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When Fathers Do More Childcare: The Narrowing Gender Wage Gap, Intra-Household Time Reallocation, and Mothers' Rising Labor Supply

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Abstract

Married women's labor supply in the United States rose markedly beginning in the late 1950s, peaked in the late 1990s, and has increased only slowly since then, while married men's labor supply has continued to decline. This apparent slowdown in married women's labor supply in recent decades masks substantial heterogeneity across households. From the late 1990s to the early 2020s, married mothers (with at least one child under age 15) experienced large increases in work hours, whereas women without children (non-mothers) saw only small increases. Over the same period, married fathers reduced work hours more than their counterparts without children while increasing time devoted to childcare. Fertility rose slightly, with childbirth occurring later in life. To explain these changes, we develop a two-earner life-cycle model in which labor supply and fertility are endogenous and spouses' childcare time is substitutable. Counterfactuals show that the narrowing gender wage gap is the primary driver of recent shifts: it raises mothers' work hours and lowers fathers' work hours, in part by reallocating childcare toward fathers and thereby expanding mothers' capacity to work and accelerating their human capital accumulation. Applying the same framework to the period before the late 1990s yields an important distinction: a similar reduction in the gender wage gap still increases women's work hours substantially, but generates weaker heterogeneity between mothers and non-mothers and a more limited role for childcare reallocation, reflecting women's lower contribution to household income in that era relative to recent decades.

JEL classification

E24, J16, J22

Keywords

married women, labor supply, gender wage gap, childcare, heterogeneity, recent trend reversal

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1 Introduction

It is well known that the labor supply of married women has leveled off since the late 1990s, following a continuous, long-term increase that spanned five decades after World War II. Over the same period, the labor supply of married men has steadily declined. While the historical increase in married women's labor supply has been studied extensively, the period after the plateau in the late 1990s marks a consequential turning point that has received far less attention and warrants closer examination. The shift is evident in aggregate data: married women's annual work hours rose by only 71 hours from the late 1990s to the early 2020s, compared with an increase of 484 hours over the preceding two decades. Understanding the macroeconomic implications of this recent slowdown is as crucial as understanding the historical increase. Does the slowdown affect all married women, or do some groups continue to increase labor supply while others do not? What factors are driving these recent trends? Addressing these questions will not only aid in projecting the future size of the labor force but also inform the development of effective labor market policies.

Using the March Current Population Survey (CPS) data from 1998 to 2023, we confirm this trend reversal and document significant heterogeneity in recent time allocation patterns and labor supply behavior among subgroups of married couples.[1] Specifically, since the late 1990s, the labor supply of married women with children has increased markedly, whereas the labor supply of married women without children has risen only modestly. In parallel, married men with children have reduced their labor supply more than their counterparts without children. Additionally, using the American Time Use Survey (ATUS) data, we observe that married men have increased childcare time during this period. Furthermore, utilizing June CPS data, we document that while fertility rates among married women have slightly increased, childbirth has been delayed over the same period.

The primary goal of this paper is to understand why married women *with* children have

[1] We focus on married heterosexual couples, as data on the labor supply behavior of same-sex married couples are sparse, due to changes in identifying same-sex couples over time. Refer to Isaac (2025) for a more thorough discussion.

continued to increase their labor supply in recent decades, while their husbands have simultaneously reduced their work hours. This study aims to quantitatively identify the main drivers behind these trends. To address this goal, we develop a two-earner life-cycle model with incomplete markets, which provides a unified framework for analyzing joint labor supply and fertility changes among married couples. While our model is designed to be simple by excluding educational choice and assortative matching, it remains sufficiently robust to capture the observed joint labor supply and fertility behavior across different household groups in the late 1990s. A key innovation is that the model endogenizes both labor supply and fertility decisions and explicitly captures the substitutability between mothers' and fathers' childcare time. Many existing studies (e.g., Blundell, Pistaferri and Saporta-Eksten, 2018; Guner, Kaygusuz and Ventura, 2020) often treat fertility as exogenous, which potentially leads to limited analyses of women's labor supply, childcare, and fertility responses.

Moreover, to the best of our knowledge, this paper is the first to quantify the role of fathers' childcare time in shaping mothers' work hours. Together, these features yield a unified framework linking fertility, childcare, and spouses' labor supply decisions, offering a deeper understanding of recent changes in behavior among married households.

Our paper contributes to four strands of literature. First, it contributes to the fairly small literature on the recent trend reversal in married women's labor supply by providing a structural explanation for the changes in women's behavior observed between the late 1990s and the early 2020s. The reversal in the aggregate labor supply for married women has been documented by Aaronson, Cajner, Fallick, Galbis-Reig, Smith and Wascher (2012), Albanesi and Prados (2022), Cohany and Sok (2007), Juhn and Potter (2006), Fogli and Veldkamp (2011), Moffitt (2012), Siegel (2017), and Olsson (2025). Many of these studies, however, are descriptive in nature and do not provide a structural, quantitative account of the mechanisms behind the recent trends, with a few exceptions. Fogli and Veldkamp (2011), for instance, argue that the stagnation in women's participation after 2000 can be attributed to a learning process influenced by societal beliefs about the effects of maternal employment on children's outcomes. However, their study does not provide a quantitative explanation for the observed decrease in labor force participation. More recently, Albanesi and Prados (2022) investigate the slowdown in married women's labor force participation and find that wage growth has been concentrated among women married to highly-educated, high-income husbands, whose earnings grew markedly between 1995 and 2005. This, in turn, created a negative income effect on the labor supply of wives, leading to a reduction in their labor market participation. Despite its contributions, their model abstracts from fertility decisions.

Second, and more importantly, our paper builds on and contributes to the large literature on the determinants of changes in women's labor supply and fertility by quantifying a channel through which the narrowing gender wage gap reshapes within-household childcare allocation, thereby influencing wives' labor supply and fertility. Related work has emphasized the gender wage gap and returns to work experience. A broad set of empirical and structural studies has examined how these forces—often alongside childcare costs and technological change in the household sector—shape women's labor supply and fertility across cohorts and over time. Using a cohort-based approach, Attanasio, Low and Sanchez-Marcos (2008) find that a combination of decreased childcare costs and a narrowing gender wage gap is critical for explaining the increase in life-cycle labor supply for women born in the 1950s compared to those born in the 1940s. Park (2018) identifies increased returns to work experience and higher penalties for non-work as dominant factors that drive changes in life-cycle labor supply and fertility behavior among married women across cohorts, from the 1950s cohort to more recent cohorts. Greenwood, Guner, Kocharkov and Santos (2016) employ a model of marriage, divorce, and educational attainment to demonstrate that technological progress in the household sector, together with a narrowing gender wage gap, played a key role in the rise in married women's labor supply from 1960 to 2005. Blau and Kahn (2017) document a persistent decline in the gender wage gap, using PSID data between 1980 and 2010, and find that gender differences in occupation and industry are the key drivers.[2] Siegel (2017) studies

[2]They document that progress in reducing the gender wage gap was slower (and even reversed) in the 1990s. We will show that since then, there has been a steady and persistent reduction in the wage gap

trends in U.S. fertility and female labor force participation in married households between 1965 and 2005. In a one-period representative model with endogenous fertility, he finds that the falling gender wage gap explains the flattening out of U.S. fertility rates and increases in men's time spent on home production.

Building on these studies, our paper also highlights the narrowing gender wage gap as a key force behind increasing women's labor supply, particularly among women *with* children. Our contribution is to quantify a mechanism that is central to the recent period: as women's relative wages rise, childcare is endogenously reallocated toward fathers, which expands mothers' capacity to work and accumulate their human capital and generates the pronounced heterogeneity between mothers and non-mothers observed in recent decades. By modeling childcare time choices for both spouses and endogenizing fertility, we quantify how increases in fathers' childcare time amplify mothers' labor supply responses to the decline in the gender wage gap.

These findings motivate a natural question: how do the same forces operate in earlier periods, when women's labor supply was rising rapidly and fertility was falling? Much of the related work focuses on the period before the late 1990s (e.g., Caucutt, Guner and Knowles, 2002; Olivetti, 2006) and emphasizes the narrowing gender wage gap (or rising returns to work experience) as the primary driver of increasing female labor supply and declining fertility. We further strengthen our contribution to this literature by showing that the same unified model can also account for the labor supply and fertility changes observed in that earlier era, while implying somewhat different operative mechanisms than in recent decades. Applying the same structural framework across periods allows us to conduct a within-model "horse race" centered on the narrowing gender wage gap, thereby assessing how far similar explanations extend and identifying the mechanisms that are specific to the environment after the late 1990s within a unified quantitative framework.

Third, our paper contributes to the literature on within-household risk sharing and the

between the mid-1990s through the early 2020s.

role of wives' labor supply in providing insurance against income and wage shocks. Blundell, Pistaferri and Saporta-Eksten (2016) and Wu and Krueger (2021) document that female labor supply plays a primary role in providing consumption insurance against permanent male wage shocks. Park and Shin (2024) further explore this mechanism by decomposing wives' labor supply adjustments in the intensive and extensive margins. We add to this strand of literature by showing that rising wage risk among husbands is another driver of increased female labor supply in recent decades.

Lastly, our study contributes to the literature that links marriage and fertility decisions to earnings risk. We find that higher wage uncertainty among husbands leads households to delay childbirth, consistent with Sommer (2016).

Our findings are as follows. First, we document substantial heterogeneity behind the aggregate slowdown in married women's labor supply: work hours increase markedly for women *with* children but change little for women without children, while men show the opposite pattern, with larger declines among men *with* children than among men without children. Second, we quantify sizable effects of the narrowing gender wage gap on joint labor supply and fertility, and show that these effects differ between households with and without children. For households with children, it leads to a substantial increase in mothers' work hours and a delay in childbirth, along with a decline in fathers' work hours and an increase in fathers' childcare time—highlighting the substitutability between mothers' and fathers' childcare time. We quantify that roughly 38% of the increase in mothers' work hours attributable to the narrowing gender wage gap (95 annual hours) is driven by the concurrent increase in fathers' childcare time. The rise in women's relative wages, together with fathers' greater childcare involvement, jointly strengthens mothers' incentives to work more and delay childbirth, accelerating their human capital accumulation. Third, we find that increased wage uncertainty among men has meaningful effects on joint labor supply and childbirth timing. Quantitatively, however, this effect is smaller than the gender wage gap mechanism and its implied heterogeneity does not align with the observed trends. Finally, we show that our unified framework also accounts for labor supply and fertility changes in the earlier period, enabling a within-model "horse race" that highlights the role of the narrowing gender wage gap. Before the late 1990s, rising women's relative wages generated large increases in women's work hours but relatively little heterogeneity across household types and limited reallocation of fathers' time into childcare, reflecting women's lower contribution to household income in that era relative to recent decades.

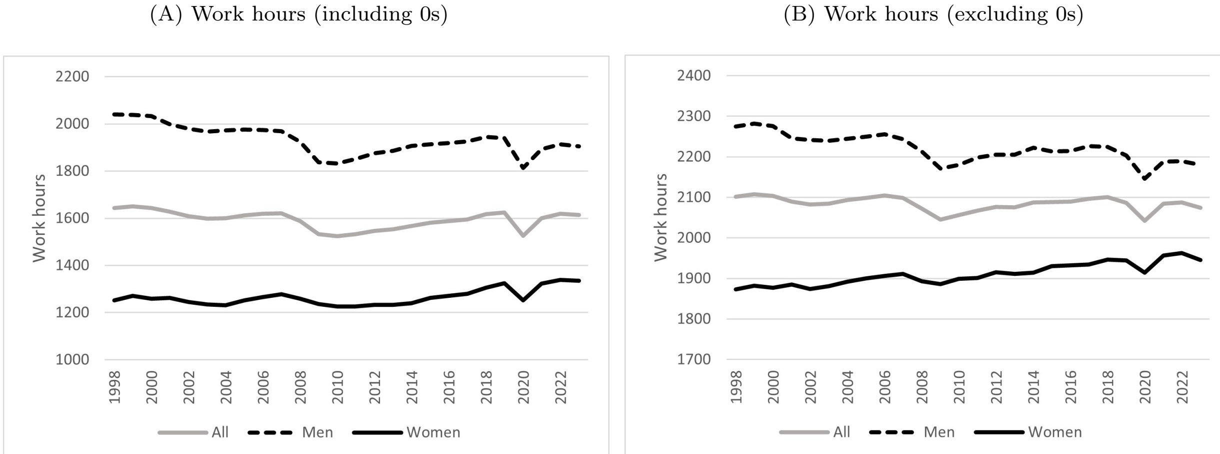
The remainder of the paper is structured as follows: Section 2 outlines the key empirical facts motivating our analysis. Section 3 introduces the model framework, and Section 4 details its parameterization. In Section 5, we present the results of the benchmark economy and findings from several counterfactual experiments. Finally, Section 6 concludes.

