		Single		Married		Single		Married		Single		Married	
(%)	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change	Levels	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
0	2.367	0.000	6.208	0.000	8.700	0.000	9.049	0.000	7.555	0.000	14.827	0.000	8.377	0.000	21.858	0.000
5	2.579	0.212	6.500	0.292	8.697	-0.003	9.046	-0.002	7.692	0.137	15.002	0.175	8.373	-0.003	21.853	-0.006
10	2.812	0.445	6.812	0.604	8.695	-0.005	9.046	-0.003	7.844	0.289	15.182	0.355	8.371	-0.005	21.825	-0.034
15	3.073	0.706	7.145	0.937	8.694	-0.007	9.047	-0.002	8.013	0.458	15.364	0.537	8.370	-0.006	21.771	-0.087
20	3.360	0.994	7.488	1.280	8.690	-0.010	9.050	0.001	8.197	0.642	15.546	0.719	8.367	-0.010	21.704	-0.155
25	3.678	1.311	7.837	1.629	8.687	-0.013	9.052	0.003	8.399	0.844	15.741	0.914	8.364	-0.013	21.673	-0.186
30	4.025	1.658	8.199	1.991	8.683	-0.017	9.053	0.004	8.618	1.063	15.946	1.118	8.360	-0.016	21.654	-0.205
35	4.414	2.047	8.573	2.365	8.679	-0.021	9.055	0.006	8.862	1.307	16.151	1.324	8.357	-0.020	21.623	-0.235
40	4.845	2.479	8.959	2.751	8.676	-0.025	9.057	0.009	9.130	1.575	16.364	1.536	8.353	-0.024	21.597	-0.261
45	5.321	2.955	9.337	3.129	8.670	-0.030	9.061	0.012	9.423	1.868	16.573	1.746	8.347	-0.029	21.589	-0.270
50	5.851	3.484	9.727	3.519	8.664	-0.036	9.064	0.015	9.744	2.189	16.789	1.962	8.342	-0.035	21.587	-0.271
55	6.428	4.061	10.108	3.900	8.658	-0.042	9.068	0.020	10.088	2.533	17.002	2.175	8.336	-0.040	21.602	-0.256
60	7.067	4.700	10.483	4.275	8.653	-0.047	9.072	0.023	10.465	2.910	17.210	2.382	8.332	-0.045	21.620	-0.238
65	7.761	5.394	10.839	4.631	8.647	-0.053	9.077	0.028	10.869	3.314	17.407	2.580	8.326	-0.051	21.654	-0.205
70	8.503	6.136	11.165	4.956	8.645	-0.055	9.086	0.037	11.294	3.739	17.591	2.764	8.323	-0.053	21.704	-0.154
75	9.169	6.802	11.448	5.240	8.684	-0.016	9.100	0.051	11.682	4.127	17.759	2.932	8.361	-0.016	21.785	-0.073
80	9.937	7.571	11.686	5.478	8.697	-0.003	9.111	0.062	12.111	4.556	17.905	3.078	8.374	-0.003	21.878	0.019
85	10.700	8.333	11.859	5.651	8.714	0.014	9.123	0.074	12.530	4.975	18.023	3.196	8.390	0.013	21.991	0.133
90	11.366	8.999	11.960	5.751	8.741	0.041	9.135	0.087	12.895	5.340	18.111	3.283	8.416	0.039	22.126	0.268
95	11.838	9.471	11.997	5.789	8.784	0.084	9.145	0.096	13.160	5.605	18.166	3.339	8.458	0.081	22.256	0.398

