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Interactions amongst gender norms: Evidence from US couples *

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Abstract

A considerable body of work has shown that motherhood is accompanied by a reduction in labor market participation and hours of market work, while more recent findings indicate that women who earn more than their husbands tend to subsequently take actions that reduce their market income. Both patterns of behaviour have been interpreted as women trying to conform to child-rearing norms and to the prescription that the husband should be the main breadwinner. In this paper we use panel data for US couples to re-examine women's behaviour when they become mothers and when they are the main breadwinner. We start by asking whether the arrival of a child affects women who are the main breadwinner and those who are not in the same way, and then turn to how mothers and childless women react when they are the main breadwinner. Our results are consistent with the breadwinner norm only affecting mothers, suggesting that the salience of gender norms may depend on the household's context, notably on whether or not children are present. Concerning the arrival of a child, we find that although the labor supply of women who earn more than their husbands initially responds to motherhood less than that of secondary earners, the two groups converge after 10 years. Moreover, women in the former category exhibit a disproportionately large increase in the share of housework they perform after becoming mothers. The latter results suggest that the presence of children pushes women to seek to compensate breaking a norm by adhering to another one.

JEL Classification: D10, J16, J22

Key words: gender identity norms, female labor supply, children, relative income

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1 Introduction

While the early literature on gender earnings gaps focused on differences in human capital accumulation, massive convergence in education and labor market participation has called forth additional explanations.[1] Recent work has consequently focused on gender identity roles and norms as important factors for the persistence of gender gaps, emphasizing the idea that individuals adhere to gender-specific behavioral prescriptions because not following the norm is inherently costly for them. Social norms on child-rearing require mothers to be the main care-provider and a large literature has shown that women's market work is vastly reduced after the birth of their first child, in line with social expectations. Some authors have focused on the norm that the husband should be the household's main breadwinner and found that women's labor supply is reduced when the couple does not conform to this prescription.[2] Yet, norms do not exist in isolation and the aim of this paper is to examine how gender norms interact.

As argued by Akerlof and Kranton (2000), social norms affect agents' utility by generating a cost that appears when the individual (or household) does not conform to the norm, and, consequently, observed behavior will depend on the costs and benefits stemming from breaking it. In such a framework, adherence to a norm will depend on the context. Motherhood seems to be particularly important, as shown by recent work that indicates that women's values change as they become mothers.[3] Indeed, data from the World Value Survey, reported in Figure 1, show that gender attitudes differ depending on whether or not women have children. For example, women are more likely to agree with the idea that breaking the breadwinner norm causes problems if they have children than if they do not. Such evidence indicates that context and personal experience can be major factors in how social prescriptions are perceived. However, the way in which different norms interact has received little attention in the literature. Norms could reinforce each other, so that when an individual adheres to one she or he tends to also follow another, related norm, or could offset each other making individuals who break one social prescription adhere particularly strongly to some other.[4]

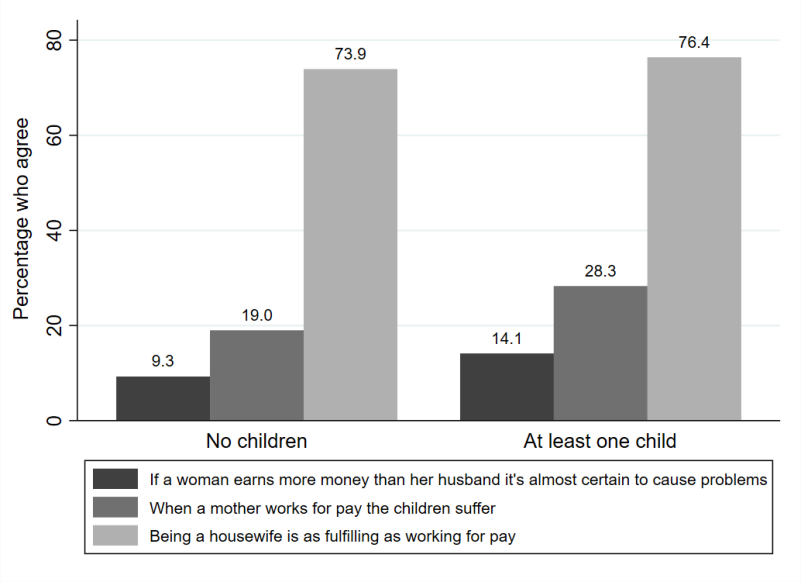
[1] See, for example, Blau and Kahn (2017) and Goldin (2014) for overviews and discussions of trends.

[2] See, for example Angrist and Evans (1998), Adda et al. (2017) and Kleven, Landais, and Søgaard (2019) on the so-called child penalty and Bertrand et al. (2015) for the seminal work on the breadwinner norm.

[3] For example, Kuziemko et al. (2018) show that upon becoming mothers women adopt more traditional attitudes, suggesting that motherhood serves as an information shock to their beliefs. Grinza et al. (2022), using longitudinal panel data for the UK, find that becoming a parent significantly shifts women's attitudes towards more conservative views, while leaving men unaffected.

[4] An example of the latter is provided by Bertrand et al. (2015) who, in one of the rare studies addressing norm interaction, find that when women break the breadwinner norm they tend to offset it by increasing the share of housework they perform so as to strongly conform to the idea that the wife should be the home-maker. Theoretically, there is little work on the interaction between different social norms or values, an exception being Petit (2024).

Figure 1: Gender norms in the US: Differences by parental status



Notes: Author's calculations based on the *World Value Survey* data for the US, 2011. Each column shows the percentage of respondents who agree or strongly agree with the corresponding statement. For the first statement the possible answers were: Agree, Disagree or Neither, and only respondents who answer "Agree" where included. For the two other questions the possible answers were Strongly agree, Agree, Disagree, Strongly disagree, and both respondents who answer "Agree" or "Strongly agree" were included.

In this paper we focus on two major gendered social prescriptions: the prescription that the mother should be the main childcare provider and that which requires the husband to earn more than his wife, and try to understand to what extent female labor supply decisions are affected by the interaction between these two norms. Using panel data for US couples, our analysis proceeds in two steps. We first examine how labor supply changes with motherhood. As is well-known, motherhood reduces participation and hours of market work, and we start by asking whether child-rearing norms affect women who are the main breadwinner and those who are not in the same way. Notably, if a woman chooses not to conform in terms of the breadwinner norm, will she also be less likely to follow traditional child-care roles after she becomes a mother?

We then consider the effect of the male breadwinner norm. This aspect has recently gained attention as a factor playing an important role in holding back women's performance in the labor market. In their seminal work, Bertrand et al. (2015) use as the key explanatory variable for labor supply decisions whether a woman earns more than her husband in year $t-1$, and argue that breaking the norm leads women to subsequently reduce participation and hours of market work. We hence examine whether this norm affects all women in the same way, distinguishing

between those with at least one child and those without children. It is possible that couples pay little attention to whether they conform to traditional gender roles as long as they do not have children, yet the arrival of offspring and the desire to transmit certain preferences could be a trigger that makes gender norms salient and hence pushes women who are earning more than their husbands to modify their behavior.

We address the first question through an event study approach, estimating the impact of the birth of the first child on the labor market trajectories of women. Having information on both members of the couple, we can assess whether there are differences in the responses depending on who was the main breadwinner in the couple before having their first child. We find that motherhood has a strong impact on women's labor supply, in line with existing work, as both women who were earning less and those who were earning more than their husband reduce their hours and employment probability as a result of their first child's birth. Yet participation responses differ markedly across the two groups. Women who are secondary earners display a sharp reduction in participation immediately after the birth that partly recovers from the 6th year onwards. In contrast, women who are the main breadwinner are initially significantly less likely to stop working but their participation falls steadily over time, so that 10 years after the birth of their first child both groups converge, being 28 percent less likely to be employed than before motherhood. We also find that both groups of women experience a large increase in their hours of housework, roughly doubling them one year after the birth. Moreover, while for all women the hours of housework keep increasing over time, the medium-term effect is substantially larger for those who were initially the main breadwinners in their households.

A possible interpretation of these results is the difficulty that women have not behaving according to gender norms and point towards two novel conclusions. First, we find that even if women earn more, they still adhere to the "motherhood" norm of reducing labor supply and shouldering more childcare responsibilities than men. This result goes against what we would expect to observe if comparative advantage in market work were driving the household's decisions. Second, our results indicate that while women who were the main breadwinners are initially less likely to conform to the child-rearing norm than secondary earners, over time they reduce their participation and converge to that exhibited by secondary earners, raising questions about why they do not manage to sustain decisions that are not in accordance with the norm.

The second step in our analysis consists in considering the effect of the male breadwinner norm. Our results indicate that mothers behave as previously found, as those who earn more than their husbands in t-1 are less likely to be in the labor force and, conditional on employment,

work fewer hours at t. In contrast, women without children do not, as we find no evidence that breaking the norm affects their labor supply, a result that seems to indicate that the cost of not conforming only appears once there are children in the household.

The reaction to the male breadwinner norm also seems to be strongly affected by the wife's education level. Bertrand et al. (2015) have shown that in more educated couples, women's earnings fall less than in less educated ones when the male breadwinner norm is broken. We further explore these differences by focusing on the dimension along which women adjust. In particular, we find that women (with children) who have a college degree reduce their hours but not their probability of participating. A possible reason for this is that for these women their identity stems both from their role in their household as well as their professional life, and hence dropping out of the labor force to conform with child-rearing norms entails a loss of professional identity. We do not observe this pattern when we look at women with education below a college degree, for whom career concerns may be, on average, less important.

This paper contributes to three different strands of literature. First, it adds to recent work on the so-called "child penalty", defined as the extent to which women fall behind men (in employment rates, hours or earnings) due to having children.[5] Recently, event studies around the birth date of the first child have gained popularity as they have the potential to capture the global treatment effect of children, as opposed to only the local treatment effect of a second or third child, obtained from the twin or sibling-sex-mix instruments proposed by the previous literature on the child penalty (Angrist and Evans, 1998). This approach has been used to estimate how various outcomes change after the birth of the first child, such as hours worked, the dynamics of within-couple gaps in earnings, or changes in within-firm remuneration and bonuses (Paull, 2008), Angelov et al. (2016), and Lundborg et al. (2017). We follow the event-study approach proposed by Kleven, Landais, and Søgaard (2019), who find a long-run penalty on earnings in Denmark, and apply it to labor supply choices.[6] We contribute to this literature by focusing on how the pre-birth circumstances, notably the relative earnings of the two members of a couple, affect the intensity of the effects of parenthood on labor market trajectories. In particular, we show that although women who were the main breadwinners in the household initially have a behavior that conforms less to the norm than that of secondary earners, this difference is short-lived as they eventually reduce their labor supply as much as the latter and

[5]Recent work has also highlighted how the expectation of motherhood can affect outcomes, for example through their impact on women's career choices as in Adda et al. (2017) or because firms are less likely to employ women who are likely to become mothers, as shown by Becker et al. (2019)

[6]See also Kleven et al. (2019) and Kleven et al. (2023) for an international comparison, Lucifora et al. (2021) on French data, and Berniell et al. (2023) and Berniell et al. (2021) on Latin America.

even overcompensate their adherence to social norms by exhibiting a particularly large increase in the household responsibilities that they shoulder.

The paper is also related to recent work on how social norms can help us understand gender gaps in the labor market, a literature reviewed by Bertrand (2011)). Some of this literature has focused on the intergenerational transmission of norms within the family or in society as a whole, providing micro-foundations for differential sorting of men and women across occupations and women's decisions to participate in the workforce.[7] One of the remaining challenges is to understand why women "choose" to work fewer hours or to be in less-well-paid firms, sectors and occupations, and behavioral responses to gender norms within couples appear as a potential explanation. Bertrand et al. (2015) identify such effects, and their results indicate that in couples in which the wife's potential earnings are likely to exceed her husband's, women tend to reduce their labor supply or work in lower-payed jobs, a behavior consistent with them trying to a gender role reversal in earnings. They conclude that conforming to this gender identity norm partly explains gender gaps. A number of articles have found similar results for other countries, such as Sweden, Brazil and Uruguay.[8]

In a paper closely related to ours using German data, Sprengholz et al. (2022) argue that context can affect the strength of responses to the norm. Comparing West and East Germany, they find that the male breadwinner norm significantly affects labor supply decisions in West Germany but not in the East where the socialist regime had implemented strong policies to erode gender stereotypes. Context is also crucial for Hwang et al. (2019) who use Korean data to look at how the social environment, defined by sex-ratios at birth in the place of birth of the husband, affect the wife's housework time. Closer to our approach is Lippmann et al. (2020). They use German data to maintain that norms can offset each other. Women who earn more than their husbands increase the number of housework hours, but only in West Germany and not in the East, suggesting that the socio-political context in which individuals grow is a key determinant of the cost individuals face when not adhering to social norms. Our results contribute to this

[7]This literature has examined, for example, women's under-representation in mathematics and in other scientific disciplines (Nollenberger et al., 2016), the persistence of occupational gender segregation (Breen and García-Peñalosa, 2002), and labor force participation and hours of work (Fortin, 2005; Bertrand et al., 2015; Fernández et al., 2004; Farré and Vella, 2013; Olivetti et al., 2020; Humlum et al., 2019). According to Blau and Kahn (2017), this approach has the potential to help explain not only the unexplained gender gap (i.e. the fraction not accounted for gender differences in measured qualifications), but also gender differences in some of the measured factors themselves.

[8]See Ichino et al. (2024) for Sweden, Codazzi et al. (2018) for Brazil and Galván (2022) for Uruguay. The importance of social norms has also been addressed concerning relative hours of work, with women exhibiting lower satisfaction if they break the norm that the husband should work more hours than the wife (Flèche et al., 2020). Some authors have criticized parts of the analysis in Bertrand et al. (2015), notably, Hederos and Stenberg (2022), Zinovyeva and Tverdostup (2021) and Binder and Lam (2022).

literature by examining an additional way in which norms are affected by context, and provide evidence that is consistent with the arrival of children to the household being a trigger of women's response to the male breadwinner norm. That is, the cost of not adhering is not only affected by society-wide conditions but also by the individual household's context.