2 Empirical Facts

As noted in Section 1, aggregate labor supply has stagnated since 1998, and our analysis primarily focuses on this period. We observe several important trends of joint labor supply, childcare time, and fertility behavior among married households in the U.S.

Figure 1 illustrates recent trends in annual work hours by gender. Panel (A) displays average work hours, including individuals with zero work hours, while Panel (B) shows average work hours excluding those with zero hours. When zero work hours are included, as shown in Panel (A), aggregate work hours for married individuals have slightly decreased, as indicated by the gray line. Specifically, overall average work hours declined by 35 hours (a 2.1% decrease) from 1,646 hours in the late 1990s (1998–2000) to 1,611 hours in the early 2020s (2021–2023), with each value representing a three-year average. This stagnation masks opposing trends between men and women. For example, women's work hours increased by 71 hours (5.6%, from 1,261 hours to 1,332 hours), while men's work hours declined by 134 hours (-6.6%, from 2,037 hours to 1,903 hours). These opposing patterns by gender are still evident when examining work hours at the intensive margin, as shown in Panel (B). Women's

Figure 1: Work hours by gender, 1998-2023



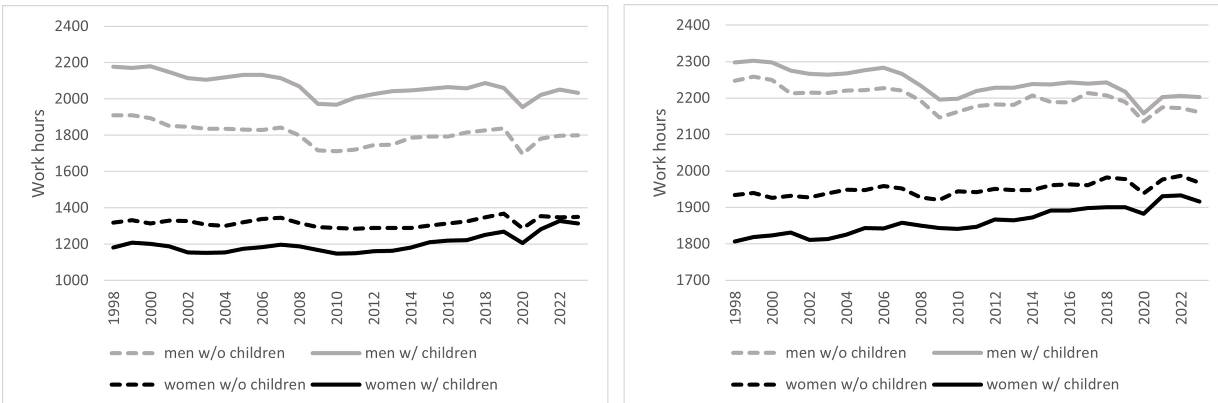
Source: March CPS (1998–2023)
Notes: Samples are restricted to married individuals aged 25–64. Work hours refer to annual hours. See Appendix A for detailed sample restrictions and definitions of labor supply measures.

work hours increased by 78 hours (4.1%, from 1,877 hours to 1,955 hours), whereas men's work hours decreased by 91 hours (-4%, from 2,277 hours to 2,186 hours).

To explore potential heterogeneity in labor supply changes within each gender group, we plot work hours not only by gender but also by the presence of children. Here, individuals with children are defined as those living in the household with at least one child under age 15. As illustrated in Figure 2, significant differences emerge. In Panel (A), which includes individuals with zero work hours, the increase in work hours is more pronounced for women with children compared to those without children. For example, women with children increased their work hours by 111 hours (9.3%, from 1,197 hours to 1,308 hours), while women without children experienced a smaller increase of 28 hours (2.1%, from 1,322 hours to 1,350 hours). This pattern is mirrored for men in the opposite direction. The decrease in work hours is more significant for men with children than for those without children. Specifically, men with children reduced their work hours by 140 hours (-6.4%, from 2,176 hours to 2,036 hours), whereas men without children reduced their hours by 111 hours (-5.8%, from 1,904 hours to 1,793 hours). This heterogeneity remains evident in Panel (B), which excludes individuals with zero work hours. Table 1 provides a comprehensive summary

Figure 2: Work hours by gender and presence of children, 1998-2023

(A) Work hours (including 0s) (B) Work hours (excluding 0s)



Source: March CPS (1998–2023)
Notes: Samples are restricted to married individuals aged 25–64. Work hours refer to annual hours. For individuals with children, at least one child is under the age of 15. See Appendix A for detailed sample restrictions and definitions of labor supply measures.

of all the changes in work hours described above.[3]

We now turn our attention to time spent on childcare by gender. Figure 3 illustrates changes in childcare time from the early 2000s to the early 2020s. Women's childcare time decreased by 56 hours (-7.2%, from 775 hours to 719 hours), while men's childcare time increased by 30 hours (6.6%, from 458 hours to 488 hours).

Figure 4 illustrates how the relative wages of women compared to men have changed. Women's relative wages increased rapidly until 1993, followed by a decline through the late 1990s. Since then, they have resumed an upward trend, continuing to rise through the recent period.[4]

Finally, we document changes in fertility behavior. Figure 5 shows that the number of children ever born to women increased slightly—but gradually—throughout the recent period, rising from 2.04 in the late 1990s to 2.11 in the early 2020s.[5] To supplement this fact, in Table 2, we further calculate the distribution of women who never had children (non-

[3]Married men without children work fewer annual hours than married men with children, largely because they are older on average and work hours decline with age.

[4]Unlike our other data facts, which focus on the recent period (1998–2023), we plot the gender wage gap from 1975 to 2023 because we later extend our analysis to the period before late 1990s period.

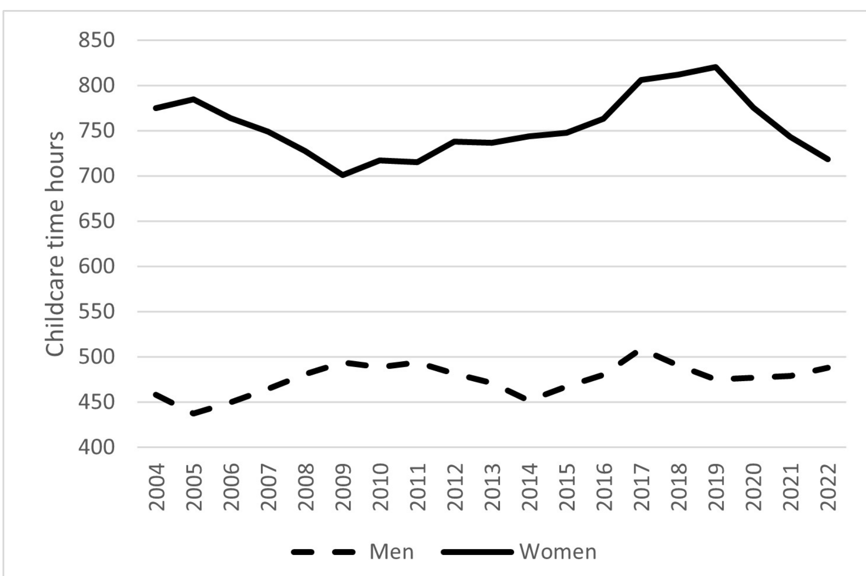
[5]Not shown in this figure is the number of children ever born to women, which declined rapidly from approximately three children in the mid-1970s to two children in the late 1990s.

Table 1: Summary of labor supply changes (in annual hours)

	P1 (1998–2000)	P2 (2021–2023)	Δ
(Including 0s) All women	1261	1332	71
with no children	1322	1350	28
with children	1197	1308	111
(Including 0s) All men	2037	1903	-134
with no children	1904	1793	-111
with children	2176	2036	-140
(Excluding 0s) All women	1877	1955	78
with no children	1933	1977	44
with children	1816	1926	110
(Excluding 0s) All men	2277	2186	-91
with no children	2252	2170	-82
with children	2299	2204	-95

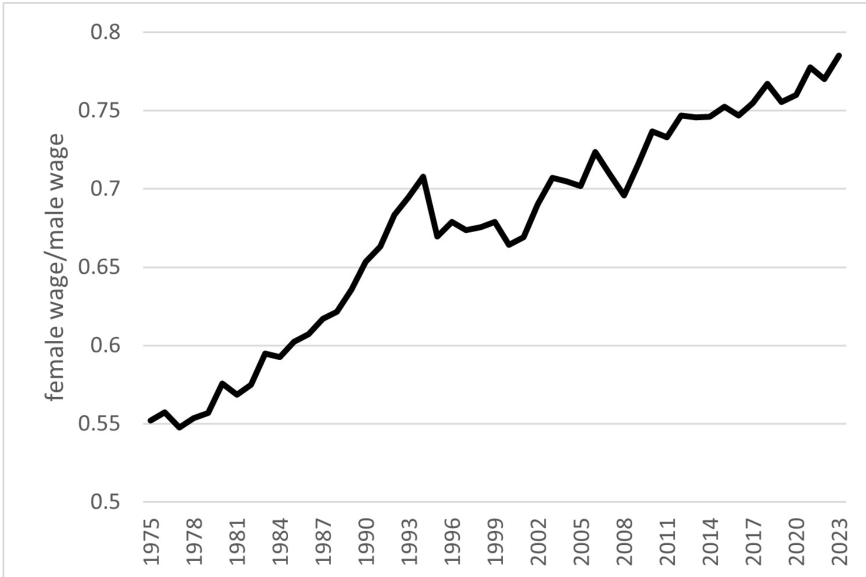
Sources: March CPS (1998–2000, 2021–2023)
Notes: Work hours are averaged for married individuals aged 25–64 over three years, from 1998 to 2000 for P1 and from 2021 to 2023 for P2. For individuals with children, at least one child is under the age of 15. See Appendix A for detailed sample restrictions.

Figure 3: Childcare time (in annual hours) for men and women



Source: ATUS (2004–2022)
Notes: Samples are restricted to married individuals aged 25–64 with at least one child under the age of 15. See Appendix A for detailed sample restrictions. The data are available starting in 2003. Three-year moving averages are reported, resulting in the exclusion of 2003 and 2023 from the time series.

Figure 4: Ratio of female to male wages



Source: March CPS (1975–2023)
Notes: Samples are restricted to married individuals aged 25–64 who are employed. See Appendix A for detailed sample restrictions and wage definitions.