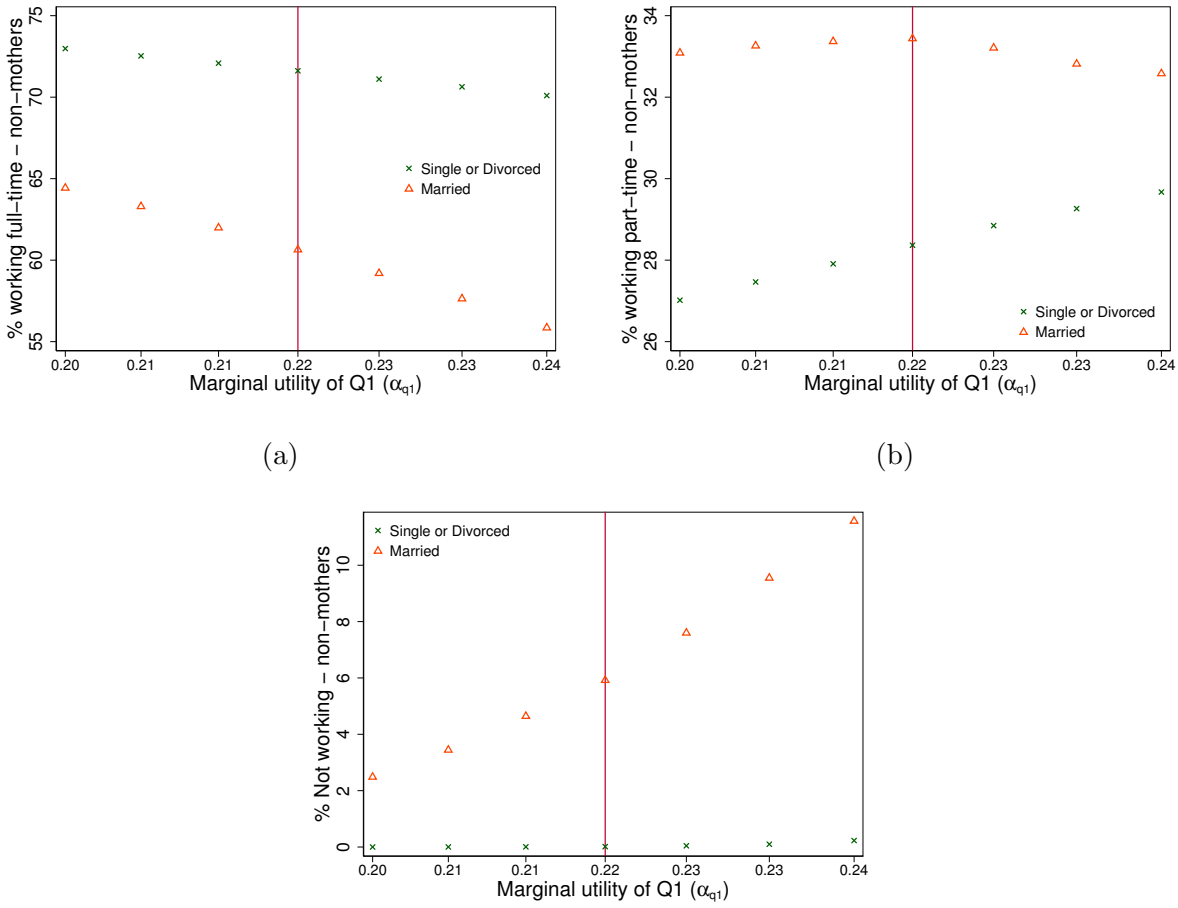
Growth is defined as the change in level relative to the benchmark model.

Table C.7: The effects of childcare subsidies on life-time employment, wages, earnings, and timing of birth, by education (Men)

Childcare	Below-college						College-graduates					
	Employment		Earnings		Timing of Birth		Employment		Earnings		Timing of Birth	
Subsidies (%)	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0	100.000	0.000	99.393	0.000	66.725	0.000	100.000	0.000	111.477	0.000	59.743	0.000
5	100.000	0.000	99.376	-0.017	67.776	1.050	100.000	0.000	111.470	-0.006	60.417	0.674
10	100.000	0.000	99.342	-0.051	69.530	2.805	100.000	0.000	111.461	-0.015	61.002	1.259
15	100.000	0.000	99.281	-0.112	72.183	5.457	100.000	0.000	111.428	-0.049	62.576	2.833
20	100.000	0.000	99.209	-0.184	75.446	8.720	100.000	0.000	111.347	-0.130	66.234	6.491
25	100.000	0.000	99.166	-0.227	77.531	10.805	100.000	0.000	111.277	-0.200	69.493	9.750
30	100.000	0.000	99.140	-0.253	78.734	12.008	100.000	0.000	111.246	-0.231	71.164	11.421
35	100.000	0.000	99.116	-0.277	79.855	13.130	100.000	0.000	111.206	-0.270	72.994	13.251
40	100.000	0.000	99.100	-0.293	80.649	13.923	100.000	0.000	111.154	-0.322	75.244	15.501
45	100.000	0.000	99.090	-0.303	80.944	14.219	100.000	0.000	111.133	-0.343	76.042	16.299
50	100.000	0.000	99.081	-0.312	81.066	14.340	100.000	0.000	111.120	-0.356	76.329	16.586
55	100.000	0.000	99.068	-0.325	81.142	14.416	100.000	0.000	111.108	-0.369	76.441	16.698
60	100.000	0.000	99.061	-0.332	81.181	14.455	100.000	0.000	111.094	-0.383	76.555	16.812
65	100.000	0.000	99.049	-0.344	81.244	14.518	100.000	0.000	111.080	-0.397	76.632	16.889
70	100.000	0.000	99.017	-0.376	81.888	15.163	100.000	0.000	111.024	-0.453	78.948	19.205
75	100.000	0.000	98.759	-0.634	94.710	27.985	100.000	0.000	110.810	-0.667	89.924	30.181
80	100.000	0.000	98.693	-0.700	96.389	29.664	100.000	0.000	110.703	-0.773	93.871	34.128
85	100.000	0.000	98.647	-0.746	96.432	29.706	100.000	0.000	110.636	-0.840	95.317	35.574
90	100.000	0.000	98.597	-0.796	96.431	29.705	100.000	0.000	110.583	-0.894	95.591	35.848
95	100.000	0.000	98.551	-0.842	96.429	29.704	100.000	0.000	110.540	-0.937	95.594	35.851