More generally, we also contribute to the growing literature on social norms in economics. Social norms have long been the realm of sociologists, yet over the past decades economists' interest in them has been rising, both because they allow us to explain a variety of phenomena but also because the rational-agent model can help understand how such norms evolve and are transmitted.[9] We add to a literature in economics that sees norms as essential in explaining women's welfare, whether in terms of labor supply decisions, as in the papers cited above, their fertility or the acceptance of intimate partner violence.[10] Our results indicate that it is important to consider various norms together, as different social prescriptions can reinforce or offset each other.

The paper is organized as follows. Section 2 describes the data and sample while Section 3 presents the methodological approach. Section 4 discusses the results on the impact of the birth of the first child on labor market outcomes and how these effects are related to the breadwinner norm. Section 5 focuses on the analysis of heterogeneous responses to the male breadwinner norm, before moving to the analysis of employment patterns. The last section concludes.

2 Data and sample description

Our primary data source is the Panel Study of Income Dynamics (PSID) for the period 1968-2015. The PSID is a longitudinal study of US households that began in 1968 with a nationally representative sample, and contains information collected on sampled families and their descendants for nearly 50 years. All individuals living in PSID families in 1968 were interviewed yearly through 1997 and every other year since then. The PSID also follows those born into or adopted by a PSID family even after they moved out of the original household. Those who married into PSID families were followed for as long as they lived with a member of the PSID sample.[11]

[9] See Hiller and Baudin (2016) for a model on the transmission of gender norms and Fernández et al. (2004) and Giménez-Nadal et al. (2019), amongst others, on evidence on transmission across generations. Bursztyn et al. (2020) show the relevance of perceptions of prevailing gender norms in society for individual's economic decisions.

[10] See, for example, Fernández and Fogli (2006) on fertility and González and Rodríguez-Planas (2020) on domestic violence, as well as Bertrand (2011) for a review of work on gender identity norms and Postlewaite (2011) for a discussion of social norms in economics. The latter also highlights the difficulty in distinguishing between individual preferences and social norms, as the former are the result of social interactions and thus shaped by the latter.

[11] The Panel Study of Income Dynamics, public use dataset is produced and distributed by the Institute for Social Research, University of Michigan, Ann Arbor, MI (2017). PSID data are publicly available at https://psidonline.isr.umich.edu/

More specifically, the data that we use come from the *Family files* and the *Cross-year Individual files*. The *Cross-year Individual files* contain one record for each person ever in a PSID family from the beginning of the study through 2015. The *Family files* contain family-level information and detailed information for the head and wife, including married and cohabitant couples. The main advantages of using these data are that they allow us to follow couples for a long time and that they contain detailed information on labor market outcomes for household heads and spouses, including labor supply, income and industry and occupation variables, as well as information on hours of housework. This makes it particularly suitable for analyzing outcomes for the two members of a couple.

Our estimation sample is composed of 129,265 couple-year observations for women who live in couples, where both, husband and wife are between 18 and 65 years old, and where at least one of the spouses has positive earnings (in the previous year).[12] The sample is also restricted to family heads and spouses or not married partners. Information on birth dates is taken from the*Birth and Adoption History File*. The event study analysis consequently includes only those couples who have a register in these data.

Table 1 presents summary statistics for the main variables in our sample. All the income related variables correspond to the previous year, and the values of wife's and husband's income in the table are expressed in 2015 dollars. On average, the men in our couple-sample are two years older than the women. The mean of the relative income is 0.29, which means that women earn on average around 29% of the income of the couple. The wife earns more than the husband in 18 percent of the cases. Also, 85 percent of women have at least one child, and the average number of children is 2.53. Education is defined as the maximum education level reached by the individual, and comprises three categories: high-school or less, 1-3 years of college and at least 4 years of college (college graduates).

Our data exhibit features that have been identified in previous work. Figure 2 depicts the (raw) averages for employment, hours of work and housework around the birth of the first child for both women and men. In panel (a) it is possible to observe that before the birth of the first child the employment trajectories of men and women evolve in parallel, suggesting no gender-specific trend but higher employment levels for men. Immediately after the birth of the first child, there is a sharp drop in employment levels for women and a slight increase for men. A similar pattern is observed with respect to hours of work and housework. Conditional

[12]Our sample includes only individuals belonging to the "core sample". The Latino sample, the immigrant refresher sample, and the low-income over-sample are excluded in order to prevent changes in these samples from affecting the results. The disadvantage of this is that the composition of the core sample is representative of US population in 1968, not of the US population today.

Table 1: Sample summary statistics

	Mean	SD	Min	Max	N
In t-1:					
Wife earns more	0.18	0.38	0	1	129,265
Wife's Income	20,785	25,766	0	1,027,758	129,265
Husband's Income	53,779	68,271	0	6,410,906	129,265
Relative Income	0.29	0.28	0	1	129,265
In t:					
Wife's age	37.15	11.12	18	65	129,265
Husband's age	39.55	11.49	18	65	129,265
Number of children at home	1.38	1.39	0	13	129,265
No children at home	0.34	0.47	0	1	129,265
Wife's labor force participation	0.63	0.48	0	1	129,265
Wife's yearly hours of work	1,152	918,9	0	7,980	129,265
Highschool or less	0.49	0.50	0	1	129,265
1-3 years of college	0.26	0.44	0	1	129,265
At least 4 years of college	0.24	0.43	0	1	129,265
Ever had a child	0.85	0.35	0	1	120,789
Number of children	2.53	1.72	0	15	120,789

Notes: The data are from the 1968-2015 PSID. The sample correspond to couple-year observations of women who live in couple (wives or non-married cohabitant couples), where both husband and wife are between 18 and 65 years old, and where at least one of the spouses has positive earnings (corresponding to the previous year). Yearly labor income is expressed in 2015 prices (deflated using Consumer Price Index (CPI) - Bureau of Labor Statistics). The number of observations in the variables corresponding to the *Childbirth History File* is smaller because information was not collected for some individuals.

on remaining employed, there is a sharp drop in yearly hours of work for women after having their first child (panel (b)), while there is an important increase in the hours of housework they perform (panel (c)). This indicates that the gaps between men and women that exist prior to the birth become much larger after the first child arrives. As we show in the Appendix, these sharp drops in labor market trajectories take place for women in all educational groups. The most noticeable difference among the various groups is that the trends in employment levels for highly-educated women before having a child are almost identical to those for men.[13]

3 Empirical approach

3.1 Key questions

To investigate how the interaction between child-rearing roles and norms concerning relative earnings within the couple affect women's labor supply decisions we tackle the question from two complementary perspectives. We start by looking at the impact of the birth of the first child on labor supply decisions and housework. In particular, we analyse whether in couples

[13]See Figures A.1 and A.2 in the Appendix.

in which the woman was the main breadwinner before the birth of the first child, she remains in the labor market while her partner takes the main role at childcare, which would be the efficient response from the point of view of a standard household model (Becker, 1991). That is, provided there are no differences in childcare productivity,[14] the specialization theory poses that an efficient allocation of household resources implies that the member of the couple with the highest market productivity remains in the labor market. In contrast, if social norms related to maternity prevailed over efficiency considerations, both groups of women would reduce their labor supply. Our first step will hence consist in examining whether women who are the main breadwinner and those who are not respond differently in terms of employment, hours of market work and hours of household work to becoming mothers.

We then turn around the question and consider how women react to breaking the male breadwinner norm. Women who earn more than their husbands tend to reduce their labor supply, and we ask whether this is the case for all women. We distinguish first between those with and those without children. Motherhood has been shown to make women more conservative and lead them to adopt more traditional attitudes (Kuziemko et al., 2018; Grinza et al., 2022) and this could be reflected in their attitudes towards other social norms, implying that behavioral patterns that were acceptable in the absence of children are not in their presence. We consider a second dimension along which norms and identity conflicts may lead women to react in different ways to the breadwinner norm: the level of formal education. As stated by Akerlof and Kranton (2000), social categories need not be mutually exclusive, and an individual may be mapped into several categories; that is, individual j can be both a "mother" and a "professional". Individuals can get a sense of identity from the job they perform and, at least in the US, this effect seems to be stronger for more educated individuals (Gallup News, 2014). Indeed, Goldin (2006) describes the period that began in the late-1970s as a "quiet revolution" characterized by a change in female identity that for the first time allowed a woman's occupation to define her fundamental identity and societal worth. As a result, if highly-educated women find themselves in conflict between the identity derived from their career and that associated to conforming to gender norms, we can expect them to be less willing than other women to drop out of the labor force when becoming mothers. To test this hypothesis we consider whether women with different levels of formal education react differently to breaking the male breadwinner norm.

These two question require different methods to examine heterogeneity in behavior, and the next two subsections explain our empirical approach to tackle each of them. A caveat is

[14] By comparing biological vs adoptive mothers and same sex couples, Andresen and Nix (2022) and Kleven et al. (2021) show that biological factors and breastfeeding are not relevant factors to explain child penalties.

in order. Our approach relies on splitting the sample across certain observable characteristics. However, these sample splits are endogenous as both educational attainment and motherhood are the result of decisions taken by women. The differences we find could hence be driven by unobservables that are not driven by norms. Our approach hence provides suggestive evidence of the role of norms, without being able to causally identify their impact.

3.2 Event study of the impact of motherhood

For our first step we follow the event study approach used by Kleven, Landais, and Søgaard (2019). We define as our event the arrival of the first child and examine how the outcomes of interest -employment, hours of work and hours of housework- are affected by the birth. Since we are interested in understanding how labor supply responses to the birth of the first child are conditioned by economic considerations of relative earnings within the couple, we need to identify couples in which the wife was earning more than the husband in the pre-motherhood context and those in which she was secondary earner. To do so, we follow the approach proposed by Bertrand et al. (2015) in their analysis of the male breadwinner norm, by defining a dummy variable, $Wem_{i,t-1}$, that takes value one if the wife earned more than the husband in $t-1$, i.e. $Wem_{i,t-1} = 1$ if $RelativeIncome_{t-1} > 0.5$, where $RelativeIncome_{t-1} \equiv WifeIncome_{t-1}$ / $(WifeIncome_{t-1} + HusbandIncome_{t-1})$. Our sample of couples will hence be divided into those where the wife earned less and those where she earned more than her husband before their first child was born.

For each individual in the sample we denote by $z = 0$ the year in which the individual has his/her first child and index all years relative to that year. We estimate the following regression:

$$y^g_{itz} = \sum_{j \neq -1} \alpha^g_j . I\left[j = z\right] + \sum_k \beta^g_k . I\left[k = age_{it}\right] + \sum_l \gamma^g_l . I\left[l = t\right] + v^g_{itz}, \tag{1}$$

where y^g_{itz} is the outcome of interest for individual i of gender $g = f, m$ in year t and at event time z.

Since the objective is to investigate how the arrival of the first child affects the labor supply and division of work within the household, we will focus on three outcomes: labor force participation, the number of hours worked in the year, and hours of housework per week. The regressions include a full set of event time dummies (first term on the right-hand side), age dummies (second term) and year dummies (third term). The event dummy goes from -5 to 10 omitting the event time dummy at $z = -1$, implying that the event time coefficients measure the impact of children relative to the year just before the first child is born. By including

a full set of age dummies, we control non-parametrically for underlying life-cycle trends, and including a full set of year dummy controls non-parametrically for time trends such as wage inflation and business cycles. The inclusion of age dummies improves the comparison between men and women as women are, on average, a couple of years younger than men when having their first child, and between women of different educational levels, as the less educated tend to have children at a younger age.

The estimated level effects are converted into percentages by calculating

$$P_z^g = \hat{\alpha}_z^g / E[y_{itz}^{\tilde{g}} | z],$$

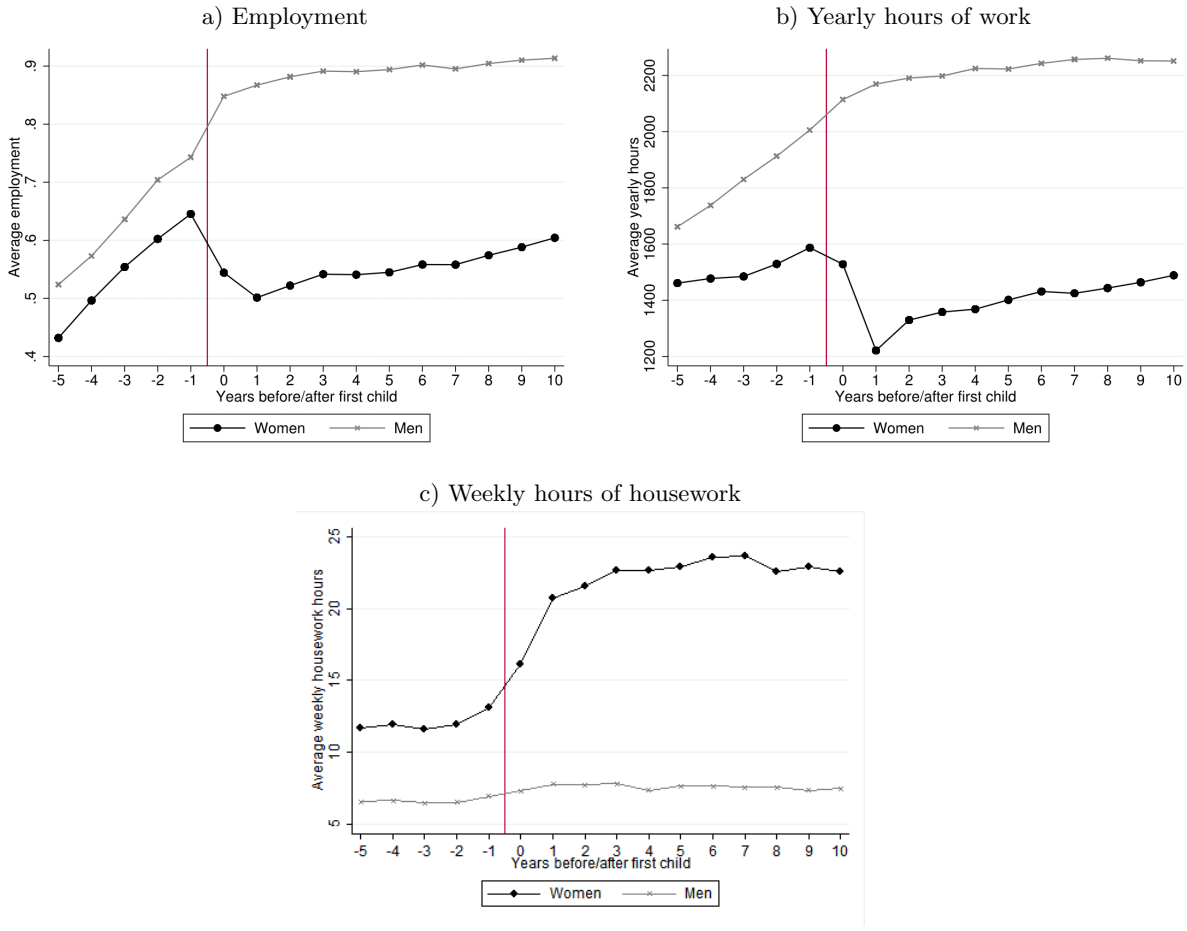
where $y_{itz}^{\tilde{g}}$ is the predicted outcome when omitting the contribution of the event dummies, i.e. $y_{itz}^{\tilde{g}} = \sum_k \beta_k^g . I\left[k = age_{it}\right] + \sum_l \gamma_l^g . I\left[l = t\right]$. Hence, P_z^g captures the year-z effect of children as a percentage of the counterfactual outcome, i.e. that in the absence of children.