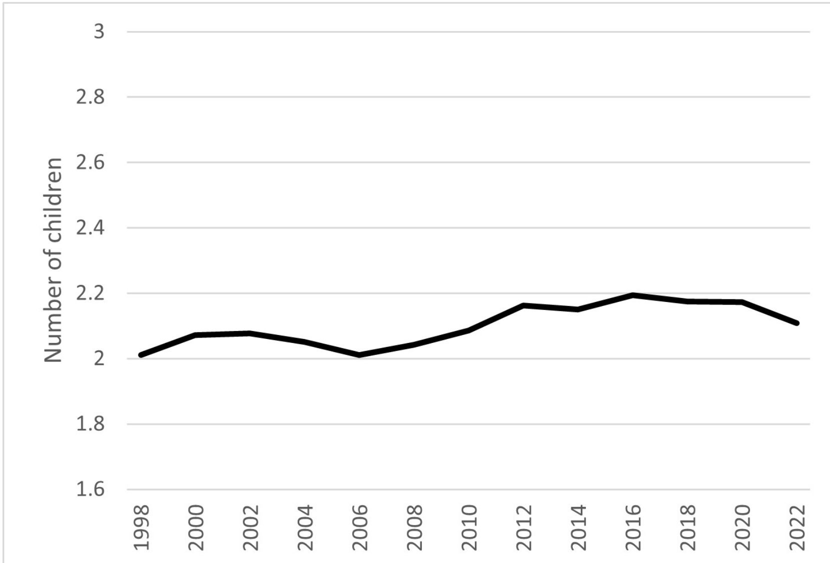
mothers) compared to those who ever had children (mothers). The share of non-mothers decreased from 12.5% to 10.2%. At the same time, women increasingly delayed childbirth. For instance, as shown in Table 2, the share of young mothers (having their first child between ages 25 and 29) declined from 63.3% to 59.8%. Meanwhile, the shares of old mothers (first childbirth between ages 30 and 34) and older mothers (first childbirth at age 35 or later) increased from 16.8% and 7.4% to 19% and 11%, respectively.[6]

3 Model

To explore the driving forces for the observed recent changes described in Section 2, we build a two-earner life-cycle model with incomplete markets, where households make joint decisions on labor supply, time allocation on childcare (if children are present), consumption, and savings. The model incorporates an endogenous fertility choice, allowing households to decide when to have children. A key element of the model is the role of the substitutability be-

[6]This pattern aligns with findings in the literature (e.g., Livingston, 2018), highlighting that while women increasingly delay childbirth, they are also more likely to have children compared to a decade ago.

Figure 5: Number of children ever born to women



Source: June CPS (1998–2022)
Notes: Samples are restricted to married women aged 40–44, as this age range is assumed to represent those who have completed their childbearing years. See Appendix A for detailed sample restrictions.

Table 2: Changes in fertility behavior

	P1 (1998–2000)	P2 (2021–2023)
Share of non-mothers	0.125	0.102
Share of women who ever had children	0.875	0.898
· Young mothers (25-29)	0.633	0.598
· Old mothers (30-34)	0.168	0.190
· Older mothers (35 and older)	0.074	0.110

Sources: June CPS (1998, 2000, 2022)
Notes: Samples are restricted to married women aged 40–44, as this age range is assumed to represent those who have completed their childbearing years. Data from 1998 and 2000 are used for P1, while data from 2022 are used for P2. See Appendix A for detailed sample restrictions.

tween mothers' and fathers' childcare time, which leads women with children to adjust their work hours more than those without children in response to changing economic conditions. Even though our model does not incorporate educational choice, assortative matching, or divorce, it successfully replicates key empirical moments in the late-1990s benchmark economy, including both targeted and non-targeted.

3.1 Economic environment

The economy is populated by a single cohort of households consisting of married couples (one male and one female), with or without children. We adopt a unitary model, where both the husband and the wife share a common life-cycle and preferences. Each household lives for j_T periods, where a model period corresponds to five actual years.

Let $j \in \{1, 2, ..., j_T\}$ denote an age (or 'period') of the life-cycle. Adults in each household start economic activity at $j = 1$ (ages 25-29), become infertile at $j = j_I$ (ages 45-49), retire at $j = j_R$ (ages 65-69), and die at $j = j_T$ (ages 75-79). The household may choose to have children before reaching j_I, selecting among the birth-timing options defined in the following subsection. From age 1 until age $j_R - 1$, in each period, the household chooses their joint labor supply, time allocation on childcare (if they have children), consumption, and savings. Financial markets are incomplete and households trade risk-free bonds subject to a natural borrowing constraint.

3.1.1 Fertility choice

Households choose whether or not to have children and, if so, the timing of birth, with women categorized into four fertility states: non-mothers (no children), young mothers (childbirth at ages 25-29), old mothers (childbirth at ages 30-34), and older mothers (childbirth at ages 35-39). If a household chooses to have children, two children are born within a single model period.

The fertility decision rule is as follows:

$$F = \begin{cases} \textit{non mother}, & \text{if } F_0 = \max(F_0, F_1, F_2, F_3) \\ \textit{young mother}, & \text{if } F_1 = \max(F_0, F_1, F_2, F_3) \\ \textit{old mother}, & \text{if } F_2 = \max(F_0, F_1, F_2, F_3) \\ \textit{older mother}, & \text{if } F_3 = \max(F_0, F_1, F_2, F_3), \end{cases} \tag{1}$$

where F_i represents the expected lifetime value associated with fertility choice i: $i = 0$ for non-mother, $i = 1$ for young mother, $i = 2$ for old mother, and $i = 3$ for older mother.

3.1.2 Wages and human capital

Each individual's human capital depends on work history/experience and gender, which takes the form of Ben-Porath (1967):

$$h^g_{j+1}(h^g_j, n^g_{p,j}) = (1-\delta^g)h^g_j + \alpha^g_h (n^g_{p,j})^{\zeta^g}(h^g_j)^{(1-\zeta^g)}, \tag{2}$$

where δ^g represents the rate of human capital depreciation for gender $g \in \{m, f\}$, with m and f representing male (husband) and female (wife), respectively; α^g_h governs the human capital accumulation technology for gender g; $n^g_{p,j}$ is paid work at age j for gender g; and ζ^g is a parameter determining the elasticity of human capital accumulation with respect to work hours for gender g. We assume that the initial productivity/human capital is log-normally distributed, that is, $\log h^g_0 \sim N(0, \sigma^2_{h^e_0})$.

Wages are given by

$$w^g_{i,j} = p^g \times exp(h^g_{i,j} + \eta^g_{i,j}), \tag{3}$$

where p^g denotes the price per efficiency unit of labor that captures gender differences that are not explained by observables, where $p^m > p^f$, and $\eta^g_{i,j}$ is the gender-specific permanent component, which follows an AR(1) process. Specifically,

$$\eta^g_{i,j} = \rho^g \eta^g_{i,j-1} + \nu^g_{i,j} \text{ with } (\nu^m_{i,j}, \nu^f_{i,j})' \sim N(0, \Sigma_{perm}), \tag{4}$$

where

$$\Sigma_{perm} = \begin{pmatrix} \left(\sigma_{\nu^m}\right)^2 & \rho_{m,f}\sigma_{\nu^m}\sigma_{\nu^f} \\ \rho_{m,f}\sigma_{\nu^m}\sigma_{\nu^f} & \left(\sigma_{\nu^f}\right)^2 \end{pmatrix}. \tag{5}$$

Here, ρ^g represents the gender-specific persistence of permanent wage shocks; $\rho_{m,f}$ represents the correlation of permanent wage shocks between the husband and the wife; and $\left(\sigma_{\nu^g}\right)^2$ is the variance of permanent wage shocks for gender g.

3.1.3 Children

Once two children are born, they remain with the household for 3 periods from their births and then leave the household permanently. The household values children's human capital, which is given by:

$$H_{c,t} = 2h_{c,t}, \tag{6}$$

where $h_{c,t}$ represents per child human capital at children's age t. Children impose both a time cost on their parents and a monetary cost. Human capital per child is formed by combining parental time investment ($n_{c,t}/k_t$) and childcare spending per child (M_t/k_t):

$$h_{c,t} = \left[\chi_t\left(\frac{n_{c,t}}{k_t}\right)^{\rho_h} + (1-\chi_t)\left(\frac{M_t}{k_t}\right)^{\rho_h}\right]^{\frac{1}{\rho_h}}, \tag{7}$$

where

$$n_{c,t} = \left[\gamma_t(n^f_{c,t})^{\rho_c} + (1-\gamma_t)(n^m_{c,t})^{\rho_c}\right]^{\frac{1}{\rho_c}}. \tag{8}$$

$n^g_{c,t}$ denotes the childcare time of parent g when children are t years old; χ_t represent the relative weight of parental childcare time $\left(\frac{n_{c,t}}{k_t}\right)$ against market childcare $\left(\frac{M_t}{k_t}\right)$; ρ_h governs the elasticity of substitution between both childcare inputs; k_t is the number of children of age t; γ_t is the relative weight of the wife's childcare time against the husband's time; and ρ_c governs the elasticity of substitution between the wife's and the husband's childcare times. Note that parental time investments are separate in the technology, as is childcare spending, similar to the setup in Moschini (2023).[7]

We assume that only working parents pay market childcare cost (M_t), which is modeled as a fraction s_c of the household's labor income. This fraction depends on the ages of children

[7] An interesting extension might consider parents' education as part of the production process of children's human capital, as in Chiappori, Salanie and Weiss (2017). However, for the purposes of our analysis, we do not differentiate households by educational attainment. While Chiappori et al. (2017) highlight the importance of this mechanism in explaining assortative matching among college-educated households, our focus lies on other factors shaping labor supply and fertility behavior.

and on both spouses' workforce status and hours worked:

$$M_t = s_c(k_t, P^m, P^f) \times (w^m n_p^m + w^f n_p^f), \tag{9}$$

where P^g is the labor market participation (employment status) of gender g. This specification implies that childcare costs are partially endogenous, since they depend on parents' labor supply choices. Note also that there is no market childcare cost imposed if both parents do not work (Park, 2018).

3.1.4 Preferences

Preferences that a typical working-age household faces are given by:

$$U(c, n_p^m, n_p^f, f, P^m, P^f, H_c; F) = u(c, n_p^m, n_p^f, P^m, P^f; F) + x(H_c; F) I_{k>0}, \tag{10}$$

where c is family-size adjusted consumption[8]; $I_{k>0}$ is the indicator function, which equals 1 if the household has children and 0 otherwise; and all other variables are previously defined. $u(\cdot)$ and $x(\cdot)$ are, respectively, given by:

$$u(c, n_p^m, n_p^f, P^m, P^f; F) = \frac{c^{1-\gamma}}{1-\gamma} - \psi_n \frac{(n_p^m)^{1+\sigma_m}}{1+\sigma_m} - \psi_n \frac{(n_p^f)^{1+\sigma_f}}{1+\sigma_f} - \psi_m P^m - \psi_f P^f \tag{11}$$

and

$$x(H_c) = \phi H_c, \tag{12}$$

where ψ_n represents the household's disutility of work, ψ_g denotes the fixed time cost for gender g, and ϕ is the marginal utility of children's human capital.

[8]We used the OECD modified scale to adjust total consumption. This scale assigns a value of 1 to the husband, 0.5 to the wife, and 0.3 to each child. Total consumption is divided by this equivalent scale to obtain family-size adjusted consumption.

3.2 Decision problem

Given the fertility choice, from age 1 until age $j_R - 1$, the household makes joint decisions in each period regarding their labor supply, time allocation on childcare (if they have children), consumption, and savings. In particular, the household faces four mutually exclusive alternative choices depending on the couple's labor market participation options. Let d denote those alternative choices, where $d \in \{WW, WN, NW, NN\}$: $d = WW$ if both the husband and the wife work, $d = WN$ if the husband works and the wife does not work; $d = NW$ if the husband does not work and the wife works; and $d = NN$ if both the husband and the wife do not work. Let $\Omega = \{a, j, \eta^m, \eta^f, h_-^m, h_-^f\}$ be a set of state variables for the household, where a represents assets; j is age; η^m and η^f are the permanent wage shocks of the husband and the wife, respectively; and h_-^m and h_-^f are the accumulated human capital in the previous period for the husband and the wife, respectively.

The problem of a working age household can be defined as follows:

$$V(\Omega) = \max\{V^{WW}(\Omega|F), V^{WN}(\Omega|F), V^{NW}(\Omega|F), V^{NN}(\Omega|F)\} \tag{13}$$

and the value function of each case is defined by

$$V^d(\Omega|F) = \max_{c, n_p^m, n_p^f, n_c^m, n_c^f, a'} U(c, n_p^m, n_p^f, f, P^m, P^f, H_c; F) + \beta EV(\Omega'|\Omega, d, F), \tag{14}$$

subject to

$$C + a' = (1+r)a + \sum_{g=\{m,f\}} w^g n_p^g - M, \tag{15}$$

$$n_p^g + n_c^g + l^g = \bar{L} \ for \ each \ g \in \{m, f\}, \tag{16}$$

$$a = 0 \ if \ j = 1, \tag{17}$$

$$a' \geq \underline{a}, \tag{18}$$

where β represents the discount factor; C is the total aggregate household consumption; a' is the risk-free asset that pays an interest rate r; l^g is the leisure of gender g; w^g is the gender-specific wage defined in Eqn (3); and $\underline{a}$ is the natural borrowing limit. All other notations are defined previously.

