How Gender Role Attitudes Shape Maternal Labor Supply

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We examine the influence of gender role attitudes, specifically views about the appropriate role of mothers, on post-childbirth employment decisions. German panel data reveals that mothers with traditional attitudes are 15% less likely to work during early motherhood than their egalitarian counterparts. Among working mothers, those with traditional attitudes work four hours less per week, and these differences persist for at least seven years. Fathers' attitudes also predict maternal labor supply, highlighting joint decision-making within couples. Examining the interaction of attitudes with policies, we find that the introduction of a cash-for-care payment for parents who abstain from using public childcare substantially reduced the labor supply of traditional mothers, whereas egalitarian mothers' labor supply remained unaffected. Moreover, a structural life-cycle model of female labor supply demonstrates that labor supply elasticities are substantially larger for traditional mothers, while a counterfactual policy facilitating full-time childcare access has a more pronounced effect on egalitarian mothers. Our findings stress that gender role attitudes mediate the impact of policies, which implies that measured average policy effects cannot easily be transferred to other contexts, e.g., over time or to other countries, without accounting for differences in attitudes.

Keywords: Gender role attitudes, Labor supply, Life-cycle

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1 Introduction

Labor supply decisions of parents are a major driving factor for gender inequality in the labor market (Cortes and Pan, forthcoming). Globally, mothers participate substantially less in market work than women without children, fathers, or childless men. Extended spells of non-participation or part-time employment of mothers translate into long-term gender differences in wages. Moreover, they reduce aggregate economic output due to unused potential in the workforce. Nevertheless, the driving forces of maternal labor supply choices are still largely unclear.

The fact that maternal labor supply considerably varies across countries (Kleven, Landais, and Mariante, 2023) points to the role of behavioral motives like social norms or attitudes, i.e., individual norms. However, evidence on this channel primarily relies on group-level measures of norms, either comparing labor supply across countries (Kleven, Landais, Posch, et al., 2019) or using immigrants' country of ancestry as proxy for individual-level gender attitudes (following Fernández and Fogli, 2009). Direct evidence on how observed attitudes at the individual level affect household choices is scarce. Furthermore, a core question for policymakers concerns the interaction of attitudes with economic incentives. If parents with traditional gender attitudes respond differently to policies than egalitarian parents, measured average policy effects cannot easily be transferred to other contexts where gender attitudes differ, like to different subgroups of the population, over time periods, or to other countries.

This paper studies how individual-level gender role attitudes shape parental labor supply decisions, with a particular emphasis on how such attitudes mediate the effect of policy changes. Using German panel data containing self-reported gender role attitudes measured before the birth of the first child, we find that gender attitudes hold first-order importance. In an event study framework around the birth of the first child, the attitudes of both parents play a crucial role in the labor supply choices of mothers at both the extensive and intensive margin. After the introduction of a transfer that required parents not to use public childcare, the labor supply of mothers with traditional gender attitudes substantially decreased, but not the labor supply of egalitarian mothers. To quantify the underlying trade-off between gender attitudes and economic incentives and look at counterfactual policy changes, we estimate a life-cycle model of female labor supply that incorporates heterogeneity by gender role attitudes. Using the model, we show that labor supply elasticities are substantially larger for traditional mothers, while a counterfactual policy facilitating access to full-time childcare has considerably stronger effects on egalitarian mothers.

We measure gender role attitudes based on self-reported data in the German Family Panel (pairfam). Pairfam is an annual survey of up to 12,000 respondents and their partners. The survey contains rich information on the household composition, labor market outcomes, and values and beliefs of both partners. Gender role

attitudes are elicited in eight of the fourteen waves allowing us to measure them before the birth of the first child. We obtain measures of gender role attitudes based on the level of agreement with three statements, such as 'Women should be more concerned about their family than about their career,' 'Men should participate in housework to the same extent as women,' and 'A child under 6 will suffer from having a working mother.' For ease of interpretation, we aggregate the three measures to a gender role index and use a median split to identify 'egalitarian' and 'traditional' mothers in our main specification.[1]

In the first step of our analysis, we document the relevance of gender role attitudes for maternal labor supply decisions. We use an event study framework around the birth of the first child (Kleven, Landais, and Søgaard, 2019). By non-parametrically controlling for life-cycle and time trends, we compare mothers to women of the same age in the same calendar year who do not have a child yet but do so one year later. This approach ensures that the comparison group is as similar as possible. To examine the difference in the motherhood penalty by gender attitudes, we interact event time dummies with gender role attitude groups, leading to a difference-in-difference setup.[2]

Reassuringly, we find no difference in the labor supply trends of egalitarian and traditional mothers before the birth of the first child, supporting the parallel trends assumption of the event study framework. The raw data even reveals that the levels of labor supply are strikingly similar. However, after the birth of the first child, labor supply substantially deviates: mothers with traditional gender role attitudes are 15% less likely to participate in the labor market when their first child is one year old compared to egalitarian mothers. When the child is older, differences at the extensive margin slightly attenuate but persist until the full observation period, stretching to seven years after childbirth. Differences also emerge at the intensive margin. Conditional on working, both groups of women work slightly below 40 hours per week before the birth of the first child. Afterward, conditional working hours drop persistently by ten hours for egalitarian mothers but by fourteen hours for traditional mothers.

Looking at fathers, we show that their gender attitudes also play an essential role in maternal labor supply decisions. As we find evidence for assortative mating with a correlation of attitudes within couples of 0.41, we examine the contribution of paternal gender attitudes while controlling for mothers' own attitudes. We find that

1. We find similar results when using other splits, for instance, in three groups. Moreover, when looking at the three measures of gender role attitudes separately, the results are quantitatively similar for two of the three items and qualitatively similar for all.

2. Measuring attitudes before the birth of the first child is potentially crucial as afterward reported attitudes might be biased by realized labor supply choices. We document that gender role attitudes of subjects become more egalitarian over time; however, conditional on age trends, there is a slight shift towards more traditional gender attitudes around childbirth, in line with Kuziemko et al. (2018). For the analyses, we assume that despite these aggregate trends, the ranking of individuals in terms of their gender attitudes remains stable around the birth of the first child. Violations of this assumption would bias the estimated effects of attitudes downwards.

attitudes of fathers predict working hours after childbirth, where marginal effects are roughly half of marginal effects of mothers' attitudes. This finding suggests joint decision-making of couples with a higher decision weight for mothers. In line with previous findings (e.g., Kleven, Landais, and Mariante, 2023), we find very weak to no changes in the labor supply of fathers after the birth of their first child and no significant difference by either their gender attitudes or those of their female partners. For almost all parents, the option that the father reduces his labor supply is not in their choice set. Hence, the relevant trade-off for most households seems to be whether the mother stays at home to care for the children or participates in the workforce while utilizing external childcare.

A challenge in the study of gender role attitudes is that it is naturally difficult to study exogenous changes in attitudes and, hence, it is typically unclear whether the attitudes themselves cause all observed differences. One advantage of our approach compared to aggregate-level measures of norms is that we can examine the extent to which other observed characteristics drive the labor supply differences observed between traditional and egalitarian mothers. We collect several pieces of evidence that the differences in labor supply indeed reflect their attitudes. First, despite looking at a broad set of background variables, we can only explain 13% of the variation in gender role attitudes, suggesting that a substantial share of the differences is unrelated to potential confounding factors. Second, in terms of household composition, both the likelihood of having a partner and the number of children at the end of the observation period are very similar, with the only difference being that egalitarian mothers are one and a half years older at the time of first birth. Third, we employ several robustness checks to show that differences in observed background characteristics do not drive the results. Most importantly, the results are very similar when restricting the sample to West Germany, where child care availability is generally less favorable than in East Germany, and when controlling for a set of variables that are correlated with attitudes, such as education, being religious, and the state of residence.

In the next step of our analysis, we investigate how gender role attitudes interact with changes in economic incentives. Traditional and egalitarian mothers not only differ in their levels of labor supply, but they also respond differently to the introduction of a cash-for-care policy ('Betreuungsgeld'). The policy was introduced in 2013 and paid a subsidy for one- and two-year-old children if the parents did not use (subsidized) public childcare. The amount was 100€ per month, equaling 9% of the median net income of women before birth. As maternal labor supply is often dependent on the use of public childcare, this policy raises the opportunity costs of working for mothers. Since the policy required that the parents do not use any public childcare, we expect it to have the strongest effect on mothers who would have taken up modest levels of childcare in the absence of the policy, while we expect mothers taking up full-time childcare to be unaffected as long as the subsidy is not sufficiently large to induce them to reduce their childcare take-up to zero. Mothers

not taking up any childcare even without the subsidy are unaffected by the increase in the opportunity costs of public childcare but might adjust labor supply due to an income effect of the transfer.

We use a sharp eligibility threshold by birth date (August 1, 2012) during the introduction of the policy and compare mothers with children born in the two years before the cut-off date to those with children born in a two-year window after the threshold. We employ a triple-diff strategy comparing mothers with children below and above the age threshold by gender role attitudes around the birth of the first child. We find when the child is one year old, the policy reduced the labor supply of traditional mothers by eight hours per week or an additional 46% relative to their labor supply reduction in the absence of the policy. Conversely, the policy had no detectable effect on the labor supply of egalitarian mothers, with the difference between egalitarian and traditional mothers being statistically significant. The labor supply changes of traditional mothers are solely driven by the extensive margin, which is in line with the payment requiring that the parents do not use any public childcare. The results are robust to a range of specific changes, such as including additional control variables, restricting to a balanced panel, and restricting to West German mothers.

In a third step, we estimate a dynamic structural model of labor supply to quantify the underlying trade-off between gender attitudes and economic incentives and look at counterfactual policy changes. Taking the reduced form evidence into account, we do not model labor supply of fathers, but focus on a discrete set of maternal labor supply choices. Accumulation of human capital induces a trade-off between time spent out of the labor force, e.g., to provide childcare, and stunted wage growth in the future. The novel feature of the model is that we incorporate heterogeneity by gender role attitudes for a discrete set of types that differ in their disutility to work when having children.

We use the model to calculate Marshallian labor supply elasticities and find that elasticities are substantially higher for traditional mothers. Additionally, we look at a counterfactual policy change that we expect to have stronger effect on egalitarian mothers. The policy facilitates access to full-time childcare in the sense that it is no longer more expensive than part-time childcare. Full-time childcare access is often cited as a significant factor hindering the labor supply of progressive mothers. The policy change has a positive labor supply effect at the intensive margin for both attitude groups. Still, as expected the impact is considerably stronger for egalitarian mothers who increase the likelihood of working full-time by 25 percentage points when the child is between one and two years old and are still more likely to work full-time when the child is older since they accumulated more human capital compared to the baseline scenario. These results show that although labor supply elasticities are, in general, larger for traditional mothers, policy reforms targeted at the needs of egalitarian mothers can have a stronger effect on this group. More generally, they

imply that elasticities and policy effects might change over time if the distribution of gender role attitudes changes, for instance, if it becomes more egalitarian.

Our paper contributes to a growing body of literature highlighting the relevance of gender role attitudes and gender norms for mothers' labor supply. Proxies of gender attitudes like the origin country or region of migrants (Fernández and Fogli, 2009; Boelmann, Raute, and Schönberg, 2021), labor supply of the grandmother (Fernández, Fogli, and Olivetti, 2004), or peer effects (Nicoletti, Salvanes, and Tominey, 2018; Olivetti, Patacchini, and Zenou, 2020) are related to maternal labor supply.[3] However, evidence using elicited gender role attitudes at the individual level is still rather limited, especially using an event study framework around childbirth.[4] Kuziemko et al. (2018) primarily look at changes in parental attitudes after a child is born but also report results of a heterogeneity analysis of child penalty estimates by gender attitudes. In three data sets in the UK and the US, they do not find a significant difference, although coefficients in all data sets go in the expected direction. Conversely, Rafols (2023) finds that long-run child penalties in the US are larger for mothers with traditional attitudes. We show that maternal labor supply differences by gender attitude groups are substantially larger and more persistent in Germany than in these countries. Compared to the results for the US reported by Rafols (2023), the differences are almost twice as large in the first three years after the birth of the first child and three to five times as large after seven years. This finding might be related to more traditional gender attitudes and higher part-time rates in Germany. Going beyond these papers, we also look at the importance of paternal gender role attitudes and, in particular, the interaction of attitudes and economic incentives.

Studies on how gender attitudes and policies interact are limited and based on proxies of gender attitudes. Ichino et al. (2023) examine a tax reform in Sweden and find that migrants originating from countries with relatively traditional norms are more likely to reallocate childcare to mothers following a reduction in the father's tax rate and less likely to reallocate childcare to fathers following a reduction in the mother's tax rate. Lassen (2023) studies an expansion of parental leave in Denmark. She documents peer effects between sisters regarding the use of parental leave. She furthermore shows that mothers whose mother was working full-time when they

3. Boneva et al. (2022) elicit measures of perceived social norms, i.e., second-order beliefs, and show that they predict the labor supply intentions of women. Bursztyn, González, and Yanagizawa-Drott (2020) elicit perceived social norms about working women in Saudi Arabia and show that subjects underestimate the support of other men. Correcting the bias increases the likelihood that they aid their wives in finding a job. Our paper focuses on attitudes, i.e., first-order beliefs, instead of social norms. Furthermore, we are specifically interested in attitudes about women with children since, in most countries, women without children are much less affected by role attitudes or norms.

4. There exists a longer-running body of literature in sociology on the determinants (e.g., Cunningham, 2008; Zoch, 2021) and consequences of gender role attitudes. Individual measures of gender role attitudes are related to labor supply in the UK (Uunk and Lersch, 2019), the Netherlands (Stam, Verbakel, and de Graaf, 2014), and the US (Cunningham, 2008). The literature typically uses longitudinal panel models that relate changes in attitudes to changes in female labor supply. We see our event study approach around childbirth as complementary to this evidence.

were a child increase parental leave take-up less than other mothers in response to the policy. To the best of our knowledge, our study is the first to show an interaction between policy changes and direct measures of gender role attitudes. Additionally, the structural model allows us to assess the interplay of attitudes with a broader set of (counterfactual) policy changes.

Our paper also contributes to the literature on the effects of changes in childcare costs (e.g., Blau and Tekin, 2007; Lundin, Mörk, and Öckert, 2008; Black et al., 2014) and in particular cash-for-care policies. Cash-for-care policies are associated with adverse labor supply effects on mothers in several Scandinavian countries (e.g., Hardoy and Schøne, 2010; Gruber, Kosonen, and Huttunen, 2023) and the German states of Thuringia (Gathmann and Sass, 2018) and Bavaria (Fendel and Jochimsen, 2022). Collischon, Kuehnle, and Oberfichtner (2022) look at the same policy that we investigate in our paper and find small negative employment effects and more prominent effects on childcare choices. While none of these studies consider gender attitudes, some report heterogeneity analyses that our results may help to explain. They find that not having a university degree (Drange and Rege, 2013), having a migration background (Hardoy and Schøne, 2010; Fendel and Jochimsen, 2022), living in a rural area (Giuliani and Duvander, 2017), or in West Germany instead of East Germany (Collischon, Kuehnle, and Oberfichtner, 2022) is associated with stronger negative labor supply responses to a cash-for-care subsidy. In our data, all of these characteristics predict more traditional gender attitudes.

Lastly, we contribute to the structural literature on the labor supply of women over the life cycle (e.g. Adda, Dustmann, and Stevens, 2017; Borella, De Nardi, and Yang, 2023; Jakobsen, Jørgensen, and Low, 2023). While these studies show the relevance of economic incentives induced by the tax-transfer system, to the best of our knowledge, our paper is the first to incorporate heterogeneity stemming from gender role attitudes or norms into a life-cycle model of female labor supply.[5] Wang (2022) also allows for heterogeneity in the disutility to work when children are in the household using unobserved types, which could be interpreted as representing role attitudes. The fact that we identify attitude types directly from observed measures of gender attitudes facilitates the interpretation of types and the quantification of the relevance of gender role attitudes. In particular, it allows us to consider the joint distribution of attitudes and other characteristics such as wages and fertility decisions. By doing so, our study shows that gender role attitudes are an essential component of maternal labor supply choices and enables us to gauge how estimated elasticities or policy effects might change when the distribution of gender role attitudes changes over time.

5. Fogli and Veldkamp (2011) and Fernández (2013) investigate female labor force participation over time and explain it with a structural model of learning about the consequences of labor supply. Conversely, our model does not focus on changes in norms over time but on heterogeneity within the population.

2 Institutional background and data

In this section, we lay the foundation of the later analyses by describing the institutional background and the data we use.

2.1 Institutional background

We start by describing aggregate maternal labor supply and the institutional background that families face in Germany.

The labor supply of women in Germany is characterized by high employment rates of just over 70%, more than ten percentage points above the OECD average (OECD, 2017). However, relatively many women work part-time. While in the OECD on average every fourth working woman works part-time, this share is 37% in Germany. The reduction in women's labor supply after childbirth is among the strongest internationally (Kleven, Landais, and Mariante, 2023).