By exploiting individual-level variation in the timing of the first birth, the event study approach presents a way of dealing with the endogeneity problem associated with fertility decisions. Typically, fertility choices could be determined by unobserved factors which are also correlated with labor market outcomes. However, the event of having a child generates sharp changes in labor market outcomes just after the birth, which can be assumed orthogonal to unobserved determinants of those outcomes which evolve smoothly over time.[15] Therefore, by comparing the results just before and after birth it is possible to estimate the effects of having a child.[16] As in quasi-experimental settings, the main identification assumption is that is that the "treatment" , that is, the decision on when to have a child, should not be induced by unobservable information of a changed direction of the outcome for one of the spouses. This means that the timing of parenthood should not be influenced by expected future shocks to the participation and hours of work that they would have experienced in the absence of entering parenthood. However, if these shocks take place before the birth of the child, they are observed in our data and hence controlled for. Our graphical evidence supports this assumption. The descriptive figures for the levels of employment and hours of work before and after the first child is born display sharp breaks in labor market outcomes trajectories which occurs just after the birth of the first child (see Figure 2). That is, there is no evidence that the outcomes change prior to the childbirth.

[15] See Kleven, Landais, and Søgaard (2019) for a discussion.

[16] Children may have two conceptually different effects on labor market outcomes. The event study approach is designed to identify only post-child effects of realized fertility. It cannot capture pre-child effects of anticipated fertility, such as women choosing certain occupations in anticipation of expected fertility. This effect is incorporated in the pre-event levels in our formulation, implying that the event study estimates provide a lower bound for the lifetime impact of children. Adda et al. (2017) estimate that occupational choices at the age of 15–16 due to anticipated fertility are small, accounting for less than 5% of the total earnings loss from children.

Figure 2: Average employment, yearly hours of work and housework before and after having their first child



Notes: The graphs show average levels of employment, yearly hours of work (conditional on being employed) and weekly hours of housework for men and women in each event-time before and after the first child is born (vertical line).

The regression in equation (1) is estimated separately women (men) who were the main breadwinner at $z = -1$ and those who were secondary earners in order to explore if there are heterogeneous responses. We hence estimate two separate regressions for women, one for $y_{itz}^{f,Wem=1}$ and another for $y_{itz}^{f,Wem=0}$, and consequently obtain two values of the impact of motherhood, $P_z^{f,Wem=1}$ and $P_z^{f,Wem=0}$. If comparative advantage guides decisions about household labor supply and childcare, we expect to find differences between the two groups of women, with those that are the main breadwinner exhibiting weaker responses to the arrival of the child. If gender norms are the key element in the household's decision, then both groups of women should respond in similar ways. It is even conceivable that women who earn more than

their husbands respond more strongly if they compensate breaking the breadwinner norm with adhering strongly to another one.

3.3 Impact of the breadwinner norm

In our second step we turn around the question and analyze responses to the prescription that a man should earn more than his wife, to see whether the male breadwinner norm is affected by motherhood. For this we follow the approach proposed by Bertrand et al. (2015), where the actual realization of the wife earning more than her husband in the previous period is used as a predictive for observed outcomes.

The panel nature of the data allows us to include couple fixed effects and hence investigate whether realizations of earnings that imply that the male breadwinner norm is violated in year *t-1* result in a change in the labor supply of women at t. Specifically, we estimate the following linear probability model:

$$y_{it} = \alpha Wem_{i,t-1} + \beta X_{it} + \mu_i + \gamma_t + \delta_s + \varepsilon_{it}, \tag{2}$$

where y_{it} is the outcome for the wife in couple i at time t, which is either the wife's labor force participation or the logarithm of the number of hours she worked in year t. $Wem_{i,t-1}$ is a dummy that takes the value one if the wife earned more than the husband at $t-1$, i.e. $Wem_{i,t-1} = 1$ if $RelativeIncome_{t-1} > 0.5$, where $RelativeIncome_{t-1} \equiv WifeIncome_{t-1}$ / $(WifeIncome_{t-1} + HusbandIncome_{t-1})$. The parameter of interest, α, captures the predicted changes in the likelihood that the wife participates in the labor force and the hours of work when $Wem_{i,t-1}$ changes by one unit, holding the other variables constant.

The vector X_{it} is a set of controls that include the logarithms of the labor income of the husband ($\ln HusbandIncome_{t-1}$) and the wife ($\ln WifeIncome_{t-1}$) and the couple's income ($lnCoupleIncome_{t-1}$), and a quadratic in both the wife's and the husband's age. Depending on the specifications, we also include additional controls for incomes, the wife's relative income, and children controls. As well as a couple fixed effect (μ_i), the regressions include year (γ_t) and state (δ_s) fixed effects. In the regression including all the women in our sample the logarithm of one plus yearly income is used in order to include zeros in addition to an indicator for whether only the wife is working and an indicator for whether only the husband is working. Following Bertrand et al. (2015) we estimate the regression through a linear probability model, pooling together observations for all years.

The main question we want to address is how the parameter α varies across subgroups

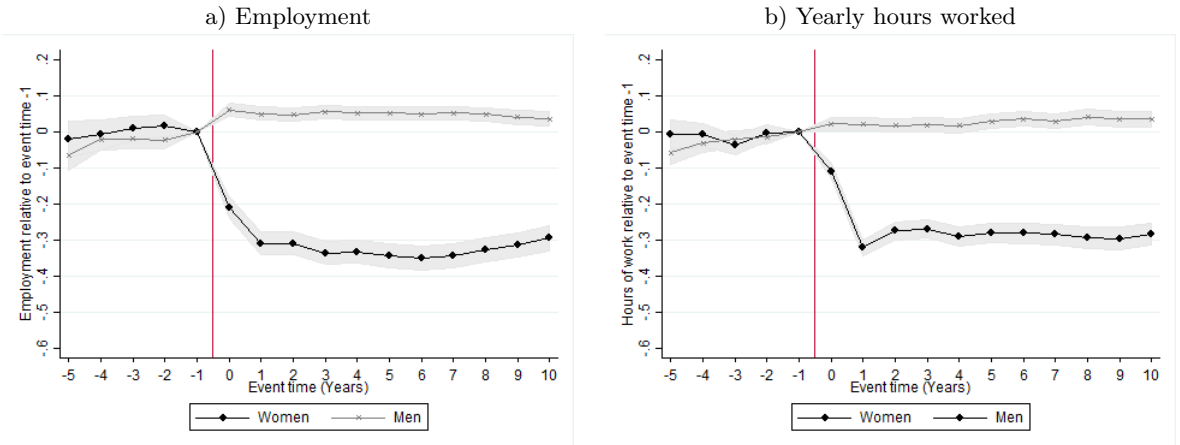
of the population for which social norms may be more or less stringent. We will consider two dimensions: women with and women without children, and women with different levels of formal education.

4 Responses to the birth of the first child

4.1 Women's labor supply responses

We start by considering the event-study regressions for the entire samples of women and of men. The resulting effects are reported in Figure 3. As previously defined, these are year-z effects (as a percentage of the counterfactual outcome absent children) relative to the year just before the first child's birth. The figure includes 95% confidence bands around the event coefficient. Once life-cycle and time trends are controlled for, men and women have stable paths before parenthood, but the dynamics differ following the arrival of the first child. Women experience an immediate drop in both employment and hours of around 30%. Hours increase after the first year and stabilize on year $z + 2$, while employment remains low for 6 years and increases moderately after that. Ten years after having their first child, women are 30% less likely to be employed and work 28% fewer hours compared to the year just before motherhood. In contrast, men experience a small increase in both their employment probability and in hours (of 5% and 2%, respectively) following the birth of their first child.

Figure 3: Impact of children on employment and hours worked



These results are in line with existing work, notably the analysis of Danish data in Kleven, Landais, and Søgaard (2019) who also find that the arrival of a child has a negative effect on women's trajectories, reducing both labor force participation and their hours of work. These responses can, however, differ across women depending on individual or family circumstances.

We turn to this question in the next subsection.

4.2 Child-rearing and relative earnings within the couple

As we have argued, women who earn more than their husbands may react differently to the birth of their first child from those who do not. Figure 4 presents the estimated impacts when we divide the sample of women into women who were earning more than 50% of the household's labor income, i.e. those for whom the dummy variable $Wem_{i,t-1}$ is equal to one, and those that were earning a smaller share prior to the birth ($Wem_{i,t-1}$=0).

Our results do not support an efficient division of labor. Both, women who were earning less and those who were earning more than their husband reduce their hours and employment probability dramatically, while men exhibit stable hours and a slight increase in their employment probability as an effect of the first child birth. Conditional on being employed, the reduction in hours of work is roughly the same for women who were and were not the main breadwinner (right panel). The magnitude of the effect in employment is, however, different across the two groups of women (left panel). The immediate effect of the birth of the first child is a drop in employment of around 20% for women who were main breadwinners, and about 35% for those who were secondary earners. Interestingly, the dynamics differ across the two groups. Secondary earners exhibit a sharp initial reduction, but the employment probability recovers after year 6. The estimated effect after ten years is 28%. In contrast, for those who were the main breadwinners, the initial drop is much smaller but the employment probability keeps decreasing over time, and 10 years after the birth the estimated effect is virtually identical for the two groups of women.[17] Equivalent results are obtained when we restrict our sample to husbands with positive incomes (see Figure A.3 in the Appendix).

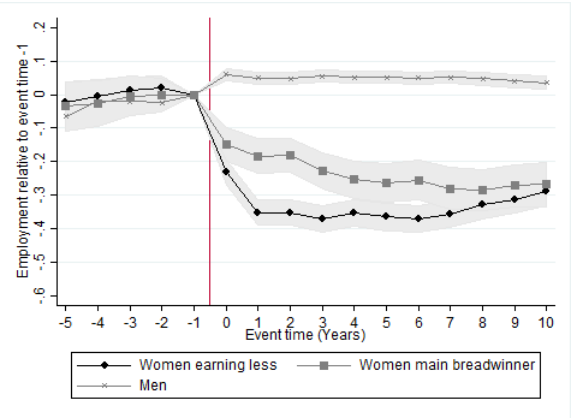
To further understand the differences between the two groups in terms of employment, Figure 5 presents the estimates for those women who have only one child (23.5% of our sample) and for those with two children.[18] Consider the former group. Again, there is a considerable difference in the magnitude of the initial employment reduction between those who earn less and those who earn more than their husbands. The latter have an initial negative effect on employment of

[17]The short-run impact is estimated considering event times just before and just after time zero. However, when we consider an event time long after zero, for example ten years after the birth of the first child, it is necessary to consider, first, that it can be capturing the effect of total lifetime fertility as opposed to the effect of the first child. Second, the smoothness assumption is no longer sufficient for identification and the long-run child penalty might be a biased estimate of the true post-child impact. Nevertheless, by comparing standard event study estimates to more sophisticated event study approaches that use control groups or instrument for child births, Kleven, Landais, and Søgaard (2019) show that the event study approach, once we control non-parametrically for age and time trends, does a good job of identifying child penalties even in the long run. Furthermore, Figure A.4 show equivalent results when we consider women with two or more children.

[18]See Figure A.5 in the Appendix for results on hours of work.

Figure 4: Impact of children and main breadwinner norm

a) Employment



b) Hours of work

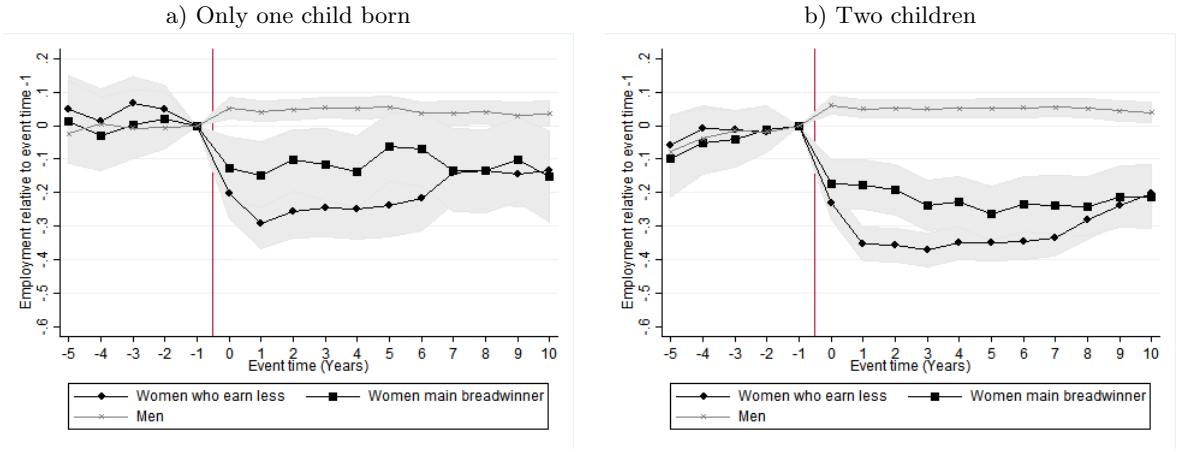
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[\tilde{Y_{ist}^g}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The effects on yearly hours worked are estimated conditional on employment. The shaded 95% confidence intervals are based on robust standard errors.

around 12% and then fluctuate around 10% for the next nine years. Women who are secondary earners experience a much larger effect of the first child birth (of 30%) but then employment slowly increases. Ten years after the birth they are around 12% less likely to work than before the birth, an estimated effect that is statistically not significantly different from that obtained for the breadwinners.[19] These results confirm those in Figure 4 indicating that employment behavior initially differs across the two groups, but not in the long run even for women with only one child.