The problem of a retired household is as follows:

$$V(a,j) = \max_{c,a'} U(c,0,0,0,0,0;F) + \beta EV(a',j'), \tag{19}$$

subject to

$$C + a' = (1+r)a, \tag{20}$$

$$l^g = \bar{L} \ for\ each\ g \in \{m,f\}, \tag{21}$$

$$a = 0\ if\ j = j_{T+1}, \tag{22}$$

$$a' \geq \underline{a}. \tag{23}$$

4 Parameterization

The model parameters are jointly calibrated to match salient features of the U.S. labor market and fertility behavior during the late 1990s (specifically, 1998-2000). We then conduct counterfactual experiments by replacing the economic environment of the late 1990s with that of a more recent period, 2021-2023. We begin by discussing how we select the values of parameters that are set outside the model, followed by how we jointly determine the remaining parameters. Detailed descriptions of the data sources and the construction of both targeted and non-targeted moments are provided in Appendix A.

4.1 Parameters set outside the model

Table 3 summarizes values of the parameters set outside the model.

Demography: Adults are assumed to live for 11 periods ($j_T = 11$), which is based on the life expectancy in the U.S. in 2010 (78.5 years). This implies that couples live until 75-79 years of actual ages. Wives complete fertility at age 4 (40-44 actual ages), denoted as $j_I = 4$. Couples retire at age 9 (65-69 actual ages), denoted as $j_R = 9$.

Prices: The price of efficiency units of labor for males (p^m) is normalized to 1. The risk-free interest rate r is set to 0.104, which corresponds to the annual rate of 0.02.

Preferences: We set σ_m and σ_f, the Frisch elasticities of labor supply for males and females, to 0.528 and 0.850, respectively, borrowed from Blundell et al. (2016). The relative risk aversion parameter, γ, is set to 1.5, which falls within the conventional range of estimates of relative risk aversion in the literature. The parameter governing the elasticity of substitution between childcare inputs, ρ_h, is set to -0.684, following Moschini (2023). The relative shares of female childcare time to male childcare time for children across different age groups, denoted by γ_1, γ_2, and γ_3, are calculated from 2003-2005 data in the American Time Use Survey (ATUS). Children are grouped into three age categories: 0-4, 5-9, and 10-14. The corresponding female-to-total household childcare time ratios are 0.655, 0.602, and 0.582 for the three age groups, respectively.

Wage dynamics and initial human capital: We adopt the correlation between the husband's and wife's wage shocks from Blundell et al. (2016); that is, $\rho_{m,f}$=0.1705. Using data from the Panel Study of Income Dynamics (PSID) from 1971 to 2021, we estimate the gender-specific variances of permanent wage shocks and the gender-specific variances of initial human capital, following the standard methodology in the literature (e.g., Heathcote, Storesletten and Violante, 2010). Details on data and sample restrictions are outlined in Appendix A, and estimation methods are described in Appendix B. The gender-specific variance of initial human capital is estimated at 0.148 for males ($\sigma^2_{h_0^m}$) and 0.213 for females ($\sigma^2_{h_0^f}$). The persistence of wage shocks is estimated to be 0.874 for males (ρ^m) and 0.849 for females (ρ^f), corresponding to annual persistence values of 0.974 and 0.968, respectively. For the variance of permanent wage shocks, our estimates are 0.0983 for males (σ^2_m) and 0.1308 for females (σ_f^2), corresponding to average annual values of 0.0187 for males and 0.0255 for females, respectively, during the 1998-2000 period.

Childcare cost: Turning to childcare cost, we use data from the PSID for 1998-2002 to calculate the childcare cost equation in Eqn (9). We model $s_c(k_t, P^m, P^f)$, the share of childcare cost relative to total household labor income, as a function of the number of children in different age groups and the labor market participation of both the wife and the husband. This is estimated using the following regression:

$$s_{c,i}(k_{t,i}, P^m, P^f) = \beta_0 + \beta_1 k_{1,i} + \beta_2 k_{2,i} + \beta_3 k_{3,i} + \beta_4 P_i^m + \beta_5 P_i^f + \epsilon_i, \tag{24}$$

where $k_{t,i}$ represents the number of children in age group t for $t \in \{1, 2, 3\}$, with age group categories defined as 0-4 years ($t = 1$), 5-9 years ($t = 2$), and 10-14 years ($t = 3$). Children impose a monetary cost when either or both parents work. The estimated coefficients are: $\beta_0 = 0.0485$, $\beta_1 = 0.0137$, $\beta_2 = 0.0023$, $\beta_3 = -0.0064$, $\beta_4 = 0.0290$, and $\beta_5 = 0.0095$. These results indicate that childcare costs are higher when children are young and when mothers work.

4.2 Parameters calibrated jointly

The remaining parameters in the model are 16 in total, encompassing preferences (β, ψ_m, ψ_f, ψ_n, ϕ, χ_1, χ_2, χ_3, ρ_c), human capital accumulation technology (α^m, α^f, δ^m, δ^f, ζ^m, ζ^f), and a price parameter (p^f). By minimizing the sum of squared percentage differences between the data moments and their model counterparts, these 16 parameters are jointly determined in a way that captures salient features of the U.S. labor market and fertility. While there is no one-to-one mapping between the parameters and data moments, the selection of data moments informs and constrains the parameter values, allowing the model to capture relevant aspects of labor market and fertility behaviors. In our model, each parameter is informed by specific data moments, capturing joint labor supply, fertility, and childcare time allocation.

Table 3: Parameters set outside the model

Parameter	Name (Source)	Values
j_I	Age that wives complete fertility	4
j_R	Age of retirement	9
j_T	Terminal age	11
$\sigma^2_{h_0^m}$, $\sigma^2_{h_0^f}$	Variance of initial HC by gender (PSID)	0.148, 0.213
ρ^m, ρ^f ,σ^2_m,σ^2_f	Permanent wage dynamics by gender (PSID)	0.874, 0.849 0.0983, 0.1308
$\rho_{m,f}$	Correlation b/w couple's perm wage shocks (Blundell et al., 2016)	0.1705
$\{\beta_i\}_{i=0,..,5}$	Childcare cost function (PSID)	0.0485, 0.0137, 0.0023, -0.0064, 0.0290, 0.0095
γ_1, γ_2, γ_3	Share of female CC time among the total childcare time by t (ATUS)	0.655, 0.602, 0.582
ρ_h	IES b/w childcare inputs (Moschini, 2023)	–0.684
γ	Relative risk aversion	1.5
σ_m, σ_f	Frisch elasticities of labor supply (Blundell et al., 2016)	0.528, 0.850
r	Interest rate (FRED, St. Louis FED)	0.104
p^m	Price per efficiency unit for males (normalization)	1

Preferences: The discount factor, β, influences the life-cycle labor supply, with male work hours for those aged 25-44 helping to pin down its value. The fixed cost of labor market participation for both genders, ψ_m and ψ_f, are tied to the employment-population ratios of both genders. The disutility of household market hours, ψ_n, affects average household work hours. The utility weight placed on children's human capital, ϕ, influences fertility behavior, particularly by affecting the proportion of non-mothers among all women. The parameters (χ_1, χ_2, χ_3), representing the shares of parental childcare time relative to market care spending by children's age group, are essential for determining the average parental childcare time allocated to children at different ages. The parameter ρ_c, which governs the substitutability between the mother's and father's childcare time, affects how childcare responsibilities are shared between the spouses. Therefore, we use the ratio of the father's childcare time to the mother's as a key moment to calibrate this parameter.

Human capital accumulation technology: The gender-specific depreciation rates of human capital, δ^m and δ^f, determine the wage losses associated with labor market interruptions for men and women, respectively. The parameters governing gender-specific human capital accumulation, α^m and α^f, are tied to wage growth for individuals who remain employed without labor market interruptions. The elasticities of human capital accumulation with respect to work hours, ζ^m and ζ^f, influence the paid work hours of both genders.

Price: The price of efficiency units of labor for females, p^f, influences the gender wage gap, therefore, we use this moment to help determine p^f.

4.3 Benchmark model fit

Table 4 summarizes the results of the model calibration. The set of data moments and the corresponding results for our benchmark model of the late 1990s are presented in Table 5. Overall, our benchmark model closely matches the targeted moments. All hours are based on weekdays and normalized relative to the total time endowment, which is assumed to be 6,240 hours (24 hours $\times$ 5 days $\times$ 52 weeks).

The calibrated discount factor, β, is 0.876, which corresponds to an annual value of 0.974. The fixed time costs of male and female labor market participation, ψ_m and ψ_f, are 0.053 and 0.278, respectively. The disutility of work for the household is 4.31 and the marginal utility of children's human capital is 9.60. The shares of parental childcare time relative to market childcare decrease as children grow: 0.696 for children aged 0-4, 0.097 for those aged 5-9, and 0.030 for those aged 10-14. The parameter, ρ_c, governing the elasticity of substitution between mother's and father's childcare time is 0.402, indicating fairly high substitutability (greater than Cobb-Douglas), though far from perfect substitutes. Our calibration results show that efficiency units of labor differ by gender, reflecting distinct gender-specific human capital technologies. Lastly, the price of efficiency units of labor for females ($p^f = 0.477$) is lower than that for males.

Table 4: Parameters calibrated jointly

Parameters	Description	Values
β	Discount factor	0.876
ψ_m, ψ_f	Fixed time cost	0.053, 0.278
ψ_n	Disutility of work for HH	4.314
ϕ	Marginal utility of children's HC	9.601
χ_1, χ_2, χ_3	Share of parental CC time among the total CC inputs	0.696, 0.097, 0.030
ρ_c	EIS b/w parental CC times	0.402
α^m, α^f	HC accumulation technology	0.473, 0.366
δ^m, δ^f	HC depreciation rate	0.209, 0.169
ζ^m, ζ^f	Elasticity of HC accumulation w.r.t. work hours	0.375, 0.103
p^f	Efficiency unit price for female labor	0.477

Table 5: Benchmark Model vs. Data, Late 1990s

Moments to match	Model	Data
Male work hours (25-44)[1]	0.347	0.346
Employment-population ratios (men, women)[1]	0.891, 0.677	0.894, 0.672
Average HH work hours[1]	0.263	0.267
Share of non-mothers[2]	0.131	0.125
Average HH per child parental time by t[3]	0.154, 0.090, 0.084	0.125, 0.090, 0.073
Ratio of father's CC time to mother's[3]	0.623	0.614
Wage growth for employment stayers (men, women)[4]	0.107, 0.223	0.110, 0.223
Wage loss for employment changers (men, women)[4]	0.134, 0.099	0.148, 0.081
Work hours (men, women)[1]	0.325, 0.201	0.326, 0.202
Gender wage gap[1]	0.676	0.673

Sources: Data moments from various sources of data. 1: March CPS, 2: June CPS, 3: ATUS, 4: PSID.
Notes: All hours are based on weekdays and normalized relative to the total time endowment (6,240 hours). See Appendix A for detailed sample restrictions.

Additionally, our benchmark model makes good predictions for other important moments that are not directly targeted. Table 6 illustrates how well the model matches work hours by gender and presence of children, as well as childcare time by gender. These non-targeted statistics closely align with the data on time allocations for work and childcare, which is important because they are used in our quantitative analysis in Section 5.

Table 6: Non-targeted Moments

Moments	Model	Data
(1) Work hours		
Women with children	0.191	0.192
Women without children	0.206	0.212
Men with children	0.362	0.353
Men without children	0.307	0.305
(2) Childcare time		
Fathers	0.072	0.074
Mothers	0.131	0.121
(3) Fertility		
Share of young mothers	0.728	0.723

Sources: March CPS for data moments on work hours; ATUS for data moments on childcare time.
Notes: All hours are based on weekdays and normalized relative to the total time endowment (6,240 hours). See Appendix A for detailed sample restrictions.

