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## ABSTRACT

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# Children and the Remaining Gender Gaps in the Labor Market\*

The past five decades have seen a remarkable convergence in the economic roles of men and women in society. Yet, persistently large gender gaps in terms of labor supply, earnings, and representation in top jobs remain. Moreover, in countries like the U.S., convergence in labor market outcomes appears to have slowed in recent decades. In this article, we focus on the role of children and show that many potential explanations for the remaining gender disparities in labor market outcomes are related to the fact that children impose significantly larger penalties on the career trajectories of women relative to men. In the U.S., we document that close to two-thirds of the overall gender earnings gap can be accounted for by the differential impacts of children on women and men. We propose a simple model of household decision-making to motivate the link between children and gender gaps in the labor market, and to help rationalize how various factors potentially interact with parenthood to produce differential outcomes for men and women. We discuss several forces that might make the road to gender equity even more challenging for modern cohorts of parents, and offer a critical discussion of public policies in seeking to address the remaining gaps.

**JEL Classification:** J16, J24, J31, J13

**Keywords:** gender, gender gap, children, labor market

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# 1 Introduction

In recent years, there has been a surge in interest among economists to understand the sources of the remaining gender disparities in the labor market. A large part of this interest stems from the fact that while women have made significant progress in the labor market over the past half a century, large gender gaps in terms of labor supply, earnings, and representation in top jobs remain. The labor force participation rate among prime-age women in the U.S. has plateaued at about 75 percent since the mid-1990s and, even among full-time workers, women continue to earn about 20 percent less than men on an annual basis. Gender pay gaps are even more pronounced at the top of the earnings distribution, and women continue to be heavily underrepresented in high-status and high-income sectors, occupations, and job positions (Blau and Kahn, 2017, Bertrand, 2018). The persistence of these gaps is all the more puzzling as women are now increasingly more educated than men and better prepared for the labor market than ever before (Goldin et al., 2006, Bertrand, 2011). Beyond concerns of rights and fairness, the continued underrepresentation of women in the labor market and gender pay gaps (especially among equally skilled men and women) is costly to society from an economic efficiency perspective (Hsieh et al., 2019).

A major development in the literature has been the focus on new classes of explanations that might help understand the remaining gender inequalities in the labor market. These include gender differences in psychological and personality traits that might lead women and men to self-select into different types of jobs and careers, and a more systematic exploration of the role of gender norms in constraining women’s behavior and shaping their preferences for work. Important review articles by Bertrand (2011), Azmat and Petrongolo (2014), and Blau and Kahn (2017) summarize the recent work in these areas. More recently, motivated by various empirical observations, economists have returned to a set of more standard explanations that emphasize the challenges that women face when trying to juggle work and family responsibilities. This has, for example, led to a more nuanced view on how women’s dominant role in childcare and non-market work – sustained perhaps by persistent gender norms – might result in gender differences in preferences for certain job attributes (e.g. workplace flexibility) and career tracks that are typically associated with lower pay and limited career progression.

In this paper, we focus on the role of children and show that many of the explanations for the persisting gender disparities in the labor market are related to the fact that household work, especially raising children, continues to impose differential demands on women’s time relative to men’s. The central role that children play in understanding women’s relative underperformance in the labor market is best illustrated by a series of recent papers that use an event-study framework to examine how women and men’s labor supply and earnings evolve in the years before and after the arrival of children (Kleven et al., 2019a, Kleven et al., 2019b, Kuziemko et al., 2018). These papers

document that the labor market trajectories of men and women diverge sharply with the arrival of children, with little recovery for mothers in the medium to longer-term. The empirical patterns are strikingly similar across a variety of countries, time periods, and even within specific occupations. This empirical regularity suggests that a focus on understanding why and how children impose a disproportionate effect on women’s careers can shed light on the sources of the remaining gender gaps and provide directions on the design of policy responses.

The plan of the paper is as follows. In the next section, we review recent empirical evidence on the link between parenthood and gender inequality, with a particular focus on papers that document the presence of systematic “child penalties” in labor market earnings and participation in various settings. To further highlight the role of children in understanding gender inequality, we expand on earlier decompositions of the gender wage gap using data from the U.S. Panel Study of Income Dynamics (PSID) by Blau and Kahn (2017) to account for the proportion that is due to inequality related to children. We adopt the decomposition procedure described in Kleven et al. (2019a) that uses event study estimates of the wage impact of children to tease out the proportion of gender inequality that can be attributed to children versus other factors. In Section 3, we present a simple household decision-making framework to motivate the link between children and gender gaps in the labor market. The aim of the model is to provide a basic scaffolding for thinking about how various factors potentially interact with parenthood to produce differential outcomes for women and men. Section 4 reviews recent literature that provides insights into the channels through which children affect gender inequality. These include research that highlights gender differences in preferences for job attributes, as well as the role of gender norms and the division of household work. In Section 5, we discuss forces in the home and at work that might make it more challenging for modern women to balance the time demands of parenthood and labor market work. In Section 6, we turn to a discussion of policies that aim to tackle the remaining gender disparities, focusing in particular on policies that are most relevant for addressing the challenges that women face in trying to juggle work and family responsibilities. Section 7 concludes.

## **2 Empirical Evidence on Parenthood and Gender Inequality**

There has been a recent wave of papers that use rich panel data to quantify the employment and earnings effect of parenthood. Earlier papers tended to focus on specific groups of highly-educated professionals such as those with MBAs and lawyers, and find large earnings penalties for women, but not men, with the arrival of the first child (Bertrand et al., 2010; Noonan et al., 2005; Azmat and Ferrer, 2017). More recent papers study the effects on the broader population in various

countries and time periods suign an event-study approach.<sup>1</sup> A number of compelling stylized facts have emerged from this literature. First, the labor market trajectories of men and women are similar in the years leading up to parenthood, but diverge sharply with the arrival of children, with little recovery for mothers in the medium to longer-term (up to 10 to 20 years) (Angelov et al., 2016; Kleven et al., 2019a; Chung et al., 2017; Goldin and Mitchell, 2017; Fitzenberger et al., 2013). Second, the observed motherhood earnings penalty appears to be due to a decline in labor supply, both on the intensive and the extensive margin, as well as a decline in wage rates. Part of this arises because women disproportionately shift to lower-paying jobs that likely offer more family amenities such as job in the public sector and in more “family-friendly” firms (Kleven et al., 2019a; Hotz et al., 2018). Third, men’s labor market outcomes remain unaffected by the arrival of the first child.

While the overall patterns are remarkably similar across countries, the magnitude of the child penalty differs quite considerably. A recent paper by Kleven et al. (2019b) estimates child penalties for a diverse set of countries using the same empirical approach, specification, and sample selection (as far as possible). The authors find that the long-run child earnings penalties for women are smallest in Scandinavian countries such as Denmark and Sweden (around 20%–25%), compared to about 30%–40% in the U.S. and the UK, and 50%–60% in Germany and Austria.<sup>2</sup> These differences in the size of the child earnings penalties across countries could be influenced by cross-country differences in family policies, gender norms, and wage-setting institutions (Kleven et al., 2019b; Blau and Kahn, 2013; Blau and Kahn, 1996; Blau and Kahn, 2003).

## 2.1 The Role of Children in Aggregate Gender Inequality in the U.S.

To provide a sense of the extent to which the child earnings penalty contributes to aggregate gender inequality in the United States, we apply the dynamic decomposition framework proposed by Kleven et al. (2019a) to decompose the observed gender pay gap into components attributable to background/human capital characteristics and the differential effects of children. This analysis complements standard gender gap decompositions, such as those reported in Blau and Kahn (2017), by incorporating children as a potential driver of explained and unexplained gaps.

As discussed in Kleven et al. (2019a), the emphasis of the dynamic decomposition exercise is on

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<sup>1</sup>There is an earlier literature that examines the effects of parenthood on wages using cross-sectional and fixed effects models. These include papers by Waldfogel (1997), Korenman and Neumark (1992), and Budig and England (2001). Waldfogel (1998) studies the pay gap between parents and non-parents and examines the extent to which gender differences in the returns to marriage and parental status can account for the gender wage gap at age 30 in the U.S. in the 1980s and 1990s. She is perhaps first in the literature to identify and refer to this differential effect of parenthood on the wages of men and women as the “family gap.”

<sup>2</sup>The long-run child penalty is defined as the average percentage by which women’s earnings fall behind men five to ten years after the arrival of the first child.

quantifying the impact of children on gender gaps without controlling for labor market choices that are likely affected by the presence of children (e.g. labor market experience, occupation, and firm choices). This is a key point of departure from standard gender gap decompositions that typically focus on the residual pay gap after accounting for mean differences in the characteristics and type of work that men and women engage in. It is also worth noting that children do not feature as a main explanation in standard decompositions since, men and women, on average, have similar number of children. By explicitly modeling the differential impact of children on the earnings trajectories of men and women, the dynamic decomposition allows a further examination of the unexplained component of standard decomposition analyses. At the same time, because children can also affect the gender pay gap through women’s labor market attachment and occupational/industry choices, the impact of children can also work through the explained components of standard cross-sectional decomposition analyses.

### 2.1.1 Event-Study Estimates of the Impact of Parenthood on Earnings

Child-related inequality in the dynamic decomposition framework is based on event-study estimates of the impact of parenthood on earnings of mothers relative to fathers. The event-study approach exploits within-person variation in the timing of first birth to trace out the evolution of earnings in the years before and after the birth of the first child (i.e. the “event”). As long as the timing of first birth is uncorrelated with trends in the unobserved determinants of individuals’ outcomes, the event-study approach yields causal estimates of the effects of parenthood. Specifically, earnings  $Y_{it}^g$  is modeled for person  $i$  of gender  $g$  in year  $t$  as follows:

$$Y_{it}^g = \sum_{\tau=-5}^{\tau=10} \beta_{\tau}^g \cdot \mathbb{1}[\tau = t - e^i] + \sum_a \gamma_a^g \cdot \mathbb{1}[a = \text{age}_{it}] + \sum_y \delta_y^g \cdot \mathbb{1}[y = t] + \epsilon_{it}^g \quad (1)$$

where event time (time relative to the birth of the first child) is indexed by  $\tau$ , and  $e^i$  denotes the calendar year in which person  $i$  had their first child. Therefore, the variable  $\mathbb{1}[\tau = t - e^i]$  is an indicator for person  $i$  in year  $t$  having had their first child  $\tau$  years ago. We omit the indicator variable for the year before the first birth (i.e.  $\tau = -1$ ), implying that the event time coefficients ( $\beta_{\tau}$ ) measure the impact of children relative to the year before the birth of the first child. The inclusion of these fixed effects control non-parametrically for life-cycle trends and time-trends. Hence, the event-time estimates should be interpreted as the effects of parenthood on earnings relative to the no-child counterfactual as predicted by age and year. Standard errors are clustered at the individual level. We also include controls for age fixed effects and calendar-year fixed effects.

We estimate equation (1) using the 1976 to 2017 waves of the Panel Study of Income Dynamics (PSID). The sample is restricted to household heads and spouses/cohabitators who are 20 to 55 years

old and who had their first child between the ages of 20 and 45. We further consider parents who are observed at least once before and after the birth of their first child and whose earnings outcomes are observed at least four times over the fifteen-year window (i.e. five years before and ten years after first birth).

The main outcome variable is annual labor earnings, defined in the PSID as total labor income before taxes and transfers for the year prior to the interview.<sup>3</sup> Individuals who are not working are assigned zero earnings. Following Kleven et al. (2019a), earnings are specified in levels to keep individuals with zero earnings in the data (due to non-participation). The estimated level effects from equation (1) are converted into percentages by calculating  $P_\tau^g \equiv \frac{\hat{\beta}_\tau}{E[\tilde{Y}_{it}^g|\tau]}$  where  $\tilde{Y}_{it}^g$  is the predicted outcome when the contribution of the event dummies are omitted. In other words,  $P_\tau^g$  captures the effect of children as a percentage of the no-child counterfactual at event time  $\tau$ .