Fertility patterns are strongly correlated with educational attainment, and our next step consists in examining differences across education groups. In order to maintain reasonable sample sizes, we split women into two groups: women with a high-school degree or less, and those with "some college" and at least 4 years of college, which are grouped together. The labor supply changes for the less-educated group are depicted in the left-hand panel of Figure 6. Although women who are the main breadwinner initially have a smaller reduction in employment

[19]Given that the number of observations is considerable reduced, the confidence intervals become larger, especially for women with only one child who earn more than their husbands. Table A.1 in the Appendix presents the results of estimating a regression pooling all women and including the event time dummies interacted with an indicator for the woman being the main breadwinner in t=-1, instead of estimating separate regressions. For those who have one child, we obtained significant coefficients on the interactions between the event time dummies and the main breadwinner variable until year 6, while for those who have two children, they are always significant but decrease in magnitude. This indicates that there is a statistical difference in the magnitude of the initial employment reduction between those who earn less and those who earn more than their husbands, which tends to converge after the child turns 6.

Figure 5: Impact of children on employment and main breadwinner norm



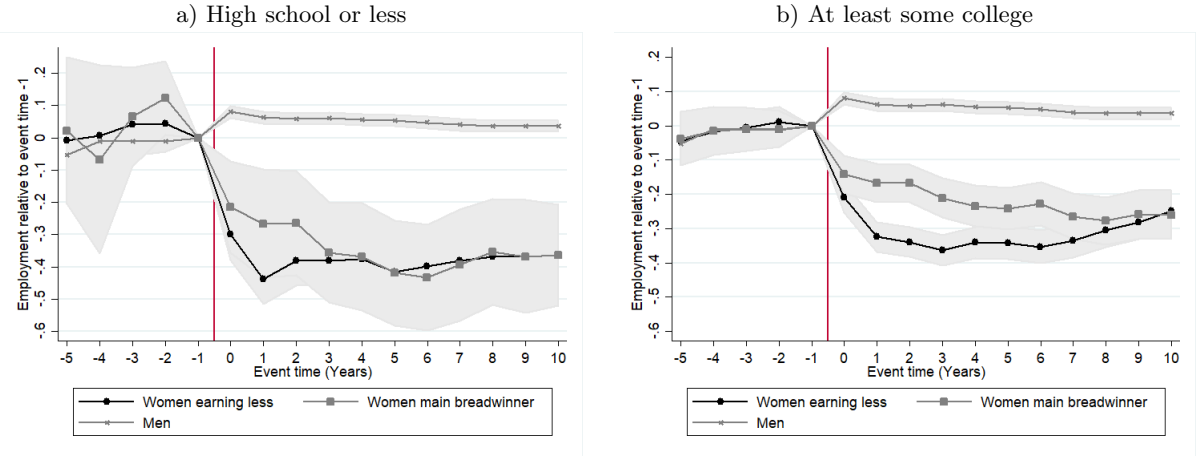
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The shaded 95 % confidence intervals are based on robust standard errors.

than those who are not, these differences are not statistically significant and have disappeared by year 4.[20] The results for high-skilled women are reported on the right-hand panel. The first thing to note is that the decline in participation is more gradual and, after 10 years, smaller than for the less-skilled group, amounting to 26% rather than 36%. Second, high-skilled women exhibit different patterns depending on whether or not they are the main breadwinner, in line with our earlier findings. Interestingly, there seems to be no difference in the behavior of the husbands of the two types of women.

These three figures indicate a strong response of women to motherhood, which occurs both for women with one child and for those who have two, implying that the dynamics are not (mainly) driven by the arrival of subsequent children. These dynamics show that although women who are the main breadwinner initially behave differently from those who are not, exhibiting smaller reductions in their labor supply, these differences are only temporary. After ten years, the two groups have reduced their labor supply by exactly the same amount, with an employment probability well below that in the year before they had their first child. A possible explanation is that while women who earn more than their husbands are initially more reluctant to conform to child-rearing norms, they eventually behave in accordance to them just as much as secondary

[20]Table A.2 in the Appendix presents the results of estimating a regression including the event time dummies interacted with an indicator for the woman being the main breadwinner in t=-1. For those who are less educated (panel a) the coefficients of the interaction are only significant until year 3, while for those with at least some college (panel b) the estimates are always significant. This implies that high-educated women exhibit different patterns depending on whether or not they are the main breadwinner.

Figure 6: Impact of children on employment and main breadwinner norm by education groups



Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and for women who were main breadwinners or secondary earners in $z = -1$. The education groups are defined on the basis of the wife's education. The effects on yearly hours worked are estimated conditional on employment. The shaded 95% confidence intervals are based on robust standard errors.

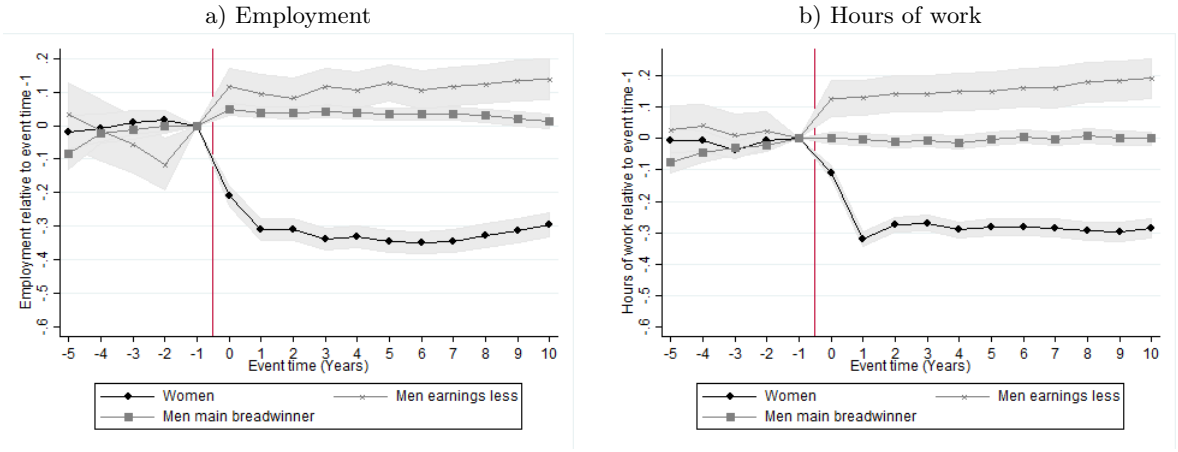
earners. Interestingly, this difference in behavior is more marked for high-education women, while those with a lower educational attainment show employment dynamics that are less affected by whether or not they are the main earner. A possible interpretation of these results is that the latter group of women is more willing to conform to the norm from the start, while the former only do so as time passes.

4.3 Men's employment and the division of housework

We turn next to the impact of children on men's employment. Again, we split the sample between men earning more and those earning less than their wives and report the change relative to the year before the birth of the first child. For those who were already main breadwinners, having a child has virtually no effect on the probability of employment and hours worked. However, men that were earning less than their wives before the birth, increase their probability of employment by around 12%, while the estimated effect on their hours of work rises steadily in the 10 years following the birth, and hours are around 20% higher by the end of the decade (Figure 7).

There are two possible explanations for these changes. One is simply that the increased labor market activity of these men seeks to compensate the reduction in household income occurring when their wives, who were bringing home a high share of earnings, reduce their employment. Alternatively, men may react to the presence of children by reverting to a traditional division of

Figure 7: Impact of children and main breadwinner norm



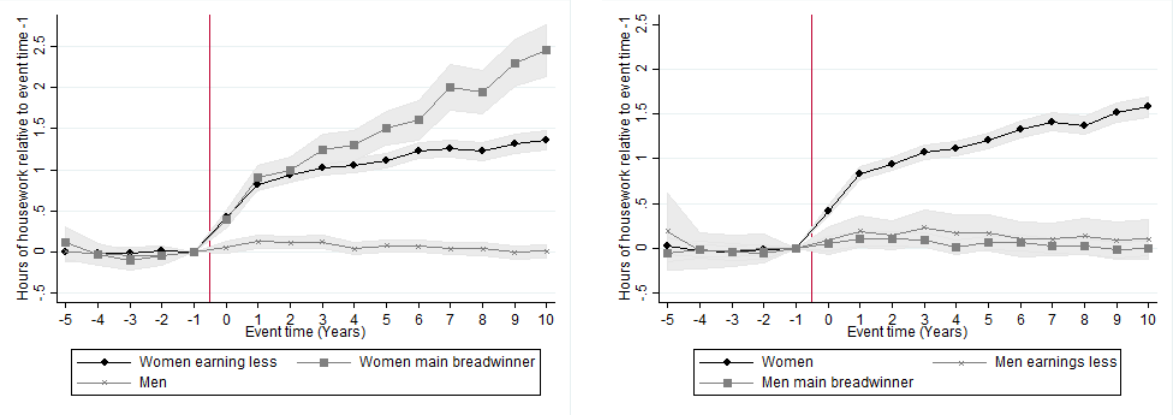
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The effects on yearly hours worked are estimated conditional on employment. The shaded 95% confidence intervals are based on robust standard errors.

labor and hence increase their market activity and reduce the amount of time spent in housework.

We consider this possibility by examining the response of hours of housework following the birth of the first child. Average weekly hours of housework before having children are 12 hours for women and 7 for men. Following the birth of their first child, the dynamics of housework for men and women diverge, with men still performing about 7 hours per week and women almost doubling them to 23 hours (Figure 2). When we perform our estimations of the effect of the first child on housework we find that the birth does not affect the hours spent in housework for men, and that this is the case for both men that were and were not the main breadwinner (Figure 8, right panel). For women there is a large increase just after the child's birth, with hours roughly doubling one year after the birth. The left panel of Figure 8, reports the estimates for both female secondary earners and women who were the main breadwinner prior to the child's arrival. Initially, the estimated effect of the child is an increase by about the same amount in the number of weekly hours and for both groups hours keep increasing. However the increase in the estimated effects is much faster for those who were the main breadwinners, who after 10 years have an increase of 250% compared to the year before motherhood.

An obvious question that arises from our analysis so far, is whether the reduction in market hours matches the increase in working time at home. To answer this question, Figures 9 and 10 present the estimates of the event study analysis for total hours, i.e. the sum of yearly hours

Figure 8: Impact of children on hours of housework



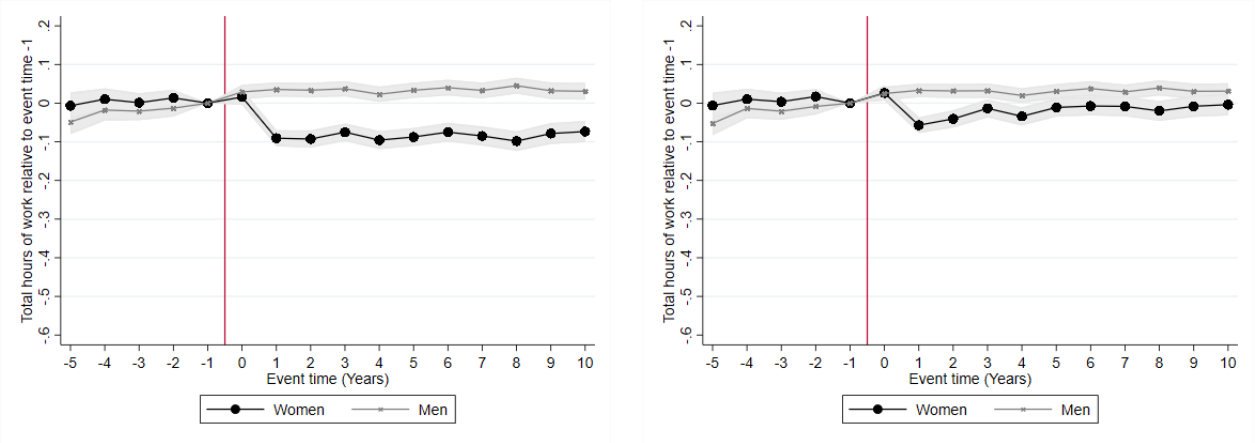
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The shaded 95% confidence intervals are based on robust standard errors. The number of weekly hours of work is reported in Figure A.6 in the Appendix.

worked in the market and at home. Comparing Figure 3 (panel b) to Figure 9 we see that while, following the birth of the first child, the decline in hours of market work is around 0.32, the decline in total hours of work is around 0.10 (panel a). Moreover, if we restrict the sample to women with positive hours of market work after childbirth (panel b), the decline in total hours is even smaller. These results suggest that most of the reduction in hours of market work by mothers is explained by an increase in hours of housework. Also, we find that the decline in total hours is a somewhat more pronounced (although the difference seems not to be statistically significant) for those women who were the main breadwinner (Figure 10), consistent with the finding that these were the ones who increased the most their hours of housework compared to their pre-motherhood situation.

Figure 9: Total hours of work (market and housework)

a) Total hours of work

b) Total hours conditional on positive market hours

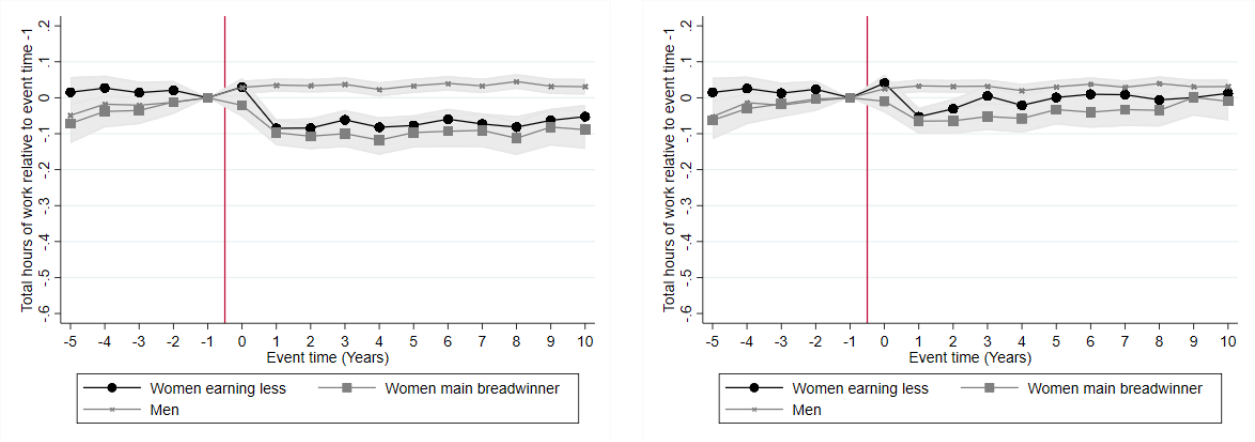


Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$. The outcome is the sum of the yearly hours of market work and housework. The shaded 95% confidence intervals are based on robust standard errors.