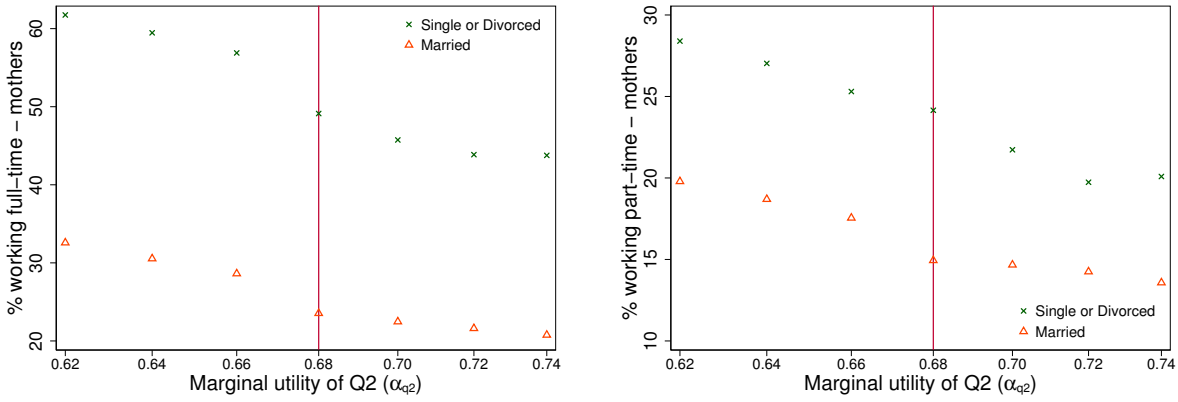
D Appendix: Sensitivity Analyses

Figure D.1: Sensitivity Analyses - marginal utility of household good Q_1 (α_{q1})



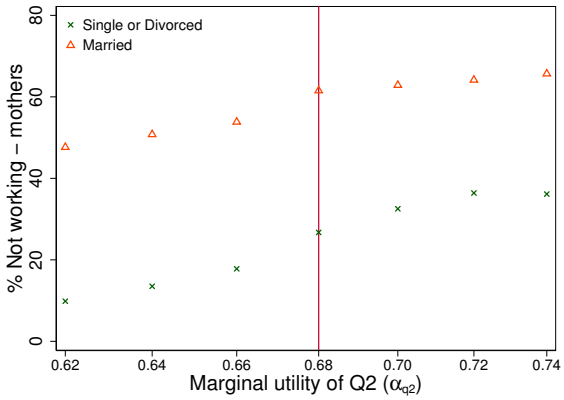
Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

Figure D.2: Sensitivity Analyses - marginal utility of household good Q_2 (α_{q2})

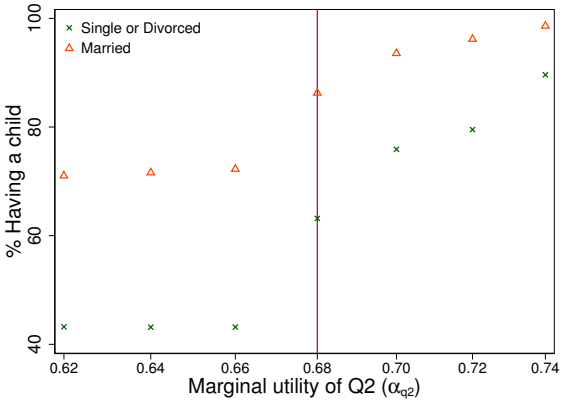


(a)