Figure 1 plots the  $P_\tau^g$  coefficients for men and women separately, along with 95% confidence bands around the estimates. Consistent with previous work, women experience a sudden, large, and persistent drop in earnings with the arrival of the first child, whereas men’s earnings appear essentially unchanged. Importantly, men and women’s earnings evolve similarly in the years prior to parenthood, supporting the causal interpretation that the earnings losses experienced by women are indeed the result of children. Strikingly, up to ten years after the birth of the first child, women’s earnings show little sign of recovery. The long-run child penalty in the earnings of women relative to men five to ten years after the arrival of the first child is close to 40%.<sup>4</sup>

### 2.1.2 Dynamic Decomposition of Aggregate Gender Inequality

To decompose aggregate gender earnings gaps over time, the dynamic decomposition framework extends the baseline event-study specification given by equation (1) to allow for period-specific coefficients on event time. In particular, we focus on four ten-year time periods from 1975 to 1984 (“1980s”), 1985 to 1994 (“1990s”), 1995 to 2004 (“2000s”), and 2005 to 2016 (“2010s”).<sup>5</sup>

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<sup>3</sup>To be precise, annual labor income is defined as total labor income before taxes and transfers, including bonuses, overtime pay, tips, commissions, as well as income from professional practice, and extra job income. Farm income and business income are not included in the measure. To account for inflation over time, we deflate earnings using the Personal Consumption Expenditures (PCE) price index, taking 2010 as the base year.

<sup>4</sup>The child penalty at event time  $\tau$  is defined as the percentage by which women are falling behind men due to children and is calculated as:  $P_t \equiv \frac{\hat{\beta}_\tau^m - \hat{\beta}_\tau^w}{E[\tilde{Y}_{it}^w|\tau]}$ .

<sup>5</sup>Unlike Kleven et al. (2019a) who use rich administrative data, the substantially smaller sample size afforded by the PSID does not allow us to estimate separate event time coefficients for each year. We picked 10-year periods as a compromise to allow the estimated child penalties to change over time, and at the same time ensure that they are sufficiently precisely estimated.



Specifically, we estimate the following specification:

$$Y_{ipt}^g = \sum_y \sum_{\tau=-5}^{\tau=10} \beta_{y\tau}^g \cdot \mathbb{1}[\tau = t - e^i] \cdot \mathbb{1}[y = p] + \sum_k \alpha_k^g X_{kit}^g + \nu_{ipt}^g \quad (2)$$

where  $p \in \{1980, 1990, 2000, 2010\}$  represents ten-year periods and  $X_{kit}^g$  is a vector of covariates indexed by  $k$  that vary across individuals and calendar year. These covariates include age and calendar-year fixed effects, as well as other background characteristics such as race, census region, and education dummies.

As explained in Kleven et al. (2019a), the mean gender gap in each time period  $p$  can be expressed as a sum of the estimated child penalties (from equation (2)), the impact of different coefficients on non-child covariates i.e. differences in the returns to background/human capital characteristics such as race, region, and education), as well as the impact of mean differences in the levels of background covariates. The first two components represent “unexplained” effects in standard decomposition analyses, while the third component represents the “explained” effects.<sup>6</sup> Note that the estimated child-related inequality may not capture the full effects of children. To the extent that women may already have made education and career choices in anticipation of motherhood, these effects would load on background or residual inequality.

The results from the decomposition exercise are shown in Figure 2. The area in red corresponds to child-related gender inequality, the area in blue shows background-related inequality (i.e. due to differences in both the levels and returns to race, region, and education), while the grey-shared area represents the remaining gender earnings gap. The aggregate gender earnings gap (defined as the difference in average earnings between men and women as a percentage of men’s average earnings) has declined over this period. While men earned 57% more than women in the mid-1970s, their earnings advantage declined to 45% by the mid-2010s.<sup>7</sup>

Background-related inequality accounted for about 13% of the overall gender gap in earnings in the 1980s, but its contribution in absolute terms has declined over time, in line with the narrowing of educational differences between men and women. By the end of the sample period, background-related inequality was responsible for only a small proportion of total inequality (less than 5%). On the other hand, child-related gender inequality accounted for a sizable proportion of aggregate gender earnings gaps from the mid-1970s to the mid-2010s. The magnitude of child-related gender inequality appears to have risen over time, both in absolute terms (from 26% in the 1980s to 29%

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<sup>6</sup>In the interest of space, we do not describe the full decomposition procedure in the paper. Interested readers can refer to Section III of Kleven et al. (2019a)

<sup>7</sup>These gaps are larger than those reported by Blau and Kahn (2017) since we do not restrict the sample to full-time, year-round workers and assign zero earnings to individuals who are not employed. Therefore, our estimate of the gender earnings gap also captures gender differences in the labor force participation.

in the 2010s) and as a proportion of total gender inequality. The modest increase in child-related gender inequality coupled with the decline in overall gender earnings gap, implies that child-related inequality accounts for an increasingly larger proportion of aggregate gender earnings gap over time. By the 2010s, child-related inequality accounted for nearly two-thirds of the overall gender pay gap in the U.S.

In sum, the similarity of the findings in the U.S. and Denmark underscores the important role that children play in the persistence of gender disparities in labor market outcomes. Accordingly, a clearer understanding of why and how children continue to have differential effects on women’s and men’s career trajectories is of first order importance in attempting to address the remaining gaps.

### 3 Children and Gender Gaps: A Theoretical Framework

In this section, we discuss the theoretical underpinnings of the sources of the child penalty for women in the context of a household decision-making model. In our simple model, the utility of an individual depends on the consumption of a market good, their partner’s consumption, and a public good, namely children.<sup>8</sup> For simplicity, we do not formally include leisure in this model. Each individual is endowed with one unit of time, which can be allocated between working in the market ( $h_i$ ) and producing the household public good ( $1 - h_i$ ). Work hours in the market are paid at rate  $w_i$ . Married individuals’ time investment are used to produce the household public good (e.g. quality of children) according to the household production function,  $f(\cdot)$ .

Formally, individual  $i \in \{f, m\}$ ’s utility when married to their spouse  $j \in \{f, m\}$ , is given by:

$$U_i(w_i, w_j) = \max_{0 \leq h_i \leq 1} [\delta_i w_i h_i + w_j h_j + \beta_i f(1 - h_i, 1 - h_j)n] \quad (3)$$

where each individual takes the labor supply decision of their partner,  $h_j$  as given,  $n$  is the number of children (which we assume to be fixed and exogenous), and  $\delta_i$  and  $\beta_i$  are preference parameters. In this model,  $\delta_i$  can be interpreted as the relative weight that an individual places on one’s own consumption relative to their spouse’s consumption.  $\delta = 1$  implies that an individual places equal weight on own relative to spouse consumption.  $\delta > 1$  can be interpreted as the utility loss stemming from potential disagreement over consumption bundles. It can also represent a higher weight being placed on one’s own career relative to their spouse’s career.  $\beta_i$  represents the value each individual places on the household good. For example, the quality of the household good (e.g. children or a cleaner house) may generate more utility for some individuals relative to others.

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<sup>8</sup>This model is adapted from Bertrand et al. (2020) and Fernandez (2002).

**Before Children** In the simplified model without leisure, in the absence of children (i.e.  $n = 0$ ), both the husband and the wife will work full-time ( $h_m = 1$  and  $h_f = 1$ ). Differences in earnings between spouses will be solely determined by differences in wages. If  $w_m > w_f$ , then we will observe wives making less than their husbands, even before the birth of the child. In our model, there are no returns to experience (i.e. wage profiles are flat), so it does not deliver the positive slope in earnings before the birth of the child as observed in the data.

**After Children** The analysis becomes more interesting after the child is born. We model children as an exogenous shock. We discuss the model predictions under both unitary and non-unitary household assumptions.

### 3.1 Unitary Model of the Household

In the unitary model of the household, we assume that each spouse places the same weight on their own consumption and their partner's consumption ( $\delta_i = \delta_j = 1$ ) and on the household public good ( $\beta_i = \beta_j$ ). For simplicity, we begin by assuming a log linear production function of child rearing:  $\ln(\alpha_i(1 - h_i) + \alpha_j(1 - h_j))$ . This functional form implies that spouses are perfect substitutes in childrearing, but differ in their marginal productivities.<sup>9</sup>

First, consider the case where workers can freely choose their hours and that males ( $m$ ) and females ( $f$ ) are equally productive in household production ( $\alpha_i = \alpha_j$ ). Given these assumptions, optimal labor supplies of the husband and the wife will depend on who has a higher market wage. If  $w_m > w_f$ , and assuming that  $w_m > \beta$ , men will devote all their time to market work ( $h_m = 1$ ). Wife's labor supply will depend on her wage relative to  $\beta$ . In the case where  $w_f > \beta$ , the wife devotes some of her time to market work, with  $h_f^* = 1 - \frac{\beta}{w_f}$ . If  $w_f < \beta$ , the wife spends all her time in childrearing activities.

In this case, the model predicts that after the birth of the first child, fathers' earnings are unaffected, whereas mother's earnings drop either to zero (if her wage was low enough that it is better to stay at home, i.e.  $w_f < \beta$ ) or to  $w_f \left(1 - \frac{\beta}{w_f}\right)$ . The child penalty in this case can be explained fully by men's higher wages. Analogously, we should observe the opposite child penalty, with men's earnings decreasing and women's staying constant in households where mothers face higher wages than fathers.<sup>10</sup>

We turn now to the situation in which mothers and fathers differ in terms of their productivity in

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<sup>9</sup>We discuss how the analysis changes if alternative functional forms are used later in Appendix A.

<sup>10</sup>We do not consider the case of  $w < \beta$  for both members. In this case, if  $2w < \beta$ , both members will choose to stay at home full-time. If  $2w > \beta$ , the member with lower wage will stay at home, and their partner will work part-time in the market. Neither situation is commonly observed in the data.

child rearing ( $\alpha_f \neq \alpha_m$ ). Here, even if  $w_f > w_m$ , we might observe women reducing their hours or dropping out of the labor force, and thus a decline in earnings, if women are more productive in the production of quality children ( $\alpha_f > \alpha_m$ ) and  $\frac{w_f}{\alpha_f} \leq \frac{w_m}{\alpha_m}$ . Essentially, the partner who has a comparative advantage in the labor market (relative to home production) will specialize in market work.

### 3.2 Non-Cooperative Model of the Household

Next, we consider the case where men and women have different preferences and interact in a non-cooperative way. Specifically, men and women place different weights on children ( $\beta_i \neq \beta_j$ ) and on their own consumption (or earnings) relative to their spouse's consumption ( $\delta_i \neq \delta_j$ ).

Each spouse solves the following optimization problem (assuming  $\alpha_m = \alpha_f$ ), taking  $h_j$  as given:

$$\max_{0 \leq h_i \leq 1} U_i(h_i, h_j) = \delta_i w_i h_i + w_j h_j + \beta_i \ln((1 - h_i) + (1 - h_j))$$

Optimal labor supply within the household after the arrival of the child is determined by the ratio:  $\frac{\beta}{\delta w}$ . The spouse with the lower ratio will devote more time to market work.<sup>11</sup> Assuming that at least one spouse works full-time, the analysis is similar to that of the unitary model, where the spouse with the higher  $\frac{\beta}{\delta w}$  ratio will work in the market if  $w_i > \frac{\beta_i}{\delta_i}$ , and his/her labor supply will be given by  $h_i^* = 1 - \frac{\beta_i}{\delta_i w_i}$ .