Figure 10: Total hours of work (market and housework): Breadwinners vs secondary earners

a) Total hours of work

b) Total hours conditional on positive market hours



Notes: The graph shows event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and for women who were either main breadwinners or secondary earners in $z = -1$. The outcome is the sum of the yearly hours of market work and housework. The shaded 95% confidence intervals are based on robust standard errors. The shaded 95 % confidence intervals are based on robust standard errors.

Overall, our estimates indicate that the effect of the arrival of children on labor market trajectories is large even for those women who were the main breadwinners in their households

prior to the child's birth. Women seem to take on the role of main carer, reducing employment and (for those who remain employed) their working hours. There are, nevertheless, important differences between women that were the main providers in their households before being mothers and those that were secondary earners. Although, conditional on employment, the groups have similar reactions in terms of hours of work, they differ in the probability of employment and the amount of housework performed. Initially the effect on employment is greater for secondary earners, yet the two groups of women exhibit the same reduction in their employment probability after ten years. In contrast, the pattern for hours of housework indicates that it is those women that were initially the main breadwinner that experience the greatest effect in terms of house work (compared with their previous levels) when children arrive.

Our results contrast to those obtained by Angelov et al. (2016) who use Swedish data to look at the effect of childbirth on women's earnings. They find that wives whose husbands are relatively better paid exhibit a reduction in earnings, largely driven by lower hours of work, while for those whose husbands had a lower income (relative to the wife's), the gender earnings gap becomes less pronounced. These results are in line with the theory of comparative advantage within the couple. Our results for the US indicate the opposite. Both women who were secondary earners and main breadwinners take the greatest responsibilities at home when the child arrives increasing their hours of housework, while it remains almost unchanged for men. Moreover, those women who were the main breadwinners prior to the child's birth experience a greater change in their housework time compared to the group of secondary earners.

These differences across countries could be explained by the strength of social norms. Using data from the World Value Survey, Miller et al. (2021) find that there is considerably less support for the male-breadwinner norm in Sweden than in the US, with support in the latter being equivalent to that found in Germany, a country with strong traditional gender norms. [21] The results for Sweden are consistent with the two norms reinforcing each other, making it more likely that couples behave so as to allow the member with higher earnings to do less housework and earn more, irrespective of gender. In contrast, in the US the strength of the breadwinner norm seems to push couples to offset departing from it by behaving in a more traditional way in terms of household division of labor.

[21] Miller et al. (2021) measure support at the individual level and control for a number of individual characteristics. They find that the effect of being American (or German), as compared to being Swedish, increases support for the breadwinner norm by twice as much as having a tertiary rather than a secondary education degree.

5 Do all women react to the breadwinner norm?

5.1 Mothers and non-mothers

The previous section indicates that women's labor supply choices following the birth of their first child are strongly shaped by social conventions on caring for children and that such reactions often contradict the specialisation pattern that would be implied if the main carer were the spouse with lower income. We now turn to how women react to breaking the breadwinner norm and analyze heterogeneity in the responses to the prescription that a man should earn more than his wife. In particular, we seek to understand the relationship that the male breadwinner norm has with motherhood. The presence of children may affect the way in which couples react to gender norms. Historically, motherhood has been the key aspect defining female identity, hence it is possible that couples pay little attention to whether they conform to traditional gender roles as long as they do not have children. The arrival of offspring could be a trigger that makes gender norms salient and hence pushes women who are earning more than their husbands to modify their behavior. We will thus explore whether the effect of the male breadwinner norm is stronger for women with than for women without children.

As described above, we follow the approach proposed by Bertrand et al. (2015), and examine whether realizations of earnings that imply that the male breadwinner norm is violated in year t result in a change in the labor supply of women at $t+1$. Crucially, the panel nature of the data allows us to include couple fixed effects. Table 2 considers married women's labor force participation as a function of the dummy variable $Wem_{i,t-1}$, which takes value one if the wife earned more than the husband in $t-1$. The three columns in each panel present different specifications as additional controls are added. Columns (1) and (4) have couple fixed effects (as well as standard controls), columns (2) and (5) add polynomials for the wife's and the husband's income, and columns (3) and (6) add the relative income of the wife as well as child controls, taking the form of dummy variables for whether the youngest child is 3 or younger, between 4 and 6, or older than 6. We split the data into two groups, depending on whether women are mothers, with the results for childless women being on the left panel and those for women with at least one child on the right panel.

We start by examining the effect on participation (top panel). The coefficients for mothers are negative and statistically and economically significant. A wife who earns more than her husband, is 1.8 percentage points less likely to be in the labor force the following year than one who does not, results which are close to those reported in Bertrand et al. (2015) when considering all women. In contrast, the coefficient for childless women is negative, much smaller, and, once

Table 2: Labor supply and relative income by ever had a child

	(1)	(2)	(3)	(4)	(5)	(6)
	(a) Dependent variable: female labor force participation					
	No child born			At least one child born		
Wem_{t-1}	-0.013*	-0.004	-0.010	-0.021***	-0.012***	-0.018***
	[0.007]	[0.008]	[0.008]	[0.004]	[0.004]	[0.005]
Observations	17,761	17,761	17,761	103,028	103,028	103,028
R-squared	0.369	0.375	0.377	0.408	0.415	0.416
	(b) Dependent variable: ln yearly hours of work					
	No child born			At least one child born		
Wem_{t-1}	-0.075***	-0.006	0.001	-0.101***	-0.031***	-0.012*
	[0.013]	[0.012]	[0.014]	[0.007]	[0.006]	[0.007]
Observations	14,928	14,928	14,928	69,830	69,830	69,830
R-squared	0.598	0.627	0.628	0.633	0.665	0.667
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spouses incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	yes	yes
Children controls	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. In Panel (a) the dependent variable is an indicator variable which takes the value of one if the woman is in the labor force, zero otherwise. In panel (b) the dependent variable is the logarithm of yearly hours of work, and the regressions are conditional on being employed (positive labor income and hours). *No child born* is a subsample of women who in year t do not have any child born, while *At least one child born* includes those women who in year t have at least one child born. Wem_{t-1} is an indicator variable that equals one if the relative income is greater than 0.5 at time $t-1$. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. *cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. *Children controls* include indicator variables for whether the youngest child is 3 or younger, between 4 and 6, or older than 6. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

we include the additional controls, not statistically significant. The sample of childless women is considerably smaller than that for women with children, raising the question of whether sample size is the main reason behind the lack of statistical power. But even if the absence of significance is driven by sample size, the estimated coefficients for the sample of childless women are much

smaller than those obtained for women with children. In our preferred specifications (columns (3) and (6), which include the most controls), the effect of the norm on participation is about half of what we find for mothers. The bottom panel of Table 2 runs the same regressions for yearly hours of work (conditional on working). For women who never had a child, we initially find a negative effect of having earned more, but it disappears once we start including controls and eventually becomes positive, of small magnitude and not significant. For mothers, it is negative and significant. Table A.3 in the Appendix shows that the difference between the two groups is statistically significant.[22]

Overall, the table indicates that the effect of the breadwinner norm is much more important for mothers than for women without children. The former have a strong reaction to the norm in terms of labor force participation and hours of work, while women with no children have no statistically significant response to earning more than their husbands. Moreover, these results are robust to increasing the threshold used for defining whether the wife earns more, as shown in Tables A.4 and A.5, where we report results for employment and hours for thresholds of 0.51, 0.52 0.55 and 0.60, and show that the value and significance of the coefficients barely change. This evidence suggests that the male breadwinner norm has an effect on women's labor supply decisions only when there are children in the household.

5.2 The breadwinner norm and educational attainment

We next split our sample by education group. As discussed above, women with different education levels could react differently to being the breadwinner. Indeed, Bertrand et al. (2015) indicate that education is an important dimension. They look at less educated couples (both the wife and the husband have at most high school education) and more educated couples (both the wife and the husband have at least some college education), and find that, when the breadwinner norm is reversed, the wife's income falls by more for the former than for the latter couples (see footnote 41 in their paper). To look at this question in more detail we consider only the wife's education (although it is highly correlated with that of the husband) and consider three

[22]Table A.3 reports results when we pool all women and interact $Wem_{i,t-1}$ with a dummy for having at least one child instead of estimating separate regressions for mothers and non-mothers. The estimated coefficients for the interaction terms are always negative and significant, both for labor force participation and for the logarithm of yearly hours of work (-0.034*** and -0.054*** respectively in the specification with all the additional controls), which indicates statistically different responses for mothers and childless women. These results confirm that it is mothers who exhibit a reduction in participation. For mothers, the coefficients tend to be of larger magnitude than in our specification in Table 2. For non-mothers, we find equivalent results to those in Table 2 when looking at participation (a negative and significant coefficient on $Wem_{i,t-1}$ that becomes insignificant once all controls are included), while the regression for hours displays a positive and significant effect. The differences are probably due to the fact that we are imposing the same return to all other characteristics for the two groups. Notably, the return to experience is likely to be considerably lower for mothers than for non-mothers.

educational groups: high school or less, some college, and at least 4 years of college. We want to understand how potential reduction in the wife's earnings come about, hence we consider the impact on two outcomes: the probability of participating in the labor force and hours of work. Given our results above and since the number of women without children is too small to consider various educational categories, we focus on women with at least one child.

The results are reported in Table 3, where the left-hand side displays the coefficients for participation and the right-hand side for annual hours of work. The three panels consider the impact of $Wem_{i,t-1}$ on these two variables separately for the three educational groups in our dataset: women with a high-school degree or less, women with some college education, and those with at least four years of college. As before, the various columns sequentially add controls. When we consider participation, the coefficient is negative, large and significant for women with a high-school degree or less as well as for those with "some college", but it is non-significant and of a much smaller magnitude for those with at least 4 years of college, indicating a differential response across educational groups. Women with some college have a reduction of similar magnitude to that of the entire population, 1.9 percentage points, while the effect is substantially stronger for less educated women, amounting to a negative effect of 3.3 percentage points.[23]

The right-hand side of Table 3 performs the same analysis looking at hours of work (conditional on being employed). Both women at the bottom and those at the top of the skill distribution exhibit a negative and significant coefficient, indicating that earning more than her husband leads women to subsequently reduce their hours of work. The effect is considerably stronger for more educated women: if a wife earned more than her husband in $t-1$, conditionally of remaining employed, she worked 2.2% and 3.5% fewer hours in the next period if she is in the bottom and top education groups, respectively. To gauge these magnitudes, note that average annual hours worked for mothers are 980 for the less and 1265 for the most educated. Our coefficients imply that, if a wife earned more than her husband, in the next period she

[23]Table A.6 in the Appendix reports results when we pool all women and interact $Wem_{i,t-1}$ with a dummy for each educational group instead of estimating separate regressions. The estimated coefficient for Wem_{t-1} is negative and significant (-0.034*** in the specification with all the additional controls), while the estimated coefficients for the interaction terms between the wife earning more and some college and college graduates ($Wem_{t-1} * Somecollege$ and $Wem_{t-1} * Collegegraduate$) are positive and significant and of similar magnitude (0.030*** and 0.036***, respectively, in the specification with all the additional controls). This indicates that only the less educated women adjust their labor force participation in response to the male breadwinner norm. On the contrary, for yearly hours of work, in the specification with all the additional controls, we obtain negative and significant coefficients only for the interaction of Wem_{t-1} with college graduates. Again, here the differences between the results obtained when estimating the regressions separately for each educational group and the pooled estimation with interaction terms are probably due to the fact that we are imposing the same return to all other characteristics for the three educational groups.

Table 3: Labor supply and relative income for mothers

	(1)	(2)	(3)	(4)	(5)	(6)
	Female labor force participation			*ln yearly hours of work*		
	(a) Highschool or less					
Wem_{t-1}	-0.019***	-0.019***	-0.033***	-0.097***	-0.035***	-0.022**
	[0.007]	[0.007]	[0.007]	[0.009]	[0.010]	[0.011]
Observations	51,766	51,766	51,766	31,575	31,575	31,575
R-squared	0.429	0.436	0.436	0.632	0.673	0.673
	(b) Some college					
Wem_{t-1}	-0.025***	-0.020**	-0.019**	-0.109***	-0.031**	-0.007
	[0.008]	[0.008]	[0.009]	[0.013]	[0.013]	[0.012]
Observations	27,748	27,748	27,748	20,170	20,170	20,170
R-squared	0.382	0.387	0.389	0.630	0.663	0.665
	(c) At least 4 years of college					
Wem_{t-1}	-0.019***	0.000	0.005	-0.095***	-0.024**	-0.035**
	[0.007]	[0.007]	[0.008]	[0.012]	[0.012]	[0.014]
Observations	23,294	23,294	23,294	17,958	17,958	17,958
R-squared	0.407	0.414	0.418	0.649	0.672	0.675
Additional controls						
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spouses incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	no	yes
Children controls	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. In columns (1) to (3) the dependent variable is an indicator variable which takes the value of one if the woman is in the labor force, zero otherwise. In columns (4) to (6) the dependent variable is the logarithm of yearly hours of work, and the regressions are conditional on being employed (positive labor income and hours). Wem_{t-1} is an indicator variable that equals one if the relative income is greater than 0.5 at time $t-1$. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. *cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. *Children controls* include indicator variables for whether the youngest child is 3 or younger, between 4 and 6, or older than 6. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

works 22 hours less on average if she is low educated and 44 hours less for those with college. In contrast, for the middle skill group (*some college*), once we include controls, notably, once the relative income of the wife is included, the effect becomes statistically insignificant and small in magnitude, although it remains negative.