These patterns substantially differ between East and West Germany. During the separation of Germany from 1945 to 1990, policies and norms in the Eastern, socialist part of Germany encouraged mothers to return to work quickly after childbirth. Conversely, in West Germany, a male-breadwinner norm prevailed in both norms and policies. Although the policy system was fully aligned after the reunification, differences in labor market outcomes between East and West Germany persist (Jessen, 2022).

Several policies are in place to support families. Germany utilizes a comprehensive means-tested welfare system to assist low-income households. Furthermore, parents have a legal right to parental leave allowing them to return to the same or similar job within three years. Paid parental leave with a replacement rate of 67% is available for up to fourteen months, where each parent can claim at most 12 months.[6] Additionally, parents receive a monthly child benefit of about 200 EUR per month.

We depict the share of children taking up public childcare over time in Appendix Figure A.1. The supply and take-up of public childcare services for children under three years of age has been steadily progressing since 2005 but has slowed down substantially after 2014. For older children, childcare take-up exceeds 90% over the full observation period. In 2015, 33% of children under the age of three attended public childcare, compared to 94% of children between three and five years old.

The tax system adopts income splitting for married couples, which implies that each partner is taxed as if they earned half of the combined income. Due to the progressive nature of the tax rates, this arrangement provides substantial tax advantages to married couples that are increasing with the income gap and lead to high marginal tax rates for the lower-earning spouse.

6. See Olivetti and Petrongolo (2017) for a comparison to family policies in other high-income countries.

2.2 Data set

To understand the labor supply choices of mothers, we need detailed information on the household context, labor market outcomes, and, importantly, the gender role attitudes of individuals.

We use the German Family Panel (pairfam), which provides all the necessary data. It surveys up to 12,000 randomly sampled subjects and their partners every year since 2009 (Huinink et al., 2011; Brüderl et al., 2023). The subjects are drawn from three cohorts, born in 1971-73, 1981-83, and 1991-93. The questionnaire covers a large set of background variables, biographical information, labor market outcomes and values and beliefs of both partners. The latter is an advantage over administrative data sets that provide larger sample sizes but do not contain this information. Another crucial feature of the pairfam data set is that partners of the main subjects are tracked and surveyed regardless of whether they are (already) living in the same household, unlike in many other surveys. This allows us to use pre-birth information of both parents even if couples only move together shortly before having their first child.

In wave 11, a refreshment sample is drawn that replaces drop-outs and adds the cohort born in 2001-2003. From wave 2 onwards, the DemoDiff (Demographic Differences in Life Course Dynamics in Eastern and Western Germany) is part of the pairfam sample, which leads to respondents living in Eastern Germany being overrepresented in the two oldest cohorts in the final sample. We use the available data from 2009 to 2022 and deflate all income measures using the consumer price index with baseline 2015.

For the event studies in the next section, we build an *event study sample*, for which we restrict the sample to mothers who have their first child in the observation period and are not younger than eighteen or older than 40 when giving birth. Furthermore, we exclude same-sex couples such that all subjects are either single or have a male partner.[7] We look at up to five years prior and seven years past the birth, and for each subject require at least two observations before and two observations after the birth of the first child. This results in a sample of 839 mothers. In robustness analyses, we replicate the results, among others, for a balanced panel of 551 mothers running from two years before birth to three years after birth.

For our structural estimation, we make use of an *estimation sample* which differs from the *event study sample* in several aspects. First, we restrict on women living together with a partner as the model does not account for household formation or dissolution. Second, we drop all women who are either self-employed, in education, retired, or doing military service to ensure the human capital accumulation processes are comparable. Third, we do not restrict the sample based on years around

7. Andresen and Nix (2022) show that labor supply patterns of same-sex parents strongly differ from those of heterosexual parents. This restriction affects less than 1% of the subjects.

birth of the first child, but based on an age range from the age of 24 to the age of 45. Fourth, we include women who do not get a child and do no longer require that we observe them before and after having a child.

2.3 Gender role attitudes

In eight of the fourteen waves in pairfam, subjects are asked about a set of attitudes and must indicate their agreement with several statements on a five-point scale ranging from 'strongly disagree' to 'strongly agree.' In this study, we focus on three items referring to the role of mothers, which we list in the notes of Figure 1. 'Women family' and 'Equal housework' are normatively framed, while 'Child suffers' is framed as a belief but constitutes a clear normative imperative about the role of a mother. Figure 1 shows the distribution of responses to these items over all waves and subjects.

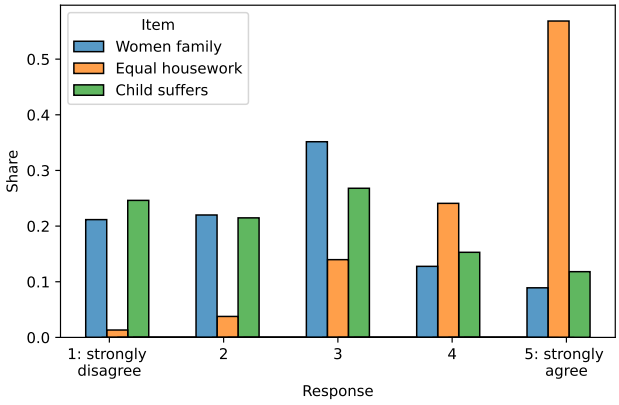


Figure 1. Distribution of elicited gender role attitudes

Notes: Distribution of responses to three items measuring gender role attitudes in pairfam. The five-point scale ranges from 'strongly disagree' to 'strongly agree.' We pool responses over all waves. Sample: All three items observed. The wording of the items is listed below:

Item label	Item wording
Women family	'Women should be more concerned about their family than about their career.'
Equal housework	'Men should participate in housework to the same extent as women.'
Child suffers	'A child under 6 will suffer from having a working mother.'

For the 'Women family' and 'Child suffers' items, the modal response is the central value and the distribution is wide-ranging, with more than one-fifth of subjects strongly disagreeing and about one-tenth of subjects strongly agreeing. The distribution of the 'Equal housework' item is more concentrated on the right of the scale.

Note that in contrast to the other items, stronger agreement with the 'Equal housework' item indicates more egalitarian attitudes. Hence, we reverse the scale for this item in the following such that higher values are associated with more traditional attitudes for all items.

For the later analysis, we primarily focus on a gender role attitudes index, which we create as the standardized mean of the items. Inter-item correlations are between 0.17 and 0.38, indicating that the three items measure the same concept of role attitudes towards mothers but slightly different aspects. Hence, we also consider the three items separately in robustness analyses.

We next show that gender role attitudes vary over demographic variables in reasonable ways. Table 1 reports coefficients of OLS regressions of the index (in the first column) and the three individual items on a set of background variables. We standardize the dependent variables such that effect sizes are comparable. The observed patterns are very similar over all four columns. Men hold more traditional attitudes than women. The same is true for subjects with lower education, any migration background, those who do not live in urban municipalities, and those who feel affiliated with a religion. Living in East Germany is strongly associated with egalitarian attitudes for the 'Child suffers' item, but – conditional on the other background variables – not for the other items. Subjects born in earlier cohorts tend to hold more traditional attitudes at the same age. However, we also document an age trend almost as strong as the birth year effect, whereby gender role attitudes of subjects born in a given birth year become more egalitarian over time. Conditional on age trends, we find a slight shift towards more traditional gender attitudes around childbirth (see Appendix Figure A.3), in line with Kuziemko et al. (2018).

We draw three conclusions from these results. First, the items are very similarly distributed in the population, suggesting that they indeed measure the same concept. Second, gender role attitudes are related to demographic variables in reasonable ways, thereby validating our elicited measures. Third, the explanatory value of background variables is limited as no more than 13% of the observed variance can be explained. A substantial part of the variation in gender attitudes between subjects seems unrelated to confounding variables.

The panel structure of pairfam allows us to measure gender role attitudes before the birth of the first child. We use the last observation before birth as a measure of pre-birth attitudes. The index is reasonably stable within individuals over time ($\rho = 0.63$). For the following analyses, we assume that the ranking of individuals remains stable over time. Violations of this assumption would bias the estimated effects of attitudes downwards in the later analyses. We classify mothers into two groups based on a median split of their pre-birth gender role attitudes and label the

Table 1. Predicting (traditional) gender role attitudes

	Gender role attitudes	Women family	Disagreement: Equal housework	Child suffers
Male	0.22***	0.054***	0.3***	0.31***
	(0.0089)	(0.012)	(0.012)	(0.012)
Age	−0.021***	−0.024***	−0.0066***	−0.032***
	(0.0007)	(0.0009)	(0.001)	(0.0009)
Birth year	−0.024***	−0.03***	−0.015***	−0.027***
	(0.0007)	(0.001)	(0.0009)	(0.001)
Living in East-Germany	−0.12***	−0.015	−0.021	−0.32***
	(0.012)	(0.015)	(0.015)	(0.015)
Education: tertiary	−0.25***	−0.31***	−0.16***	−0.28***
	(0.0094)	(0.012)	(0.012)	(0.012)
Any migration background	0.25***	0.33***	0.13***	0.28***
	(0.012)	(0.015)	(0.015)	(0.015)
Municipality ≥ 100k inhabitants	−0.14***	−0.15***	−0.15***	−0.11***
	(0.01)	(0.013)	(0.013)	(0.013)
Religious affiliation	0.18***	0.18***	0.16***	0.19***
	(0.011)	(0.015)	(0.014)	(0.014)
Observations	74836	74836	74836	74836
Adj. R^2	0.13	0.074	0.049	0.13

Notes: OLS regressions of gender role attitudes on background variables. In columns (2) to (4), the dependent variables are the individual items (not restricted to being observed before the birth of the first child). In the first column, the dependent variable is the gender role attitude index, the standardized mean of the three items coded such that higher values correspond to more traditional attitudes. See the notes of Figure 1 for the wording of the three items. We standardize all dependent variables and code them such that higher values are associated with more traditional gender attitudes. Sample: All three items observed. Standard errors are clustered at the individual level and reported in parentheses.
$^*-p<0.1, ^{**}-p<0.05, ^{***}-p<0.01$

groups as 'egalitarian' and 'traditional.'[8] Table 2 shows summary statistics of these two groups in our event study sample.

Unsurprisingly, traditional women in our sample hold more traditional gender role attitudes based on all three items. In line with a within-household correlation of gender role attitudes of 0.41, the attitudes of the fathers – also measured before the birth of the first child – differ in the same direction, albeit less pronounced. Egalitarian women tend to have egalitarian partners, although assortative mating is far from perfect and several couples have unaligned gender attitudes.

In the third part of Table 2, we focus on differences in background variables. This comparison shows us in which dimensions and how strongly the gender attitude groups differ, facilitating the interpretation of the later empirical results. In line with the findings of Table 1, egalitarian mothers are more likely to have a tertiary degree and live in East Germany or urban municipalities. They are less likely to have a migration background or a religious affiliation.[9] Egalitarian subjects are 1.5

8. In the *estimation sample* used for the structural model in Section 5, we do not observe gender role attitudes before having a child for many subjects because they do not have a child or did so before our observation period. In that sample, we therefore use the mean over all elicitations of an individual to classify subjects into gender attitude types.

9. The adherence to more traditional attitudes among individuals with a migration background aligns with the observation that the primary source countries for immigration, particularly Turkey and Poland, uphold more traditional gender norms than Germany (see Lomazzi and Seddig, 2020).

Table 2. Summary statistics of gender role attitude groups

	Gender role attitudes group	
	Egalitarian	Traditional
Women family	2.01	3.27
	(0.04)	(0.04)
Equal housework	4.82	3.97
	(0.02)	(0.05)
Child suffers	1.60	2.95
	(0.03)	(0.05)
Partner: Women family	2.41	2.92
	(0.05)	(0.06)
Partner: Equal housework	4.29	4.02
	(0.05)	(0.06)
Partner: Child suffers	2.37	2.85
	(0.06)	(0.07)
Age at birth first child	30.40	28.90
	(0.21)	(0.24)
Education: tertiary	0.56	0.37
	(0.02)	(0.02)
Any migration background	0.13	0.19
	(0.02)	(0.02)
Living in East-Germany	0.36	0.24
	(0.02)	(0.02)
Municipality $\geq$ 100k inhabitants	0.34	0.22
	(0.02)	(0.02)
Religious affiliation	0.61	0.75
	(0.02)	(0.02)
Has a partner before birth	0.87	0.84
	(0.02)	(0.02)
Has a married partner before birth	0.46	0.47
	(0.02)	(0.02)
N subjects	434	405

Notes: Mean and standard errors (in parentheses) of several variables for both gender role attitudes groups. In the first part, we display mean values of the three gender role attitudes items measured before the birth of the first child on a five-point scale. The second part reports the respective attitudes of the fathers. In the third part, we report the means of background variables. The last row reports the number of subjects in each group. Partner attitudes and some background variables are only available for a subsample. We determine the groups via a median split on the gender role attitude index for all women in the full sample. Sample: observed at least twice before and twice after the birth of the first child.

years older on average when they have their first child but have almost the same likelihood of having a partner and being married in the period before giving birth. We confirm his pattern in Appendix Figure A.2, which looks at partnership variables five years prior to seven years after the birth of the first child. Both groups have the same likelihood of having a married partner during the thirteen years considered, and the likelihood of having any partner is only slightly and mostly insignificantly higher for egalitarian mothers. Moreover, realized fertility develops in the same way

for both groups, with, on average, just under two children seven years after the birth of the first child.

3 Gender role attitudes and labor supply around childbirth

In this section, we look at the labor supply of mothers in an event study setting. We show that gender role attitudes are highly relevant for labor supply choices at both the extensive and intensive margin after the birth of the first child, with mothers holding traditional attitudes reducing their labor supply more strongly and persistently. The results build the foundation for the structural model we build and estimate below.

3.1 Empirical strategy

We are interested in ascertaining how the labor supply of traditional and egalitarian mothers reacts to having their first child, and in particular, the difference between the two groups. For this purpose, we run event study regressions based on Kleven, Landais, and Søgaard (2019), frequently used in the literature to examine the effect of children on a large range of outcomes. By non-parametrically controlling for life-cycle and time trends, the approach compares mothers to women of the same age in the same calendar year who do not have a child yet but do so one year later. This approach ensures that the comparison group is as similar as possible, in contrast to, for instance, alternative approaches using women who never have a child as a control group. Kleven, Landais, and Søgaard (2019) discuss the assumptions under which the coefficients of the event dummies can be interpreted as the effect of the first childbirth. Notably, the estimated effects include the impact of additional children and do not account for any anticipatory effects of childbirth on the outcome variable. Under a smoothness assumption that all determinants of outcome variables that are not controlled for are similar before and after childbirth, the method identifies the effect of the first child conditional on those determinants.

We adjust the specification such that we interact event dummies with gender attitude groups. Event time 0 corresponds to the birth year of the first child. The left-out time dummy is -1 and the left-out attitude group is egalitarian mothers. For individual i, in year s, and event time t, we estimate

$$\begin{aligned} Y_{ist} &= \alpha + \beta \cdot traditional_i \\ &\quad + \sum_{k \neq -1} \mathbb{I}[k = t] \cdot (\gamma_k + \delta_k \cdot traditional_i) \\ &\quad + \phi_{age_{is}} + \psi_s + \nu_{ist}. \end{aligned} \tag{1}$$

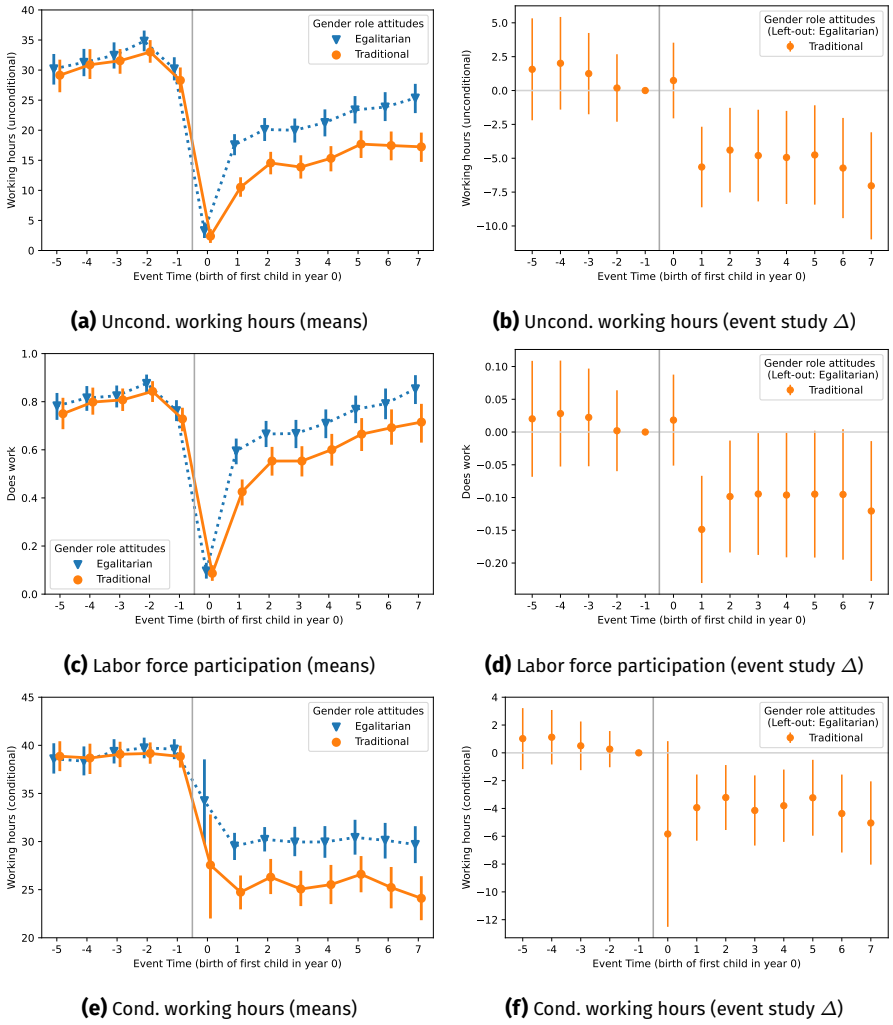
At event time -1, the outcome variable Y_{ist} depends on the intercept α and – in case the mother has traditional gender attitudes – the β coefficient. For other event times, we add a γ_k and a δ_k coefficient each, governed by the event time dummy variables $\mathbb{I}[k = t]$. Furthermore, we control for age ($\phi_{age_{is}}$) and year (ψ_s) fixed effects.