### 3.3 Summary of Model Predictions

In sum, our model suggests that compared to men, women are more likely to work fewer hours or exit the labor force, and see their earnings decline after the birth of a child if the following conditions hold:

1. Both husbands and wives have the same preferences and productivities at home, but the wife faces a lower wage than her husband.
2. Wives face higher wages than their husbands, but they are either more productive at home ( $\alpha_f > \alpha_m$ ), value the household public good more than their husbands ( $\beta_f > \beta_m$ ), or suffer a utility penalty from working in the market ( $\delta_f < \delta_m$ ).

Why would women be more productive at child rearing, value children more than men, or suffer a greater utility penalty from working in the market? One explanation is that mothers, at least

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<sup>11</sup>Throughout we assume that for both partners,  $\frac{\beta}{\delta w} < 2$ , so that at least one of them will work in the market.

during the child’s first year do have a biological comparative advantage. However, this advantage should dissipate quite quickly after the first year and the model predicts that women should start increasing their work hours again. If women face higher wages than their partners, the increase in work hours would be steeper and we should observe their partners shifting away from market work toward home production.

On the other hand, social norms regarding gender roles could generate gender differences in the preference parameters ( $\beta$  and  $\delta$ ). In particular, men and women may place a lower value on women’s labor market earnings if a working wife or a female breadwinner challenges conventional gender roles within the household (Akerlof and Kranton, 2000; Bertrand et al., 2015). Gender differences in the value placed on the household public good (for example, in the form of ‘better’ kids or a cleaner house) could arise because society views home production as largely being a woman’s domain. Men may face a higher cost of engaging in household production because it goes against their identity as breadwinners in the household, while women may place a higher value on household good if they perceive that society judges them based on their performance in that domain. It is also possible that women simply prefer spending more time with their children relative to men, either due to intrinsic preferences or internalized norms.

### 3.4 Empirical Implications of the Model

To examine the empirical implications of the model, we use the PSID to study how the effects of parenthood on husbands and wives vary by their relative earnings potential.<sup>12</sup> To proxy for the relative earnings potential within couples, we use the pre-child difference in the number of years of schooling between spouses.<sup>13</sup> For the analysis, we consider four distinct subgroups of couples, namely those where: (1) the husband is more educated than the wife, (2) the husband is equally educated as the wife, (3) the wife is more educated than the husband with a gap of one to two years of schooling, and (4) the wife is more educated than the husband with a gap of more than two years of schooling.

The sample of household heads and spouses is similar to that used for the event-study and dynamic decomposition analyses in Section 2.1, but with further restrictions to those with non-missing information on spousal pre-child education. We estimate a similar event-study specification as outlined in equation (1) for each of the four subgroups of couples, separately for women and men,

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<sup>12</sup>We use the terms “husband” and “wife” to refer generically to the male or female spouse or live-in partner, regardless of marital status.

<sup>13</sup>While the model suggests the use of pre-child wages as a proxy for earnings potential, using wages will entail a smaller and selected sample since not all men and women work prior to the arrival of the first child, and respondents need to be married before their first births in order for us to observe spouses’ wages. The latter is less of a constraint when education is used since we can use the education information of spouses’ in later waves (even if the spouse/partner only enters the sample post-baby).

and include controls for own-age and spouse’s age (as dummies) and year fixed effects. Figure 3 shows the effects of parenthood on the earnings trajectories of women and men for each of the four subgroups. The overall patterns are remarkably similar across the four couple-types within gender. Regardless of the education differences between spouses, women experience a large, sudden, and persistent decline in earnings with the arrival of the first child. Although the earnings decline appears to be somewhat smaller among women who are more educated than their spouses in the short to medium term, child penalties for these women remain substantial. In fact, after ten years, women’s earnings show little recovery and the magnitude of the long-run child penalties are similar across the four subgroups at around 50%. By contrast, men’s earnings are essentially unaffected by parenthood across the four couple-types.<sup>14</sup>

Within the context of the household model presented earlier, the fact that the child earnings penalty is observed across all groups of women, even those that are much more educated (and likely to face higher market wages) than their husbands, suggests that unless women are considerably more productive in home production than men, comparative advantage alone cannot easily rationalize the observed patterns. If comparative advantage were driving the differential impacts of children on men and women, we should observe non-existent motherhood earnings penalties (or perhaps even earnings premiums) for women who are considerably more skilled than their husbands. In these couple types, men should also face some earnings penalty with parenthood. At least for these couples, the observed motherhood penalties are likely to be driven by gender differences on the relative weights placed on wives’ vs. husbands’ earnings and/or in the value of time spent on children.<sup>15</sup>

### 3.4.1 Preferences or Discrimination?

In the household model presented above, the motherhood earnings penalty arises due to supply-side decisions resulting from men’s comparative advantage in the labor market or gender differences in preferences and productivity at home. Another possibility is that a portion of the child penalty experienced by women could be due to labor market discrimination. In the context of the model, labor market discrimination against women could affect women’s pre-birth wages, which would tend to reinforce household specialization with the arrival of children. In addition, discrimination might

<sup>14</sup>Similar patterns are observed when we examine employment as the outcome (results available on request).

<sup>15</sup>Using data from Norway, Andresen and Nix (2019) examine child penalties among heterosexual, adopting, and same-sex couples to disentangle the potential sources of the child penalty. They find that while women in heterosexual and adopting couples experience similar motherhood penalties, the patterns differ for same-sex couples. In particular, for same-sex couples, the birth mother experiences a larger income penalty relative to her partner, but catches up within two years after the birth of the first child. The authors are able to rule out that costs associated with giving birth (e.g. health effects, breastfeeding, time spent with child) – a factor that we do not include in our model – are driving the observed child penalties. Moreover, controlling for relative skill differences across spouses does not eliminate the motherhood penalty for heterosexual and adopting couples. Overall, the authors reach a similar conclusion that child penalties are likely driven by gender norms and gender differences in preferences for childcare.

also be directed especially toward working mothers, either in the form of taste-based discrimination possibly due to the violation of women’s appropriate roles (e.g. Akerlof and Kranton, 2000) or statistical discrimination due to employer expectations of more intermittent labor market attachment. Such discrimination could generate a child penalty for women either by directly lowering the post-birth wages of women, or by affecting mothers’ relative career opportunities.<sup>16</sup>

While there are reasons to believe that part of the child earnings penalties experienced by women are due to discrimination, it is not easy to empirically distinguish the role of discrimination. Earlier papers often attributed unexplained gender wage gaps (i.e. wage differences that are not accounted for by gender differences in measured characteristics) as estimates of discrimination; however, in the presence of unobservable differences between men and women (e.g. unmeasured productivity characteristics or preference parameters), such estimates are clearly not satisfactory.

More compelling evidence of discrimination have been found through the use of experiments. In particular, Correll et al. (2007) examine whether mothers are more likely to face discrimination when finding a job using a lab and field-based experiment. In the lab, when student evaluators were asked to assess resumes of equally-qualified female or male job applicants who differed in terms of parental status, mothers were perceived as less competent and less committed to paid work, and were recommended lower starting salaries. Men, on the other hand, were not penalized for being fathers, and were instead perceived to be more committed and recommended higher salaries. The authors confirm their lab findings using a resume audit study where they submitted fictitious resumes of same-sex applicants who were equally-qualified but differed in terms of parenthood. Mothers were only called back for an interview about half as often as non-mothers, while fathers were called back at similar rates as non-fathers. These findings are consistent with discrimination on the basis of parental status.

Other audit and correspondence studies that examine gender biases in hiring yield findings that are more mixed. While earlier resume audit studies of the U.S. restaurant industry by Neumark (1996) and among young workers in the finance industry by Petit (2007) uncover evidence of hiring discrimination against women, other studies find, perhaps not surprisingly, that the extent of gender discrimination in hiring is likely to depend on the types of occupations considered. For example, Riach and Rich (2006) conduct a resume audit study in four occupations in the UK (i.e. accountants, computer programmers, engineers, and secretaries) and find evidence of discrimination against women in the male-dominated occupations, while men were discriminated against in female-dominated and mixed occupations. Booth and Leigh (2010) examine four female-dominated occupations (with female share ranging from 65 to 85 percent female) which include waitstaff, data-entry, customer service, and sales jobs, and find that women in these jobs receive more callbacks

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<sup>16</sup>Women may also choose to differentially invest in skills in anticipation of such labor market discrimination, which would show up as lower potential wages relative to men, and hence, promote household specialization.

than males.<sup>17</sup> Carlsson (2011) consider positions in both female-dominated occupations (e.g. teachers and nurses) and male-dominated occupations (e.g. IT professionals and drivers), and find that while women received more callbacks in female-dominated occupations, applicants of both genders received similar callback rates in male-dominated occupations.

While these experimental studies provide some evidence of discrimination on the basis of gender and parental status in some settings, the implications for wage gaps and career progression are less clear. A separate strand of literature has sought to infer the presence of taste discrimination on the part of employers by testing a central prediction of Becker’s (1957) model of taste-based discrimination that suggests that because discrimination is unprofitable, competitive forces should reduce or eliminate employer discrimination. These papers exploit differences or changes in competitive pressure due to market structure, deregulation, international trade, and firm takeovers, and generally find that an increase in competitive pressure tends to be associated with a reduction in the gender wage gap (Hellerstein et al., 2002; Black and Strahan, 2001; Black and Brainerd, 2004; Heyman et al., 2013).

Finally, a recent working paper by Charles et al. (2018) proposes a direct test of the Becker’s theory by relating cross-state differences in women’s relative labor market outcomes in the U.S. to different points of the distribution of male and female sexism in a state (as measured using responses to gender-related questions in the General Social Survey). Consistent with the idea that it should be the prejudice of the marginal discriminator that determines women’s relative wage and employment outcomes, the authors show that the labor force participation gap and selection-corrected wage gap in a state are strongly related to the attitudes of the median male in that state, but not the attitudes of men at the tails of the distribution.<sup>18</sup> Interestingly, percentiles of the distribution of female sexism do not exhibit similar patterns.

While the above-mentioned studies suggest the potential role of labor market discrimination in understanding the motherhood penalty and the remaining disparities in the labor market, it remains difficult to distinguish the role of discrimination and preferences in most observational settings. In what follows, we will consider potential explanations for the child penalty that focus on women’s supply-side considerations. That is, how gender pay gaps can arise even when employers practice “equal pay for equal work.”

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<sup>17</sup>Bertrand and Mullainathan (2004) also find that females in sales jobs receive more callbacks than males. However, the difference is not statistically significant and much smaller than the racial gap.

<sup>18</sup>In the U.S., women are about half the labor force. Assuming that the distribution of sexism among employers is similar to the distribution of sexism among all adults in a state, the marginal discriminator is likely to be drawn from the “middle” of the sexism distribution, whereas employers with sexist beliefs at the tails of the distributions (i.e. the 10th and 90th percentile) are likely to be infra-marginal.



## 4 Why Children Are Key to Understanding Gender Inequality

The household model presented in the previous section suggests several reasons why children impose a disproportionate effect on women’s careers. In this section, we discuss recent research that provides insights into these channels, namely gender differences in preferences for job attributes (Section 4.1) and the role of gender norms and the division of household work (Section 4.2). We then turn to a discussion of the determinants of the formation and evolution of gender norms for the traditional division of labor within the household (Section 4.3).

### 4.1 Gender Differences in Preferences for Job Attributes

Regardless of the underlying sources, the household model suggests that both comparative advantage and differences in preferences can generate the empirical observation that women are more likely than men to make important career adjustments around childbirth and to take on the role as the dominant provider of household work and childcare, even when they have careers.