5 Explaining Changes in Joint Labor Supply, Childcare Time, and Fertility Behavior

In this section, we explore the driving forces behind the recent changes in couples' labor supply, childcare time, and fertility behavior. To do so, we use our benchmark model to simulate the responses of married couples' time allocations for work and childcare (when children are present), as well as their fertility behavior, to changing economic conditions from the late 1990s to the early 2020s. Specifically, we examine the effects of three key changes in the determinants: (1) a decreased gender wage gap, (2) increased wage uncertainty among men, and (3) decreased real interest rates.

Our counterfactual experiments replace, one at a time, the values of key labor supply and fertility determinants in the benchmark model with those from the recent period, while keeping all other model parameters fixed at their late-1990s levels. A determinant is regarded as important if the differences in labor supply and fertility behavior between the benchmark model and the counterfactual experiment with the updated determinant becomes similar to the observed changes between the late 1990s and the early 2020s.

5.1 Effects of a decreased gender wage gap

As documented in Section 2, the ratio of women's wages to men's increased from 0.673 in the late 1990s to 0.778 in the recent period. We attribute this rise to changes in both the human capital production technology for men and women in Eqn (2) and the price of female efficiency units of labor. To capture these changes, we recalibrate the model for the early 2020s economy and extract the associated human capital and price parameters—α^m, α^f, δ^m, δ^f, ζ^m, ζ^f, p^f—from that calibration. We then incorporate these recalibrated parameter values into the benchmark (late-1990s) model by replacing the original human capital accumulation parameters and the female efficiency unit price, while holding all other parameter values fixed at their late-1990s levels.[9] This procedure isolates the effect of the reduced gender wage gap on households' labor supply, childcare, and fertility decisions. Table 7 summarizes the effects of the reduced gender wage gap on time allocations (work and childcare) and fertility behavior across various subgroups of married men and women in the model.

In Table 7, column (A) presents values generated from the benchmark model, while column (B) shows results from the counterfactual experiment with a decreased gender wage gap. The third column reports the model-predicted changes (the difference between the counterfactual and the benchmark), and the fourth column presents the corresponding changes observed in the data from the late 1990s to the early 2020s. A comparison of the values in the third and fourth columns shows that the decreased gender wage gap alone accounts for

[9] Appendix E reports the full calibration results for the early 2020s economy. We separately conduct an alternative exercise in which we adjust only p^f in the benchmark model to match the observed gender wage gap in the early 2020s. The calibrated value implies an increase in p^f from 0.477 to 0.526. The resulting effects are similar to those obtained from replacing the full set of human capital and price parameters.

Table 7: Effects of decreased gender wage gap

Variable	Model (1998-2000) (A)	Counter-factual (B)	(B)-(A)	Actual change
Women				
Work hours	1254	1402	148	71
Work hours w/ children	1193	1440	247	111
Work hours w/o children	1283	1386	102	28
Childcare time	816	833	16	-56
Share of non-mothers	0.131	0.216	0.085	-0.023
Share of young mothers	0.728	0.544	-0.184	-0.086
Men				
Work hours	2026	1914	-112	-134
Work hours w/ children	2260	2099	-161	-140
Work hours w/o children	1913	1836	-77	-111
Childcare time	450	486	36	30

Notes: The analysis is restricted to married individuals. All hours are annual. Work hours are averaged across individuals, including those with 0 hours.

all of the observed changes in women's work hours (both with and without children), men's work hours among fathers, fathers' childcare time, and the share of young mothers.

Most importantly, we find that the effects of the reduced gender wage gap differ significantly between households with and without children. Married women with children would have increased their labor supply by 247 annual hours (21%, from 1193 hours to 1440 hours) due to the reduced gender wage gap, while the comparable increase for married women without children is only 102 annual hours (10%, from 1283 hours to 1386 hours). This pattern is mirrored in the opposite direction for their husbands. Married men with children would have reduced their labor supply by 161 hours (-7%, from 2260 hours to 2099 hours), while married men without children would have reduced theirs by 77 hours (-4%, from 1913 hours to 1836 hours). Furthermore, men with children would have increased their childcare time by 36 hours (8%, from 450 hours to 486 hours). Finally, the narrowing gap incentivizes delayed childbirth, evidenced by a decline in the share of young mothers from 0.728 to 0.544.[10]

We then investigate the extent to which the rise in married mothers' work hours is driven by the increase in their husbands' childcare time.[11] This analysis isolates a key mechanism—and a central contribution of this paper: the role of substitutability between mothers' and fathers' childcare time. We posit that a narrowing gender wage gap encourages fathers to increase their childcare time, which substitutes for mothers' childcare time and thereby enables mothers to allocate significantly more time to market work, explaining why mothers increase labor supply more than non-mothers. To quantify this channel, we conduct an experiment where we fix fathers' childcare time at late-1990s levels while applying the decreased gender wage gap. Under this restriction, mothers' work hours would have increased by only 152 hours—95 hours less than in the main counterfactual—and their childcare time would have increased by 76 hours—60 hours more than in the main counterfactual. This implies that approximately 38% of the total increase in mothers' labor supply (95 annual hours) is directly attributable to increased childcare time by husbands, highlighting the critical role of childcare substitutability within the household.

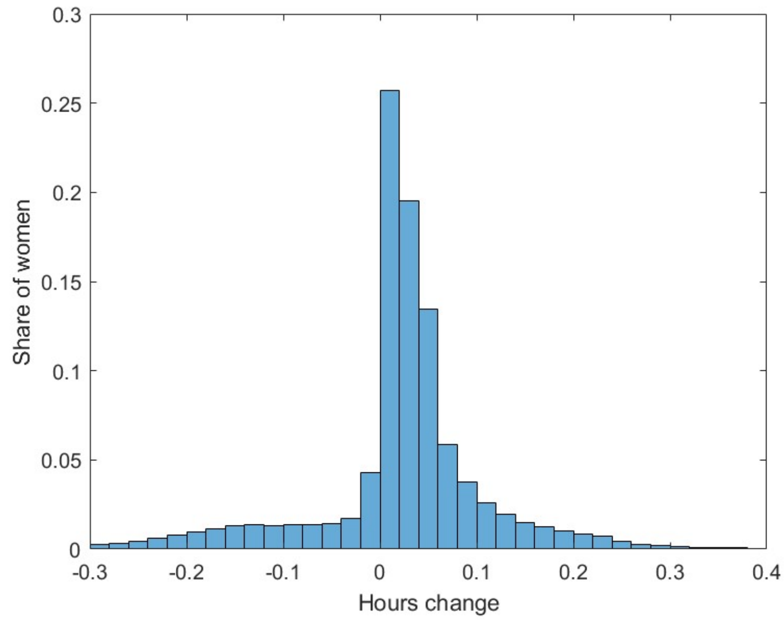
So far, we have focused on average responses, which can mask substantial dispersion across individuals. To better understand the sources of the increase in women's work hours induced by the narrowing gender wage gap, we further examine heterogeneity in work hour changes across individual women. We begin by plotting work hour changes for women with children in Figure 6.[12] As shown in the figure, the distribution is shifted to the right—most mothers increase their work hours—but there is a nontrivial left tail, with some mothers reducing hours. The distribution therefore exhibits substantial dispersion, indicating mean-

[10] In Siegel's environment, rising relative female wages led to a reallocation of home production from women to men, similar to what we find in our model. As a result, work hours among women increase, though they do not entirely offset the decline in women's home production.

[11] In this section, the definitions of "mothers" ("fathers") and "non-mothers" ("non-fathers") differ from those in Section 2. Here, "mothers" ("fathers") are women (men) living with children in the household, while "non-mothers" ("non-fathers") are women (men) not living with children in the household. "Non-mothers" ("non-fathers") therefore include both women (men) who never had children and women whose children have grown up and left the household.

[12] We also conduct this analysis for women without children, as detailed in Appendix D. However, because the effects are more pronounced for mothers, we focus our discussion on this group.

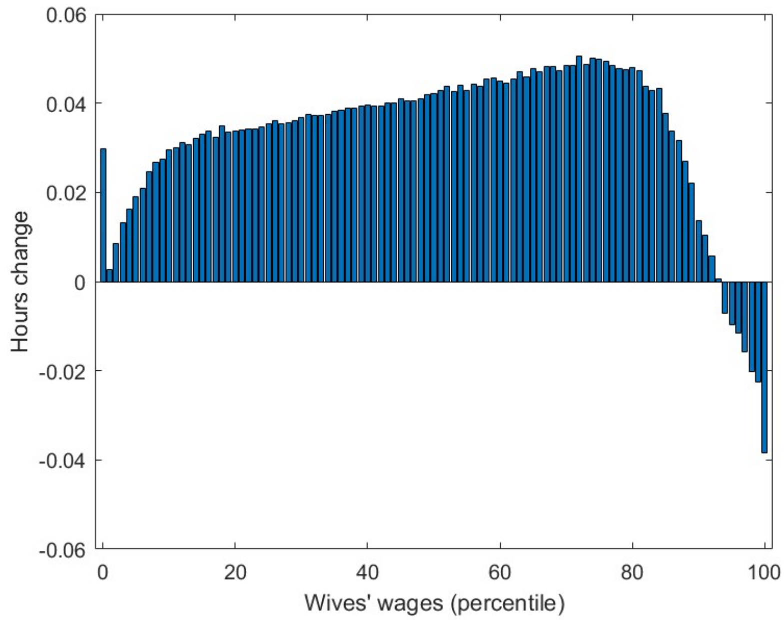
Figure 6: Distribution of changes in work hours for women with children



Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

ingful heterogeneity in responses. To explore potential sources of this heterogeneity, we relate changes in mothers' work hours to both their own wages and their husbands' wages. Figures 7 and 8 plot work hour changes across percentiles of mothers' own wages and husbands' wages, respectively. Together, the figures suggest that heterogeneity is primarily driven by mothers' own wages rather than husbands' wages. Specifically, in Figure 7, work hour increases rise with mothers' wage percentiles and peak around the 77th percentile, consistent with substitution effects dominating for most mothers; at very high own wages, the increases diminish and turn negative, indicating that income effects become relatively stronger. By comparison, Figure 8 shows relatively little variation across husbands' wage percentiles until the upper tail (around the 83rd percentile), where mothers' work hour increases begin to diminish. Taken together, these patterns indicate that heterogeneity in mothers' labor supply responses is more closely tied to mothers' own wages than to husbands' wages, except at the top of the husbands' wage distribution where household income effects appear more important.

Figure 7: Heterogeneity in mothers' work hour changes by own wage

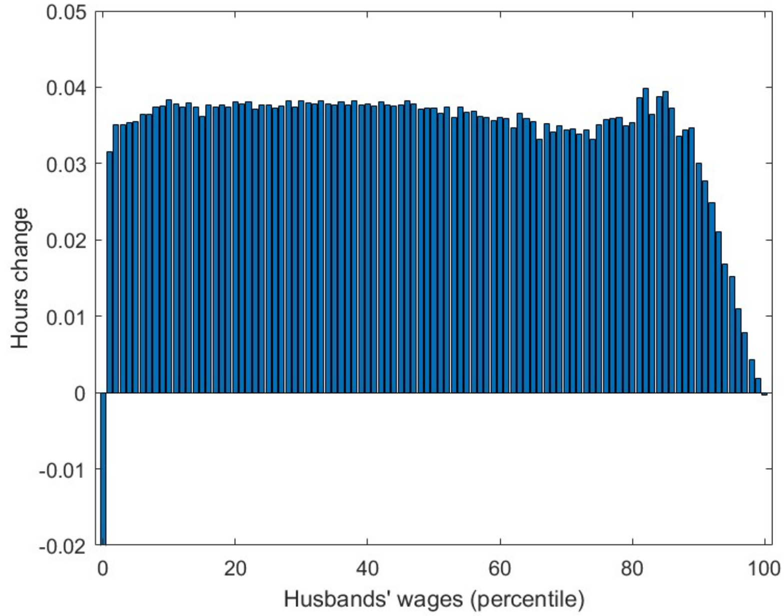


Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

Figure 9 presents the heterogeneous changes in work hours for women with children with respect to both their own and their husbands' wages. This figure confirms the patterns observed in Figures 7 and 8 and further clarifies why some women with non-working husbands reduce their work hours despite an increase in their relative wages (as shown in Figure 8). Specifically, these women are more likely to decrease their work hours because their own wages are relatively high; indeed, women in the top wage decile account for approximately 40% of the group with non-working husbands.