Our results indicate that while all mothers seem to react to the male breadwinner norm, education is an important determinant of *how* they respond. Less educated women adjust both the intensive and the extensive margin of labor supply, but other educational categories seem to react by changing only one of these margins. Those with some college adjust participation, while those with at least 4 years of college respond by reducing their hours of work but do not leave the labor market. Three non-mutually-exclusive explanations could be behind these patterns. First, the opportunity cost of not working will be higher the higher the income of the woman is, and since those with most skills command the highest wages, they tend to reduce their hours but not to quit market employment. Second, the various groups may face different labor market constraints, with some women being able to adjust hours and others not. Their labor supply reaction would then be imposed rather than a choice.[24] An additional explanation relies on the importance of different identity traits. Women at the top of the education distribution are more likely to form their identity around their professional life, as argued by Goldin (2006). As a result, dropping out of the labor force would consequently have a larger cost in terms of identity loss than for other women and hence they choose to try to conform to the male breadwinner norm by adjusting hours while maintaining a professional life. Women without a college degree are less likely to derive a strong sense of identity from their job, and hence choose to adjust their participation.

6 Conclusions

A growing literature in economics has tried to identify how gender identity shapes women's labor market outcomes and this paper contributes to it by considering the interaction between different gender norms. Norms may reinforce each other, so that when a woman tends to conform in one aspect she also accepts other social conventions, or could have offsetting effects, such that an individual that behaves contrary to one norm would tend to compensate by strongly adhering to another one.

We focus on two norms, the social prescription requiring mothers to be the main care-giver for children and the view that men should be the household's main breadwinner, and use panel data for US couples to present descriptive evidence on their interactions. We start by investigating

[24]While high-skill women are likely to have the capacity to negotiate working hours, those with fewer years of education may not. Women with no college occupy a variety of positions, and adjusting hours may be possible for some, such as "Maids and housekeepers, cleaners", but not for others. They hence adjust both their participation and hours. For women in the middle of the skill distribution, the nature of the jobs they perform may give them little freedom to choose their hours as they are often support staff for professionals and are hence constraint by the requirements of the latter's schedules. They hence tend to adjust participation rather than hours.

how labor supply changes after the birth of the first child differ depending on whether the couple's earnings pattern before the birth conformed or not to the breadwinner norm. Our event-study analysis shows that the arrival of the first child has little impact on the father's employment, market hours, and housework but is associated with dramatic reductions in the market labor supply of women. We find sharp changes both for women who were secondary earners and those who were the main breadwinners. Interestingly, the reduction in the probability of employment is initially lower for the latter group, yet it keeps falling over time so that 10 years after the birth of the first child both groups of women have an equal reduction in the probability of being employed relative to the pre-birth level. Moreover, although all women increase the amount (and share) of housework that they do immediately after becoming mothers, housework increases most for those who were the main breadwinner, as if this were a compensation for having departed from the traditional patterns of relative earnings.

Our second contribution consists in considering heterogeneous reactions to the male breadwinner norm. When we split the sample between women who have had at least one child and those who have not, we find that those with children are more likely to adhere to the norm, with the effect being statistically insignificant for childless couples. Survey data find that women tend to agree more with gender stereotypes after becoming mothers and our results indicate that this change in attitudes is translated into labor market differences. The second dimension we consider is the woman's level of formal education. Education can be important as it affects career objectives, potentially creating a conflict between identity as a mother and identity as a professional. When we split the data by education level, we find that the most skilled women reduce their hours of work but, contrary to less skilled women, do not leave the labor market, a behavior that can be interpreted as an attempt to reconcile the two identities.

Overall, our results are consistent with the idea that there is a close interaction between different norms. The effect of the male breadwinner norm seems to be highly contextualized, as women's willingness to depart from the norm is correlated with education and the presence of children. This is important because the long-term consequences of reducing labor supply (not explored in this paper) can be different depending on whether a woman reduces her hours or drops out of the labor force. In contrast, motherhood generates very strong responses along traditional lines both in terms of labor supply and housework, but also in terms of women moving to feminised industries and occupations, as we show in the Appendix. Contrary to what an efficient allocation of household time would imply, even those women who were the main breadwinners in the household before having their first child, largely conform to the traditional

division of roles. These women seem to attempt to conform less, as manifested by a smaller initial reduction in employment, but over time end up being the ones with the strongest response to motherhood, catching up with other women as far as participation is concerned and increasing dramatically the amount of housework they undertake.

A possible interpretation of our results is that, in the US, there is a hierarchy of norms. While the effect of the male breadwinner norm is highly contextualized, norms related to children are not, indicating that the potential social cost when not conforming is higher. This has important implications for gender equalization policy and raises the question of whether efforts to be more inclusive in the professional sphere will have limited success if they are not accompanied by strategies that focus on child-care in a way that allows women not to bear the brunt of parenthood. Understanding such policy complementarities is an important question that we leave for future work.

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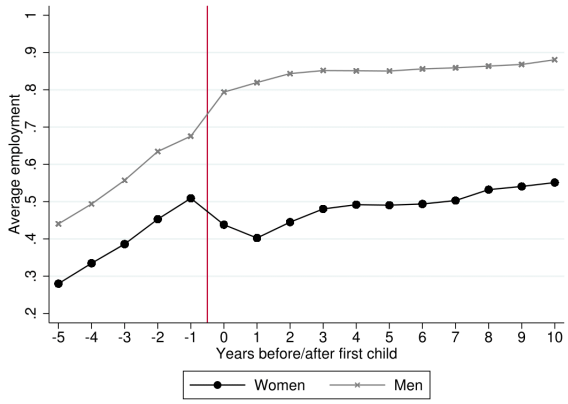
Appendix

This Appendix has two sections. Appendix A provides additional tables and figures that are referred to in the text. In particular, the figures correspond to the analysis in section 4 and report a number of equivalent exercises looking at different outcomes or for additional subsets of the data. The tables correspond to the analysis in section 5. Appendix B provides further analysis of the effect of the birth of their first child by examining how it affects the occupation and industry in which women work.

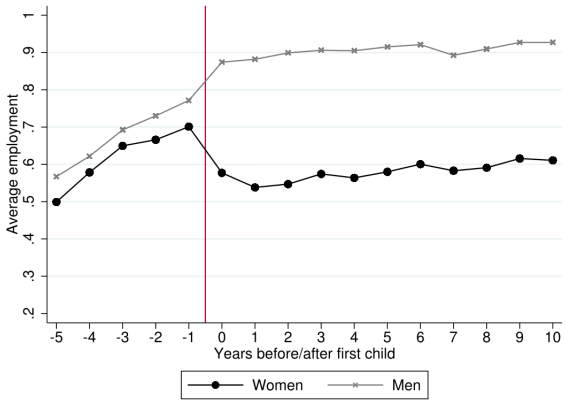
A Additional figures and tables

Figure A.1: Average employment level for women and men before and after having their first child

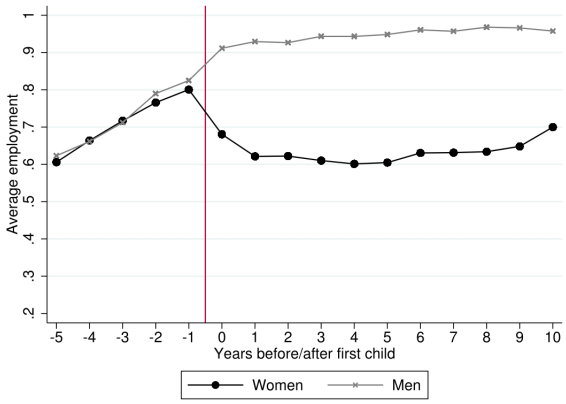
a) 12 or less years of education



b) 13-15 years of education



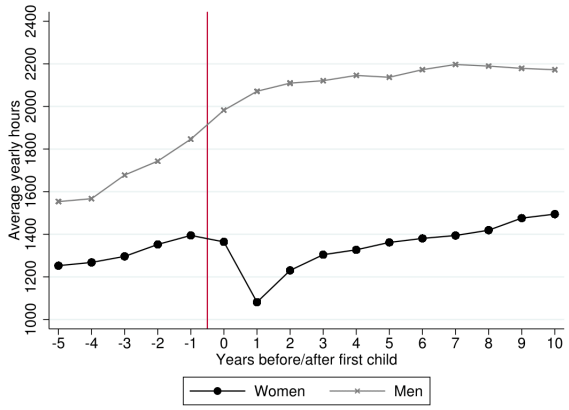
c) More than 15 years of education



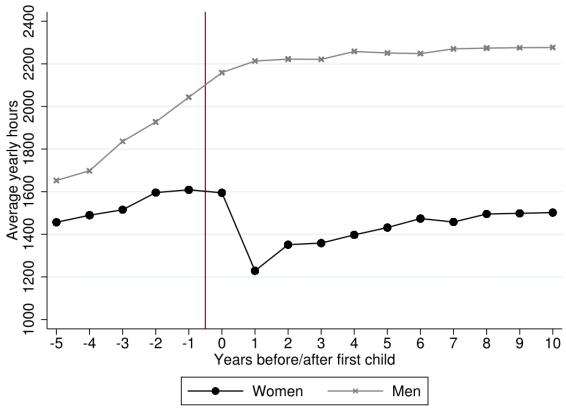
Notes: The graphs show average levels of employment in each event-time before and after the first child is born (vertical line).

Figure A.2: Average yearly hours for women and men before and after having their first child

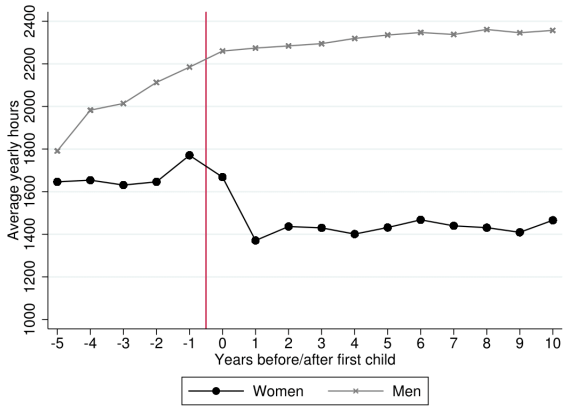
a) 12 or less years of education



b) 13-15 years of education

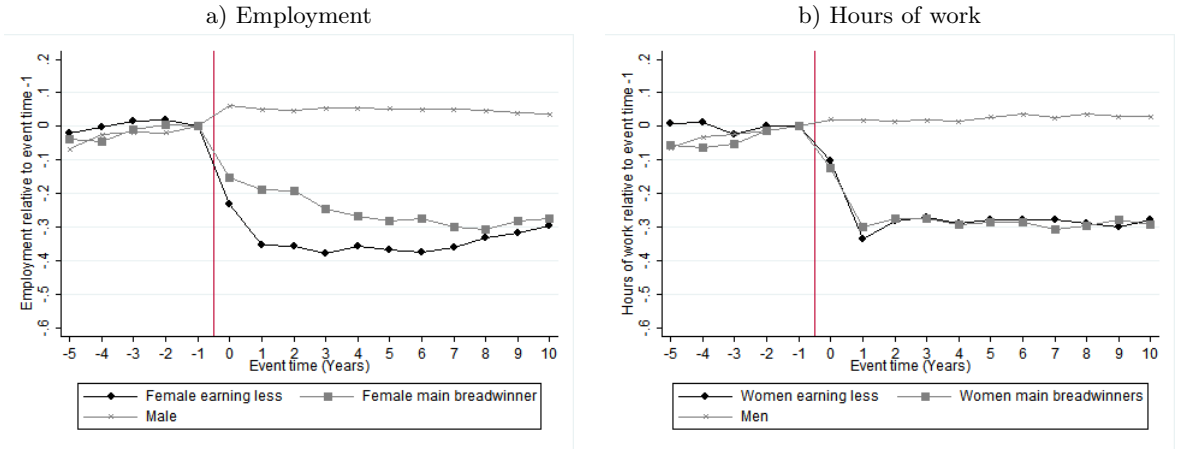


c) More than 15 years of education



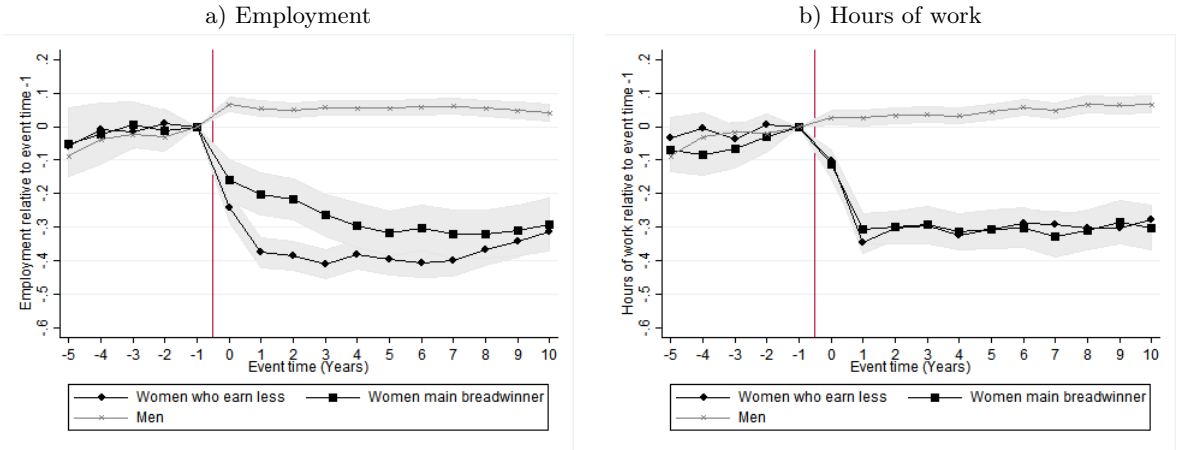
Notes: The graphs show average levels of yearly hours of work (conditional on being employed) in each event-time before and after the first child is born (vertical line).