Various studies have documented that women are more likely to sort into different occupations or positions within occupations that are more compatible with their dual roles in the home and in the labor market with the arrival of the first child. For example, using matched employer-employee data from Sweden, Hotz et al. (2018) show parenthood is associated with a larger share of female co-workers, share of part-time workers, and the share of female co-workers with young children for women relative to men.<sup>19</sup> They further construct an index of workplace “family friendliness” and show a clear increase in the probability that mothers work at a family friendly workplace relative to fathers, with the onset of parenthood.<sup>20</sup> Relatedly, Pertold-Gebicka et al. (2016) examine employment adjustments around motherhood in Denmark and find that women are more likely to switch from private to public sector jobs after the birth of a child, and that these transitions are related to pre-birth occupational characteristics such as time pressure and the convexity of pay (i.e. earnings returns to working long hours).

Several recent studies have also shown that women make certain career choices in anticipation of children.<sup>21</sup> Adda et al. (2017) estimate a dynamic life cycle model of labor supply, fertility, and occupational choice to study the trade-off between occupational choices and intended fertility. The

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<sup>19</sup>Similarly, Cha (2013) uses longitudinal data from the Survey of Income and Program Participation (SIPP) and shows that mothers are more likely to exit male-dominated occupations when they work 50 hours or more per week, but the same effect is not observed for men or childless women.

<sup>20</sup>The index of family-friendliness is constructed from a model-based approach that aggregates the marginal willingness to pay (MWP) for workplace attributes of mothers for each Swedish workplace in the data.

<sup>21</sup>These studies build on the insights from earlier work such as Polachek (1981) and Gronau (1988) that argue that traditional gender roles imply that women have a greater tendency to sort into occupations with lower degrees of skill depreciation than men as they anticipate more work interruptions and shorter careers.

model allows different occupations to differ in terms of entry wages and rates of skill depreciation, and amenity value with regard to children (i.e. “child-friendliness”). The model is estimated using German data in the context of the German apprenticeship system (a 2-3 year vocational training program in a specific occupation) which allows the authors to observe initial occupational choices before fertility decisions are made, yet incorporates individual preferences for future fertility. Comparing women with children to a no-child scenario,<sup>22</sup> the authors find that about three-quarters of the life cycle career costs associated with motherhood is due to intermittent/reduced labor supply, and about one-quarter results from differences in wages, with selection into child-friendly occupations at the beginning of the career accounting for close to 20% of the wage contribution.

Further evidence on this channel is provided by Wasserman (2019) who explores how workplace time requirements affect women’s occupational choice in the context of specialty decisions among medical residents. Exploiting a 2003 policy that capped the average workweek for medical residents at 80 hours, she finds that women (but not men) increased their entry into specialties that experienced larger reductions in residency hours due to the policy. These findings are consistent with women choosing to enter certain occupations or positions within occupations early in their career in anticipation of the time demands associated with future family formation.

Standard models of compensating differentials (e.g. Rosen, 1986) imply that gender differences in preferences for workplace flexibility are likely to have important earnings consequences to the extent that such job amenities are costly for employers to provide.<sup>23</sup> Several studies have sought to quantify gender differences in the preferences for workplace flexibility using hypothetical job choices and its implications on the gender pay gap. Hypothetical job choice experiments are a popular way of estimating individual preferences for workplace (and other non-market) attributes since they allow researchers to sidestep thorny empirical issues in isolating compensating differentials from observational data on actual job choices.<sup>24</sup> In these experiments, respondents are presented with a series of hypothetical job choice scenarios that are constructed to reflect a realistic menu of potential job offers that vary in earnings, and other job characteristics (e.g. hours of work, work hours flexibility, the option to work part-time, etc.). In each scenario, respondents are asked to choose which job they prefer from a menu of two or three job offers and the scenarios are then repeated and the job characteristics are varied randomly. Respondents’ stated preferences for these jobs allows researchers to construct a measure of individual preferences for each job attribute in terms of earnings that respondents are willing to forego for a particular job attribute (i.e. willingness

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<sup>22</sup>In this scenario, the model is re-estimated assuming that the woman knows ex-ante that she cannot have children.

<sup>23</sup>Family-friendly job amenities are costly for employers to provide because the provision of such amenities (e.g. shorter work hours, allowing job interruptions, flexible work arrangement, on-site daycare and paid family leave, etc.) can be thought of as reducing employers’ profit from the productivity of workers.

<sup>24</sup>The issue is that observed relationships between earnings and a particular job attribute tend to be confounded with other unobserved job attributes and individual characteristics. In fact, previous work examining compensating differentials or workers’ valuation of job conditions using realized wage differentials and job choices tend to yield mixed results, that often “go the wrong way” (Wiswall and Zafar, 2018).

to pay).

Using a hypothetical job choice experiment administered as part of an application process to hire telephone interviewers to staff a national call center, Mas and Pallais (2017) find that the average worker is willing to give up substantial pay for the option of working from home (8% of wages) and to avoid a schedule set by an employer on short notice (20% of wages). Moreover, they find that women, particularly those with young children, have a higher willingness to pay for the option of working from home and to avoid on-call scheduling. Nevertheless, while they find that women are indeed more likely to be in jobs that offer these amenities, the gender difference in representation across jobs is not large enough for these workplace preferences to explain the observed gender wage gap, even with sizable compensating differentials. In a closely related study, Wiswall and Zafar (2018) utilize a survey of hypothetical job choices administered to undergraduate students from NYU and find that women are willing to pay significantly more than men for jobs that offer greater work flexibility in the form of the option to work part-time and lower work hours and job stability. On the other hand, men have higher willingness to pay for jobs with high earnings growth. Overall, they find that gender differences in preferences for these job attributes can explain as much as a quarter of the early-career gender gap in earnings.<sup>25</sup>

While these studies indicate how sorting across occupations and jobs on the basis of family-friendly job attributes can contribute to the gender pay gap, in her highly influential AEA presidential address, Goldin (2014) highlights the need to look within occupations to examine how jobs are organized and compensated to better understand the sources of the remaining pay disparities. In particular, she argues that some occupations disproportionately reward individuals who are willing to work long (and particular) hours, and that these same occupations are also those that tend to have larger gender earnings gaps. Because women tend to place a higher value on temporal flexibility and work fewer hours, they suffer greater earnings penalties relative to men in occupations where the rewards for long work hours are particularly large. Occupations in the business sector and law appear to exhibit among the greatest convexity of pay with respect to time worked, suggesting that the large penalties for shorter work hours and job interruptions (which is more frequent among women) in these occupations is likely to be a key factor in explaining the substantial divergence in career trajectories of MBAs and lawyers over the lifecycle as documented in studies by Bertrand et al. (2010), Noonan et al. (2005), and Azmat and Ferrer (2017).

Córtés and Pan (2019) provide support for a causal interpretation of the relationship between the returns to working long hours and the gender pay gap. Exploiting cross-city variation in the influx of low-skilled migration, the authors show that increases in the supply of long hours by skilled

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<sup>25</sup>Using a similar experimental set-up, Maestas et al. (2018) find that women value the option to telecommute, having paid time off, and avoiding heavy physical activity more than men. In this study, accounting for gender differences in the value placed on certain working conditions (especially paid time off and avoiding heavy physical activity) reduces the gender compensation gap by about a third.

women (generated by the greater access to household services provided by migrants) reduce gender pay gaps among the highly skilled in occupations that disproportionately reward long hours of work. Taken together, the studies by Goldin (2014) and C3rtes and Pan (2019) suggest that restructuring work to reduce the penalties associated with working fewer hours or policies that reduce the gender gap in work hours can help to address the remaining pay differentials.

## 4.2 Gender Norms and the Division of Household Work

Having shown that children have very different effects on the career choices and trajectories of women and men, a question that naturally arises is – why are women still expected to be the main providers of childcare within the household, despite the convergence in economic roles in society today?

As alluded to in our discussion of the household model, gender norms are likely to be responsible for the unequal division of non-market work within the household, especially in situations where women have a comparative advantage in market work. Indeed, the notion that individuals are unwilling to act in contravention of understood or agreed upon behaviors has a long-standing history in the social sciences, dating back at least to Smith (1759). In their seminal paper, Akerlof and Kranton (2000) incorporate insights about social identity from sociology and social psychology into economics to provide a formal way for thinking about how identity considerations can influence individual behaviors and choices in a variety of settings. Akerlof and Kranton (2000) define identity as one’s sense of self, or one’s sense of belonging to a social category that is coupled with expectations about how individuals in that category should behave. In their proposed model, identity directly enters an individual’s utility function, and influences behavior and outcomes because deviating from the prescribed behavior associated with one’s social category is costly. Applying the model to the concept of gender identity norms, the relevant social categories are those of “man” and “woman,” and both genders may (un)consciously adopt or adhere to these norms in social interactions so as to avoid social sanctions or because they have internalized these norms.

Particularly relevant to the division of household work and women’s labor supply choices, especially when children are present, is the set of norms regarding the appropriate role of women in society. These identity norms include prescriptions such as “men should work in market, while women manage the home.” Earlier attempts to test the relevance of gender identity norms examine cross-country and within-country variation in gender role attitudes and its correlation with women’s (relative) labor market outcomes. For example, Fortin (2005) uses data from the World Values Surveys in 25 OECD countries over a ten-year period and shows that countries with more traditional views toward women as homemakers and men as breadwinners have lower female labor force participation and larger gender pay gaps. Similar correlations are also observed across states

in the U.S. (Charles et al., 2018). Papers by Fortin (2015) and Cotter et al. (2011) use data from the General Social Survey to examine trends in gender role attitudes within the U.S. from 1977 to the late 2000s. Strikingly, both papers find that the evolution of gender role attitudes appears to closely mirror the evolution of female labor force participation over time – trends toward more progressive gender roles appears to have stalled since the mid-1990s, precisely coinciding with the plateauing of female labor force participation in the U.S. Nevertheless, while these correlations are suggestive that gender identity norms matter for women’s labor market outcomes, it is difficult to attach a causal interpretation given that the associations could be driven by reverse causality or unobserved differences (across countries or over time).

Another strand of papers seeks to isolate the causal effect of cultural norms regarding gender roles on women’s outcomes by focusing on international migrants and exploiting the feature that immigrants who reside in the same country face similar market forces and institutions, yet are exposed to different cultural factors depending on their country of origin or ancestry. The idea is that by comparing immigrants from different origin countries who are now residing in the same countries and therefore face similar economic conditions and institutional environment, differences in behaviors and outcomes across immigrants from different source countries can be attributed to differences in cultural exposure. Fernandez and Fogli (2009) show that second-generation American women whose ancestors originate from countries with higher female labor force participation are more likely to work, even after controlling for individual and spousal socio-demographic characteristics. Interestingly, the authors find that husband’s ancestry also matters, and appears to be more important than wives’ ancestry in driving the work outcomes of married women. Studies by Antecol (2000) and Blau et al. (2011) similarly find that home-country female labor participation rates are predictive of the labor supply behavior of first-generation American immigrant women. Further, Blau et al. (2011) show that when exposed to the labor market conditions and social norms in the U.S., immigrant women from both high-female participating and low-female participating countries eventually achieve similar participation rates as comparable natives, suggesting a relatively high degree of cultural assimilation.

As a more direct test of the role of gender identity considerations in limiting the further convergence in women’s labor market outcomes, especially as women’s position in the labor market improves relative to men, Bertrand et al. (2015) examine the economic and social implications of the behavioral prescription that “a man should earn more than his wife.” Using administrative earnings data from the U.S., the authors document that, among married couples in the U.S., the distribution of the share of household income exhibits a sharp drop just to the right of 0.5, that is, at the point where the wife starts to earn more than her husband. To the extent that these patterns reflect an aversion to a situation where the wife earns more than the husband, the authors argue that such norms should also matter for sorting in the marriage market and the evolution of relative income within a couple. To test these implications, the authors use data from the U.S. Census to show

that within a marriage market over time, when a randomly chosen woman becomes more likely to earn more than a randomly chosen man, the marriage rate declines. Within couples, when the probability that a wife out-earns her husband increases, she is more likely to be out of the labor force and, even if she does work, the gap between her realized and her potential income is greater (in part due to lower hours of work). Further, the authors show that when wives earn more than their husbands, thereby violating the identity norm, marital satisfaction is lower and these unions are more likely to end up in a divorce. Finally, wives in such couples take on a greater share of the housework, consistent with the idea that a “threatening” wife compensates by taking on more housework to assuage their husband’s unease with the situation (Hochschild and Machung, 1989). The findings on women’s labor supply and time-use are particularly hard to square with standard household models based on comparative advantage (e.g. Becker, 1981) which would generally predict the opposite – that is, spouses with a comparative advantage in market work should spend more time in the labor market and perform *less* housework.