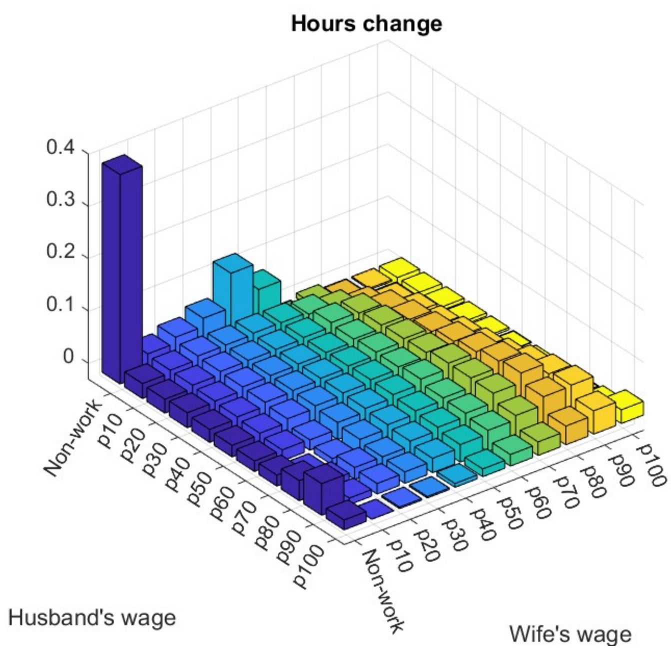
Lastly, we examine how much of the increase in women's work hours—driven by the reduced gender wage gap—is attributable to the extensive and intensive margins. We quantify these contributions by calculating changes in work hours among women who are employed in both the benchmark model and counterfactual exercise (intensive margin), as well as hours worked by women who enter the labor force only in the counterfactual (extensive margin). Overall, the intensive margin explains 78% of the total increase, while the extensive margin accounts for 22%. These patterns are similar across subgroups: for women with children, the

Figure 8: Heterogeneity in mothers' work hour changes by their husbands' wage



Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

Figure 9: Heterogeneity in mothers' work hour changes by both own and husbands' wages



Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

intensive and extensive margins account for 76% and 24%, respectively; for women without children, the corresponding figures are 81% and 19%. This result may seem surprising given that existing studies, such as Attanasio, Levell, Low and Sanchez-Marcos (2018), emphasize the significant role of the extensive margin—particularly among women with children—in response to wage changes. However, those studies primarily focus on earlier time periods, whereas our analysis covers a more recent period, during which many women, including those with children, were already participating in the labor market. As a result, the role of the intensive margin becomes relatively more prominent.

5.2 Effects of increased wage uncertainty among men

In the data, the variance of male permanent wage shocks increased substantially from 0.0983 (corresponding to an average annual value of 0.0187) in the late 1990s to 0.1571 (corresponding to an average annual value of 0.0299) in the recent period. In contrast, the variance of female permanent wage shocks changed little, increasing only slightly from 0.1308 (corresponding to an average annual value of 0.0255) in the late 1990s to 0.1396 (corresponding to an average annual value of 0.0269). Accordingly, our analysis focuses on the effects of increased wage uncertainty among husbands during this period.

Table 8 presents the effects of increased male wage uncertainty. Although greater wage uncertainty has a meaningful impact on joint labor supply, its quantitative effects on women's labor supply are smaller than those generated by the reduced gender wage gap. Moreover, the model-implied heterogeneity runs counter to the data: in this counterfactual, women with children increase their labor supply less than women without children, and men with children reduce their labor supply less than their counterparts without children. Specifically, women with children would have increased their labor supply by 49 annual hours (a 4.1% increase) in response to their husbands' increased wage uncertainty, whereas women without children would have increased theirs by 91 annual hours (a 7.1% increase). Simultaneously, men—both with and without children—would have reduced their work hours, with larger declines among men without children. This pattern reflects the nature of permanent wage shocks, which accumulate with age. Because men without children tend to be older than men with children, the rise in wage uncertainty exerts a stronger effect on their labor supply, prompting their wives (women without children) to work more to mitigate the heightened risk. Finally, the model predicts that greater wage uncertainty would have led more women to delay childbirth and would have increased fathers' childcare time, though the magnitude of this increase is roughly half the size of that generated by the reduced gender wage gap.

Although the counterfactual results for increased wage uncertainty among husbands do not account for the recent empirical trends, they nonetheless provide an important contribution to the literature by highlighting the role of spousal labor supply as an insurance mechanism against wage risk. Our findings are consistent with the well-documented "added worker effect." In particular, Park and Shin (2024) and Blundell et al. (2018) document substantial positive responsiveness of wives' precautionary labor supply to their husbands' permanent wage risk. A back-of-the-envelope calculation based on our simulated responses implies that wives increase annual hours by about 1.7 % in response to a one standard deviation increase in their husbands' wage uncertainty, closely aligned with their results.

Our results also speak to the literature linking marriage and fertility choices to earnings risk. For example, Sommer (2016) shows that when children are modeled as consumption commitments, increased earnings risk leads to delayed childbirth and lower fertility, and induces households to work and save more. Consistent with the delay channel, our counterfactual indicates that rising wage uncertainty for husbands causes households to delay childbirth, reflected in an 11 percentage point decline in the share of young mothers. However, unlike Sommer (2016), we find that this uncertainty channel does not account for the decline in fertility in our counterfactual. The counterfactual also implies that, among households with children, both spouses increase childcare time, partially buffering the household against the utility loss associated with husbands' reduced labor income.

Table 8: Effects of increased wage uncertainty among men

Variable	Model (1998-2000) (A)	Counter-factual (B)	(B)-(A)	Actual change
Women				
Work hours	1254	1331	77	71
Work hours w/ children	1193	1242	49	111
Work hours w/o children	1283	1374	91	28
Childcare time	816	840	24	-56
Share of non-mothers	0.131	0.136	0.005	-0.023
Share of young mothers	0.728	0.614	-0.114	-0.086
Men				
Work hours	2026	1883	-144	-134
Work hours w/ children	2260	2194	-66	-140
Work hours w/o children	1913	1733	-180	-111
Childcare time	450	466	16	30

Notes: The analysis is restricted to married individuals. All hours are annual. Work hours are averaged across individuals, including those with 0 hours.

5.3 Effects of decreased real interest rates

The real interest rate decreased from approximately 2% annually in the late 1990s to nearly 0% in the early 2020s. Table 9 summarizes the effects of this decline in our model. We find that decreased real interest rates work against the observed changes in joint labor supply. Notably, however, the impact varies across households' life-cycle stages. For younger households—those with children—the reduction in the real interest rate leads to sizable decreases in labor supply for both husbands and wives through intertemporal substitution of leisure. When the real interest rate falls and the substitution effect dominates the income effect, younger households find current leisure relatively cheaper and therefore reduce current labor supply.[13] In addition, younger households utilize another margin to increase lifetime utility following an interest rate decline: fertility. Table 9 shows that the lower interest rate

[13] A decrease in the real interest rate, holding other prices constant, lowers the relative price of current leisure. When the substitution effect outweighs the income effect, young households increase current leisure and reduce labor supply.

drives an increase in fertility, specifically by encouraging more women to have children (a 13 percentage point decrease in the share of non-mothers). This rise in fertility is particularly notable as it is not explained by the other economic changes discussed previously; rather, it is uniquely captured by the decline in interest rates. A significant drop in the real interest rate relaxes the intertemporal budget constraint for younger households, making the "investment in children" more attractive by lowering the life-cycle cost of fertility (Cumming and Dettling, 2024; Manuelli and Seshadri, 2009).

In contrast, this effect is reversed for older households—those without children. When the real interest rate decreases, older households, particularly men, tend to increase their labor supply as the income effect outweighs the substitution effect. These households typically hold substantial savings, which constitute their primary source of wealth. A decline in the interest rate lowers the returns on their savings, resulting in a negative wealth effect. To compensate for this loss in capital income, they respond by working more hours.

Table 9: Effects of decreased real interest rates

Variable	Model (1998-2000) (A)	Counter-factual (B)	(B)-(A)	Actual change
Women				
Work hours	1254	1174	-80	71
Work hours w/ children	1242	936	-257	111
Work hours w/o children	1283	1317	33	28
Childcare time	816	801	-15	-56
Share of non-mothers	0.131	0.000	-0.130	-0.023
Share of young mothers	0.728	0.935	0.207	-0.086
Men				
Work hours	2026	2106	80	-134
Work hours w/ children	2260	1820	-440	-140
Work hours w/o children	1913	2277	364	-111
Childcare time	450	470	21	30

Notes: The analysis is restricted to married individuals. All hours are annual. Work hours are averaged across individuals, including those with 0 hours.

5.4 Further discussion: Connection to the period before the late 1990s

A large body of work on female labor supply and fertility behavior focuses on the period prior to the late 1990s. For example, Olivetti (2006) and Caucutt et al. (2002), among many others, consistently emphasize the narrowing gender wage gap (or increased returns to work experience) as the key driver of rising female labor supply and declining fertility during that era. In this subsection, we reinforce the contribution of our analysis by showing how our unified benchmark model can also account for the joint labor supply and fertility changes in this earlier period. Using the same structural framework for both eras allows us to disentangle which mechanisms operate similarly across time and which are unique to the period after the late 1990s. This "horse race" across key drivers—conducted within a single internally consistent model—clarifies the extent to which familiar explanations continue to apply and highlights what is genuinely new about recent trends. More broadly, our approach bridges earlier and more recent periods within a single quantitative framework, thereby strengthening the paper's contribution to the existing literature.

To implement this exercise, we focus on the substantial rise in women's relative wages that occurred before the late 1990s. The female-to-male wage ratio increased from 0.552 in the mid-1970s to 0.673 in the late 1990s—a 12 percentage point increase, comparable in magnitude to the 11 percentage point increase observed between the late 1990s and early 2020s. We interpret this earlier rise as being driven by an increase in the price of women's efficiency units (p_f).[14] Accordingly, we recalibrate p_f in our benchmark model to match the observed mid-1970s gender wage gap. This recalibration raises p_f from 0.409 in the mid-1970s to 0.477 in the late 1990s. We then incorporate this recalibrated value into the model—while keeping all other parameters fixed at their late-1990s levels—and simulate the effects of the decrease in gender wage gap from the mid-1970s to the late 1990s.

[14] We are unable to fully calibrate the model for the mid-1970s as empirical moments for childcare time use and childcare costs are unavailable for the 1970s through the 1990s. As in Section 5.1 for the period after the late 1990s, results are similar whether we replace only p_f or replace the full set of human capital technology parameters.

Table 10 summarizes the results of this counterfactual. The table is structured analogously to the previous ones except that the third column reports column (B) minus column (A)—rather than column (A) minus column (B), as in the earlier tables— thereby capturing the effects of the decreased gender wage gap from the mid-1970s to the late 1990s.

Three key patterns emerge when comparing this earlier era to the recent period. First, heterogeneity between mothers and non-mothers is markedly weaker than in the recent period. In the earlier era, women with children would have increased annual work hours by 268 hours and women without children would have increased theirs by 247 hours, a difference of only 21 hours (compared to a difference of 145 hours in the period after the late 1990s based on results from Table 7). Second, despite this weaker heterogeneity, the increase in women's work hours—both for mothers and non-mothers—is substantial and, in fact, larger than in the period after the late 1990s (258 hours before the late 1990s vs. 148 hours after the late 1990s), although the growth in women's relative wages is similar across the two periods. This stronger response is consistent with a dominant own-wage substitution effect when wives' baseline wages are relatively low. Lastly, the increase in women's relative wages in this earlier period is not large enough to meaningfully alter the intra-household division of labor for households with children. While rising female relative wages incentivizes mothers to work more, they do not induce a sizable substitution of husbands' time into childcare, because women's contribution to household income remains relatively low in this era compared with recent decades. As a result, the mechanism that is central in the recent period—husbands taking on more childcare, thereby amplifying mothers' labor supply relative to non-mothers—plays only a limited role in this earlier era.

The reduced gender wage gap during this period, however, explains all of the entire observed decline in the share of non-mothers and 56% of the decline in the share of young mothers, consistent with the view that rising women's wages were a primary force behind earlier fertility changes.