Figure A.3: Impact of children and main breadwinner norm



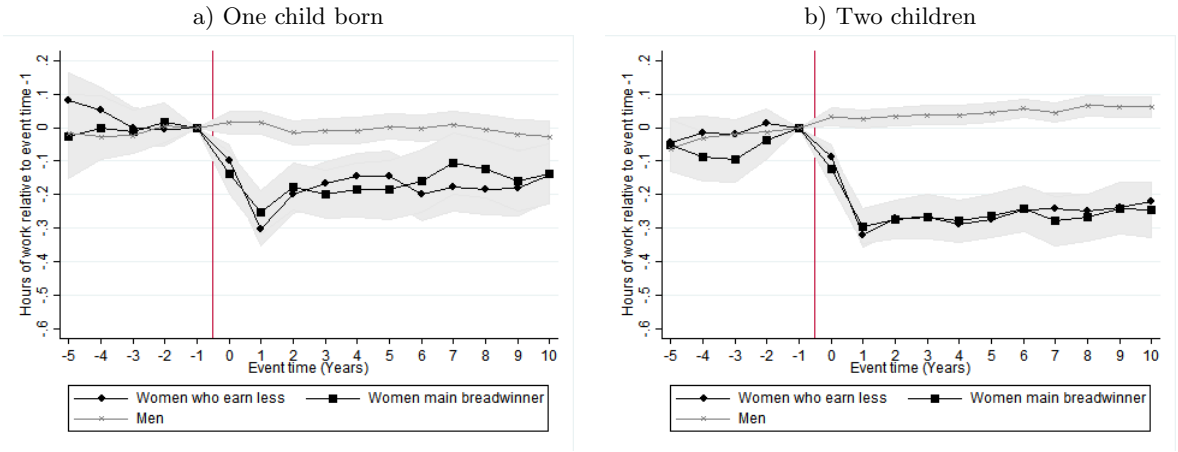
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The effects on yearly hours worked are estimated conditional on employment. The sample is restricted to husbands with positive earnings on year t-1.

Figure A.4: Impact of children and main breadwinner norm: Sample of women and men with two or more children born



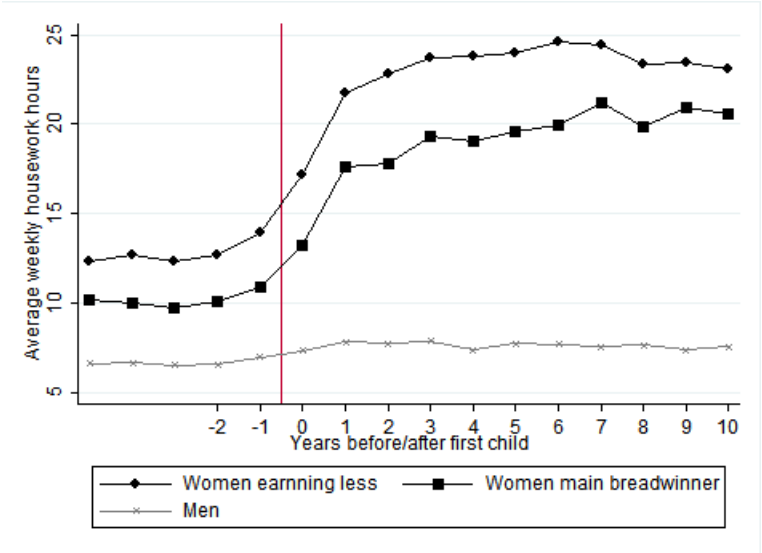
Notes: The graphs show event time coefficients estimated from equation (2) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The effects on yearly hours worked are estimated conditional on employment. The shaded 95 % confidence intervals are based on robust standard errors.

Figure A.5: Impact of children and main breadwinner norm: Hours of work



Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women who were main breadwinners or secondary earners in $z = -1$. The shaded 95 % confidence intervals are based on robust standard errors.

Figure A.6: Average weekly hours of housework before and after having their first child



Notes: The graph shows average numbers of weekly hours of housework in each event-time before and after the first child is born.

Table A.1: Event study estimates of the effect of the first child birth on employment by number of children and main breadwinner

	(a) Just one child														
	-5	-4	-3	-2	0	1	2	3	4	5	6	7	8	9	10
Event	0.047	0.031	0.040	0.043*	-0.189***	-0.255***	-0.217***	-0.212***	-0.240***	-0.223***	-0.210***	-0.163***	-0.119***	-0.129***	-0.124***
	[0.030]	[0.030]	[0.028]	[0.025]	[0.028]	[0.030]	[0.031]	[0.033]	[0.035]	[0.037]	[0.038]	[0.038]	[0.037]	[0.039]	[0.040]
*Event*Wem*	0.074*	0.084**	0.107***	0.059**	0.117***	0.169***	0.172***	0.148***	0.175***	0.210***	0.201***	0.087	0.056	0.094	0.048
	[0.044]	[0.036]	[0.029]	[0.029]	[0.041]	[0.043]	[0.043]	[0.050]	[0.054]	[0.053]	[0.054]	[0.063]	[0.060]	[0.062]	[0.065]
	(b) Two children														
	-5	-4	-3	-2	0	1	2	3	4	5	6	7	8	9	10
Event	0.004	0.023	0.010	0.016	-0.210***	-0.305***	-0.336***	-0.349***	-0.337***	-0.331***	-0.328***	-0.320***	-0.273***	-0.240***	-0.220***
	[0.029]	[0.024]	[0.019]	[0.017]	[0.020]	[0.020]	[0.020]	[0.021]	[0.021]	[0.022]	[0.022]	[0.023]	[0.023]	[0.024]	[0.025]
*Event*Wem*	0.021	0.001	0.019	0.059***	0.097***	0.180***	0.195***	0.180***	0.170***	0.138***	0.168***	0.161***	0.107***	0.102***	0.091**
	[0.038]	[0.033]	[0.027]	[0.018]	[0.030]	[0.030]	[0.030]	[0.032]	[0.033]	[0.035]	[0.036]	[0.038]	[0.039]	[0.039]	[0.040]

Notes: The data are from the 1968-2015 PSID. The table reports the estimated coefficients for Wem_{t-1} (an indicator variable that equals one if the relative income is greater than 0.5 at time $t-1$) and for Wem_{t-1} interacted with a dummy variable for having at least some college and a dummy for college graduates. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. The log of the wife's income, the log of the husband's income, the log of the couple's income and the relative income are also included interacted with the education dummies. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table A.2: Event study estimates of the effect of the first child birth on employment by education level and main breadwinner

	(a) Highschool or less														
	-5	-4	-3	-2	0	1	2	3	4	5	6	7	8	9	10
Event	0.009	0.037	0.045	0.063**	-0.216***	-0.340***	-0.319***	-0.328***	-0.330***	-0.351***	-0.356***	-0.344***	-0.336***	-0.341***	-0.351***
	[0.044]	[0.035]	[0.031]	[0.027]	[0.028]	[0.028]	[0.029]	[0.030]	[0.030]	[0.031]	[0.032]	[0.033]	[0.034]	[0.035]	[0.037]
*Event*Wem*	0.103	0.078	0.144***	0.137***	0.120**	0.180***	0.136**	0.120*	0.054	0.061	0.048	0.061	0.093	0.108	0.137*
	[0.081]	[0.059]	[0.036]	[0.025]	[0.052]	[0.054]	[0.056]	[0.062]	[0.069]	[0.072]	[0.073]	[0.078]	[0.074]	[0.072]	[0.080]
	(b) At least some college														
	-5	-4	-3	-2	0	1	2	3	4	5	6	7	8	9	10
Event	0.014	0.011	0.006	0.022	-0.209***	-0.294***	-0.317***	-0.337***	-0.328***	-0.329***	-0.335***	-0.330***	-0.297***	-0.286***	-0.259***
	[0.022]	[0.020]	[0.017]	[0.014]	[0.017]	[0.017]	[0.018]	[0.018]	[0.019]	[0.019]	[0.020]	[0.020]	[0.021]	[0.021]	[0.021]
*Event*Wem*	0.048*	0.049**	0.058***	0.054***	0.109***	0.173***	0.197***	0.179***	0.149***	0.147***	0.172***	0.130***	0.083**	0.085**	0.062*
	[0.029]	[0.025]	[0.020]	[0.016]	[0.024]	[0.025]	[0.025]	[0.027]	[0.029]	[0.029]	[0.030]	[0.032]	[0.033]	[0.034]	[0.034]

Notes: The data are from the 1968-2015 PSID. The table reports the estimated coefficients for Wem_{t-1} (an indicator variable that equals one if the relative income is greater than 0.5 at time $t-1$) and for Wem_{t-1} interacted with a dummy variable for having at least some college and a dummy for college graduates. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. The log of the wife's income, the log of the husband's income, the log of the couple's income and the relative income are also included interacted with the education dummies. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Labor supply and relative income by ever had a child. Alternative estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Labor force participation			*ln yearly hours of work*		
Wem_{t-1}	0.012**	0.014**	0.007	-0.053***	-0.000	0.029***
	[0.006]	[0.006]	[0.006]	[0.011]	[0.010]	[0.010]
Wem_{t-1} **Child*	-0.040***	-0.033***	-0.034***	-0.082***	-0.054***	-0.054***
	[0.006]	[0.006]	[0.006]	[0.011]	[0.009]	[0.009]
Observations	120,789	120,789	120,789	91,520	91,520	91,520
R-squared	0.410	0.418	0.418	0.612	0.645	0.645
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spousal incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. The table reports the estimated coefficients for Wem_{t-1} (an indicator variable that equals one if the relative income is greater than 0.5 at time $t-1$) and for Wem_{t-1} interacted with a dummy variable for having at least one child born. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. *cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: Labor supply and relative income: Thresholds of relative income above 0.5

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: female labor force participation					
	No child born			At least one child born		
$Wem_{t-1} > 0.51$	-0.013*	-0.003	-0.008	-0.023***	-0.012***	-0.019***
	[0.007]	[0.008]	[0.009]	[0.004]	[0.004]	[0.005]
$Wem_{t-1} > 0.52$	-0.012	-0.002	-0.007	-0.024***	-0.014***	-0.021***
	[0.008]	[0.008]	[0.009]	[0.004]	[0.004]	[0.005]
$Wem_{t-1} > 0.55$	-0.012	-0.003	-0.009	-0.023***	-0.013***	-0.020***
	[0.008]	[0.009]	[0.009]	[0.005]	[0.005]	[0.005]
$Wem_{t-1} > 0.60$	-0.014	-0.007	-0.014	-0.021***	-0.012**	-0.018***
	[0.009]	[0.009]	[0.010]	[0.006]	[0.005]	[0.006]
Observations	17,761	17,761	17,761	103,028	103,028	103,028
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spouses incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. For each threshold x, $Wem_{t-1} > x$ is an indicator variable that equals one if the relative income is greater than x at time $t-1$. For each threshold we estimate three specifications of the regressions. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, indicators for whether only the wife is working or only the husband is working, a quadratic in the wife's and husband's age, year fixed effects and state fixed effects. *Cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. *Children controls* include indicator variables for whether the youngest child is 3 or younger, between 4 and 6, or older than 6. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. The table reports the estimated coefficients for *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: Hours of work and relative income: Thresholds of relative income above 0.5

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: ln yearly hours of work					
	No child born			At least one child born		
$Wem_{t-1} > 0.51$	-0.074***	-0.005	0.003	-0.100***	-0.030***	-0.011
	[0.013]	[0.012]	[0.015]	[0.007]	[0.007]	[0.007]
$Wem_{t-1} > 0.52$	-0.076***	-0.009	-0.002	-0.102***	-0.033***	-0.013*
	[0.013]	[0.012]	[0.015]	[0.007]	[0.007]	[0.008]
$Wem_{t-1} > 0.55$	-0.077***	-0.013	-0.007	-0.102***	-0.033***	-0.014*
	[0.014]	[0.013]	[0.016]	[0.008]	[0.007]	[0.008]
$Wem_{t-1} > 0.60$	-0.061***	-0.006	-0.000	-0.098***	-0.036***	-0.017*
	[0.016]	[0.015]	[0.018]	[0.010]	[0.008]	[0.009]
Observations	14,928	14,928	14,928	69,830	69,830	69,830
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spouses incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. For each threshold x $Wem_{t-1} > x$ is an indicator variable that equals one if the relative income is greater than x at time $t-1$. For each threshold we estimate three specification of the regressions. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. *Cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. *Children controls* include indicator variables for whether the youngest child is 3 or younger, between 4 and 6, or older than 6. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. The table reports the estimated coefficients for *** p<0.01, ** p<0.05, * p<0.1.

Table A.6: Labor supply and relative income for mothers, by educational level. Alternative estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Labor force participation			*ln yearly hours of work*		
Wem_{t-1}	-0.024***	-0.021***	-0.034***	-0.094***	-0.042***	-0.003
	[0.007]	[0.006]	[0.007]	[0.009]	[0.009]	[0.011]
Wem_{t-1} **Some college*	0.008	0.014	0.030***	-0.012	0.014	-0.012
	[0.010]	[0.010]	[0.012]	[0.017]	[0.014]	[0.017]
Wem_{t-1} **College graduated*	0.004	0.019**	0.036***	-0.011	0.029**	-0.047**
	[0.010]	[0.010]	[0.011]	[0.015]	[0.014]	[0.020]
Observations	102,253	102,253	102,253	69,358	69,358	69,358
R-squared	0.417	0.423	0.424	0.634	0.667	0.668
Couple fixed effects	yes	yes	yes	yes	yes	yes
Cubic spousal incomes	no	yes	yes	no	yes	yes
Relative Income	no	no	yes	no	no	yes
Children controls	no	no	yes	no	no	yes

Notes: The data are from the 1968-2015 PSID. The table reports the estimated coefficients for the event time dummies and the event time dummies interacted with an indicator of the woman being the main breadwinner in $z = -1$. All regressions include the log of the wife's income, the log of the husband's income, the log of the couple's income, an indicator for whether only the wife is working or only the husband is working, a quadratic in wife's and husband's age, year fixed effects and state fixed effects. *Cubic spouses incomes* denotes a cubic in the (log) of the wife's and the husband's incomes. The regression is estimated using a linear probability model. Standard errors are clustered at the couple level and are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

B Career changes

In this section we examine how the birth of their first child affects the occupation and industry in which women work. These choices are closely linked to social norms as changing industry and occupation can help women adhere to expected behavior. On the one hand, because feminized jobs tend to pay less, even women who keep working full time can reduce their earnings relative to their husband's and hence adhere to the breadwinner norm.[25] On the other, the prevalence of part-time in feminized jobs facilitates reducing the number of hours of market work thus freeing time for child-rearing. This raises the question of whether women's career choices are made ex ante, in anticipation of motherhood and family constraints, or whether they react ex post as a change in the household circumstance (the birth of the first child or relative incomes) makes social prescriptions more salient.