Under the assumptions outlined above, the δ_k coefficients depict the difference between traditional and egalitarian mothers in the effect of the first childbirth. They do not necessarily represent a causal effect of gender attitudes, given that the groups also differ in other dimensions (as documented in Table 2). This challenge is common in the literature on gender role attitudes as it is difficult to exogenously vary attitudes and quasi-experimental variations also potentially change attitudes and beliefs in other dimensions. While this might not be relevant for policy recommendations in many cases, we nevertheless collect several pieces of evidence suggesting that the differences between traditional and egalitarian mothers appear to reflect their attitudes. As shown in Section 2, despite looking at a broad set of background variables, we can only explain 13% of the variation in gender role attitudes, suggesting that a substantial share of the differences is unrelated to potential confounding factors. In terms of household composition, the likelihood of having a partner and the number of children at the end of the observation period are very similar, with the only difference being that egalitarian mothers are, on average, one and a half years older at the time of first birth. Additionally, we employ a number of robustness checks to show that differences in observed background characteristics do not drive the results. Most importantly, the results are very similar when focusing on West Germany only and when controlling for variables correlated with attitudes such as education, being religious and state of residence.

We focus on the time from five years before the birth of the first child to seven years after birth. The main sample comprises mothers we observe at least twice before and after the birth of the first child. In robustness analyses described at the end of this section, we replicate our findings for a balanced panel running from two years before to three years after birth.

3.2 Results

The left panels of Figure 2 display means of labor supply outcomes around the birth of the first child for both gender role attitude types without applying the event study framework. Labor supply is very similar in the five years before the birth of the first child, with unconditional working hours of about 32 hours (Panel 2a), a labor force participation of around 80% (Panel 2c), and conditional working hours of slightly below 40 hours (Panel 2e). After the birth of the first child, working hours strongly differ as mothers with egalitarian gender norms have a substantially higher likelihood of working than those with traditional attitudes, with the difference being most prominent when the child is one year old. Conditional on working, egalitarian women work 30 hours per week on average and traditional women only 25.



(a) Uncond. working hours (means)

(b) Uncond. working hours (event study Δ)

(c) Labor force participation (means)

(d) Labor force participation (event study Δ)

(e) Cond. working hours (means)

(f) Cond. working hours (event study Δ)

Figure 2. Female labor supply around the birth of the first child by gender role attitudes

Notes: The left panels depict means over time around childbirth by gender role attitude group (observed before the birth of the first child). The right panels depict the difference between traditional and egalitarian mothers in event study regressions as specified in Equation 1 (i.e., the δ_k coefficients). The corresponding coefficients are reported in Appendix Tables A.1, A.2, and A.3. The dependent variable is unconditional working hours in Panels (a) and (b), a dummy variable whether the woman is working in Panels (c) and (d), and conditional working hours in Panels (e) and (f). Sample: observed at least twice before and twice after the birth of the first child. The vertical error bars display 95% confidence intervals.

The right panels of Figure 2 display the results of the event study regressions (the corresponding coefficients are reported in Appendix Tables A.1, A.2, and A.3). More specifically, we plot the difference in event study dummies between traditional and egalitarian mothers (the δ_k coefficients in Equation 1). Mothers with traditional gender role attitudes are 15% less likely to participate in the labor market when their

first child is one year old. Differences at the extensive margin become slightly smaller when the child is older. Differences in unconditional and conditional working hours remain very stable until the end of the observation period at around five or four working hours, respectively.

Furthermore, Appendix Figure A.4 reveals that the differences between traditional and egalitarian mothers carry over to measures of income and – to a lesser extent – long-term wages.

Maternal labor supply differences by gender attitude groups are substantially larger and more persistent in Germany than in the US. To contrast the relevance of gender attitudes over these countries, we compare our results to findings based on the 1979 cohort of the National Longitudinal Survey of Youth by Rafols (2023). As she splits the sample in three groups based on their pre-birth gender attitudes, we do the same in Appendix Table A.5. On the extensive margin, Rafols (2023) reports average differences in the participation rate between the most traditional and the most egalitarian group in the first three years after birth of the first child of 7.3 percentage points on average. We find 13 percentage points. After seven years, the difference is still 12 percentage points in our sample while Rafols (2023) reports no larger difference than four percentage points from that event time on. On the intensive margin, the average difference during the first three years is 3.1 hours per week in the US and 5.6 hours in Germany. After seven years, it is only one hour in the US, but still 5 hours in Germany. The higher relevance of gender role attitudes in Germany could be related to more traditional gender role attitudes and the high availability of part-time work opportunities.

3.3 Gender role attitudes of the fathers

Next, we examine the gender role attitudes of fathers and show that they are also strongly related to maternal labor supply. At the end of the section, we briefly document that the labor supply of fathers does not react to having a child, independent of gender role attitudes.

We are interested in whether the gender attitudes of the father predict maternal labor supply in addition to the fact that they are positively correlated with maternal gender attitudes. Therefore, we regress unconditional working hours on the gender attitudes of both parents. We deviate from the event study regressions above in two aspects to facilitate interpretation. First, we pool observations over years and add event dummies for the year of childbirth, the period when the child is one or two years old, and the period when the child is at least three years old. Second, we add the attitudes as continuous measure and standardize them to account for the fact that fathers' gender attitudes tend to be more traditional than those of the mothers. Note that higher values of the gender role attitude index correspond to more traditional attitudes. As before, we consider the period from five years prior to seven years past the birth of the first child.

Table 3. Female (unconditional) working hours by fathers' gender role attitudes

	Working hours (unconditional)			
	(1)	(2)	(3)	(4)
Event time = 0	−32***	−32***	−32***	−32***
	(0.69)	(0.69)	(0.69)	(0.72)
Event time ∈ [1, 2]	−18***	−18***	−18***	−18***
	(0.8)	(0.79)	(0.79)	(0.84)
Event time ≥ 3	−16***	−16***	−16***	−16***
	(1)	(1)	(1)	(1.1)
Attitudes mother (traditional)	−0.45		−0.23	−0.18
	(0.51)		(0.55)	(0.56)
Attitudes mother (traditional) × Event time = 0	−0.35		−0.53	−0.63
	(0.61)		(0.66)	(0.71)
Attitudes mother (traditional) × Event time ∈ [1, 2]	−3.1***		−2.5***	−2.6***
	(0.63)		(0.71)	(0.73)
Attitudes mother (traditional) × Event time ≥ 3	−2.9***		−2.1***	−2.1***
	(0.68)		(0.77)	(0.77)
Attitudes father (traditional)		−0.7	−0.61	−0.61
		(0.51)	(0.55)	(0.55)
Attitudes father (traditional) × Event time = 0		0.25	0.47	0.46
		(0.64)	(0.7)	(0.7)
Attitudes father (traditional) × Event time ∈ [1, 2]		−2.4***	−1.3**	−1.3**
		(0.61)	(0.67)	(0.68)
Attitudes father (traditional) × Event time ≥ 3		−2.5***	−1.6**	−1.6**
		(0.68)	(0.75)	(0.75)
Attitudes mother × Attitudes father				−0.2
				(0.47)
Attitudes mother × Attitudes father × Event time = 0				0.33
				(0.57)
Attitudes mother × Attitudes father × Event time ∈ [1, 2]				0.17
				(0.56)
Attitudes mother × Attitudes father × Event time ≥ 3				0.1
				(0.66)
Year FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Observations	5865	5865	5865	5865
Adj. R^2	0.31	0.31	0.32	0.32

Notes: OLS regressions of unconditional working hours on gender role attitudes of both parents interacted with event time dummies and age and year fixed effects. We consider the period from five years prior to seven years past birth of the first child. We add event dummies for the year of childbirth, the period when the child is one or two years old, and the period when the child is at least three years old. Gender role attitudes are used as continuous variable, standardized, and coded such that higher values correspond to more traditional attitudes. Sample: observed at least twice before and twice after the birth of the first child, attitudes of both parents observed. Standard errors are clustered at the individual level and reported in parentheses. * $-p < 0.1$, ** $-p < 0.05$, *** $-p < 0.01$

Column (1) in Table 3 reveals that before having a child, as well as in the year the first child is born, the attitudes of the mother are virtually unrelated to her working hours. Afterward, an increase in traditional maternal gender attitudes by one standard deviation is associated with a decrease of slightly above three hours when the child is between one and two years old and slightly below three hours for older children.[10] For paternal attitudes in column (2), we find the same pat-

10. These results also show that our findings in Figure 2 are not driven by the fact that we classify subjects into two groups. Conversely, also for a continuous measure of gender role attitudes, we find a strong relation to post-birth labor supply but no relation to labor supply before birth.

tern, where the respective coefficients are slightly lower. In column (3), we include the attitudes of both parents as independent variables. In line with the positive correlation of attitudes within couples, coefficients are smaller than in the previous columns. However, they are still substantial and both significant. In column (4), we add interaction terms between the attitudes of both parents. The coefficients of the interaction terms are small and not significant while the individual coefficients hardly change.[11]

These findings suggest that both parents' attitudes influence maternal labor supply independently of each other and that the effects are additive. They indicate that how quickly mothers return to the labor market is a joint household decision but with higher decision weights for the mothers.

In Appendix B.2, we look at the labor supply decision of fathers around the birth of their first child. We find very weak to no changes in labor supply over event time and no significant difference by either their gender attitudes or those of their female partners. For almost all parents, the option that the father reduces his labor supply is not in their choice set. Hence, the relevant trade-off for most households seems to be whether the mother stays at home to care for the children or participates in the workforce while utilizing external childcare. This trade-off is what the structural model in Section 5 focuses on.

3.4 Robustness

A range of robustness checks confirm that the findings of this section are robust to the addition of further control variables, different classification approaches of attitude groups, and alternative sample restrictions.

Additional controls. First, we add further control variables to the event study regressions: living together with a partner, education, migration background, having any religious affiliation, municipality size, and state fixed effects. The last column of Appendix Table A.4 reveals that the coefficients are almost unaffected.

Alternative classification. Second, we investigate alternative classifications of women by their gender role attitudes. Appendix Figure A.5 shows the results for the classification into three instead of two groups, which lead to very similar patterns: after childbirth, the most traditional group of mothers reduces labor supply significantly stronger than the most egalitarian group of mothers, and the moderate group falls somewhere in between. In Appendix Table A.1, we classify subjects based

11. In Appendix B.1, we provide additional evidence for the relevance of fathers' attitudes for maternal labor supply based on attitude groups instead of continuous measures. In particular, we run event study regressions in which we interact event time dummies with attitude groups based on a median split of fathers' attitudes. Furthermore, we interact attitude groups of the parents (leading to four groups). We find that only if both parents have traditional gender attitudes, female labor supply after the birth of the first child is substantially and significantly lower compared to couples with egalitarian attitudes.

on the three individual gender role attitudes items instead of our index. Throughout, we find a larger labor supply drop for traditional than egalitarian women after birth. For the 'Child suffers' item, the coefficients are substantially lower and, in many cases, not significantly different from 0. Conversely, for the other two items, the results are very similar to the classification by the index. We find very strong and persistent differences for all items at the intensive margin (Appendix Table A.3),

Alternative sample. Third, we look at alternative sample restrictions. Appendix Figure A.6 replicates Figure 2 for a balanced sample running from two years before to three years after birth. The results are very similar to the main specification. Appendix Table A.4 replicates the regression shown in Figure 2b for alternative samples. Both qualitatively and quantitatively, the coefficients are very similar when only looking at subjects living in West Germany and when dropping all observations from 2020 onwards (to abstract from any effects by the Covid-19 pandemic).

4 Gender role attitudes and a cash-for-care policy

In this section, we look at the introduction of a cash-for-care policy and show that gender role attitudes shape the labor supply response to the policy, with only traditional mothers reducing their labor supply. After describing the policy and explaining our empirical strategy, we present the results.

4.1 Cash-for-care policy

In 2013, Germany introduced a cash-for-care policy ('Betreuungsgeld'). For a child aged one or two years old, parents could claim a subsidy of initially 100 EUR per month if they did not use public childcare facilities. This value amounts to approximately 9% of the median net income of women before birth or 4% of the median net income of eligible households. As maternal labor supply is often dependent on the use of public childcare, the policy increased the opportunity costs of working for mothers. The subsidy was fully credited against welfare transfers such that the policy did not increase disposable income for indigent households. In contrast to similar policies in Norway, Sweden, and the German state of Thuringia, eligibility for the cash-for-care policy is withdrawn completely when any subsidized public childcare is taken up. We expect the policy's effect to be more concentrated on the extensive margin compared to these other contexts in which the payment is gradually withdrawn. Furthermore, we expect the policy to have the strongest effect on mothers who would have taken up small levels of childcare in the absence of the policy. In contrast, we expect mothers taking up full-time childcare to be unaffected as long as the subsidy is not sufficiently large to induce them to reduce their childcare take-up to zero. Mothers not taking up any childcare, even without the subsidy,

are unaffected by the increase in the opportunity costs of public childcare but might adjust labor supply due to an income effect of the transfer.

Essentially for our empirical strategy, the policy reform employed a clear eligibility cut-off based on the date of birth, whereby only children born after the cut-off date could receive the payment. The eligibility cut-off was planned to be January 1, 2012 in the first version of the parliamentary bill but was unexpectedly changed to August 1, 2012 during the legislative process. Importantly, this did not allow parents to adjust the fertility timing in anticipation of the policy change.

In July 2015, the Federal Constitutional Court abolished the cash-for-care policy, ruling that the policy exceeds the federal legislative authority. As the transfer continued for all parents who had their claim already approved, there is no clear cut-off in terms of birth date for the policy withdrawal, and hence, we focus on the introduction of the policy.

In August 2013, Germany expanded the legal claim to a spot in public childcare from all children from three years old onwards to all children from the age of one onwards. In contrast to the cash-for-care policy, there was no clear cut-off based on birth age. Children born after August 1, 2012 are fully affected by the legal claim, while children in the control group are also affected, albeit not directly at the point in time at which they become one year old. The impact of the legal claim appears to be relatively minor, given that only a small number of parents actively seek to enforce it (Wiesner and Kößler, 2014). Additionally, local authorities regularly provide childcare spots that are not attractive for parents and, hence, are not taken up. Consequently, we do not see a noticeable jump in child care take-up after 2013 (see Appendix Figure **??**).

If anything, we would expect the introduction of the legal claim to increase the labor supply of mothers and bias the estimated labor supply response to the cash-for-care policy upwards.

Our data set asks subjects whether the household receives the cash-for-care payment. The share of eligible households that use the subsidy is almost twice as high for traditional mothers (38% vs 21%).[12]

4.2 Empirical strategy

To evaluate the program's impact, we employ a treatment group comprising all children born in a two-year window after the cut-off date (August 1, 2012), while the control group comprises those born in a two-year window before the cut-off date, totaling 344 births. The identification assumption underlying this approach is that

12. Based on the 'Kinderbetreuungsstudie,' Collischon, Kuehnle, and Oberfichtner (2022) report take-up rates of 60% in West Germany and 28% in East Germany. These numbers provide further suggestive evidence of unequal take-up by gender attitudes. It also indicates differences in the level of measured take-up between the studies. However, this does not affect the following analyses as these do not use take-up information.

the two groups are similar in all respects except for their eligibility for the cash-for-care payment. Under this assumption, observed differences in outcomes can be attributed to the program's effects.