More recent work by Bursztyn et al. (2017) show that traditional gender norms remain relevant among highly-educated and career-oriented women. Using administrative and survey data on MBA students at UCLA, the authors provide evidence suggesting that single women avoid actions that may advance their careers during the MBA program as these actions are likely to signal professional ambition to a potential future spouse and lower their marriage market value. Specifically, the authors show that while married and unmarried female MBA students have similar grades on exams and assignments (which are unobservable to other students), the latter have systematically lower participation grades. This is consistent with unmarried female students not wanting to appear too smart or ambitious in situations where they might meet their potential spouse. The authors complement this descriptive evidence with a field experiment utilizing a real-stakes questionnaire on job preferences and personality traits that newly admitted students are required to complete to determine their internship placement. Students were randomly assigned to two conditions that varied in terms of peer observability – in the “public” version, students were told that their answers would be seen by a career counsellor and discussed in the career class while in the “private” version, students were similarly told that their answers would be seen by a career counsellor but that anonymized answers would be discussed in class. Strikingly, the authors find that single female students report less ambitious career goals and leadership attributes in the public vs. private condition. On the other hand, answers do not differ across the two conditions for non-single female students or men (regardless of relationship status).

As Bertrand (2020) astutely points out in her 2020 AEA presidential address, that gender norms and stereotypes affect women’s (and men’s) behavior suggest that these considerations are likely to directly shape one’s preferences when it comes to career considerations such as labor supply decisions and occupational choice. This makes it difficult to infer whether the observed choices that women make with regards to their caregiving role or desire for certain job attributes are due

to intrinsic preferences, or influenced in part by prevailing gender stereotypes and norms. This is important as it suggests that the choices made by men and women may not reflect intrinsic differences in preferences or skills, but may in fact, be a reflection of a broader set of constraints imposed by society.

### 4.3 What Drives Gender Identity Norms?

The papers discussed above highlight the relevance of gender norms for the traditional division of labor within the household and the disproportionate impact that children impose on women's careers. An equally important question is what determines the formation and evolution of these norms.

Several papers have emphasized the historical origins of gender norms, and demonstrate how cultural persistence can lead to the stickiness of these norms over long periods of time. As one of the earliest papers in this stream, Alesina et al. (2013) show that traditional agricultural practices influenced historical gender roles and the evolution of gender norms. The authors exploit variation in the historical geo-climatic suitability of the environment for growing crops using the plough and show that ethnicities and countries whose ancestors practiced plough cultivation (which required more physical strength, and hence favored male labor), rather than shifting cultivation, have lower rates of female labor force participation even today. A related study by Hansen et al. (2015) finds that societies with longer histories of agriculture have lower female labor force participation and less-equal gender roles today, likely due to historically higher fertility and a reduced role for women outside the home. Other papers in this stream have examined the long-run impacts of historical male-biased sex ratios induced by the resettlement of convicts to Australia (Grosjean and Khattar, 2019) as well as increases in relative female income due to the cotton revolution (Xue, 2018) on women's labor market outcomes and gender-role attitudes today.

While the historical origins of gender roles provide a possible rationalization for the persistence of gender norms even as economic conditions change, the fact that past conditions matter does not exclude the possibility that short-run factors can also lead to important shifts in gender norms. Indeed, technological and medical innovations, economic development, and changes in the production structure of the economy are likely to have contributed to the altering of women's identity and changing gender roles in the later half of the 1990s (Goldin and Katz, 2002; Greenwood et al., 2005; Goldin, 2006; Albanesi and Olivetti, 2016). Several studies have also used the division of Germany into Eastern and Western blocs and the subsequent reunification to examine how political institutions such as socialism – which promoted women's economic inclusion – affect gender roles within the household. These papers find that decades after reunification, exposure to state socialism appears to have led to the adoption of more progressive gender-role attitudes, increased

women’s preferences for work, and a shift away from the male breadwinner norm (Bauernschuster and Rainer, 2012; Beblo and Gorges, 2018; Campa and Serafinelli, 2019; Senik et al., 2020). Focusing on German women on both sides of the Inner German border within the same commuting zone, Boelmann et al. (2020) document that the motherhood penalty in terms of female labor supply is also smaller among East German mothers relative to their West German counterparts.

The social environment has also been found to be important in the transmission of gender norms and preference formation. Indeed, a growing body of work points toward a strong intergenerational component in the transmission of gender-role attitudes and preferences for work. Fernandez et al. (2004) exploit variation in the mobilization rates of men across U.S. states during WWII as a shock to mothers’ labor force participation and find that men whose mothers worked were more likely to have working wives. Interestingly, the authors find little evidence that the work behavior of a married woman’s own mother has an effect on her labor supply. This finding suggests a potentially important propagation mechanism for broader shifts in gender norms – with more of these “non-traditional” men around, more women enter the labor market and, in turn, produce progressive sons (Bertrand, 2011).

Using the 1979 National Longitudinal Survey of Youth (NLSY79), Farre and Vella (2013) provide direct evidence of the intergenerational transmission of gender-role attitudes. Further, they show that mothers with less traditional gender-role attitudes are more likely to have working daughters and daughter-in-laws.<sup>26</sup> The gender socialization of children could also depend on the broader family situation that they are exposed to. Also using the NLSY79, Bertrand (2019) shows that exposure to non-traditional family arrangements where mothers have greater economic power in the household is associated with more liberal gender-role attitudes among young adults. Several papers have also explored the role of sibling sex composition and find that, for women, having a brother relative to a sister results in them holding more traditional family attitudes and exhibiting a greater degree of gender conformity as measured by occupational and partner choice (Rao and Chatterjee, 2018; Brene, 2020; Healy and Malhotra, 2013). Possible mechanisms include sex-typing in mixed-gender sibships or differential parental investments. Drawing on time-use data from Denmark, Brene (2020) provides some suggestive evidence of “gendered parenting” among children with an opposite-sex sibling, which she argues is likely to directly shape the interests and behavior of their children along gender-specific lines.

Recent studies are also starting to look beyond the family environment to examine other gender socialization channels involving an individual’s broader social network. Olivetti et al. (2018) show that women who were exposed to more peers with working mothers during adolescence were less likely to believe that work conflicts with family responsibilities as adolescents and are more likely

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<sup>26</sup>Similar results have also been found in the developing country context among adolescents in India (Dhar et al., 2019).



to work for pay when they have children. Maurin and Moschion (2009) document similar peer effects on women’s labor supply based on the work behavior of neighbors. A few papers provide evidence of the cultural diffusion of gender norms through migration using large-scale migration flows within Germany and the former USSR. These papers generally find that exposure to migrants from countries of origin with more progressive gender norms prompted women in the local population to adopt less traditional gender-role attitudes (Jarotschkin et al., 2020), and increased women’s labor market attachment in the local population and workplace (Schmitz and Weinhardt, 2019; Boelmann et al., 2020).

## 5 Are the Career-Family Trade-offs Widening?

Although women continue to shoulder the disproportionate burden of household work, due to gender differences in comparative advantage and/or persistent gender norms, one might have expected that shifts toward more progressive gender norms, changes in the economic role of women, and technological innovations in the household sector should make it easier for modern cohorts of women to combine career and family (Bertrand, 2018).

In this section, we consider potential countervailing forces, both on the home front and on the work front that may have contributed (and further contribute) to widening the set of career-family trade-offs that women face and the persistence of gender disparities in the labor market.

### 5.1 Increase in Parental Time Demands

The macroeconomics literature has emphasized the decline in the costs of motherhood as a key driver of rising aggregate female labor force participation in the U.S. over much of the 20th century. In the household sector, electrification and the widespread adoption of time-saving technologies in the household (such as washing machines, vacuum cleaners, frozen foods, and ready-made clothes) liberated women from household chores and contributed to the significant rise in married female labor force participation over the last century (Greenwood et al., 2005). Further, beginning in the 1930s, there were significant declines in the health costs associated with motherhood as a result of pharmaceutical and medical innovations which dramatically reduced mortality and morbidity associated with childbirth. Improvements in the quality of infant formula also meant that women’s return to the labor market was less constrained by the need to breastfeed (Albanesi and Olivetti, 2016). Finally, as discussed in the previous section, stigma costs associated with a working mother have also declined throughout much of the 20th century (Fernandez, 2013), thereby alleviating the identity or psychic costs of being a working mother.

Yet, more recently, it appears that some of these gains may have played out or even reversed.

Several studies document a notable increase in parental time spent with children, even as women spent more time in the workforce and the amount of time spent on housework declined significantly (Aguiar and Hurst, 2007; Bianchi et al., 2006). Ramey and Ramey (2010) take a closer look at trends in childcare in the U.S and find that the increase in parental time spent on childcare occurred in the mid-1990s and was particularly large for college-educated parents. Indeed, they document that in the mid-1990s, both college-educated and non-college educated mothers aged 25 to 34 spent roughly 11 hours a week on childcare activities. By the early 2000s, college-educated mothers reported spending 20 to 22 hours, while their less educated counterparts reported spending about 16 hours. Fathers have also increased their time spent with children, but they start from a significantly lower base of about 4 hours per week. In the early 2000s, college-educated fathers spend about 10 hours per week on childcare, while non-college educated fathers spend about 7 hours per week. Similar patterns have also been documented for the UK (Borra and Sevilla, 2019).

Besides time spent with children, another time-intensive aspect of childrearing that has increased in importance is that of breastfeeding. In a striking reversal of the trends highlighted in Albanesi and Olivetti (2016), mothers today are encouraged to breastfeed exclusively for at least six months and infant formula, especially in the early months of a child's life, is seen as a second best option. In line with the medical advice, rates of breastfeeding have increased significantly over the past several decades in the U.S. and the UK. Such unexpected increases in parental time demands may explain why recent cohorts of women appear to systematically underestimate the employment consequences of motherhood and are "surprised" by how difficult it is to combine work and family (Kuziemko et al., 2018).

While it remains unclear what is the driving force behind the observed increase in parental time demands, several explanations have been proposed. Ramey and Ramey (2010) argue that the increase in parental investments in childcare in the U.S., especially among the highly-educated, could be due to growing competition for slots in top colleges due to the high returns associated with selective colleges. As suggestive evidence in support of this view, they show that parental time spent with children are less pronounced in Canada, where the hierarchy among colleges is less steep. Providing additional support for this explanation, Borra and Sevilla (2019) show, using data from UK, that increased competition for university places in the 1980s and early 1990s coincided with a larger increase in the time spent on educational activities with children by highly-educated parents relative to less-educated parents.

Doepke and Zilibotti (2017) propose a theory of parent-child relations to understand how parenting styles are determined and argue that increases in inequality and the accompanying rise in the returns to education and skills raises the returns to the investment in children's human capital and, consequently, promotes authoritative and intensive parenting. The authors argue that when future stakes are high, "helicopter parenting", which is more engaged and time-intrusive, is preferred as

it seeks to cultivate a sense of responsibility and accountability that will help children develop into high-achievers. The authors show that the model predictions line up with cross-country variation in inequality and parenting styles, as well as changes in parenting style over time and across education groups within the U.S.