Finally, unlike in the period after the late 1990s, the model underpredicts the effect of the narrowing gender wage gap on the joint evolution of labor supply and fertility timing in this earlier era. One possibility is that additional forces were operating alongside rising relative wages. These include declining childcare costs (e.g., Attanasio et al., 2008)[15], changing beliefs about the effects of maternal employment on child outcomes (Fogli and Veldkamp, 2011), shifts in social norms and preferences over marriage and gender roles (Fernandez, Fogli and Olivetti, 2004), the rapid diffusion of oral contraception among young women in the 1970s (Goldin and Katz, 2002), and technological progress in the household sector (Greenwood et al., 2016). Incorporating these complementary mechanisms would likely strengthen the overall response to the narrowing gender wage gap and help reconcile the remaining gap between the model and the data in this earlier period.

Table 10: Effects of decreased gender wage gap, before the late 1990s period

Variable	Model (late-1990s) (A)	Counterfactual (mid-1970s) (B)	(A)-(B)	Actual change
Women				
Work hours	1254	996	258	484
Work hours w/ children	1242	925	268	507
Work hours w/o children	1283	1037	247	445
Childcare time	816	812	4	N/A
Share of non-mothers	0.131	0.038	0.093	0.053
Share of young mothers	0.728	0.853	-0.125	-0.222
Men				
Work hours	2026	2136	-110	-69
Work hours w/ children	2260	2348	-88	-66
Work hours w/o children	1913	2017	-104	-102
Childcare time	450	462	-12	N/A

Notes: The analysis is restricted to married individuals. All hours are annual. Work hours are averaged across individuals, including those with 0 hours.

[15] In the period after the late 1990s, childcare costs, as a share of household labor income, have remained relatively stable. Accordingly, our analysis models childcare costs in proportional terms (as a share of household labor income), rather than in dollar terms.

6 Conclusion

The recent evolution of family labor supply is characterized by notable heterogeneity between households with and without children—a divergence that stands in contrast to the period before the late 1990s, when such heterogeneity was weaker. Women with children have continued to increase their work hours even during the period of trend reversal in aggregate labor supply, while their husbands have experienced the largest reduction in work hours and contributed more to childcare than before. In addition, a larger share of women in the recent period have further delayed childbirth. This paper provides a quantitative explanation for these changes. We develop a two-earner life-cycle model for married couples that captures key features of the U.S. labor market and fertility behavior. The model is sufficiently rich to account for changes in joint labor supply and fertility behavior across different subgroups of households, particularly by the presence of children.

Overall, the paper's main lesson is that understanding recent changes in mothers' labor supply requires modeling the household as the unit of adjustment. When childcare is modeled as an endogenous margin and parents' time is substitutable, the narrower gender wage gap in recent decades reshapes the intra-household allocation of childcare, amplifying mothers' labor supply relative to non-mothers and helping to rationalize concurrent shifts in fertility timing. The key distinction between recent decades and earlier decades, then, lies in the mechanism through which these wage gains translate into intra-household behavior. What is distinctive about the recent period is not that women's relative wages rose per se, but that these wage gains generated a much stronger childcare-substitution response: fathers' time substitutes for mothers' time, producing the pronounced heterogeneity observed in the data.

Future work could enrich this framework by incorporating divorce risk, endogenous educational choices, and assortative matching.[16] As emphasized in recent literature (e.g., Albanesi

[16]In Appendix F, we show that the changing composition of married individuals has minimal effect on our results. First, the fraction of married women experiencing divorce has actually decreased in the recent period. Second, if the shares of continuously married and newly divorced women had remained at their 1990s levels, the increase in average annual work hours among married women from the late 1990s to the early 2020s would have been approximately just one hour higher than what is observed in the data.

and Prados, 2022; Chiappori et al., 2017; Greenwood et al., 2016), assortative matching has strengthened over time, potentially generating distinct behaviors based on matching status. Additionally, applying this joint labor supply framework to same-sex married couples offers a promising avenue for research, given that intra-household time allocations may follow different dynamics in that context.

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Appendix

A Data

We use multiple data sources, including the Panel Study of Income Dynamics (PSID), the March Supplement of the Current Population Survey (March CPS), the June Supplement of the Current Population Survey (June CPS), and the American Time Use Survey (ATUS). The PSID is used to estimate both the childcare cost function and wage dynamics, and to calculate various wage-related moments that are targeted for model calibration. The March CPS is employed to calculate both targeted and non-targeted moments of labor market outcomes. The June CPS and ATUS are used to calculate fertility-related moments.

A.1 Panel Study of Income Dynamics (PSID)

The PSID is a longitudinal survey of a nationally representative sample of individuals living in 5,000 U.S. families. The survey interviews began in 1968 and were conducted annually until 1997, after which they have been conducted biennially. The initial sample included two groups: the Survey Research Center (SRC) sample, consisting of 3,000 representative households, and the Survey of Economic Opportunities (SEO) sample, consisting of 2,000 low-income households. For our analysis, we use data from the PSID core sample, specifically the SRC sample. To estimate the childcare cost function, we restrict the PSID sample to wives with children under age 15 during the period 1997–2001 (corresponding to income years 1996–2000). For other wage-related moments, our sample is limited to married individuals aged 25 to 64 for the same period.

When estimating wage dynamics, we apply the same sample restrictions as for other wage-related moments, but extend the sample period from 1971 to 2021 (income years 1970–2020). We define the hourly wage rate as the ratio of total annual labor income to annual hours. Total labor income is a comprehensive earnings measure, which includes not only wage and salary income but also bonuses, overtime, tips, commissions, and the labor parts of farm and business income. We exclude, however, business and farm income from total labor income, as the PSID's treatment of business and farm income in total labor income has changed over the years, resulting in inconsistency in the total labor income variable over time. The wage rate is deflated and expressed in 2012 dollars using the PCE deflator.

A.2 March Supplement of the Current Population Survey (March CPS)

The March CPS, also known as the Annual Social and Economic Supplement (ASEC), is conducted annually by the U.S. Census Bureau and the Bureau of Labor Statistics. It collects detailed information on income, poverty, health insurance coverage, and other demographic and socioeconomic characteristics of U.S. households. For our analysis, we focus on married individuals between the ages of 25 and 64 for the periods 1998–2000 (for the early period) and 2021–2023 (for the recent period). Employment status is based on total annual hours worked: individuals working at least 500 annual hours are classified as employed, while those working fewer than 500 hours are considered unemployed. The hourly wage rate is calculated as the ratio of total annual labor income to annual hours worked. Total labor income is a comprehensive measure that includes all pre-tax income from wages, salaries, non-farm business income, and farm business income. Total annual hours worked are calculated by multiplying the usual hours worked per week across all jobs in the previous year by the actual number of weeks worked in that year. The wage rate is deflated and expressed in 2012 dollars using the PCE deflator.

A.3 June Supplement of the Current Population Survey (June CPS)

The June CPS focuses on fertility, marital history, and birth expectations in the United States. This supplement is not conducted annually; it was surveyed irregularly until 1998 and has been administered biennially since then. It collects detailed data on variables such as the number of children ever born, age at first birth, and current marital status. For our analysis, we use data from 1998 and 2000 (for the early period) and 2022 (for the recent period). We focus on married women aged 40 to 44, assuming this age range encompasses those who have completed their childbearing years. This sample allows us to calculate the shares of non-mothers, young mothers, old mothers, and older mothers.

A.4 American Time Use Survey (ATUS)

The ATUS collects information on time use for a nationally representative sample of the U.S. population. The sample is drawn from individuals who completed their eighth and final month of interviews for the Current Population Survey. One respondent per household reports detailed information on his/her time use about the previous day. ATUS is the only federal survey providing data on the full range of market and non-market activities. The data files include information collected from nearly 245,000 interviews conducted from 2003 to 2023. The monthly sample is divided into four randomly selected panels, one for each week of the month. To ensure good measures of time spent on weekdays (Monday through Friday) and weekend days (Saturday and Sunday), the sample is split evenly between weekdays and weekend days.

To calculate childcare time-related moments, we restrict our sample to married mothers and fathers with children under the age of 15 and use weekday diaries only. We use data from 2003–2005 for the early period and 2021–2023 for the recent period. Given that our benchmark model assumes both males and females spend positive hours on childcare when children are present in the household, we further limit our sample to individuals reporting positive childcare hours. Our definition of childcare time includes the following activities: (1) caring for and helping household children, (2) activities related to household children's education, (3) activities related to household children's health, and (4) travel related to caring for children.

B Estimation of wage dynamics

We used data from the Panel Study of Income Dynamics (PSID) for 1971–2021 to estimate wage processes. The estimation process involves three steps.

In the first step, we run an OLS regression by gender over the sample period. For each gender, we estimate the following equation:

$$\log w_{i,j,t} = \sum_{t=1}^{T} \beta_{0,t} D_t + \beta_1 j + \beta_2 j^2 + \varepsilon_{i,j,t}, \tag{B.1}$$

where $w_{i,j,t}$ is the wage rate of individual i of age j at time t. D_t represents time dummies, and $\varepsilon_{i,j,t}$ is error terms. We then obtain residuals, $\widehat{\varepsilon_{i,j,t}}$ from Eqn (B.1) and use them to estimate the wage dynamics. Following the literature, $\widehat{\varepsilon_{i,j,t}}$ is assumed to be the sum of idiosyncratic shocks, $z_{i,j,t}$, and measurement error, whose variance is estimated at 0.02 (French, 2004). $z_{i,j,t}$ consists of two orthogonal components: a permanent ($\eta_{i,j,t}$) and a transitory component ($v_{i,j,t}$). Specifically, $\eta_{i,j,t}$ follows an AR(1) process as described in Eqn (3) and $v_{i,j,t}$ is an *i.i.d.* shock.

In the next step, we estimate two types of time-varying wage shock variances, the persistence of the permanent wage shock, and the initial variance of the persistent shocks using the Generalized Method of Moments (GMM). Here, we exclude the wage shock variances for the last year of the sample (income year of 2020) due to finite sample bias at the end year of the sample. Consequently, we estimate $L = 99$ parameters. The theoretical moment is defined as:

$$M^j_{t,t+n}(\Theta) = E(r_{i,j,t}\ r_{i,j+n,t+n}), \tag{B.2}$$

where Θ is $L \times 1$ parameter vector, $r_{i,j,t}$ represents residual wages of individual i at age j in year t, and $r_{i,j+n,t+n}$ is the residual wages of the same individual n periods later. We then calculate the corresponding empirical moments by grouping individuals into 30 overlapping 10-year age groups, such as 25-34, 26-35,..., 55-64-year-old groups. The moment conditions are as follows:

$$\widehat{M^j_{t,t+n}} - M^j_{t,t+n}(\Theta) = 0, \tag{B.3}$$

where $\widehat{M^j_{t,t+n}} = \frac{1}{I_{j,t,n}} \sum_{i=1}^{I_{j,t,n}} \widehat{r_{i,j,t}}\ \widehat{r_{i,j+n,t+n}}$, and $I_{j,t,n}$ is the number of observations of age j in year t with an n-period gap. The GMM estimator solves the following minimization problem:

$$\widehat{\Theta}_{GMM} = argmin_{\Theta} g(\Theta)' W g(\Theta), \tag{B.4}$$

where $g(\Theta) = \widehat{M} - M(\Theta)$; $\widehat{M}$ is a vector of the stacked empirical moments; $M(\Theta)$ is the theoretical moments; and W is a weighting matrix. Following Altonji and Segal (1996), we use an identity matrix for W. Lastly, we average the variances for 1998-2000.

As emphasized by many studies, the welfare consequences of transitory wage shocks are negligible (Blundell, Pistaferri and Preston, 2008; Park and Shin, 2024). Consequently, we exclude transitory shocks and focus solely on the permanent wage shock process in our model.