In the spirit of a triple-difference design, we interact dummies of event time t, gender attitude A, and eligibility for the cash-for-care payment $eligible_{st}$ and estimate

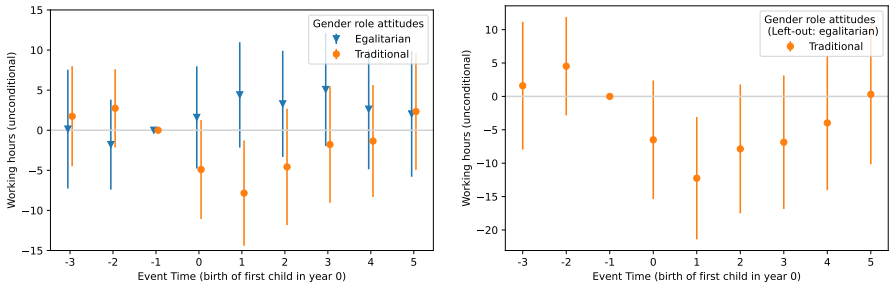
$$\begin{aligned} Y_{ist}^{A} = & \sum_{a} \mathbb{I}[a = A] \cdot \left(\alpha^{a} + \zeta^{a} \cdot eligible_{st}\right) \\ & + \sum_{a} \sum_{k \neq -1} \mathbb{I}[a = A] \cdot \mathbb{I}[k = t] \cdot \left(\gamma_{k}^{a} + \eta_{k}^{a} \cdot eligible_{st}\right) \\ & + \phi_{age_{is}} + \nu_{ist}, \end{aligned} \tag{2}$$

where $\mathbb{I}[a = A]$ are dummy variables whether the subject is of gender attitude type a and, as before, $\mathbb{I}[k = t]$ are event time dummy variables. We add age fixed effects ($\phi_{age_{is}}$) but – conversely to the analyses in the last section – no year fixed effects, as all children in the sample were born around the same time and hence event time and year are highly collinear. Our coefficients of interest are the η_{k}^{a}, which indicate the treatment effect of the cash-for-care policy for gender attitude type a at event times k.

Similar policies were already in place in some German states prior to the introduction of the federal policy. We exclude residents of Baden-Württemberg from the analysis as a cash-for-care policy was abolished in 2013 in this state. A similar policy existed throughout the observation window in Saxonia, Thuringia, and Bavaria. As the federal and state policies could be claimed simultaneously, we do not exclude observations from these states in our main specification.

4.3 Results

The impact of the cash-for-care policy on the labor supply of mothers substantially varies depending on their gender attitudes. Figure 3 displays the results of the event study regressions. For mothers with traditional gender roles, the policy demonstrates a notably negative treatment effect of eight hours when their child is one year old (Panel 3a). As non-eligible traditional mothers reduce their working hours at that event time by seventeen hours on average, the cash-for-care effect amounts to an additional 46%. Further analysis reveals that this effect is primarily driven by changes at the extensive margin, indicating that more mothers in this group choose to reduce labor force participation during this specific period. By contrast, there is no discernible impact on the labor supply of mothers with more egalitarian views towards gender roles. The positive yet insignificant coefficient for egalitarian mothers might be driven by the expansion in the legal claim to a spot in public childcare. The difference between the two groups is statistically significant, as shown in Panel 3b.



(a) Egalitarian and traditional mothers

(b) Δ egalitarian and traditional mothers

Figure 3. Difference in female (unconditional) working hours by cash-for-care eligibility by gender role attitudes around the birth of the first child

Notes: The figure displays coefficients of event study regressions around the birth of the first child. We interact event dummies with a dummy whether the child is eligible for cash-for-care and gender role attitudes type (see Equation 2). The eligible group comprises all children born in a two-year window after the cut-off date while the non-eligible group comprises all children born in a two-year window before the cut-off date. The left panel displays the difference in unconditional working hours by cash-for-care eligibility around the birth of the first child separately for egalitarian and traditional mothers, relative to event time -1. We report the corresponding coefficients in Appendix Table A.6. The right panel plots the respective differences between egalitarian and traditional mothers. Sample: observed at least twice before and twice after the birth of the first child, not living in Baden-Württemberg. The vertical error bars display 95% confidence intervals.

When examining the full sample without a split by gender attitude type, we find a relatively small negative and not statistically significant effect of the policy. This finding aligns with the results by Collischon, Kuehnle, and Oberfichtner (2022), who also find only minor adverse employment effects when analyzing administrative data.

4.4 Robustness

In this section, we show that our finding, that the labor supply of traditional mothers decreased under a cash-for-care policy, but not the labor supply of egalitarian mothers, is robust to different sample restrictions and specifications.

First, we add a set of controls to our main specification in the last column of Appendix Table A.6. The results remain very similar qualitatively and quantitatively. Second, Appendix Figure A.7 replicates Figure 3 using a balanced panel. The results are very similar to the main specification, indicating that they are not driven by the fact that we do not observe some mothers in all periods. Finally, Appendix Table A.6 shows the results when we restrict the sample to mothers living in West Germany or drop those living in states with a cash-for-care policy at the state level (Saxonia, Thuringia, or Bavaria). In both cases, we detect even a slightly stronger negative labor supply effect for traditional mothers when their child is one year old. However, for the latter robustness check, we detect a significant difference between

the treatment and control group at event time -1, indicating that the identification assumption of parallel trends might not be fulfilled.

5 A structural model of female labor supply

Based on the results of the last sections, we estimate a structural life-cycle model of female labor supply. Our key methodological contribution is that we model heterogeneity stemming from gender role attitudes using a discrete set of attitude types. The model allows us to estimate labor supply elasticities and the effects of counterfactual policy changes where we focus in particular on how those vary over gender attitude types. We describe the model and the estimation of the model in this section.

5.1 Overview

We start by describing the most essential features of the model and introducing the basic components.

A key reason why labor supply decisions of parents influence a substantial part of gendered inequalities in labor market outcomes is that periods in which a mother does not work translate not only to lower labor income in that period but also affect future earnings through (the absence of) human capital accumulation. Hence, it is essential to model the development of wages and the decision-making process of couples over the life cycle.

We set up a life-cycle model which closely builds upon state-of-the-art models, for instance, by Blundell et al. (2016), Adda, Dustmann, and Stevens (2017), and Jakobsen, Jørgensen, and Low (2023). While we slim down some parts of these models, we add heterogeneity by gender role attitude types as a novel feature.

Specifically, we differentiate again two types, traditional and egalitarian mothers, that differ in their preferences about working when having children. Additionally, we allow for differences in initial wages, partner income, and fertility patterns.

We focus on women living with a partner and follow them from age 24 to 65 in discrete time steps of one year. Subjects are forward-looking and maximize the sum of current utility and discounted expected future utility. By doing so, they take a set of state variables $S_t = (K_t, n_t, o_t)$ into account, where $K_t \geq 0$ is the human capital of the woman, $n_t \in \{0, 1, 2, 3\}$ is the number of children, and $o_t \in \{\emptyset, 0, 1, \dots 16, 17\}$ is the age of the youngest child in the household.[13] We denote the age of the women with t, gender attitude type with A, and all variables referring to the (male) partner with m. In each period, women decide whether they work full-time, work part-time,

13. The notation in this section loosely follows Jakobsen, Jørgensen, and Low (2023).

or abstain from working entirely, which we denote as $l_t \in \{0, l_{PT}, l_{FT}\}$, representing monthly working hours.[14] As we are particularly interested in the interplay of gender role attitudes and economic incentives for female labor supply, we incorporate a detailed representation of the German tax and transfer system.

5.2 Gender role attitudes lead to identity conflicts

Before describing the structural model in more detail, we briefly discuss our conceptualization of gender role attitudes. This motivates the way we incorporate gender role attitudes in the structural model and how we interpret the estimated parameters.

We assume that gender role attitudes are linked to a perception of the appropriate extent of labor supply for mothers, contingent upon the age of their youngest child. Akerlof and Kranton (2000) denote these attitudes *prescriptions*. Once a woman has a child, she becomes part of the social group of mothers and has preferences to follow the prescriptions she associates with that group.[15] If the realized labor supply deviates from the prescriptions, identity conflicts and disutility emerge, which increases in the size of the deviation. Importantly, we assume that for women without children, there are no prescriptions, and hence no potential identity conflicts.

5.3 Model setup

5.3.1 Per-period utility. Subjects value consumption C_t, as well as non-market time. The latter implies that, when holding consumption constant, labor supply l_t enters the utility function negatively. The per-period utility function consists of the following three terms:

$$U(C_t, l_t, n_t, o_t; A) = \frac{(C_t / \nu(n_t))^{1-\rho}}{1-\rho} + f(l_t) + q(l_t, o_t; A)\mathbb{I}[n_t > 0]. \quad (3)$$

The first term represents the constant relative risk aversion value of consumption where ρ governs the level of risk aversion and $\nu(n_t)$ equivalizes household consumption using the OECD scale ($\nu(n_t) = 1.5 + 0.3n_t$), depending on the number of children n_t. The second term $f(l_t)$ constitutes disutility of work

14. We set $l_t = 0$ in the period a mother gives birth, in line with observed choices for almost all women. For the first two months after childbirth, the mother is not even legally allowed to work.

15. We do not take a stance on how prescriptions are formed. A likely determinant is social norms. Furthermore, the desire to adhere to norms might directly influence behavior even if these norms are not reflected in individual attitudes. We do not consider this channel further.

$$f(l_t) = \begin{cases} \mu_{PT}, & \text{if } l_t = l_{PT} \\ \mu_{FT}, & \text{if } l_t = l_{FT} \\ 0, & \text{else,} \end{cases} \tag{4}$$

where μ_{PT} and μ_{FT} represent the disutility of working part-time and full-time respectively.

The third term $q(l_t, o_t; A)$ flexibly captures changes in the preferences to work when children are in the household. The novel component of our model is that we allow for heterogeneity in the parameters of this function and relate the heterogeneity to observed measures of gender role attitudes. The disutility of working when children are present is given by

$$q(l_t, o_t; A) = \begin{cases} \mu_{PT}\left(\alpha^A_{PT,child} + \alpha^A_{age}\max\{6 - o_t, 0\}\right), & \text{if } l_t = l_{PT} \\ \mu_{FT}\left(\alpha^A_{FT,child} + \alpha^A_{age}\max\{6 - o_t, 0\}\right), & \text{if } l_t = l_{FT} \\ 0, & \text{else.} \end{cases} \tag{5}$$

Thereby, $\alpha^A_{PT,child}$ and $\alpha^A_{FT,child}$ capture the change in the disutility to working when a child of at least six years is in the household, relative to the disutility of working when no children are present (μ_{PT} or μ_{FT}). Furthermore, the disutility changes with the age of the youngest child (α^A_{age}) up to the age of six.[16] All these parameters differ by gender attitude type A.

The additional disutility of working with children could be induced by different factors like changing prescriptions about appropriate labor supply but also increased demand for household production or utility from spending time with children. When interpreting our estimated parameters, we assume that other factors influencing the preference to work while having children do not differ by A. Then, we can attribute the difference between attitude types in the disutility to work with children as the difference in identity-related disutility. Considering that identity considerations might also impact choices of egalitarian mothers, this difference signifies, in that sense, a lower bound of the overall relevance of gender role attitudes for maternal labor supply choices.

5.3.2 Wage process. Labor income Y_t is the product of the hourly wage w_t and labor supply l_t

$$Y_t = w_t l_t, \tag{6}$$

where the wage depends on accumulated human capital K_t via

$$\log w_t = \gamma_0 + \gamma_1 K_t. \tag{7}$$

16. We evaluate $\max\{6 - o_t, 0\}$ to zero for $o_t = \emptyset$.

Human capital evolves based on

$$K_{t+1} = (1-\delta)K_t + \mathbb{I}[l_t = l_{FT}] + k_{PT}\mathbb{I}[l_t = l_{PT}] + k_\epsilon \epsilon_t. \tag{8}$$

It depreciates with the rate δ and increases by 1 when working full-time and by k_{PT} when working part-time. We also incorporate an additive shock ϵ_t to human capital, representing a permanent wage shock.[17] We ensure $K_{t+1} \geq 0$.

To reduce the state space, we model the wage of the partner w_t^m as a quadratic function of the age of the woman, following van der Klaauw (1996) and several other studies. However, we allow for differences by type A. We do not model the labor supply decision of partners but assume full-time work such that the labor income of the partner is given by $Y_t^m = w_t^m l_{FT}$.

5.3.3 Budget constraint. The budget constraint is given by

$$C_t = Y_t + Y_t^m + T_t(Y_t, Y_t^m, n_t, o_t) - CC_t(n_t, o_t, l_t). \tag{9}$$

In each period, household consumption C_t is determined as the sum of the labor income of both partners after applying taxes and transfers $T_t(Y_t, Y_t^m, n_t, o_t)$ and subtracting childcare costs $CC_t(n_t, o_t, l_t)$. We employ childcare costs as estimated by Geyer, Haan, and Wrohlich (2015) for Germany and assume that they are directly related to the labor supply of the mother as we do not account for informal childcare. We closely replicate the German tax and transfer system for the year 2018.[18] See Appendix C for more details on implementing the tax and transfer system and childcare costs.

5.3.4 Fertility. We estimate fertility as a quadratic function of the age of the woman if the mother has no child yet. If she already has a child, the probability of having another child is a quadratic function of both her age and the age of the youngest child. Fertility drops to zero if the mother has three children or if she reaches age 45.

Based on whether a birth b_{t+1} occurs in a period, the number of children n_t and the age of the youngest child o_t develop as

$$n_{t+1} = n_t + b_{t+1}, \tag{10}$$

17. We fix both the probability of a negative shock ($\epsilon_t = -1$) and the probability of a positive shock ($\epsilon_t = 1$) to 0.25 while no shock ($\epsilon_t = 0$) happens with a probability of one-half. The scaling parameter k_ϵ governs the size of the shocks and is estimated below.

18. That is, after the abolishment of the cash-for-care policy that we study in Section 4.

and

$$o_{t+1} = \begin{cases} 0, & \text{if } b_{t+1} = 1 \\ o_t + 1, & \text{if } b_{t+1} = 0 \text{ and } o_t \in \{1, 2, \ldots, 16\} \\ \emptyset, & \text{if } b_{t+1} = 0 \text{ and } o_t \in \{\emptyset, 17\}. \end{cases} \tag{11}$$

5.3.5 Recursive formulation. The recursive problem of households can be formulated as

$$V_t(S_t) = \max_{l_t} \{U(C_t, l_t, o_t; A) + \beta \mathbb{E}[V_{t+1}(S_{t+1})]\},$$

such that

1. the stochastic state transition $S_t \mapsto S_{t+1}$ is governed by equations (8), (10), and (11),
2. the relationships between variables are given by the equations (3) – (7) and (9)

We assume subjects retire at age 65 and receive no utility from human capital afterward. The model is solved numerically by backward induction using a brute-force approach and fine grids for all continuous-valued state variables, as described in Appendix D.

5.4 Estimation

The estimation proceeds in two steps. We first set some model parameters based on the previous literature or estimate them based on data outside the model estimation. In the second step, we estimate the remaining parameters of the model using the Method of Simulated Moments.

5.4.1 Calibrated parameters. We set the CRRA coefficient ρ to 1.5 following, for instance, Jakobsen, Jørgensen, and Low (2023) and fix the discount factor β at 0.95. The human capital return to part-time work k_{PT} is 0.5 following Adda, Dustmann, and Stevens (2017). We set the depreciation rate of human capital δ to 0.05.

In line with typical working contracts, we set weekly working hours for a full-time job to 40 and for a part-time job to half of it. Multiplying with 4.34 yields monthly working hours l_{FT} and l_{PT}. To calculate observed data moments (see below), we count all subjects working at least 35 hours per week as working full-time and anybody working more than zero but less than 35 hours per week as working part-time.

Finally, we calibrate the labor income of the partner and fertility patterns based on pairfam data, allowing for differences across attitude types. We describe the calibration in more detail in Appendix C.

5.4.2 MSM Estimation. We estimate the remaining parameters using the Method of Simulated Moments (MSM) (Gourieroux, Monfort, and Renault, 1993). These parameters specify the human capital shock (k_ϵ), the wage process (γ_0, γ_1), the disutility of working (μ_{PT}, μ_{FT}), and the change in the disutility of working with children ($\alpha^A_{PT}, \alpha^A_{FT}, \alpha^A_{age}$) where we estimate the latter set of parameters for both A. We denote the set of these eleven parameters with θ.

We estimate θ as

$$\hat{\theta} = \underset{\ell \leq \theta \leq b}{\operatorname{argmin}}\, g(\theta)^\top W g(\theta), \tag{12}$$

where $g(\theta) = m^{data} - m^{sim}(\theta)$ is a J-dimensional vector of differences between the empirical moments, listed in Table 4, and the corresponding moments simulated from the model at the parameters θ. W is a $J \times J$ symmetric positive definitive weighting matrix, set to the inverse of the covariance matrix of the empirical moments. We impose lower (ℓ) and upper (b) bounds on the parameters, e.g., we impose that the human capital shock factor (k_ϵ) is positive. We report the list of all bounds in Table A.7.

To simulate the moments m^{sim} at a specific parameter value θ, we solve the model and simulate lifetime trajectories for $N_{sim} = 10.000$ subjects, given initial conditions that we randomly draw from the data at age 24.[19] We then minimize the criterion function using a non-linear least-square minimizer.