The apparent slowdown in the shift toward more egalitarian gender norms (as briefly discussed in Section 4.2) may have also contributed to women’s increasing challenges in combining work and family. Fortin (2005) documents that while the share of men and women holding traditional gender-role attitudes have been declining over time, there has been little progress in gender attitudes since the post-1940 birth cohorts. This appears to be especially true for the set of views regarding the potential conflict between maternal employment and children’s wellbeing. Several sociologists attribute the stalling of gender norms as reflecting “egalitarian essentialism,” where women and men should have equal opportunities at work, but are free to choose different roles based on beliefs about the essential nature of men and women (e.g. men and women are more naturally suited to some roles than others). This might explain why there has been greater progress toward gender-neutral attitudes on aspects related to the public sphere (e.g. employment opportunities and leadership abilities), but a stalling, or perhaps even reversal in the upward trend toward more progressive attitudes concerning the role of women within the family as a working mother or wife (Charles and Grusky, 2004; Cotter et al., 2011; Pepin and Cotter, 2018). Indeed, there is speculation that women’s advances in education and the labor market may in fact serve to reinforce gender essentialism in the family (Pepin and Cotter, 2018; England, 2010). Further, it is possible that some “dormant” identity norms are becoming increasingly relevant as women’s economic position improves. In a world where women’s human capital accumulation and labor market attachment is low, norms such as “a man should earn more than his wife” have little practical relevance; however, as women’s earnings potential improves, such norms would start to gain traction and create situations where women seeking to balance careers and families may spend even *more* time at home to assuage their partners and their guilt (Bertrand, 2018; Bertrand et al., 2015).

## 5.2 Workplace Demands and Couple Equity

Turning to the market work side of things, changes in the structure of jobs that increased the rewards for inflexible work is another countervailing force that is making it more challenging for women to combine work and family. We previously discussed how women’s lower willingness to work long hours and greater demand for temporal flexibility can lead to greater earnings penalties relative to men in occupations that disproportionately value such worker attributes (Goldin, 2014). Several researchers have documented that the earnings premium for working long hours appears to have increased considerably since the 1980s for most occupations, with college-educated workers experiencing particularly large increases over time (Kuhn and Lozano, 2008; Córtes and Pan, 2019).

In particular, Cha and Weeden (2014) show that rising returns to overwork, defined as working 50 or more hours per week, coupled with the gender gap in the propensity to work overtime, worked to slow the convergence of the gender wage gap during the 1979 to 2009 period by an estimated 10 percent of the total wage gap. For professional and managerial occupations, the authors estimate that the gender wage gap would have narrowed by an additional 30 and 20 percent, respectively, in the absence of the rise in the returns to overwork during the sample period.

The precise sources of the increase over time in the rewards for working long (and inflexible) hours remain unclear. Cha and Weeden (2014) discuss some of the possible drivers. These include the diffusion of tournament compensation and promotion systems, where small differences in productivity can result in large differences in pay (Lazear and Rosen, 1981). Lemieux et al. (2009) document that an increasing fraction of jobs in the U.S. labor market utilize performance pay schemes. Components of performance pay such as bonus pay and commissions are typically determined based on the relative performance across workers and are likely to incentivize workers to work longer hours to “win” the tournament and realize higher returns. Moreover, when actual productivity is hard to observe, firms may rely on work hours as a proxy for productivity, leading to a “rat-race” equilibrium where workers supply long hours of work to signal their productivity and commitment to the job (Landers et al., 1996). The secular rise in inequality in the labor market and the rising returns to skill is likely to increase the returns to signaling. Even absent signaling, rising wage inequality could increase the returns to long work hours by incentivizing workers to obtain more skill on the job in order to gain access to better, high-paying jobs (Michelacci and Pijoan-Mas, 2012). Finally, other structural shifts such as technological change and globalization may have also increased the returns for high-ability individuals to increase their work hours to take greater advantage of productivity-enhancing technologies and the access to larger markets. Indeed, future work that can shed more light on the key drivers of the increase in the returns to working long hours would be highly valuable.

Regardless of the underlying sources, rising returns to inflexible work arrangements not only imposes greater penalties on the fewer hours that women already work, but also creates a situation where striving for equity within couples becomes more costly (Goldin, 2019). From a household’s financial standpoint, in the face of rising returns to long work hours, it makes more sense for one partner to specialize in household work so that the other partner can reap the sizable benefits from higher work commitment, rather than for both partners to contribute equally to home production and market work. Essentially, rising returns to job inflexibility would tend to increase the returns to specialization within the household, making it more difficult for women (even the highly-educated ones) to achieve gender parity. Bertrand (2018) further highlights that this phenomenon is likely to be even more binding today for educated women in high-paying occupations as many more of them are likely to be married and have children than before. For these couples, both husbands and wives are likely to be in jobs with competing demands, making it more challenging for women to

achieve their full earnings potential.

## 6 Policies to Address the Remaining Gender Disparities

In this section, we discuss the impact of policies that seek to address the remaining gender disparities, focusing on policies that are particularly relevant for the set of work-family considerations that are crucial for understanding the role of children in gender inequality. These include family-friendly policies that (1) promote work-family balance for women such as maternity leave provisions and flexible work arrangements, (2) target maternal labor supply by improving affordability and access to childcare, and (3) attempt to equalize childcare by encouraging fathers to participate in childcare through paternity leave policy. On the work front, we discuss changes in the structure of work as a possible demand-side response.

### 6.1 Family-Friendly Policies

#### 6.1.1 Maternity Leave Policies

To address the competing work and family considerations that many women face, many public policies and firm-level policies aim to facilitate women's participation in the labor market by augmenting work-family amenities such as paid maternity leave entitlements, the option to work part-time, as well as access to and subsidies for childcare. Many firms also try to make their workplaces more attractive to women by offering women options to work remotely as well as greater flexibility over the scheduling of their work day.

The vast majority of developed countries have in place some form of parental leave entitlement at the national-level that provides workers (typically the mother) with time-off work to care for newborn children. With the exception of the U.S., a substantial portion of maternity leave is paid and accompanied by some period of job protection. Nevertheless, there is a wide variation in maternity leave provisions across countries. Across OECD countries, most offer between 14 and 22 weeks of employment-protected maternity leave and between 16 to 60 weeks of paid maternity leave (Olivetti and Petrongolo, 2017). Theoretically, the effects of maternity leave policies on women's labor force attachment and the gender pay gap are ambiguous. On the one hand, these policies encourage employment continuity since women have a job available when they are ready to return back to work. Moreover, by enabling them to retain firm-specific or occupation-specific human capital, maternity leave policies can help to increase women's wages and narrow the gender pay gap. On the other hand, extended maternity leave could encourage women to take longer leaves (especially during the benefit period) and make it difficult for them to effectively re-enter

employment or to remain on the same career track. Women may also develop a stronger attachment to their children during long leave periods leading to a greater desire to spend even more time with the child (Schonberg and Ludsteck, 2014). Besides these labor supply effects, on the demand side, longer parental leaves likely raise the costs of hiring women and employers may also be less inclined to assign women of child-bearing age to important jobs or clients (in anticipation of their future time off from work).

Recent research has found mixed effects of maternity leave policies on women's labor market outcomes. This is perhaps unsurprising given the wide variation in policy details across countries and over time. Overall, cross-country evidence exploiting within country variation in maternity leave policies over time suggests that moderate job-protected leave entitlements of up to about one year tend to be associated with higher female employment and positive or zero effects on wages, while longer leaves adversely affect the same outcomes. The positive effects of moderate job-protected leave entitlements on female employment appear to be concentrated among low-skilled women, while longer maternity leaves tend to widen the gender earnings gap among high-skilled women (Olivetti and Petrongolo, 2017; Blau and Kahn, 2013; Ruhm, 1998). Micro-level studies that exploit the staggered introduction of maternity leave policies and later reforms tend to find more muted effects. Careful studies by Lalive et al. (2014) and Schonberg and Ludsteck (2014) examining major expansions in maternity leave coverage in Austria and Germany, respectively, find that these extensions lead to delays in mothers' return to work with virtually no effect on the employment rates and earnings for women three to six years after childbirth. Schonberg and Ludsteck (2014) further show that the extension of the maternity benefit period beyond the job protection period in Germany had significant negative effects on women's long-run employment and earnings, suggesting that policy details such as job protection are important in understanding the potential effects of benefit extensions.

Studies of the U.S. experience has been more limited, largely due to the lack of policy changes. Several studies have examined the effects of the introduction of the 1993 Family and Medical Leave Act (FMLA) which provides 12 weeks of job-protected *unpaid* leave to qualifying workers. Most of these studies find that while the FMLA increased leave-taking, it had little measurable impact on the employment and wages of eligible women (Waldfogel, 1999; Han et al., 2009; Baum, 1999). Recent work by Thomas (2016) finds that while the FMLA resulted in modest gains in the likelihood of employment for women hired after the introduction of the policy, these women were less likely to be promoted relative to comparable women hired before the FMLA. Other studies exploit the implementation of paid family leave policies at the state level in Rhode Island and California. Studies using survey data and a difference-in-difference approach generally find that these policies improve mothers' employment and wage outcomes in the short-run (Rossin-Slater et al., 2013; Baum and Ruhm, 2016). However, a more recent study by Bailey et al. (2019) using universe of individual tax returns from California find little evidence that the California's 2004 Paid

Leave Act improved women’s career outcomes in the short or longer-term. Moreover, the authors find that access to paid leave does not appear to increase the likelihood that women remain with their pre-birth employer, suggesting that the retention of firm-specific human capital may have played a limited role in promoting employment continuity.

### 6.1.2 Childcare Provisions

Another set of public policies seek to support maternal employment by providing direct substitutes for maternal time in childcare in the form of affordable and accessible childcare. Such policies include childcare subsidies and improvements in the availability and quality of childcare, as well as changes in the school schedule. In general, studies find that improving access to childcare increases the labor force participation and earnings of mothers, especially among single or low-skilled women. Focusing on the U.S. experience, Gelbach (2002) shows that kindergarten enrollment led to substantial increases in the labor supply of single mothers, but less so for married mothers. Cascio (2009) find similar positive effects on the maternal labor supply of single mothers (with no children under the age of five) resulting from the expansion of access to publicly-funded kindergarten programs in the 1960s and 1970s. Evaluations of more recent universal pre-kindergarten programs, however, yield more mixed findings. Fitzpatrick (2010) uses a regression discontinuity framework and finds that access to universal pre-K in Georgia and Oklahoma in the 1990s increases statewide preschool enrollment significantly, but has little effect on the labor supply of most women. Cascio and Schanzenbach (2013) exploit the timing and age-targeting of the Georgia and Oklahoma programs (relative to the rest of the U.S.) within a difference-in-difference framework and find some evidence of a modest increase in the employment rate of less-educated mothers. However, these estimated effects, are somewhat sensitive to the choice of specification, and if anything, only during the first few years after the program was in place.

A number of studies have examined the introduction of highly subsidized, universally accessible childcare in the Canadian province of Quebec in 1997. These studies find that the “\$5 per Day Childcare” significantly increased maternal labor supply, with the labor force participation of mothers rising by almost 8 percentage points (Baker et al., 2008; Lefebvre and Merrigan, 2008). These effects continue to persist up to at least 10 years after the policy was introduced (Haeck et al., 2015). One possible explanation for the larger effects observed in these studies relative to the U.S. studies could be because the reforms studied in the U.S. had narrower coverage and are less comprehensive. For example, the universal Pre-K programs in the U.S. typically apply only to children aged 4 years old and covers childcare of at most 6 hours per day, compared to 12 hours per day in the case of the Quebec policy (Haeck et al., 2015).