(b)



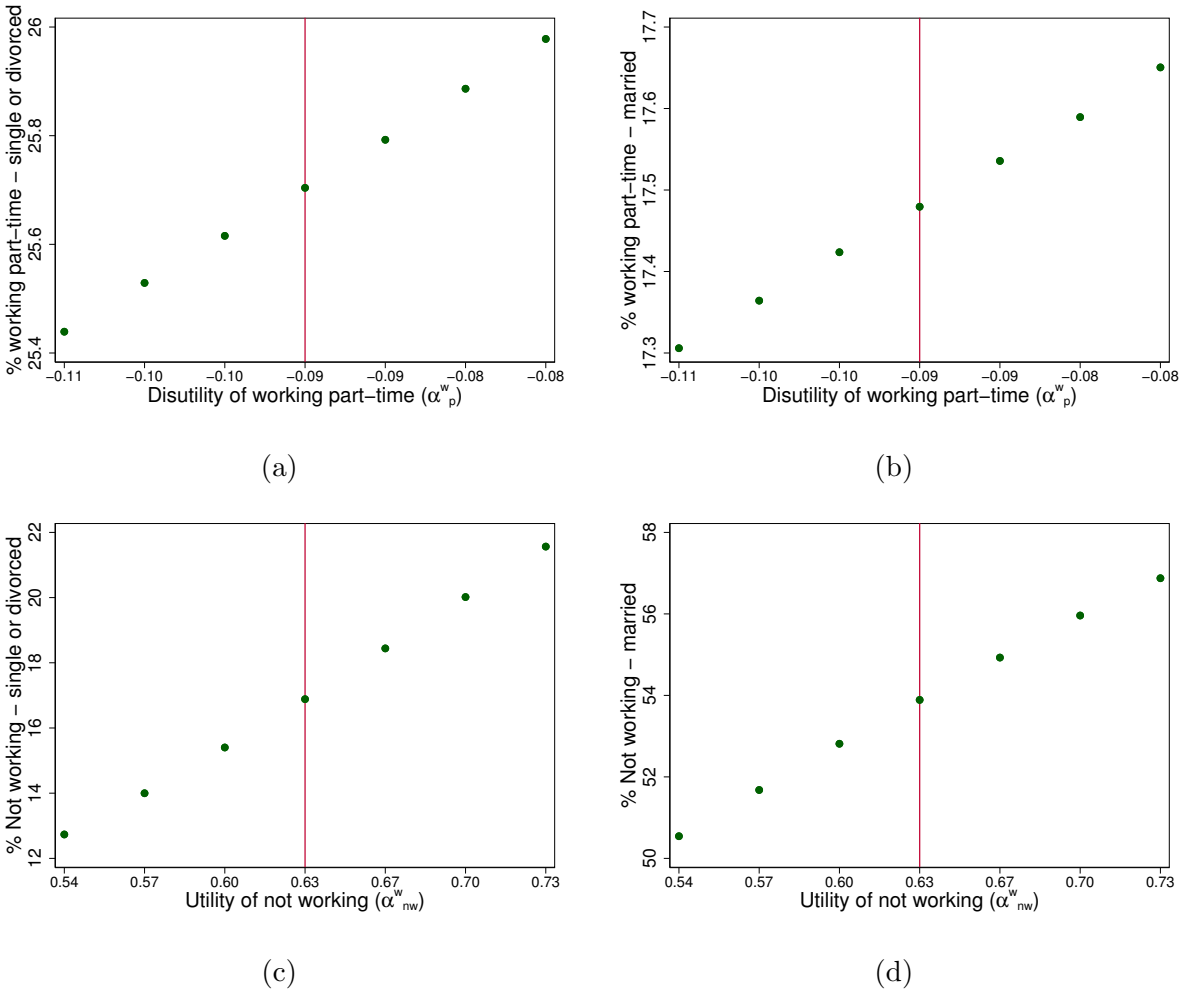
(c)



(d)

Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

Figure D.3: Sensitivity analyses - disutility of working part-time and utility of not working (α_p^w and α_{nw}^w)