We only employ moments up to the age of 45 as we do not track our sample beyond that age. We do not deem this a substantial limitation as we are primarily interested in the time when children are born and raised, which typically happens during our observation period. Nevertheless, we simulate the choices of women up to age 65 in order to capture the importance of human capital on lifetime earnings.

Table 4 displays the moments we use in our estimation. A set of 44 moments depicts labor supply, i.e., the share working and the share working full-time, depending on the age of the youngest child (closely related to the reduced form evidence in Section 3) and the number of children. We include moments by the age of the youngest child, up to the age of seven, as labor supply plateaus around this age, and later years would not provide much further information. These moments are informative on the disutility of working when having children, in particular ($\alpha^A_{PT}, \alpha^A_{FT}, \alpha^A_{age}$). We expect the baseline disutility of working (μ_{PT}, μ_{FT}) to be primarily identified by the 44 moments on labor supply by age and the moments on labor supply of childless women. Furthermore, we add the age profile of income over the life cycle to be informative on the wage process (γ_0, γ_1) and the transition probabilities between labor supply states to inform the size of human capital shocks k_ϵ. The latter moment group relates choices over periods. Eisenhauer, Heckman, and Mosso (2015) argue

19. We use LCM (2023) for the solution and simulation of the model and Gabler (2022) for the numerical optimization.

Table 4. List of moments

Moments	Number
Share working by age	22
Share working full-time by age	22
Gross-income by age	22
Share working by age of the youngest child by gender attitude type	14
Share working full-time by age of the youngest child by gender attitude type	14
Share working by number of children by gender attitude type	8
Share working full-time by number of children by gender attitude type	8
Year-to-year labor supply transitions	9
	119

Notes: The list of moments we use to estimate the model. We calculate moments by age (of the mother) from age 24 to age 45 and moments by age of the youngest child from age one to seven.

that these kinds of dynamic moments are essential for the identification of dynamic life-cycle models.

6 Results structural estimation

In this section, we use the structural model introduced in the last section to calculate labor supply elasticities and a counterfactual policy change and explore the role of gender attitudes. Before doing so, we present the estimation results and show that the model fits the data well.

6.1 Estimation results

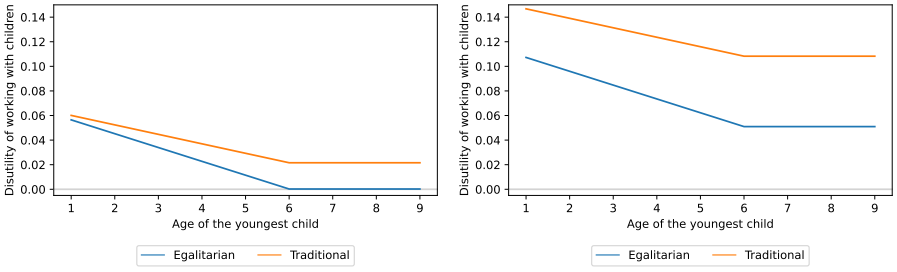
6.1.1 Estimated parameters. Appendix Table A.7 reports the list of estimated parameters. An increase in human capital by one unit is associated with an increase in the log wage by 0.075 or an increase in the wage by roughly 8%. The return to human capital is only slightly below 0.085 as estimated by Jakobsen, Jørgensen, and Low (2023). We estimate a human capital shock factor (k_ϵ) of 0.49. The estimated μ_{PT} and μ_{FT} are negative, implying that subjects as expected ceteris paribus prefer not to work. Thereby, the disutility of full-time work is slightly more than twice as large as that of part-time work.

We visualize the estimated parameters governing the disutility of working with children in Figure 4. The figure shows the increase in working part-time and full-time by the age of the youngest child, relative to when having no children. The disutility of working part-time increases by roughly six percent when having a one-year-old child for both attitude types. For egalitarian mothers, this measure decreases substantially more with the child's age than for traditional mothers and reaches about zero when the child is six. From this point on, egalitarian mothers no longer experience a higher disutility cost compared to having no children, while it remains at three percent for traditional mothers. The child-related increase in the preference not to work full-time is substantially stronger than in the preference not to work part-time. For a one-year-old child, it increases by fifteen percent for traditional and eleven percent for egalitarian mothers.

6.1.2 Model fit. Next, we compare the fit of our model to empirical data moments and find that, overall, we can replicate observed patterns well.

Figure 5 displays age profiles of the share of women that are working, the share working full-time, and the average labor income. We fit labor supply over the life cycle reasonably well, with some deviations in the full-time rate at the beginning and the end of the considered period. For labor income, we observe that observed moments are somewhat noisily measured in pairfam. We fit the pattern well, but simulated labor income is, on average, slightly too high.

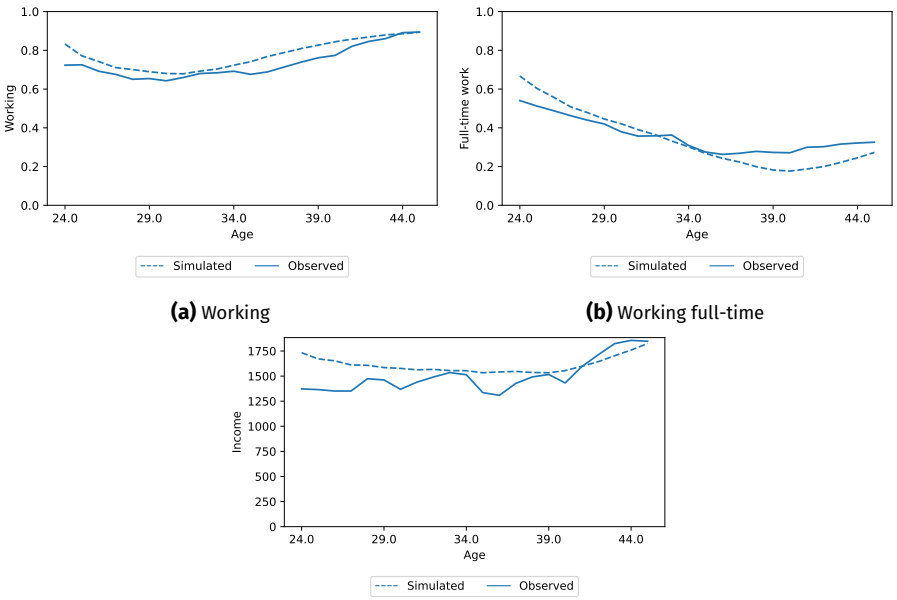
We next turn to the moments capturing labor supply depending on the age of the youngest child and the number of children. Looking at the top panels of Figure 6, we see that the simulated labor supply varies less smoothly with the age of the youngest



(a) Working part-time **(b)** Working full-time

Figure 4. Disutility of working with children (increase relative to having no children)

Notes: This figure depicts the increase in the disutility of working part-time (left panel) and full-time (right panel) when having a child of a certain age relative to having no children. In particular, we calculate $\alpha^A_{PT,child} + \alpha^A_{age} \max\{6-o_t, 0\}$ and $\alpha^A_{FT,child} + \alpha^A_{age} \max\{6-o_t, 0\}$, respectively.



(a) Working **(b)** Working full-time

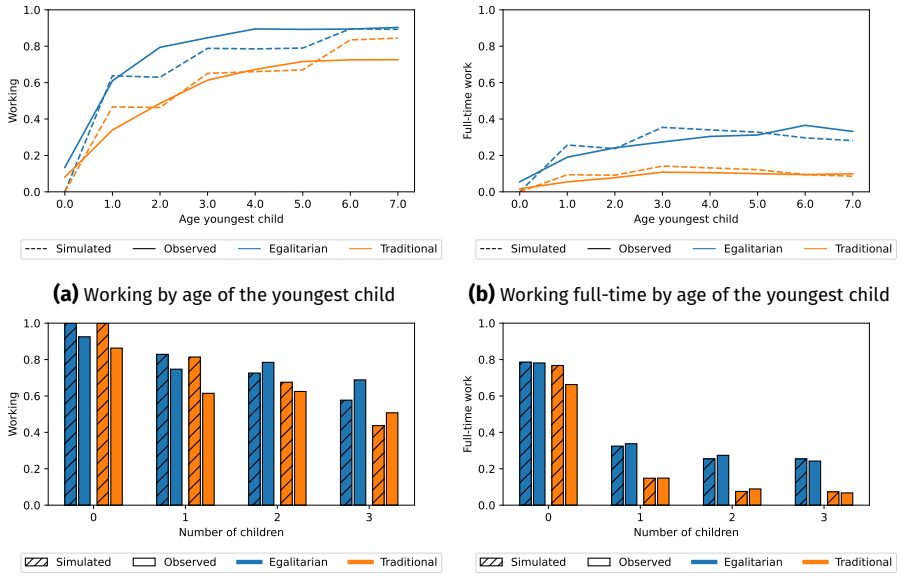
(c) Labor income

Figure 5. Simulated and observed moments by age

Notes: This figure depicts simulated and observed moments by the age of the women. Panel 5a reports the share working, Panel 5b the share working full-time, and Panel 5c the average labor income. We calculate observed moments in the estimation sample based on pairfam data.

child than in observed data. Nevertheless, the trends, the overall level, and, in particular, the difference between traditional and egalitarian mothers are well replicated. The bottom panels of Figure 6 show that the model also replicates the labor supply patterns by the number of children. While we fit the share of women working full-

time very precisely, we slightly overestimate the share of working women with no or one child and underestimate the share of working women with three children.



(a) Working by age of the youngest child

(b) Working full-time by age of the youngest child

(c) Working by number of children

(d) Working full-time by number of children

Figure 6. Simulated and observed moments by age of the youngest child and number of children

Notes: This figure depicts simulated and observed moments by age of the youngest child (top panels) and number of children (bottom panel). The left panels report the share working, and the right panels report the share working full-time. We differentiate these moments by gender attitude type. We calculate observed moments in the estimation sample based on pairfam data.

Table 5 reports the simulated and observed transition probabilities. Simulated labor supply choices are somewhat more persistent than observed in the data. One reason could be that our model does not incorporate job search frictions.

Overall, we conclude that the model fits the data well, especially given the complex decision problem of households that we aim to match.

Table 5. Simulated and observed labor supply transition probabilities

	No Work	Part Time	Full Time
Simulated			
No Work	0.72	0.22	0.06
Part Time	0.06	0.90	0.04
Full Time	0.11	0.02	0.87
Observed			
No Work	0.64	0.28	0.08
Part Time	0.12	0.78	0.10
Full Time	0.13	0.09	0.78

Notes: Transition probabilities of labor supply choices in consecutive periods. Rows represent the employment status in period t, while columns represent the employment status in period $t+1$.

6.2 Labor supply elasticities

In this section, we calculate the labor supply elasticities for wage changes. This exercise follows at least two purposes. First, we compare the estimates to previous literature as another validation check of our model. Second, we analyze how elasticities differ by gender attitude types as a first evidence on whether the response to changes in incentives interacts with gender attitudes.

We calculate Marshallian elasticities as the response to a permanent increase in wages. Specifically, we increase the wage by 5% in all periods and calculate how this affects labor supply at different points in time over the life cycle. We consider two measures of labor supply: unconditional working hours, that is, counting not working as zero working hours, and labor force participation as a measure of the extensive margin response.

Table 6 reports the results. We first note that elasticities monotonically increase from age 25 to 35, increasing further up to age 40 for at least three of the four measures. This pattern aligns with the results by Wang (2022), who report Marshallian elasticities for unconditional working hours of 0.43 at age 25, 0.96 at age 32, and 1.13 at age 40. The fact that we find overall larger elasticities is expected, given that we only consider women in a relationship. For the subset of partnered women, Wang (2022) reports average elasticities of 1.54, slightly exceeding our results.

Interestingly, labor supply elasticities are larger for traditional mothers than egalitarian mothers, with the only exception at age 40 for unconditional working hours, which is most likely driven by different fertility patterns. These results show that in terms of Marshallian elasticities, traditional mothers are more responsive to changes in economic incentives, which fits very well the fact that both Blundell et al. (2016) and Wang (2022) find smaller elasticities for higher educated mothers.

Table 6. Labor supply elasticities for permanent changes in wages

	Working hours (unconditional)		Labor force participation	
	Egalitarian	Traditional	Egalitarian	Traditional
Age 25	0.62	0.78	0.11	0.33
Age 30	1.33	1.66	0.77	1.01
Age 35	1.58	1.71	0.74	1.13
Age 40	1.70	1.59	0.95	1.34
Mean	1.31	1.44	0.64	0.95

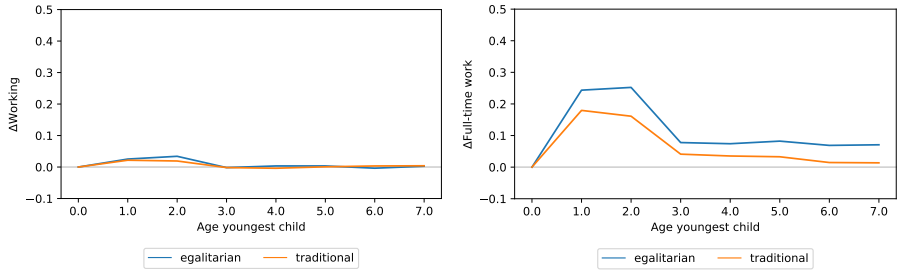
Notes: We calculate elasticities as labor supply response to a permanent increase in wages of 5% over the full life-cycle. The first four rows display the elasticity at the respective age, while the last row averages over these four points in time. We consider unconditional working hours in the two first columns and labor force participation in the two last columns.

6.3 Reform to full-time childcare

Finally, we use our model to simulate a counterfactual policy change, which removes barriers to full-time childcare. For this purpose, we set the additional cost of full-time childcare over part-time childcare to zero. Based on the estimated childcare costs by Geyer, Haan, and Wrohlich (2015), which we use in our model, full-time childcare costs for children younger than three years then decrease substantially from 381 EUR to 219 EUR per month while full-time childcare costs for children between three and six years decrease only slightly from 128 EUR to 122 EUR.

Figure 7 depicts the changes in labor supply by the age of the youngest child, separately for egalitarian and traditional mothers. Panel 7a reveals that the reform has almost no effect at the extensive margin, as expected, given that the policy change does not affect part-time childcare costs. Conversely, the rate of mothers working full-time increases considerably by more than 15 percentage points when the child is of age one or two for traditional mothers. For egalitarian mothers, the effect is even stronger as the full-time rate increases by 25 percentage points. This indicates that a larger share of egalitarian mothers is restricted in their labor supply choices by the lack of access to cheap full-time childcare. In relative terms, the difference between the attitude groups becomes even more pronounced in the years when the child is older. The full-time rate of traditional mothers returns almost entirely to the baseline rate. In contrast, egalitarian mothers are consistently more likely to work full-time, driven by a stronger increase in human capital through the reform.

These results show that although labor supply elasticities are generally larger for traditional mothers, policy reforms targeted at the needs of egalitarian mothers can have a stronger effect on this group.



(a) Δ working by age of the youngest child **(b)** Δ Working full-time by age of the youngest child

Figure 7. Reform effects of full-time childcare subsidy by age of the youngest child by gender attitudes

Notes: This figure depicts the difference in simulated labor supply between our baseline model and a reform in which we set the additional costs of full-time childcare (over part-time childcare) to zero. The left panels focus on the share working, and the right panels focus on the share working full-time.

7 Conclusion

This paper documents that gender role attitudes hold first-order importance for parental labor supply decisions in at least two respects. After having their first child, traditional mothers are substantially more likely to be out of the labor force and work fewer hours, although the labor supply in the years prior to birth is remarkably similar to that of egalitarian parents. Furthermore, we show that gender role attitudes interact with economic incentives, both based on an ex-post evaluation of an actual policy change and ex-ante simulations of counterfactual policy changes using a structural model.

A central feature of our paper is that we use individual-level measures of gender role attitudes. This has the distinct advantage over more coarse norm-based measures (Fernández and Fogli, 2009) that it allows us to exploit between-individual heterogeneity. In particular, we examine the relation of individual-level measures of attitudes with potential confounding variables and can control for them in our analyses. Moreover, we disentangle the contribution of paternal and maternal gender attitudes and find that fathers' attitudes are influential after controlling for mothers' attitudes. This finding suggests that couples make decisions surrounding maternal employment and childcare jointly.

Our study's primary methodological innovation lies in integrating heterogeneity arising from gender role attitudes into a dynamic structural model of female labor supply. This allows us to assess how elasticities and policies differ over gender role attitudes and how estimated mean effects would change if the distribution of attitudes were to change. Notably, our findings indicate that the labor supply of traditional mothers is more responsive to changes in economic incentives than that of egalitarian mothers. Additionally, we explore a counterfactual policy aimed at

facilitating full-time childcare access, often cited as a significant factor hindering the labor supply of progressive mothers. As expected, we find a more pronounced positive labor supply effect for egalitarian mothers.