To analyze this question, we estimate the effect of the first child's birth on the probability of being employed in a feminized industry or occupation relative to the probability of being in such an industry/occupation the year before the birth of the first child. Ideally, we would also have liked to examine how the choice is affected by whether or not the wife is the main breadwinner; unfortunately a relatively small share of women are in such category, and when we cross that with motherhood and industry/sector we do not have enough observations to obtain reasonable estimates.

We create our industry and occupation variables by recovering information on three different variables defined for the head of household and wife in the PSID Family files. For the period 1968-1980 we consider the industry and occupation variables that were coded retroactively using original PSID reports and the three-digit 1970 Census industry and occupation codes.[26] For the period 1981-2001 the industry and occupation information was obtained using the 3-digit 1970 Census Industry code and, lastly, for 2003-2015 the 3-digit 2000 Census code was used. In all the cases the information corresponds to the main job.[27] Based on this, we construct 19

[25] A sizable literature provides evidence that feminized occupations pay less than male occupations for workers with similar measured characteristics; see Levanon et al. (2009), Blau and Kahn (2017), and Bayard et al. (2003), amongst others.

[26] This retroactive coding was done for a selected sample of PSID heads and wives: (a) Original sample Heads and Wives/"Wives still living by 1992 who reported main jobs in at least three waves during the period 1968-1992, with at least one of those reports prior to 1980. (b) Additionally, original sample Heads and Wives/"Wives" who had reported at least one main job between 1968 and 1980 but were known to have died by 1992. The selection criteria did not include all Heads and Wives/"Wives" who had worked between 1968 and 1980, therefore this variable contains missing information. For detailed information about the Retrospective Coding Project please see the document, "A Panel Study of Income Dynamics: 1968-1980 Retrospective Occupation-Industry Files Documentation", available on PSID website.

[27] Since there is no clear correspondence between 1970 and 2000 census industries and occupation codes, a reclassification was needed is some cases based on the description of the 3-digit categories.

industry categories and 25 occupational categories.

Table B.1: Feminized industries classification. Descriptive statistics

Industry	Percentage of women	Distribution of women across industries	Yearly hours of work			
			Women		Men	
(a) Feminized industries			*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Other services, exc public adm	65.6	9.1	1298	7.6	2100	11.1
Retail Trade	55.6	13.9	1480	5.7	2169	6.5
Education and related services	72.2	13.3	1507	5.1	2005	8.3
Accomodations and Food services	65.9	3.1	1516	11.6	1958	17.5
Arts, Entertainment and recreation and welfare services	67.6	3.9	1559	11.4	1918	15.9
(b) Included as feminized industries in the broader classification						
Health care and social assistance	81.4	16.3	1724	4.5	2102	10.3
(c) Non feminized industries						
Agriculture, Forestry, Fishing and Hunting	17.3	1.0	1231	25.3	2319	12.9
Management, Administrative and support and wast management services	44.1	1.9	1584	16.1	1922	14.9
Profesional, Scientific and techinical services	47.5	4.3	1617	9.7	2086	9.2
Transportation and warehousing	23.3	1.9	1620	14.8	2199	8.4
Real State	46.2	1.4	1663	17.8	2056	17.1
Construction	7.6	1.0	1666	20.0	1960	5.5
Wholesale trade	28.2	2.0	1724	13.1	2217	7.9
Mining	14.4	0.2	1751	39.1	2326	19.0
Manufacturing	34.5	13.4	1764	4.5	2135	3.1
Information, Newspapers, Radio, etc.	49.2	1.7	1781	11.7	2171	12.1
Public Administration and active duty military	40.0	5.6	1785	7.2	2200	6.1
Finance and Insurance	65.2	5.6	1793	6.3	2183	9.7
Utilities	15.9	0.5	1837	21.5	2106	8.9

Notes: The data are from the 1968-2015 PSID. The Industry and occupation variables correspond to main job, and are defined for Head of household (man, or woman if single) and wife (including cohabitors) at the family level. Since there is no perfect correspondence between 1970 and 2000 census industries and occupation codes, a reclassification was needed is some cases based on the description of the 3-digit categories.

We define feminized industries and occupations as those in which women account for at least 50% of the labor force and in which women work on average, less than 1650 hours.[28] As detailed in Tables B.1 and B.2, using these criteria, we classify as feminized industries: *Retail trade, Accommodation and food services, Other services excluding public administration, Arts, entertainment and welfare services*, and *Education and related services.* The feminized occupations

[28]For reference, note that a worker who works 40 hours per week with 2 weeks of vacation works a total of 2,000 hours per year. The average number of hours worked (including all employed, full and part time) in the US in 2015 was 1786 hours (OECD Stat: https://stats.oecd.org).

are: *Education (excluding university teachers) and library, Personal care and services, Maids and housekeepers, Food preparation and serving related, Arts, design entertainment and media, Sales and related, Healthcare support,* and *Office and Administrative support.*

Table B.2: Feminized occupations: Alternative classification. Descriptive statistics

Occupations	**Percentage of women**	**Distribution of women across occupations**	**Yearly hours of work**			
			Women		Men	
(a) Feminized occupations			*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Maids and housekeepers, cleaners	97.5	3.2	1116	11.6	1698	92.3
Personal care and services	87.2	5.7	1392	10.0	1881	25.9
Food preparation and serving related	73.1	6.1	1404	8.1	1846	14.5
Sales and related	50.9	5.9	1428	8.8	2175	8.2
Arts, design, entertainment, sports and media	52.6	1.6	1497	18.0	1923	19.1
Education, teachers (except university) and library	78.7	6.6	1525	7.0	1954	14.0
Office and administrative support	81.8	26.5	1641	3.3	1995	7.2
Healthcare support (nurses, etc)	91.0	8.1	1644	6.6	1949	21.0
(b) Included as feminized occupations in the broader classification						
Community and social services	59.3	1.7	1734	13.5	2150	21.0
Health technologist and technicians	78.4	1.8	1780	12.9	2199	27.5
(c) Non feminized occupations						
Farm, forestry and fishing laborers	13.6	0.6	1006	30.5	1922	11.3
Building and grounds cleaning and maintenance	42.3	3.3	1414	10.9	1750	9.9
Transportation and material moving	13.3	1.8	1514	16.0	2098	6.0
Education, university teachers	48.3	0.7	1569	26.4	2083	27.4
Production	41.1	10.4	1658	5.5	2088	4.4
Protective service workers	22.7	0.8	1725	21.4	2210	11.9
Installation, repair and maintenance	3.7	0.4	1748	27.9	2096	5.2
Healthcare practitioners	53.1	1.2	1792	18.3	2368	21.8
Architect and engineering	13.0	0.7	1828	19.8	2157	6.6
Construction and extraction	5.4	0.5	1846	26.3	2015	6.1
Life, physical and social scientist	46.2	1.2	1872	15.3	2195	14.2
Computer and mathematical	29.3	0.8	1926	15.7	2114	10.5
Legal, lawyers and judges	35.1	0.5	1936	27.1	2236	19.1
Managers and administrators, accountants, business and financial operations	34.4	9.7	1960	6.0	2403	4.6
Military	17.0	0.1	2028	83.5	2518	33.6

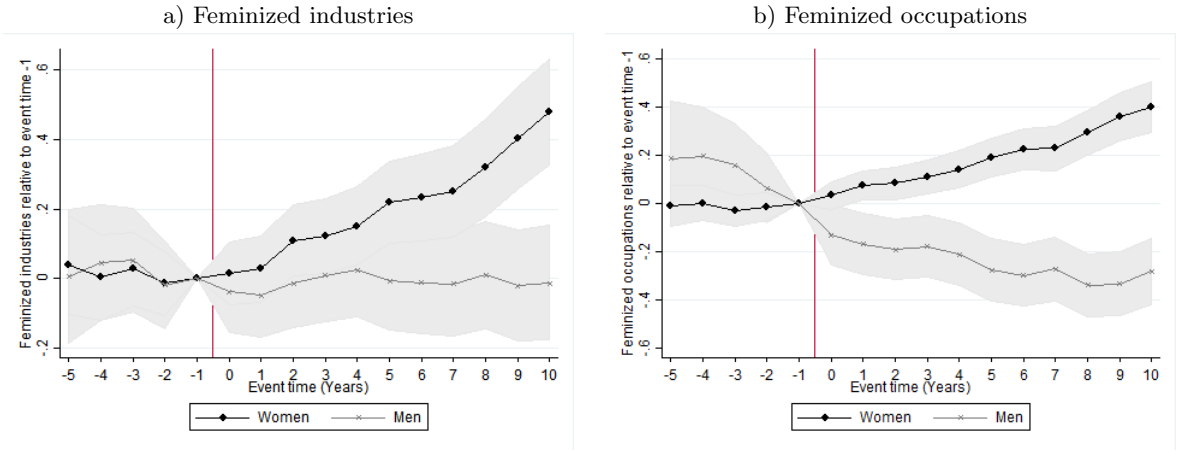
Notes: The data are from the 1968-2015 PSID. Industry and occupation variables correspond to main job, and are defined for Head of household (man, or woman if single) and Wife (including cohabitors) at the family level. Since there is no perfect correspondence between 1970 and 2000 census industries and occupation codes, a reclassification was needed is some cases based on the description of the 3-digit categories.

As a robustness exercise, we use a broader criteria to classify industries and occupations as feminized. We relax the working hours restriction to include some categories in which women

are highly represented but also have high average hours. In the case of industries, we add *Health care and Social assistance,* in which women represent 81.4% of the labor force and have a mean of 1724 hours. Regarding the occupational categories, we include also *Health technologist and technicians* and *Community and social services*, where women account for 78.4% and 59.3%, respectively. It is worth noting that for all occupations the average number of hours worked by men is higher than for women. For example, for *Healthcare practitioners*, the mean for women is 1792 yearly hours, while for men it is 2368.[29]

We use the same event-study approach as in section 4, defining indicator variables that take the value of one if the individual is employed in a feminized industry/occupation and zero otherwise. We can then estimate the effect of the first child's birth on the probability of being employed in a feminized industry/occupation. The estimates are conditional on remaining employed after the birth. Figure B.1 presents the estimated effect of having a first child on whether or not the individual works in a feminized industry (left panel) or occupation (right panel) for both men and women.

Figure B.1: Impact of children on feminized industries and occupations



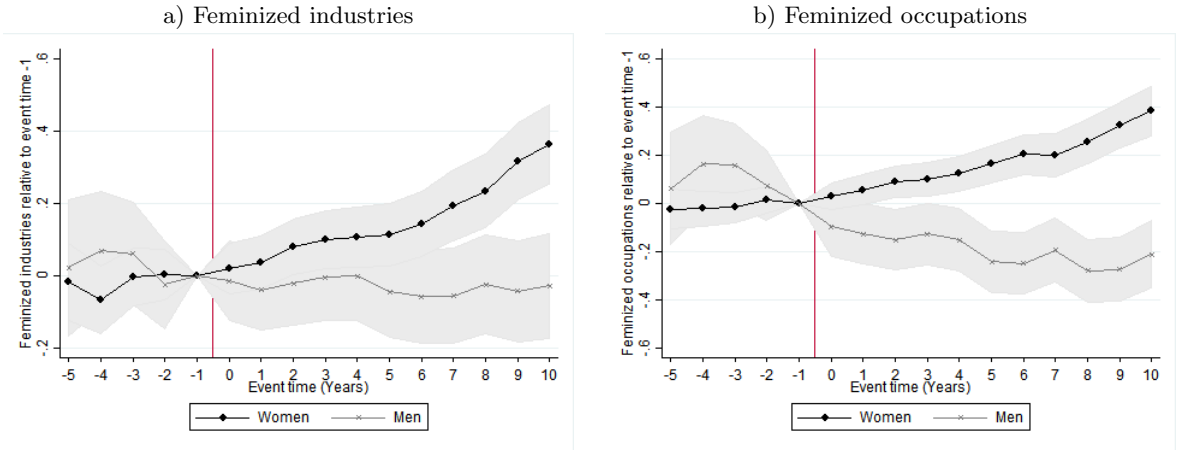
Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women. Sample is restricted to men and women for whom an occupation and industry code is declared in $z = -1$. Feminized industries and occupations are described in Sub-section B The shaded 95 % confidence intervals are based on robust standard errors.

As far as industry is concerned, we can see that men and women are on very similar pre-child

[29] An alternative classification could have been in terms of the maternity leave that different careers provide. However, in the US maternity leave provisions are decided at the firm level and not at the industry or occupation level, making it impossible to qualify jobs as more or less women-friendly along this dimension on the basis of the data we have.

trends in terms of their probability of working in a feminized industry, but start to diverge soon after having a child. While men do not change after the birth, the probability that a woman is in such an industry increases steadily after the birth and is 43 percent higher 10 years after having had her first child than it was before the birth. The pattern for occupations is quite different. Throughout their working life men reduce their probability of being in a feminized occupations, an effect that seems to be independent of the timing of fatherhood. For women, the probability of being in such occupations is stable before having children and starts increasing with the birth, being 40 percent higher than in the reference period ten years on. The estimated effects using the broader criteria to define feminized industries and occupations (Figure B.2), are slightly smaller in size but show the same trends. Ten years after child birth, women are almost 40 percent more likely to be employed in a feminized industry/occupation relative to the year before child birth.

Figure B.2: Impact of children on feminized industries and occupations, broader criteria.



Notes: The graphs show event time coefficients estimated from equation (1) as a percentage of the counterfactual outcome absent children: $P_t^g = \hat{\alpha}_t^g / E[Y_{ist}^{\tilde{g}}|t]$ for men and women. Sample is restricted to men and women for whom an occupation and industry code is declared in $z = -1$. Feminized industries and occupations are described in Sub-section B The shaded 95 % confidence intervals are based on robust standard errors.

The observed patterns indicate that motherhood acts as a trigger for women but not for men. The latter's choices (staying in feminized industries, leaving feminized occupations) seem to be unaffected by the birth of their first child. In contrast, for women this event produces large changes in industry and occupation choices. In line with our earlier findings, motherhood seems to make gender norms related to child-rearing salient. The change in career can then

be a response to the working conditions in those industries/sectors, but also be part of a more general desire to conform, which takes the form, amongst other things, of a move towards jobs seen as appropriate for women.