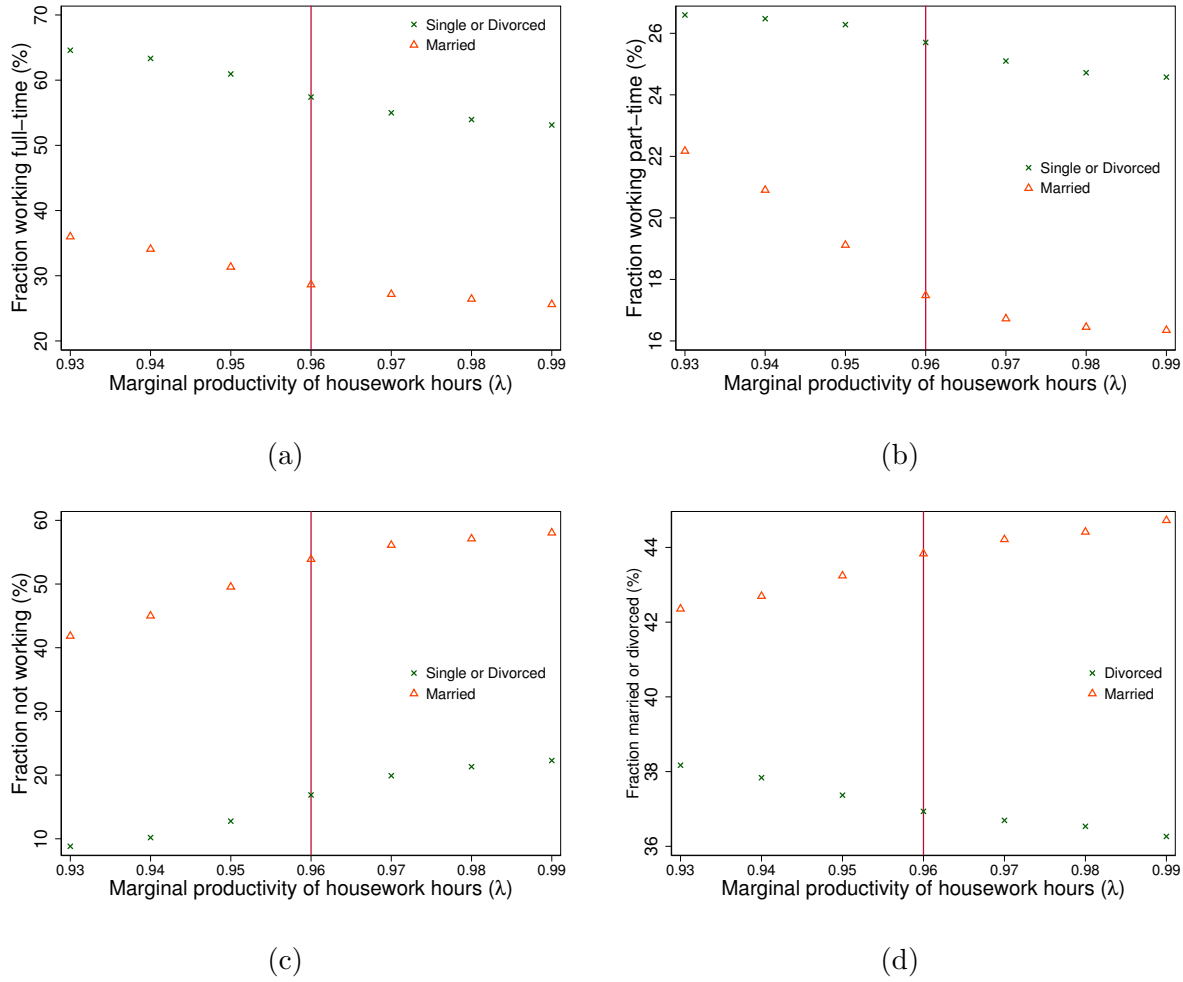


(a) (b)

(c) (d)

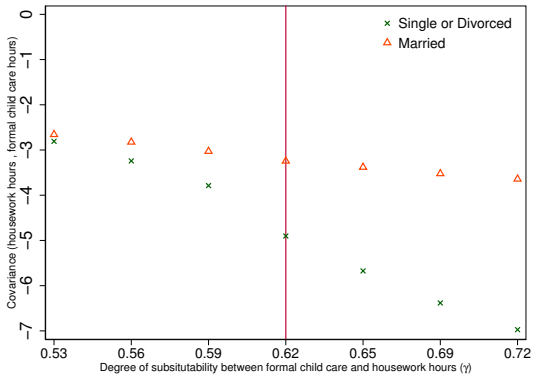
Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