Our results have important implications for policymakers aiming to increase the participation of mothers in the workforce, a common goal in many developed countries. First, the high importance of attitudes constitutes limitations to how effective policies can be in the short run. Conditional on gender attitudes, changes in economic incentives can alter behavior only to some extent. It, hence, stresses the importance of research on the drivers of gender role attitudes. Second, our results suggest that the effect of policies can depend strongly on gender role attitudes, underscoring the necessity for a diverse array of policies to influence the labor supply of different subgroups of the population effectively. Third, the mediating role of gender role attitudes emphasizes the importance of considering differences in the distribution of gender attitudes when extrapolating estimated average policy effects to different temporal or geographical contexts.

Our findings that gender role attitudes are highly influential for maternal labor supply might also be able to contribute to normative questions around policies aiming to increase female labor supply. On the one hand, if we interpret attitudes as invariable preferences, efforts to equalize the variation in labor choices could potentially lead to a decrease in overall welfare. On the other hand, previous literature shows that gender role attitudes can be influenced by the social environment and public policies (Dhar, Jain, and Jayachandran, 2022; Farre et al., 2023).[20] Our study avoids taking a normative position on these questions and leaves welfare analyses for future research.

While our model captures the key aspects of female labor supply, it simplifies certain elements of the decision context, some of which we are planning to include in later stages of our research agenda. First, a natural extension is to include endogenous fertility decisions. This would allow subjects to adjust the number and the timing of births in response to policy changes. Second, including household separations would constitute an additional motive to accumulate human capital. Third, we currently do not consider the possibility of saving. While intertemporal consumption smoothing is arguably less essential in a country with comprehensive social welfare like Germany, it might still be a relevant margin of adjustment in response to policy changes for households. Other noteworthy decision factors that we leave for future research include paternal labor supply decisions and the interplay of gender role attitudes and occupational choice.

20. This might be especially relevant considering potential externalities associated with maternal reductions in labor supply, for instance, through reduced aggregate economic outcome or statistical discrimination of young women.

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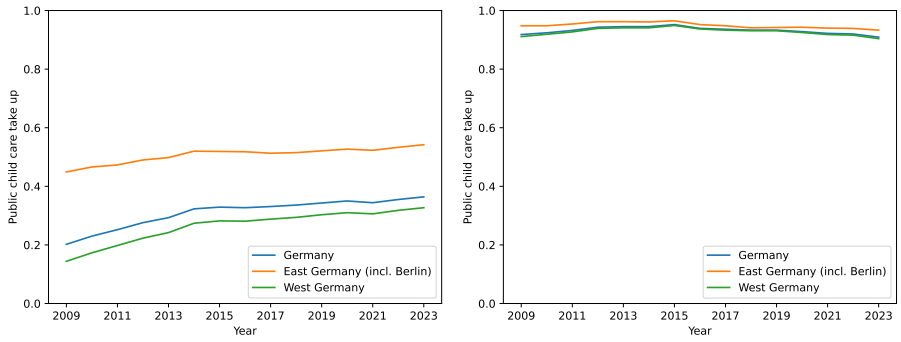
Appendix for online publication

A Additional tables and figures

In this section, we present additional tables and figures.

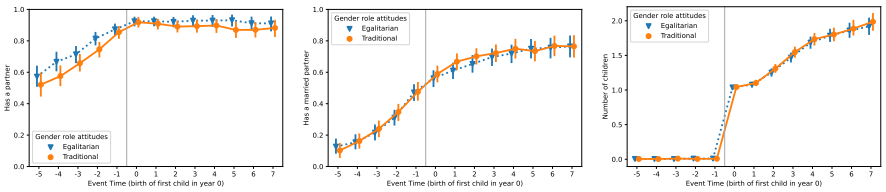
A.1 Additional tables and figures for Section 2



(a) Below the age of three **(b)** Between three and five years old

Figure A.1. Public child care take-up over time in Germany

Notes: The figure depicts the yearly share of children in public child care in Germany, and separately for West and East Germany. The left panel reports the share for children below the age of three, and the right panel reports the share for children between three and five years old. The reference date is March 1. Source: Statistisches Bundesamt: Statistiken der Kinder- und Jugendhilfe. 'Kinder und taetige Personen in Tageseinrichtungen und in oeffentlich gefoerderter Kindertagespflege 2006 bis 2023'.



(a) Has partner **(b)** Has married partner **(c)** Number of children

Figure A.2. Household characteristics around the birth of the first child by gender role attitudes

Notes: The panels depict means of household characteristics over time around childbirth by gender role attitude group (observed before the birth of the first child). The dependent variables are whether the subject lives together with a partner (Figure A.2a), whether the subject lives together with a married partner (Figure A.2b), and the number of children (Figure A.2c). Sample: observed at least twice before and twice after the birth of the first child. The vertical error bars display 95% confidence intervals.

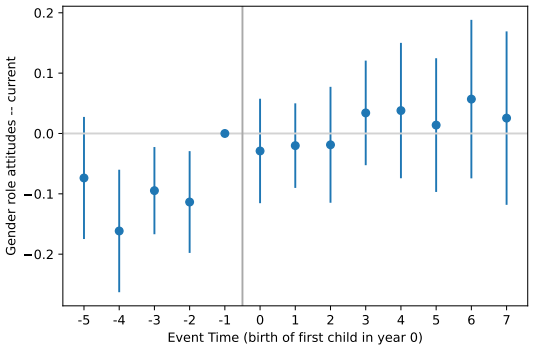
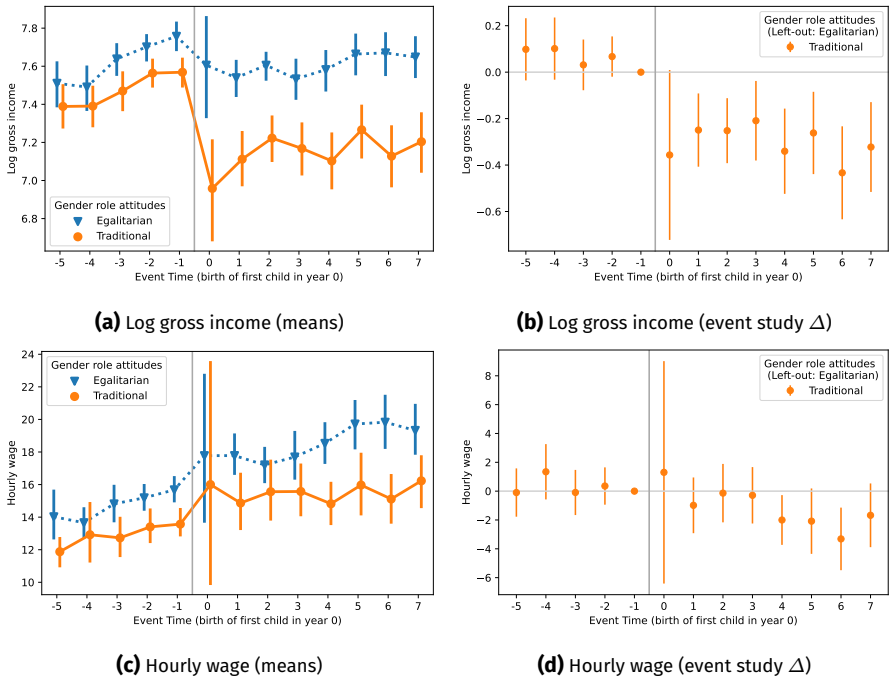


Figure A.3. Gender role attitudes around the birth of the first child

Notes: Event study regressions including age and year fixed effects with current gender role attitudes as the dependent variable. Sample: observed at least twice before and twice after the birth of the first child. The vertical error bars display 95% confidence intervals.

A.2 Additional tables and figures for Section 3



(a) Log gross income (means)

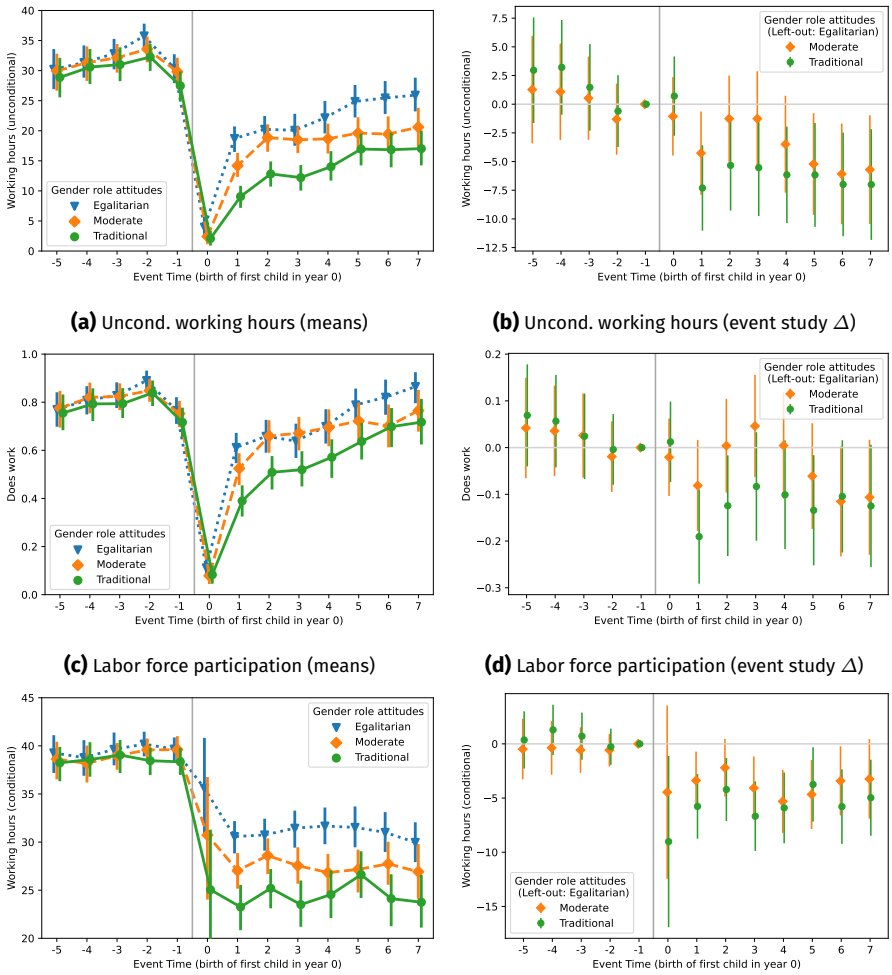
(b) Log gross income (event study Δ)

(c) Hourly wage (means)

(d) Hourly wage (event study Δ)

Figure A.4. Female income around the birth of the first child by gender role attitudes

Notes: The left panels depict means over time around childbirth by gender role attitude group (observed before the birth of the first child). The right panels depict the difference between groups in event study regressions as specified in Equation 1 (i.e. the δ_k coefficients). The dependent variable is log gross income in the top row and hourly wage in the bottom row. Sample: observed at least twice before and twice after the birth of the first child. The vertical error bars display 95% confidence intervals.



(a) Uncond. working hours (means)

(b) Uncond. working hours (event study Δ)

(c) Labor force participation (means)

(d) Labor force participation (event study Δ)

(e) Cond. working hours (means)

(f) Cond. working hours (event study Δ)

Figure A.5. Female labor supply around the birth of the first child by gender role attitudes (three groups)

Notes: The figure replicates Figure 2 for a split into three groups (terciles). Sample: observed in all periods from two periods before to three periods after the birth of the first child. The vertical error bars display 95% confidence intervals.

Table A.1. Event study regressions of unconditional working hours (individual items)

	Gender role attitudes (index)	Women family	Equal housework	Child suffers
	(1)	(2)	(3)	(4)
Traditional	−0.64	0.81	0.98	−3.69***
	(1.26)	(1.27)	(1.27)	(1.31)
Event time = -5	2.54*	2.96*	2.09	2.44*
	(1.42)	(1.54)	(1.37)	(1.27)
Traditional × Event time = -5	1.57	0.75	3.05	1.35
	(1.92)	(1.96)	(1.92)	(1.98)
Event time = -4	3.08**	3.44**	3.88***	2.79**
	(1.27)	(1.40)	(1.22)	(1.10)
Traditional × Event time = -4	2.01	1.19	0.71	2.62
	(1.74)	(1.78)	(1.77)	(1.85)
Event time = -3	3.84***	3.47***	4.38***	3.49***
	(1.12)	(1.27)	(1.04)	(0.97)
Traditional × Event time = -3	1.25	1.72	0.36	1.99
	(1.53)	(1.58)	(1.56)	(1.62)
Event time = -2	5.26***	5.75***	5.61***	4.90***
	(0.96)	(1.09)	(0.85)	(0.84)
Traditional × Event time = -2	0.19	−0.64	−0.48	0.84
	(1.27)	(1.33)	(1.31)	(1.30)
Event time = 0	−27.56***	−26.21***	−26.48***	−29.02***
	(1.00)	(1.15)	(0.94)	(0.91)
Traditional × Event time = 0	0.74	−1.80	−1.95	4.81***
	(1.43)	(1.46)	(1.45)	(1.46)
Event time = 1	−13.37***	−13.07***	−14.95***	−15.14***
	(1.12)	(1.24)	(1.00)	(1.02)
Traditional × Event time = 1	−5.65***	−5.43***	−3.13**	−2.16
	(1.52)	(1.56)	(1.58)	(1.58)
Event time = 2	−10.85***	−11.22***	−12.47***	−11.92***
	(1.19)	(1.31)	(1.09)	(1.09)
Traditional × Event time = 2	−4.40***	−3.33**	−1.80	−2.45
	(1.59)	(1.64)	(1.63)	(1.63)
Event time = 3	−11.26***	−11.04***	−11.90***	−12.91***
	(1.31)	(1.43)	(1.22)	(1.20)
Traditional × Event time = 3	−4.80***	−4.72***	−4.85***	−1.42
	(1.73)	(1.76)	(1.75)	(1.78)
Event time = 4	−9.93***	−10.31***	−10.10***	−11.58***
	(1.37)	(1.51)	(1.26)	(1.28)
Traditional × Event time = 4	−4.94***	−3.88**	−6.25***	−1.55
	(1.75)	(1.81)	(1.79)	(1.81)
Event time = 5	−7.92***	−7.07***	−7.97***	−9.22***
	(1.50)	(1.65)	(1.38)	(1.41)
Traditional × Event time = 5	−4.76**	−5.86***	−6.37***	−2.10
	(1.87)	(1.92)	(1.90)	(1.92)
Event time = 6	−7.44***	−7.03***	−9.00***	−9.25***
	(1.55)	(1.67)	(1.45)	(1.46)
Traditional × Event time = 6	−5.72***	−6.07***	−4.18**	−2.04
	(1.89)	(1.91)	(1.93)	(1.96)
Event time = 7	−6.20***	−6.96***	−8.83***	−7.69***
	(1.63)	(1.78)	(1.61)	(1.56)
Traditional × Event time = 7	−7.04***	−5.30***	−3.40*	−4.05*
	(2.02)	(2.03)	(2.05)	(2.10)
Year FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Observations	7880	7880	7880	7880
Adj. R^2	0.30	0.30	0.30	0.30

Notes: The table depicts the coefficients of event study regressions as specified in Equation 1. The dependent variable is unconditional working hours. In the first column, subjects are classified based on the gender role attitudes index (observed before the birth of the first child). This column is visualized in Figure 2b. In the remaining columns, the classification variables are the individual items. Sample: observed at least twice before and twice after the birth of the first child, all three items observed. Standard errors are clustered at the individual level and reported in parentheses. * $-$ $p < 0.1$, ** $-$ $p < 0.05$, *** $-$ $p < 0.01$

Table A.2. Event study regressions of labor force participation (individual items)