Perhaps not surprisingly, in countries with relatively low childcare costs (and high female labor force

participation) at baseline such as Norway and France, expansions in subsidized public childcare were found to have little impact on maternal employment (Havnes and Mogstad, 2011; Givord and Marbot, 2015). By contrast, the effects of childcare subsidies on maternal labor supply tend to be larger in countries like Spain and Germany where female labor force participation and the supply of childcare spaces were low pre-reform (Nollenberger and Rodríguez-Planas, 2015; Bauernschuster and Schlotter, 2015).

Another set of papers study the effects of the increased availability of affordable and flexible childcare, in the form of low-skilled immigrants in the domestic sector. In countries such as the U.S. and Europe, many low-skilled immigrants tend to work disproportionately in service sectors that substitute for household production. As such, increases in low-skilled immigration tend to lower the prices of household services (Cortes, 2008) and potentially induce natives, especially those with the highest opportunity cost of time, to outsource household production and potentially increase labor supply. Other countries such as Singapore, Hong Kong, and the Middle East have explicit programs that grant temporary visas to foreign domestic workers (FDW) to work in the countries' household sector. FDWs are a source of affordable, live-in domestic help for a large number of households in these countries – in Hong Kong, the proportion of households hiring at least one FDW is close to 8% in 2006, and among household with young children, more than one in three hired at least one FDW. Unlike government-provided childcare subsidies, these market-based alternatives to reducing childcare costs are more likely to alter the time-use decisions of skilled women (i.e. those commanding higher wages in the market) as they face the greatest incentives to purchase household services in the market.

Studies on the impacts of low-skilled immigration on women's labor supply typically find that low-skilled immigration inflows into a country increases the hours worked and the likelihood of working long hours, particularly among highly-skilled women. In particular, Cortes and Tessada (2011) exploit historical cross-city variation in low-skilled immigrant concentration in 1970 to isolate plausibly exogenous changes in low-skilled immigrant flows across US cities and over time. Their estimates suggest that the low-skilled immigration wave from 1980 to 2000 increased the amount of time that women in the top quartile of the wage distribution spent in market work by about 20 minutes per week. In addition, low-skilled immigration also increased the likelihood of highly-skilled women working long hours at their job (i.e. more than 50 or 60 hours per week). Follow-up studies find qualitatively similar patterns in countries such as Spain, Italy, and Germany (Farré et al., 2011; Barone and Mocetti, 2011; Forlani et al., 2020). In recent work, Córtes and Pan (2019) further demonstrate that low-skilled immigration inflows to the U.S have decreased the gender pay gap in occupations that disproportionately reward long work hours and induce young women to enter occupations with higher returns to overwork.

Foreign domestic worker programs that allow for the systematic importation of low-skilled foreigners



into the domestic sector also appear to have large effects on encouraging the labor force participation of mothers with young children in the host country. Using Taiwan as a control group, Cortes and Pan (2013) find that the foreign worker program in Hong Kong led to a 8 to 12 percentage point increase in employment of women with a young child, relative to females with a relatively older child, from 1978 to 2006. Moreover, the observed increase is almost entirely driven by the increase in employment rates of middle and highly-skilled females. The larger response of maternal employment to the availability of FDWs relative to other policies that shift childcare costs such as childcare subsidies or low-skilled immigration flows is likely due to the substantially more flexible household services offered by live-in FDWs. Indeed, by providing essentially all-day childcare and taking care of other household tasks such as cooking and cleaning, in many ways, FDWs represent one of the most complete forms of outsourcing household production.

### 6.1.3 Paternity Leave

Many high-income countries have introduced legislation aimed at encouraging fathers to take up parental leave by allocating a portion of parental leave for the exclusive use of fathers. OECD data on parental leave policies in 41 countries around the world indicate that while maternity leave still forms the majority of mandated paid parental leave in most countries, leave earmarked for the exclusive use of fathers (e.g. “daddy months” or “daddy quotas”) is now available in more than 80% of the countries.<sup>27</sup> In most cases, such paternity leave provisions are quite modest (e.g. two weeks or less), though several European countries offer more generous provisions of about two months of leave or more to new fathers. Interestingly, Japan and Korea offer among the most generous parental leave allocations for fathers – 30 weeks and 15 weeks, respectively – however, take-up remains exceedingly low in these countries.<sup>28</sup>

Paternity leave policies are particularly interesting from the point of view of trying to address the key factors as to why children have disproportionate effects on the careers of women relative to men. By incentivizing new fathers to take on a bigger role in their children’s lives, such policies can potentially help to accelerate the adjustment of social norms that ascribe women as dominant providers of childcare and promote a more equitable division of childcare within the household (Bertrand, 2018). Of course, the effectiveness of paternity leave in addressing the core of what is holding women back in the labor market depends considerably on the extent to which father’s early involvement persists beyond the coverage of the policy, and in the longer term, whether such policies result in a broader shift in social norms.

Given the relatively recent introduction of paternity leave policies in most countries, the evaluation

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<sup>27</sup>“Among 41 countries, only U.S. lacks paid parental leave,” Pew Research Center, 16 December, 2019.

<sup>28</sup>See, for example: “Why Icelandic Dads Take Parental Leave and Japanese Dads Don’t,” The Atlantic, January 23, 2020.

of their effects on women's outcomes is still at an early stage. Recent studies find that parental leave quotas reserved for the exclusive use by fathers are indeed effective at increasing paternity leave-taking in countries like Norway, Sweden, Canada, and Spain. Nevertheless, fathers rarely extend their leave beyond the duration of the dedicated quota. These studies find mixed effects of paternity leave provisions on women's outcomes and the division of labor within the household. An early evaluation of the introduction of daddy quotas in Sweden in 1995, that reserved one month of the total parental leave for fathers, presents little evidence that the reform induced fathers to take on more childcare duties and improved women's longer-term career outcomes (Ekberg et al., 2013). Similarly, Cools et al. (2015) find no evidence that the introduction of the daddy quota in Norway improved women's earnings and labor supply, and if anything, the policy might even have had negative impacts on women's labor market outcomes.

On the other hand, more recent studies of paternity leave policies in Germany, Quebec (Canada), and Spain have pointed toward some persistent effects on father's involvement in childcare and the division of household work (Schober, 2014; Patnaik, 2019; Farré and González, 2014). In particular, Patnaik (2019) finds that the introduction of the Quebec Parental Insurance Program (QPIP) in 2006 that reserved 5 weeks of leave for fathers reduced the gendered division of labor within couples several years after the end of the leave period. In addition, the program yielded large positive effects on mothers' labor market outcomes. Perhaps surprisingly, Farré and González (2014) show that modest paternity leave provisions of two weeks in Spain generated persistent positive effects on father's childcare involvement and women's labor market attachment up to six years after the introduction of the reform. Further, they document that the paternity leave provisions led to delays in subsequent fertility, possibly due to increased awareness of childbearing costs among men or shifts in preferences toward child quality (over quantity).

While it is not entirely clear what drives the differences in the effects of paternity leave policies across the various studies, one possibility is that earlier papers tended to focus on the early adopters of paternity leave reforms that were Scandinavian countries. In these countries, the division of household labor is considerably more egalitarian than in most countries, and women have relatively high labor force attachment; therefore, it is probably more difficult to move the needle in terms of these outcomes. Nevertheless, more work needs to be done to evaluate paternity leave policies in other country contexts to better understand when and how these policies work.

Overall, paternity leave policies have the potential to address the core set of challenges that women face in achieving both career and family. However, it is worth pointing out that the effectiveness of such policies is also likely to be constrained by the broader set of norms. For example, Dahl et al. (2014) document considerable peer effects in paternity leave-taking, suggesting that take-up is a function of fathers' identity and reputational concerns. Such concerns are likely to explain why, in spite of generous policy provisions, paternity leave take-up remains very low in countries like Japan

and Korea where traditional gender norms continue to be deep-rooted. Moreover, a recent study by Avdic and Karimi (2018) also points toward the possibility of unintended negative effects on marital stability due to the emergence of role conflicts in the family in the short run, perhaps due to deviations from initially agreed upon roles within the household. Finally, some work suggests that fathers might, in fact, face higher penalties for taking parental leave or time-off than mothers. Such differential penalties could arise due to the violation of “ideal worker” norms, which are applied more strongly to men than women (Weisshaar, 2018).

## 6.2 Changing the Structure of Work

Most of the public policies aim to address gender disparities in the labor market by focusing on constraints to women’s labor supply by attempting to substitute for maternal time in childcare by subsidizing childcare services, providing market-based alternatives, or encouraging fathers to contribute. On the surface, other policies such as the provision of maternity leave and flexible work arrangements provide women with more options to balance their family commitments while working; however, because providing such flexibility and time away from work is generally costly from the point of view of employers, such policies do little in terms of improving women’s employability and addressing gender pay gaps.

Apart from targeting women’s labor supply, another policy approach is to focus on providing employers and firms with incentives to reorganize work to reduce the penalties associated with flexible work arrangements (e.g. shorter work hours or option to take time off work). To the extent that jobs can be redesigned to enhance temporal flexibility with little to no productivity costs, this would reduce the labor market penalties for time spent on childcare for *both* genders. Apart from reducing the earnings penalties associated with women’s stronger preferences for workplace flexibility, such changes in the workplace will also help to promote couple equity by reducing the added incentive for one spouse to specialize in market work in order to yield the higher returns associated with fuller work commitment (Goldin, 2019).

Exactly how public policy can play a role in promoting the redesign and reorganization of work is not entirely clear, however. Goldin and Katz (2011) and Goldin (2014) discuss several examples of occupations and sectors that have moved toward greater hours flexibility such as physicians, pharmacists, and veterinarians. The causes of these changes are varied, ranging from the reorganization of work to achieve economies of scale, reductions in labor costs to changes possibly induced by employee pressure. One possibility is for governments to ease coordination across competing firms towards more family-friendly work organization through the provision of incentives and information. Another indirect approach might be to adopt policies that attempt to push more women to top organizational layers to accelerate job redesign. Nevertheless, a clearer understanding of the

sources of the returns to working long (and inflexible) hours, and how it varies across sectors and occupations, would go a long way in helping with the design of effective policies to reorganize work.

## 7 Conclusion

As education gaps have closed and reversed in favor of women in recent decades, young women are entering the labor force in larger numbers than ever before and are increasingly starting their careers on similar footing as men. Yet, their labor market trajectories diverge sharply with the arrival of the first child. The differential impact that children have on men and women’s careers continues to be a first-order explanation for the remaining gender gaps in the labor market. Applying the dynamic decomposition framework proposed by Kleven et al. (2019a) to microdata from the PSID, we document that the proportion of the gender earnings gap that can be attributed to children versus other factors is substantial and has increased over the past four decades. By the mid-2010s, child-related inequality accounted for nearly two-thirds of the pay gap.

To understand why parenthood might produce differential outcomes for men and women, we propose a simple household decision-making model that incorporates a set of preference parameters over own versus spousal consumption and the value placed on the household public good (e.g. children or other home-related amenities). Treating fertility as exogenous in the model, we consider the implications of the model for wives’ and husbands’ labor market choices before and after the arrival of children in the case where they have similar preferences (i.e. unitary household) and where they have different preferences (i.e. non-cooperative). The model suggests that child earnings penalties for mothers (but not fathers) will arise in unitary households only if women face a lower wage than their husbands. If women face higher wages than their husbands, then motherhood earnings penalties can only be rationalized if women are more productive at home, value the household good more, or households incur a utility penalty from women working in the market. Such gender differences in preference parameters could be generated by long-standing social norms regarding gender roles. We show, using the PSID data, that child earnings penalties are observed for all groups of women, even those that are much more educated than their spouses (and are likely to face higher market wages), suggesting that comparative advantage alone is unlikely to explain women’s relative underperformance in the labor market.