Figure D.4: Sensitivity Analyses - marginal productivity of housework hours (λ)



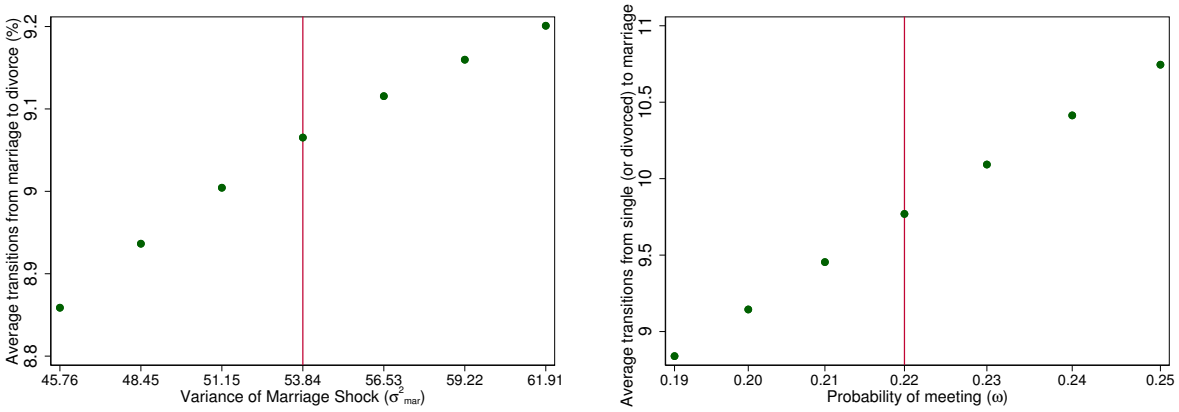
Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

Figure D.5: Sensitivity Analyses - Degree of substitutability between childcare and housework hours (γ)



Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

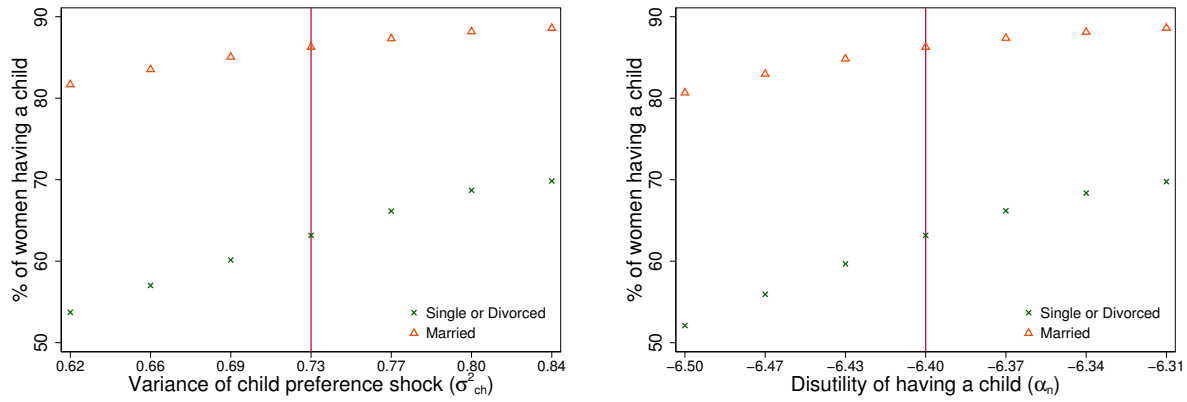
Figure D.6: Sensitivity Analyses - variance of marriage shock and probability of meeting (σ^2_{mar} and ω)



(a) (b)

Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.

Figure D.7: Sensitivity Analyses - variance of child preference shock and disutility of having a child (σ^2_{ch} and ω)



(a) (b)

Note: In these figures, I hold all the parameters constant at the estimated values, except one parameter. This parameter varies along the horizontal axis. The vertical axis reports how the values taken by a given target moment changes when that parameter varies. While in the estimation of the parameters of the model, these moments are targeted at different ages; in this figure, for presentation reasons, the average of the moments across ages is reported.