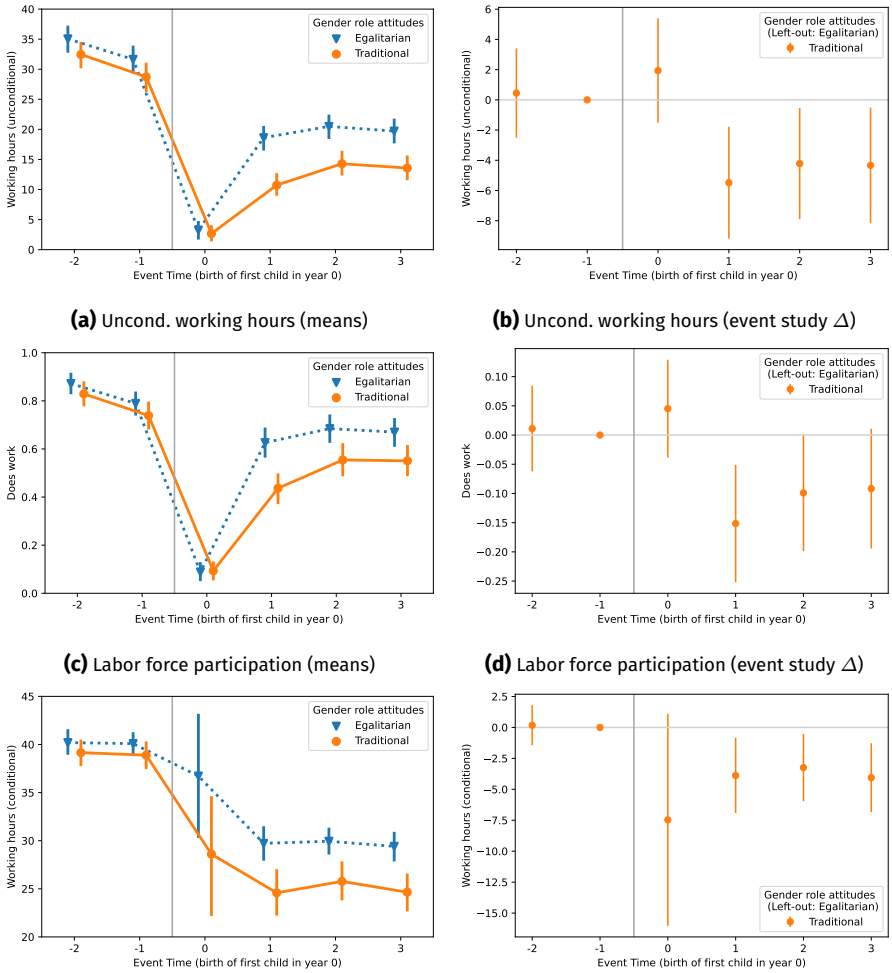
	Gender role attitudes (index)	Women family	Equal housework	Child suffers
	(1)	(2)	(3)	(4)
Traditional	0.00	0.03	0.03	−0.07**
	(0.03)	(0.03)	(0.03)	(0.03)
Event time = -5	0.09***	0.10***	0.08***	0.09***
	(0.03)	(0.04)	(0.03)	(0.03)
Traditional × Event time = -5	0.02	0.00	0.05	0.03
	(0.05)	(0.05)	(0.05)	(0.05)
Event time = -4	0.11***	0.11***	0.13***	0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Traditional × Event time = -4	0.03	0.04	0.00	0.05
	(0.04)	(0.04)	(0.04)	(0.04)
Event time = -3	0.11***	0.10***	0.12***	0.10***
	(0.03)	(0.03)	(0.03)	(0.02)
Traditional × Event time = -3	0.02	0.04	0.00	0.04
	(0.04)	(0.04)	(0.04)	(0.04)
Event time = -2	0.14***	0.14***	0.13***	0.13***
	(0.02)	(0.03)	(0.02)	(0.02)
Traditional × Event time = -2	0.00	0.00	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.03)
Event time = 0	−0.69***	−0.65***	−0.66***	−0.72***
	(0.02)	(0.03)	(0.02)	(0.02)
Traditional × Event time = 0	0.02	−0.05	−0.05	0.12***
	(0.04)	(0.04)	(0.04)	(0.04)
Event time = 1	−0.19***	−0.20***	−0.24***	−0.23***
	(0.03)	(0.03)	(0.03)	(0.03)
Traditional × Event time = 1	−0.15***	−0.12***	−0.06	−0.08*
	(0.04)	(0.04)	(0.04)	(0.04)
Event time = 2	−0.12***	−0.14***	−0.16***	−0.14***
	(0.03)	(0.03)	(0.03)	(0.03)
Traditional × Event time = 2	−0.10**	−0.05	−0.03	−0.06
	(0.04)	(0.04)	(0.04)	(0.04)
Event time = 3	−0.13***	−0.15***	−0.14***	−0.17***
	(0.03)	(0.04)	(0.03)	(0.03)
Traditional × Event time = 3	−0.09**	−0.07	−0.10**	−0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Event time = 4	−0.10***	−0.13***	−0.09***	−0.13***
	(0.04)	(0.04)	(0.03)	(0.03)
Traditional × Event time = 4	−0.10**	−0.04	−0.14***	−0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Event time = 5	−0.04	−0.03	−0.04	−0.07**
	(0.04)	(0.04)	(0.03)	(0.03)
Traditional × Event time = 5	−0.09*	−0.11**	−0.14***	−0.03
	(0.05)	(0.05)	(0.05)	(0.05)
Event time = 6	−0.03	−0.03	−0.06	−0.08**
	(0.04)	(0.04)	(0.04)	(0.04)
Traditional × Event time = 6	−0.10*	−0.09*	−0.06	0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Event time = 7	0.02	0.01	−0.06	−0.01
	(0.04)	(0.05)	(0.04)	(0.04)
Traditional × Event time = 7	−0.12**	−0.10*	0.01	−0.06
	(0.05)	(0.05)	(0.06)	(0.06)
Year FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Observations	7880	7880	7880	7880
Adj. R^2	0.25	0.25	0.25	0.25

Notes: The table depicts the coefficients of event study regressions as specified in Equation 1. The dependent variable is labor force participation. In the first column, subjects are classified based on the gender role attitudes index (observed before the birth of the first child). This column is visualized in Figure 2b. In the remaining columns, the classification variables are the individual items. Sample: observed at least twice before and twice after the birth of the first child, all three items observed. Standard errors are clustered at the individual level and reported in parentheses. * $-$ $p < 0.1$, ** $-$ $p < 0.05$, *** $-$ $p < 0.01$

Table A.3. Event study regressions of conditional working hours (individual items)

	Gender role attitudes (index)	Women family	Equal housework	Child suffers
	(1)	(2)	(3)	(4)
Traditional	−0.78	−0.35	−0.17	−1.21
	(0.71)	(0.71)	(0.71)	(0.77)
Event time = -5	−1.23	−1.18	−1.22	−1.00
	(0.85)	(0.92)	(0.87)	(0.77)
Traditional × Event time = -5	1.02	0.83	1.35	0.37
	(1.12)	(1.15)	(1.12)	(1.15)
Event time = -4	−1.44**	−0.78	−1.11	−1.26*
	(0.73)	(0.83)	(0.72)	(0.67)
Traditional × Event time = -4	1.12	−0.17	0.74	0.73
	(1.00)	(1.04)	(1.01)	(1.03)
Event time = -3	−0.40	−0.27	−0.28	−0.55
	(0.63)	(0.75)	(0.63)	(0.57)
Traditional × Event time = -3	0.51	0.21	0.47	0.91
	(0.89)	(0.93)	(0.89)	(0.95)
Event time = -2	−0.11	0.31	0.49	−0.13
	(0.47)	(0.57)	(0.45)	(0.40)
Traditional × Event time = -2	0.27	−0.50	−1.00	0.32
	(0.66)	(0.69)	(0.66)	(0.73)
Event time = 0	−5.31**	−6.71***	−6.36***	−5.57**
	(2.30)	(2.36)	(2.16)	(2.32)
Traditional × Event time = 0	−5.84*	−2.85	−4.34	−5.33
	(3.41)	(3.47)	(3.62)	(3.40)
Event time = 1	−10.00***	−9.44***	−10.73***	−10.68***
	(0.80)	(0.87)	(0.82)	(0.76)
Traditional × Event time = 1	−3.94***	−4.09***	−2.29*	−2.69**
	(1.21)	(1.18)	(1.23)	(1.33)
Event time = 2	−9.15***	−9.04***	−10.30***	−9.48***
	(0.81)	(0.93)	(0.85)	(0.74)
Traditional × Event time = 2	−3.21***	−2.82**	−1.08	−3.13**
	(1.19)	(1.19)	(1.19)	(1.29)
Event time = 3	−9.20***	−8.62***	−10.15***	−9.65***
	(0.94)	(1.07)	(0.95)	(0.88)
Traditional × Event time = 3	−4.14***	−4.44***	−2.89**	−3.71***
	(1.29)	(1.31)	(1.30)	(1.37)
Event time = 4	−8.85***	−8.33***	−9.63***	−9.35***
	(1.00)	(1.13)	(0.98)	(0.92)
Traditional × Event time = 4	−3.80***	−4.02***	−3.18**	−3.15**
	(1.33)	(1.33)	(1.36)	(1.44)
Event time = 5	−8.34***	−7.94***	−8.87***	−8.63***
	(1.14)	(1.28)	(1.09)	(1.07)
Traditional × Event time = 5	−3.23**	−3.53**	−3.19**	−2.95**
	(1.39)	(1.42)	(1.41)	(1.46)
Event time = 6	−8.45***	−8.10***	−9.52***	−8.45***
	(1.18)	(1.29)	(1.17)	(1.13)
Traditional × Event time = 6	−4.37***	−4.42***	−3.10**	−4.86***
	(1.43)	(1.43)	(1.45)	(1.50)
Event time = 7	−8.54***	−9.27***	−9.25***	−9.03***
	(1.35)	(1.42)	(1.34)	(1.30)
Traditional × Event time = 7	−5.05***	−3.04**	−4.58***	−4.31***
	(1.53)	(1.55)	(1.55)	(1.59)
Year FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Observations	5103	5103	5103	5103
Adj. R^2	0.24	0.24	0.23	0.24

Notes: The table depicts the coefficients of event study regressions as specified in Equation 1. The dependent variable is conditional working hours. In the first column, subjects are classified based on the gender role attitudes index (observed before the birth of the first child). This column is visualized in Figure 2b. In the remaining columns, the classification variables are the individual items. Sample: observed at least twice before and twice after the birth of the first child, all three items observed. Standard errors are clustered at the individual level and reported in parentheses. * $-$ $p < 0.1$, ** $-$ $p < 0.05$, *** $-$ $p < 0.01$



(a) Uncond. working hours (means)

(b) Uncond. working hours (event study Δ)

(c) Labor force participation (means)

(d) Labor force participation (event study Δ)

(e) Cond. working hours (means)

(f) Cond. working hours (event study Δ)

Figure A.6. Female labor supply around the birth of the first child by gender role attitudes (balanced panel)

Notes: The figure replicates Figure 2 for a balanced panel. Sample: observed in all periods from two periods before to three periods after the birth of the first child. The vertical error bars display 95% confidence intervals.

Table A.4. Event study regressions of working hours (robustness)

	Main specification	West Germany	Pre-2020	Full sample including controls
	(1)	(2)	(3)	(4)
Traditional	−0.64	−0.37	−0.70	−0.18
	(1.26)	(1.51)	(1.44)	(1.28)
Event time = -5	2.54*	2.83*	4.19**	2.44*
	(1.42)	(1.70)	(1.75)	(1.47)
Traditional × Event time = -5	1.57	1.28	−0.59	1.62
	(1.92)	(2.25)	(2.29)	(1.95)
Event time = -4	3.08**	4.12***	3.62**	2.92**
	(1.27)	(1.56)	(1.53)	(1.32)
Traditional × Event time = -4	2.01	0.68	1.18	1.95
	(1.74)	(2.09)	(2.04)	(1.77)
Event time = -3	3.84***	4.24***	3.37**	3.67***
	(1.12)	(1.35)	(1.36)	(1.16)
Traditional × Event time = -3	1.25	0.18	1.08	1.25
	(1.53)	(1.80)	(1.78)	(1.56)
Event time = -2	5.26***	5.60***	5.19***	5.29***
	(0.96)	(1.19)	(1.13)	(0.99)
Traditional × Event time = -2	0.19	−0.42	−0.27	0.26
	(1.27)	(1.50)	(1.43)	(1.31)
Event time = 0	−27.56***	−28.00***	−27.44***	−27.58***
	(1.00)	(1.20)	(1.20)	(1.03)
Traditional × Event time = 0	0.74	−0.26	0.76	0.69
	(1.43)	(1.67)	(1.65)	(1.46)
Event time = 1	−13.37***	−15.89***	−12.69***	−13.49***
	(1.12)	(1.32)	(1.33)	(1.14)
Traditional × Event time = 1	−5.65***	−6.16***	−6.81***	−5.53***
	(1.52)	(1.72)	(1.74)	(1.54)
Event time = 2	−10.85***	−13.88***	−10.39***	−11.02***
	(1.19)	(1.54)	(1.42)	(1.21)
Traditional × Event time = 2	−4.40***	−4.99***	−5.41***	−4.15**
	(1.59)	(1.90)	(1.80)	(1.61)
Event time = 3	−11.26***	−13.60***	−12.22***	−10.94***
	(1.31)	(1.69)	(1.59)	(1.34)
Traditional × Event time = 3	−4.80***	−5.76***	−4.30**	−5.08***
	(1.73)	(2.09)	(1.97)	(1.75)
Event time = 4	−9.93***	−12.62***	−10.60***	−10.05***
	(1.37)	(1.71)	(1.78)	(1.41)
Traditional × Event time = 4	−4.94***	−5.10**	−4.68**	−4.85***
	(1.75)	(2.10)	(2.07)	(1.77)
Event time = 5	−7.92***	−10.14***	−9.09***	−8.02***
	(1.50)	(1.88)	(2.01)	(1.54)
Traditional × Event time = 5	−4.76**	−5.16**	−4.64**	−4.92***
	(1.87)	(2.23)	(2.32)	(1.89)
Event time = 6	−7.44***	−10.55***	−7.80***	−7.86***
	(1.55)	(1.99)	(2.09)	(1.58)
Traditional × Event time = 6	−5.72***	−5.97***	−7.05***	−5.58***
	(1.89)	(2.25)	(2.33)	(1.90)
Event time = 7	−6.20***	−9.74***	−8.83***	−6.38***
	(1.63)	(2.13)	(2.44)	(1.67)
Traditional × Event time = 7	−7.04***	−6.01**	−5.22*	−6.51***
	(2.02)	(2.41)	(2.88)	(2.05)
Education: tertiary				0.35
				(0.67)
Any migration background				−1.88**
				(0.89)
Municipality ≥ 100k inhabitants				−0.23
				(0.83)
Religious affiliation				−1.12
				(0.77)
Has a partner				−1.31
				(0.93)
Year FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
State FE	No	No	No	Yes
Observations	7880	5402	5743	7585
Adj. R^2	0.30	0.36	0.31	0.31

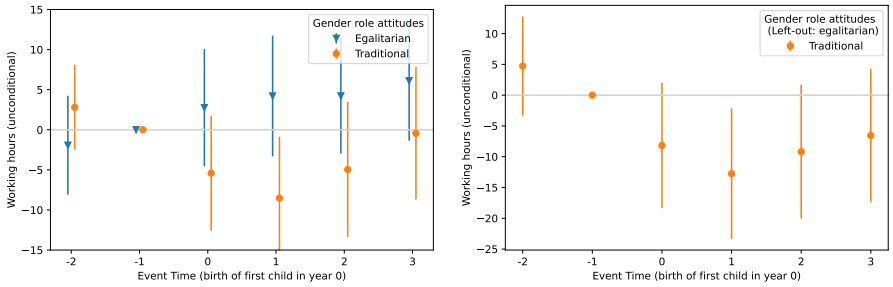
Notes: The table depicts the coefficients of event study regressions as specified in Equation 1. The dependent variable is unconditional working hours. In the first three columns the samples are restricted on subjects living in West Germany and observations before 2020, respectively. In the last column, additional control variables are added. Sample: observed at least twice before and twice after the birth of the first child. Standard errors are clustered at the individual level and reported in parentheses.
$^*-p<0.1, ^{**}-p<0.05, ^{***}-p<0.01$

Table A.5. Event study regressions (three groups)

	Working hours (unconditional)	Does work	Working hours (conditional)
Moderate	0.18	0.01	−0.10
	(1.49)	(0.03)	(0.84)
Traditional	−1.57	−0.01	−1.37
	(1.56)	(0.04)	(0.86)
Event time = -5	1.92	0.07*	−0.70
	(1.75)	(0.04)	(1.03)
Moderate × Event time = -5	1.27	0.04	−0.49
	(2.39)	(0.05)	(1.42)
Traditional × Event time = -5	2.96	0.07	0.36
	(2.35)	(0.06)	(1.35)
Event time = -4	2.67*	0.10***	−1.20
	(1.49)	(0.03)	(0.89)
Moderate × Event time = -4	1.09	0.04	−0.37
	(2.14)	(0.05)	(1.27)
Traditional × Event time = -4	3.21	0.06	1.29
	(2.11)	(0.05)	(1.18)
Event time = -3	3.79***	0.10***	−0.19
	(1.35)	(0.03)	(0.76)
Moderate × Event time = -3	0.53	0.03	−0.57
	(1.85)	(0.05)	(1.07)
Traditional × Event time = -3	1.47	0.02	0.71
	(1.92)	(0.05)	(1.11)
Event time = -2	5.97***	0.15***	0.27
	(1.19)	(0.03)	(0.58)
Moderate × Event time = -2	−1.31	−0.02	−0.58
	(1.58)	(0.04)	(0.77)
Traditional × Event time = -2	−0.60	0.00	−0.26
	(1.60)	(0.04)	(0.85)
Event time = 0	−27.06***	−0.67***	−4.15
	(1.25)	(0.03)	(2.53)
Moderate × Event time = 0	−1.06	−0.02	−4.46
	(1.74)	(0.04)	(4.08)
Traditional × Event time = 0	0.71	0.01	−9.02**
	(1.76)	(0.04)	(4.03)
Event time = 1	−12.35***	−0.17***	−9.07***
	(1.35)	(0.03)	(0.91)
Moderate × Event time = 1	−4.27**	−0.08	−3.38**
	(1.85)	(0.05)	(1.36)
Traditional × Event time = 1	−7.31***	−0.19***	−5.77***
	(1.90)	(0.05)	(1.52)
Event time = 2	−10.85***	−0.13***	−8.67***
	(1.45)	(0.04)	(0.97)
Moderate × Event time = 2	−1.27	0.00	−2.21
	(1.92)	(0.05)	(1.36)
Traditional × Event time = 2	−5.34***	−0.12**	−4.21***
	(2.01)	(0.05)	(1.48)
Event time = 3	−11.37***	−0.17***	−7.66***
	(1.59)	(0.04)	(1.14)
Moderate × Event time = 3	−1.26	0.05	−4.07***
	(2.11)	(0.06)	(1.48)
Traditional × Event time = 3	−5.53**	−0.08	−6.67***
	(2.15)	(0.06)	(1.64)
Event time = 4	−9.16***	−0.11***	−7.02***
	(1.62)	(0.04)	(1.14)
Moderate × Event time = 4	−3.49	0.00	−5.31***
	(2.16)	(0.06)	(1.48)
Traditional × Event time = 4	−6.16***	−0.10*	−5.91***
	(2.14)	(0.06)	(1.67)
Event time = 5	−6.52***	−0.03	−7.19***
	(1.74)	(0.04)	(1.31)
Moderate × Event time = 5	−5.22**	−0.06	−4.67***
	(2.26)	(0.06)	(1.62)
Traditional × Event time = 5	−6.16***	−0.13**	−3.74**
	(2.31)	(0.06)	(1.75)
Event time = 6	−5.97***	0.00	−7.60***
	(1.74)	(0.04)	(1.29)
Moderate × Event time = 6	−6.08***	−0.12*	−3.42**
	(2.24)	(0.06)	(1.63)
Traditional × Event time = 6	−6.99***	−0.10*	−5.79***
	(2.31)	(0.06)	(1.75)
Event time = 7	−5.54***	0.03	−8.32***
	(1.83)	(0.05)	(1.40)
Moderate × Event time = 7	−5.71**	−0.11*	−3.24*
	(2.42)	(0.06)	(1.87)
Traditional × Event time = 7	−7.00***	−0.12*	−4.97***
	(2.46)	(0.07)	(1.79)
Year FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Observations	7880	7880	5103
Adj. R^2	0.31	0.26	0.25