C Computation method

We solve the household optimization problem backward by employing the endogenous grid method (Carroll, 2006). This method involves solving the optimization problem conditional on each of the four mutually exclusive alternatives based on the couple's labor market participation status and each of the four different fertility choices. The optimal labor market participation policy is determined by comparing the discounted utilities across these four alternatives. After solving the discrete labor market decision problem, we separately calculate the expected lifetime value associated with four mutually exclusive fertility choices: having no children (F_0), having children as a young mother (F_1), having children as an old mother (F_2), and having children as an older mother (F_3). We compare those four values to determine the optimal fertility decision. Finally, we recover the optimal choices for joint labor supply, assets, consumption, and childcare time based on each household's fertility and the couple's labor market participation decision.

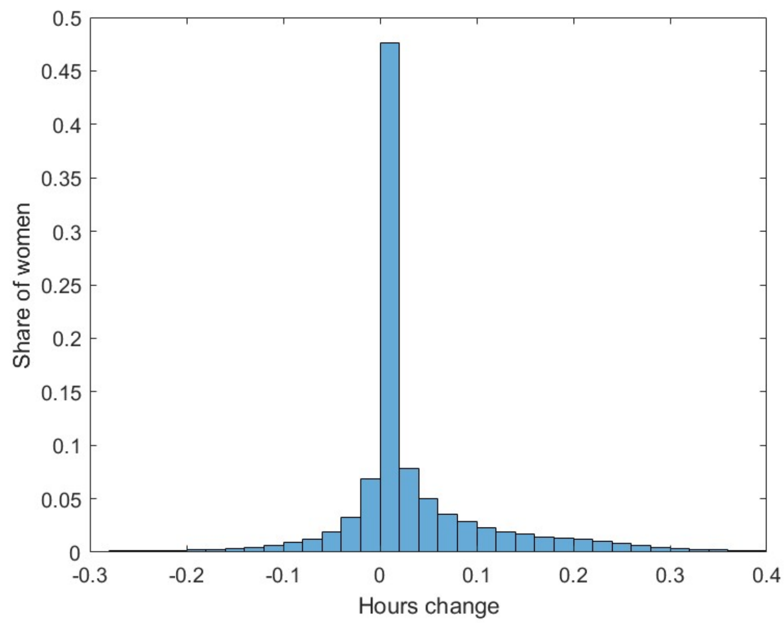
To be precise about the working-age household's problem, given the fertility and labor market participation decisions, the model defines a six-dimensional state space. This state space includes assets, age, permanent wage shocks for both the male and female partners, and their respective human capital levels. Discretization results in 384,160 grid points, with 20 points for assets, 8 for age, 49 (7×7) for couple's permanent wage shocks, and 49 (7×7) for couple's human capital levels. The asset grid is finer at lower asset levels and age-dependent, with its upper bound increasing with age. The joint grid points for the couple's permanent wage shocks are generated through discretization, with associated transition matrices. Finally, we simulate 100,000 households under each fertility choice and each labor market participation choice of the couple.

D Changes in work hours for women without children due to the decreased gender wage gap

We also investigate heterogeneity in work hour changes for women without children as a result of the decreased gender wage gap. First, we calculate the changes in work hours and plot their distribution in Figure D.1. We observe heterogeneity in work hour changes among women without children. However, compared to women with children (Figure 6), we find a smaller degree of heterogeneity, with most women experiencing only a modest increase in their work hours.

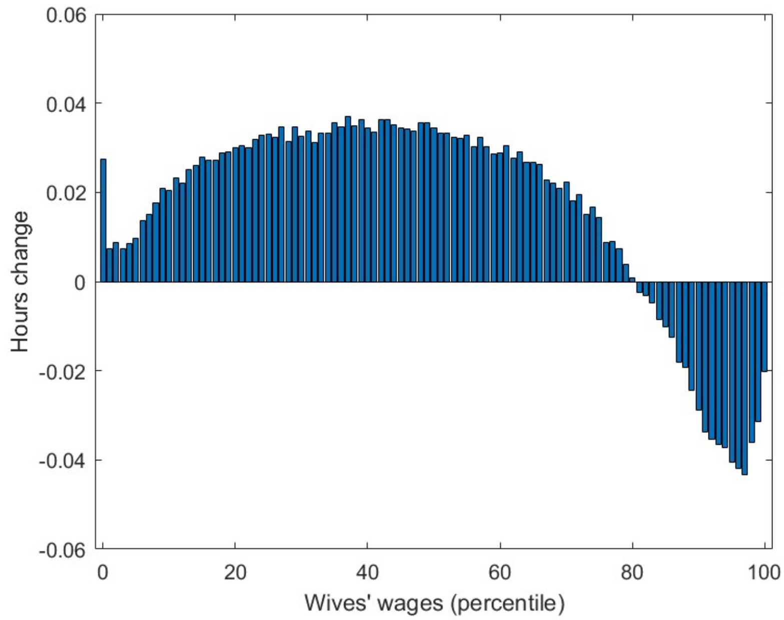
We further examine these changes by plotting them against both women's own wages and their husbands' wages. Figures D.2 and D.3 show heterogeneity in work hour changes among women without children by their own wage percentiles and their husbands' wage percentiles, respectively. The patterns discussed in Section 5.1 for heterogeneity with respect to women's own wages also hold for women without children. However, the relationship with husband's wage percentiles is a bit different: it is not monotone. For women without children, hours increases are smallest when husbands' wages are at the bottom of the distribution, rise through the middle of the distribution, and then taper off for women married to high-wage husbands. In other words, heterogeneity along the husbands' wage dimension is more pronounced for women without children than for women with children.

Figure D.1: Distribution of changes in work hours for women with children



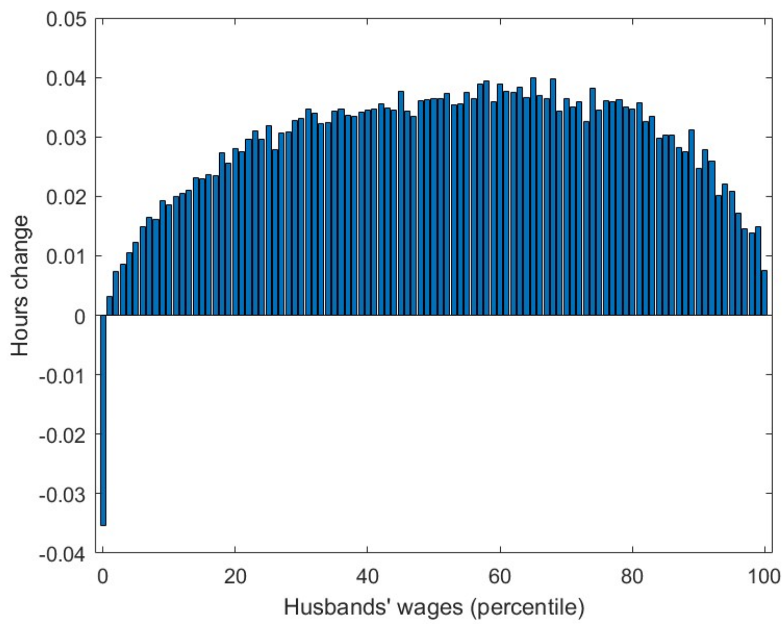
Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

Figure D.2: Heterogeneity in work hours for women with children by their own wage



Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

Figure D.3: Heterogeneity in work hours for women with children by their husband's wage



Notes: Hours changes are normalized relative to the total time endowment (6,240 hours)

E Calibration results for the early 2020s economy

Table E.1 summarizes the results of the model calibration for the early 2020s economy. The set of data moments and the corresponding results for our benchmark model are presented in Table E.2. Overall, our benchmark model closely matches the targeted moments. All hours are based on weekdays and normalized relative to the total time endowment, which is assumed to be 6,240 hours (24 hours × 5 days × 52 weeks).

Table E.1: Parameters calibrated jointly

Parameters	Description	Values
β	Discount factor	0.866
ψ_m, ψ_f	Fixed time cost	0.051, 0.409
ψ_n	Disutility of work for HH	3.881
ϕ	Marginal utility of children's HC	9.476
χ_1, χ_2, χ_3	Share of parental CC time among the total CC inputs	0.686, 0.155, 0.039
ρ_c	EIS b/w parental CC times	0.422
α^m, α^f	HC accumulation technology	0.428, 0.323
δ^m, δ^f	HC depreciation rate	0.268, 0.159
ζ^m, ζ^f	Elasticity of HC accumulation w.r.t. work hours	0.115, 0.083
p^f	Efficiency unit price for female labor	0.621

Table E.2: Model vs. Data, Early 2020s

Moments to match	Model	Data
Male work hours (25-44)[1]	0.320	0.312
Employment-population ratios (men, women)[1]	0.873, 0.671	0.871, 0.672
Average HH work hours[1]	0.263	0.258
Share of non-mothers[2]	0.084	0.077
Average HH per child parental time by t^3	0.135, 0.097, 0.082	0.154, 0.086, 0.073
Ratio of father's CC time to mother's[3]	0.613	0.672
Wage growth for employment stayers (men, women)[4]	0.115, 0.173	0.115, 0.193
Wage loss for employment changers (men, women)[4]	0.174, 0.142	0.178, 0.144
Work hours (men, women)[1]	0.310, 0.209	0.303, 0.213
Gender wage gap[1]	0.778	0.779

Sources: Data moments from various sources of data. 1: March CPS, 2: June CPS, 3: ATUS, 4: PSID.
Notes: All hours are based on weekdays and normalized relative to the total time endowment (6,240 hours). See Appendix A for detailed sample restrictions.

F Further discussions: divorce choice

A potential limitation of this study is the exclusion of divorce as a choice variable. If the married and divorced groups differ in labor supply and wages, and the divorce rate has changed since the late 1990s, this could influence aggregate trends in married women's labor supply and wages by altering the composition of married women. For example, if longer-working married women self-select into divorce, and the divorce rate has decreased over time, the observed increase in work hours among married women (the target value in Table 7) may overstate the true hours increase due to changes in the composition of married women's workforce. Similarly, this composition change could also affect observed wage changes among married women and, consequently, their observed relative wages.

However, our preliminary survey suggests that the changing composition has little effect on our results. First, the fraction of married women experiencing divorce has decreased from 18 per 1,000 married women in 2000 to 15 in 2022 (Loo, 2024), implying only a minor reduction of the divorce rate of 0.3 percentage points (from 1.8% to 1.5%). Using the March CPS data, we confirm Loo's observation by calculating the share of all women who are currently divorced. The result shows that this share decreased by only 1.6 percentage points from 13.7% in the late 1990s to 12.1% in the early 2020s. Second, and perhaps more interestingly, this minor decline in the divorce share was of a similar magnitude for both highly-educated and less-educated women: a 1.7 percentage point decrease (from 13.5% to 11.8%) for highly-educated women and a 1.3 percentage point decrease (from 14% to 12.7%) for less-educated women. These estimates suggest that the changing composition of married women has little effect on observed trends in their hours worked and wages.

We further assess the potential composition effect quantitatively using longitudinally-matched March CPS data. We first classify all married women in a given year into two groups depending on their marital status in the following year: those who transition to divorce next year and those who remain married. Next, for each group, we calculate the average annual work hours and the group share, using proper sampling weights. Our shift-share analysis suggests that if the shares of continuously married and newly-divorced women had remained at their late 1990s levels, the increase in the average annual work hours among married women (calculated as the weighted average of group-specific average annual work hours) from the late 1990s to the early 2020s would have been approximately one hour higher than what actually occurred in the data (i.e., 71 hours).[17] We also examine how the composition change affects the trend in the observed gender wage gap. Our exercise suggests that if the shares of the two groups had remained at their late 1990s levels, the increase in women's relative wages would have been lower by 0.0002 compared to what was actually observed in the data (i.e., 0.105).[18] All these findings suggest that changes in workforce

[17] In the late 1990s, women who divorced worked an average of 1,482 hours annually, compared to 1,261 hours for those who remained married. By the early 2020s, these figures increased to 1,489 hours for divorced women and 1,331 hours for married women. This evidence suggests that longer-working married women may self-select into divorce.

[18] In the late 1990s, the average wages (in 2017 dollars) were \$18.0 for women who divorced and \$19.7 for

composition among married women due to shifts in divorce patterns would not significantly affect our key results.

those who remained married. By the early 2020s, these figures rose to $21.8 for divorced women and $28.3 for continuously married women, indicating that continuously married women experienced greater wage growth than newly-divorced women.