Building on the insights provided by the household model, our review of the recent literature provides further insights into the various adjustments that women make in anticipation of and after childbirth. Indeed, what the economics literature typically regards as gender differences in the preferences for workplace attributes are likely to stem from the fact that women respond to the arrival of children differently from men, and choose occupations and career-tracks that are more compatible with their role as the dominant provider of childcare within the family. Indeed, as

suggested by the model, a growing body of research highlighting how gender identity considerations and social norms influence a variety of economic and social outcomes can help to rationalize why women continue to shoulder a disproportionate burden of childcare, despite the convergence in economic roles in society.

In thinking about how to address the remaining gender disparities in the labor market, it is quite clear that work-family trade-offs continue to be a key constraint for women in terms of achieving their full labor market potential. Our review of the existing slate of public policies aimed at addressing these trade-offs suggests that family-friendly policies that subsidize women's time out of the labor market (e.g. extended maternity leave) have little positive (and sometimes negative) impacts on women's longer-run employability and earnings. On the other hand, policies that enable women to outsource childcare more effectively tend to yield positive effects on female labor force participation, especially in societies with low rates of maternal employment. Another set of policies that appear particularly promising are those that attempt to shift gender roles and gender norms directly by encouraging fathers to take up more parental leave. Nevertheless, the effectiveness of such policies may be constrained by the broader set of norms, and the challenge hinges on ensuring that paternity leave-taking early in a child's life translates to more sustained involvement in childcare in the years that follow.

Several countervailing forces, both on the home front and on the work front, raise concerns that modern cohorts of women and men increasingly face a catch-22 with rising time-demands associated with parenthood and work. Our view is that given binding time constraints, there is a need to look beyond supply-side policies and encouraging women to close the hours gap. Policies and efforts to weaken traditional gender norms and reorganize work in such a way so as to remove the penalties for the kind of time-flexibility that modern parents require in order to meet the demands of parenthood today are likely to be more effective in addressing the remaining gaps. Indeed, women *and* men would benefit from the choice to pursue career and family aspirations. Only when such freedom of choice prevails, will society be able to fully embrace the talents of both men and women.

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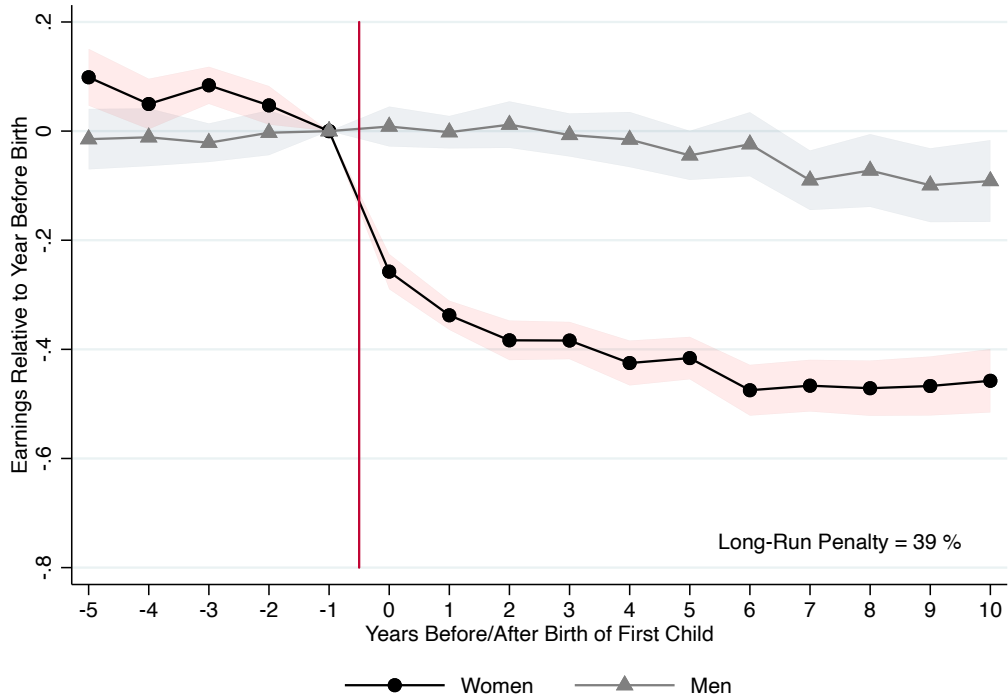
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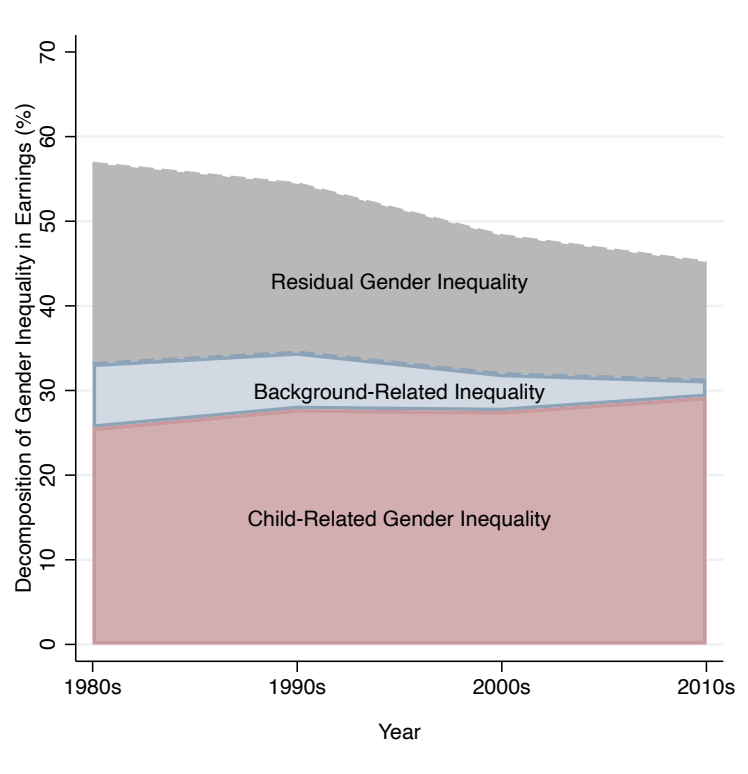
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Figure 1: Effect of Parenthood on Earnings by Gender



Note: The data is from the 1976 to 2017 waves of the PSID. The sample is restricted to household heads and spouses/cohabitators who are 20 to 55 years old and who had their first child between 20 and 45. The sample is further restricted to parents who are observed at least once before and after the birth of the first child and whose earnings outcomes are observed at least four times over the fifteen-year window. This figure plots the estimated event-time coefficients from equation (1) with annual labor earnings as the outcome variable (individuals who are not working are assigned zero earnings). The event-time coefficients are expressed as a percentage of the no-child counterfactual, for men and women separately. The 95% confidence bands around the estimates are based on standard errors clustered at the individual level. The long-run child penalty in earnings for women relative to men is calculated as  $P_t \equiv \frac{\hat{\beta}_\tau^m - \hat{\beta}_\tau^w}{E[Y_{it}^w | \tau]}$ , for event time  $5 \leq \tau \leq 10$ .

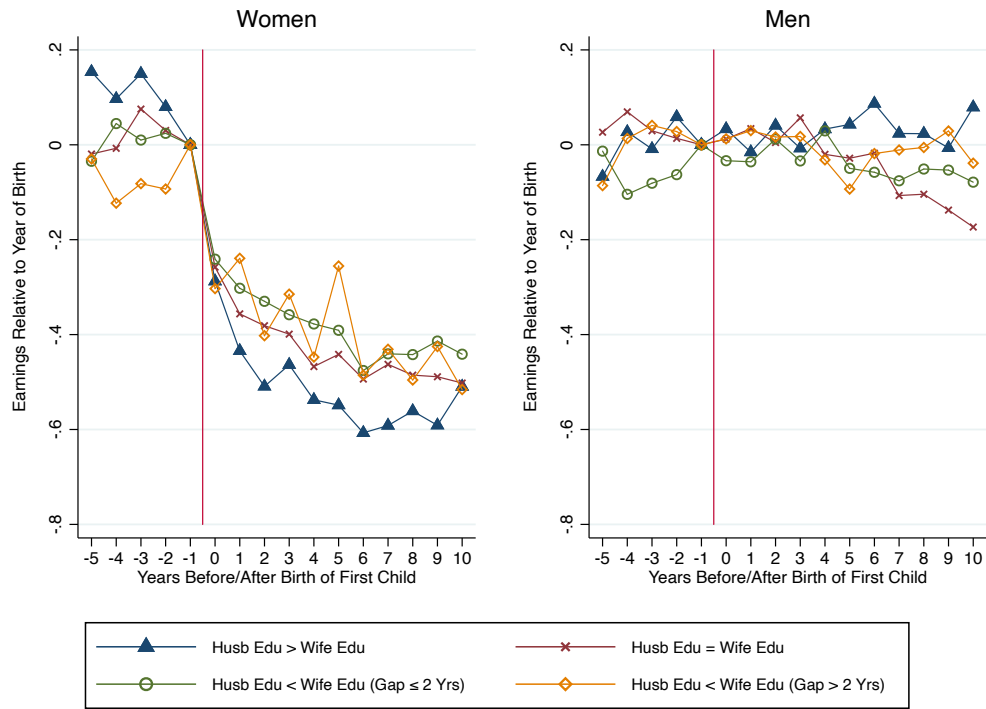
Figure 2: Contribution of Child-Related Inequality to Gender Pay Gaps Over Time



Note: See the notes to Figure 1 for a description of the data and sample. This figure shows the dynamic decomposition of gender inequality in annual earnings, based on equation (2). The specification allows for period-specific event time coefficients and controls for age and calendar-year fixed effects. The child-related gender inequality captures the estimated child penalties, the background-related inequality captures the differences in the levels and returns to race, census region and education, while the residual gender inequality captures the remaining gender earnings gap.



Figure 3: Child Earnings Penalties by Relative Skill



Note: The data and sample are similar to that used to construct Figures 1 and 2 (see notes to Figure 1). The sample is further restricted to those with non-missing information on spousal education pre-child. This figure plots the percentage effects of parenthood for husbands and wives separately, using a similar specification as outlined in equation (1). For this exercise, we consider four distinct subgroups of couples based on their relative earnings potential, proxied by the pre-child difference in the number of years of schooling between spouses.

## A Appendix: Model Extensions

### A.1 Alternative Functional Forms for Child Rearing Production Function

We consider more general functional forms for the production function of quality children:

1. Imperfect substitution between mother's and father's time, via a CES production function. In this case, fathers will also see a drop of their earnings after the birth of their child, as they will devote some of their time to child rearing. The higher the elasticity of substitution between mothers and fathers, the larger the relative drop in women's earnings after birth.
2. Child-rearing market services. How this affects women's hours after birth will depend on the level of substitution between own time and market products, and naturally on wages and price of substitutes. Women with higher wages will work more and buy more market products. Unless there is perfect substitution between market products and own time, women's earnings will go down after birth. If we allow this function to change as children grow and the amount of parental time needed decreases whereas more market inputs are needed (or they become more substitutable), we should see women's earnings increase as their labor supply increases.

### A.2 Returns to Experience/Human Capital Accumulation

We have assumed thus far that wages are flat. If there is human capital accumulation, via learning by doing, a period's wage depends on past hours worked, and today's hours will affect future wages. In terms of women's earnings profile after birth, these implications mean that (1) women will take into consideration the additional market returns of working more hours today and thus the drop in hours and earnings after birth will be smaller and (2) the divergence between women and men will be larger, as it captures not only differences in hours, but in wage profiles as well.

Finally, if human capital accumulates instead via investment in (costly) education, women, knowing that they will work fewer hours after the birth of a child, might invest less in education, or choose careers with lower part-time penalties. Under this model, we would observe women earning less than their husbands even before the birth of the child when both are working full time.