Notes: The table depicts the coefficients of event study regressions as specified in Equation 1 for a split into three groups (terciles). Standard errors are clustered at the individual level and reported in parentheses.
$* - p < 0.1, ** - p < 0.05, *** - p < 0.01$

A.3 Additional tables and figures for Section 4



(a) Egalitarian and traditional mothers

(b) Δ egalitarian and traditional mothers

Figure A.7. Difference in female (unconditional) working hours by cash-for-care eligibility by gender role attitudes around the birth of the first child

Notes: The figure replicates Figure 3 for a balanced panel. Sample: observed in all periods from two periods before to three periods after the birth of the first child. The vertical error bars display 95% confidence intervals.

Table A.6. Event study regressions of working hours by gender role attitudes and cash-for-care policy (robustness)

	Main specification	West Germany	No cash-for-care states	Full sample including controls
	(1)	(2)	(3)	(4)
Egalitarian × cash-for-care × Event time = -3	0.14	8.97*	−3.82	−2.12
	(3.78)	(4.84)	(4.67)	(3.85)
Egalitarian × cash-for-care × Event time = -2	−1.79	1.54	−2.05	−3.18
	(2.86)	(3.27)	(3.59)	(2.81)
Egalitarian × cash-for-care × Event time = 0	1.60	1.81	0.47	−0.20
	(3.25)	(4.06)	(4.28)	(3.34)
Egalitarian × cash-for-care × Event time = 1	4.41	7.71*	4.79	2.92
	(3.35)	(4.14)	(4.31)	(3.46)
Egalitarian × cash-for-care × Event time = 2	3.28	5.09	3.53	2.40
	(3.38)	(4.75)	(4.44)	(3.43)
Egalitarian × cash-for-care × Event time = 3	5.08	7.68	3.30	4.23
	(3.60)	(5.44)	(4.23)	(3.68)
Egalitarian × cash-for-care × Event time = 4	2.62	5.48	2.69	0.64
	(3.82)	(5.26)	(4.86)	(3.83)
Egalitarian × cash-for-care × Event time = 5	2.03	6.54	1.90	−0.10
	(3.99)	(5.52)	(5.05)	(4.02)
Traditional × cash-for-care × Event time = -3	1.74	−0.69	−2.82	2.78
	(3.18)	(3.22)	(3.73)	(3.11)
Traditional × cash-for-care × Event time = -2	2.73	0.96	−1.03	3.70
	(2.49)	(2.29)	(3.12)	(2.49)
Traditional × cash-for-care × Event time = 0	−4.90	−7.24**	−8.24**	−4.24
	(3.15)	(3.42)	(4.03)	(3.20)
Traditional × cash-for-care × Event time = 1	−7.84**	−9.96***	−12.38***	−8.33***
	(3.35)	(3.34)	(3.64)	(3.23)
Traditional × cash-for-care × Event time = 2	−4.58	−8.79**	−9.79**	−4.56
	(3.70)	(3.71)	(4.12)	(3.67)
Traditional × cash-for-care × Event time = 3	−1.78	−5.76	−7.53*	−1.63
	(3.71)	(3.94)	(4.41)	(3.69)
Traditional × cash-for-care × Event time = 4	−1.35	−4.99	−9.27**	−1.50
	(3.56)	(3.89)	(4.23)	(3.55)
Traditional × cash-for-care × Event time = 5	2.33	−0.20	−5.24	1.62
	(3.71)	(4.10)	(4.58)	(3.75)
Egalitarian × Event time = -3	1.76	−4.31	1.56	2.53
	(3.26)	(3.99)	(4.00)	(3.28)
Egalitarian × Event time = -2	4.26**	1.52	3.79	4.45**
	(2.05)	(2.44)	(2.49)	(2.14)
Egalitarian × Event time = 0	−27.39***	−28.56***	−26.11***	−26.74***
	(2.41)	(2.98)	(3.32)	(2.52)
Egalitarian × Event time = 1	−13.10***	−19.84***	−11.51***	−12.18***
	(2.60)	(2.89)	(3.53)	(2.69)
Egalitarian × Event time = 2	−11.62***	−18.01***	−12.10***	−11.49***
	(2.46)	(3.19)	(3.25)	(2.50)
Egalitarian × Event time = 3	−13.90***	−17.94***	−11.37***	−13.45***
	(2.76)	(3.76)	(3.36)	(2.80)
Egalitarian × Event time = 4	−10.84***	−16.67***	−10.39***	−9.84***
	(3.08)	(3.97)	(4.00)	(3.10)
Egalitarian × Event time = 5	−9.26***	−14.87***	−10.52***	−8.25***
	(3.02)	(3.78)	(3.80)	(3.07)
Traditional × Event time = -3	2.48	1.94	−0.55	1.49
	(2.48)	(2.64)	(3.00)	(2.47)
Traditional × Event time = -2	2.34	1.47	1.75	1.84
	(1.52)	(1.51)	(2.17)	(1.64)
Traditional × Event time = 0	−24.88***	−27.53***	−21.47***	−25.47***
	(2.31)	(2.73)	(2.89)	(2.40)
Traditional × Event time = 1	−16.98***	−21.87***	−14.70***	−17.21***
	(2.25)	(2.60)	(2.59)	(2.34)
Traditional × Event time = 2	−14.74***	−19.41***	−13.87***	−15.13***
	(2.42)	(2.81)	(2.78)	(2.51)
Traditional × Event time = 3	−15.33***	−20.14***	−11.89***	−15.83***
	(2.56)	(2.98)	(3.14)	(2.66)
Traditional × Event time = 4	−14.68***	−18.94***	−10.23***	−14.87***
	(2.34)	(2.80)	(2.96)	(2.43)
Traditional × Event time = 5	−15.62***	−19.72***	−10.22***	−16.21***
	(2.49)	(2.87)	(3.18)	(2.57)
Egalitarian × cash-for-care	−2.34	−4.38	−0.39	−0.83
	(2.62)	(3.53)	(3.28)	(2.64)
Traditional × cash-for-care	3.66	5.38*	8.57**	3.06
	(2.71)	(2.95)	(3.51)	(2.74)
Egalitarian	25.62***	29.28***	31.61***	26.99***
	(1.98)	(2.54)	(2.53)	(2.35)
Traditional	22.93***	25.64***	24.73***	26.10***
	(1.81)	(2.12)	(2.53)	(2.02)
Education: tertiary				0.57
				(1.14)
Any migration background				−3.12*
				(1.66)
Municipality ≥ 100k inhabitants				−1.11
				(1.29)
Religious affiliation				−1.32
				(1.25)
Has a partner				−3.65**
				(1.54)
Age FE	Yes	Yes	Yes	Yes
State FE	No	No	No	Yes
Observations	2727	1651	1703	2626
Adj. R^2	0.28	0.36	0.25	0.30

Notes: The table depicts the coefficients of event study regressions as specified in Equation 2. The treatment group consists of all children born in a two year window after the cut-off date and control group consists of all children born in a two year window before the cut-off date. The dependent variable is unconditional working hours. In the first column, our main specification as depicted in Figure 3 is shown. In columns 2 to 3 the samples are restricted on subjects living in West Germany and subjects not living in a state with a cash-for-care policy (Saxonia, Thuringia, or Bavaria), respectively. In the last column, additional control variables are added. Sample: observed at least twice before and twice after the birth of the first child, not living in Baden-Württemberg. Standard errors are clustered at the individual level and reported in parentheses. * $-$ $p < 0.1$, ** $-$ $p < 0.05$, *** $-$ $p < 0.01$

A.4 Additional tables and figures for Section 6

Table A.7. Estimated parameters

Parameter	Attitude type	Estimate	Lower bound	Upper bound
k_ϵ	–	0.48571	0	–
γ_0	–	2.02605	0	–
γ_1	–	0.07518	0	–
μ_{PT}	–	-0.00380	–	0
μ_{FT}	–	-0.00943	–	0
α^A_{PT}	Egalitarian	0.00021	0	–
α^A_{PT}	Traditional	0.02157	0	–
α^A_{FT}	Egalitarian	0.05098	0	–
α^A_{FT}	Traditional	0.10825	0	–
α^A_{age}	Egalitarian	0.01125	0	–
α^A_{age}	Traditional	0.00770	0	–

Notes: Estimated parameters. The last two columns depict the lower and upper bound we implemented for the estimation.

B Attitudes and labor supply of the fathers

In this section, we look in more detail at the role of paternal gender attitudes on maternal labor supply and on labor supply decisions of fathers around the birth of their first child.

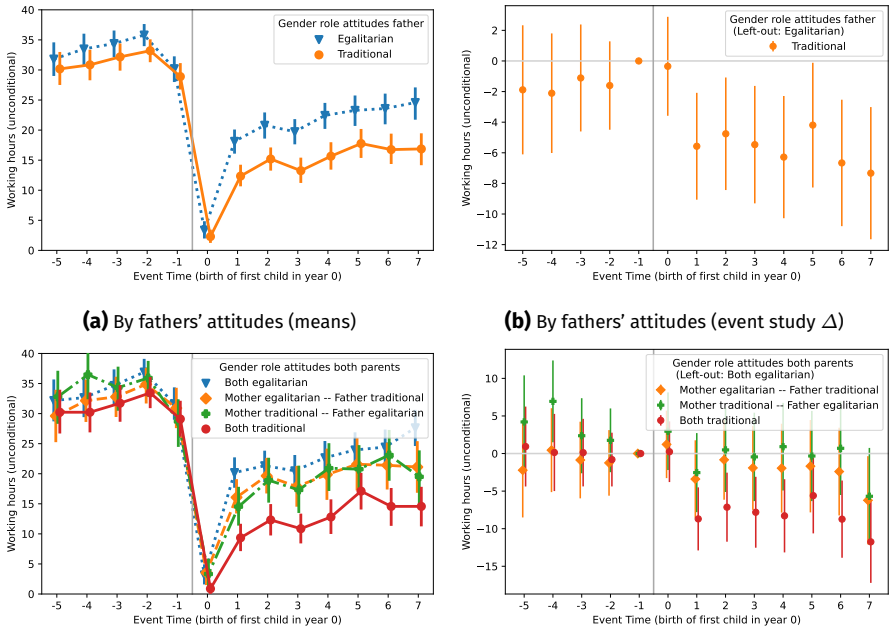
B.1 Gender role attitudes of the fathers

In the top row of Figure B.1, we examine female labor supply depending on the gender role attitudes of their partner. The attitude groups of the fathers are based on a median split for all fathers such that for both mothers and fathers roughly 50% of the subjects are classified as traditional and egalitarian.[21] For brevity, we focus on unconditional working hours, although the results are very similar when looking at the extensive or intensive margin. The figure reveals that before the birth, working hours hardly differ, but afterwards mothers with a traditional partner work more than five hours less than those with an egalitarian partner.

We next show that gender attitudes of mothers and fathers both contribute to maternal labor supply. We interact the attitude groups of mothers and fathers which

21. When using the same splitting value as for mothers' attitudes, 58% of fathers would be classified as traditional, in line with the fact that men hold more traditional attitudes (as documented in Table 1).

leads to four groups where in 33% of couples, both parents hold egalitarian gender attitudes and in 29% both hold traditional attitudes. In 21% of the couples, the father holds traditional and the mother egalitarian attitudes, while in 17% of the couples, the father holds egalitarian and the mother traditional attitudes. The bottom row of Figure B.1 displays the labor supply differences between those groups around the birth of the first child with couples in which both parents hold egalitarian attitudes as the left-out group. If only one of the parents has traditional gender attitudes, maternal working hours are only slightly below those of all-egalitarian couples. Only if both parents have traditional gender attitudes, is female labor supply after the birth of the first child substantially and significantly lower.



(a) By fathers' attitudes (means)

(b) By fathers' attitudes (event study Δ)

(c) By own and fathers' attitudes (means)

(d) By own and fathers' attitudes (event study Δ)

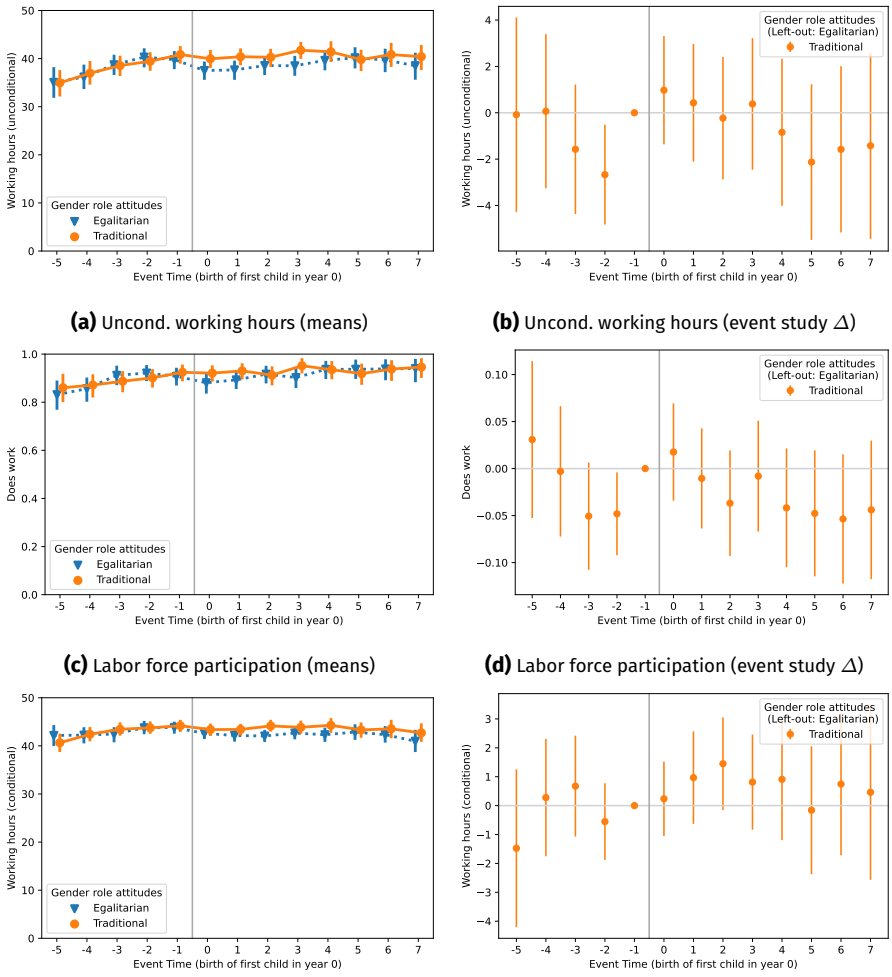
Figure B.1. Female (unconditional) working hours by fathers' gender role attitudes

Notes: The left panels depict means over time around childbirth by gender role attitude group (observed before the birth of the first child). The right panels depict the difference between groups in event study regressions as specified in Equation 1 (i.e. the δ_k coefficients). The dependent variable is unconditional working hours. In the top row, the sample is split by gender role attitudes of the partner, and in the bottom row, by both their own and the father's attitudes which results in four groups: in 33% of couples, both parents hold egalitarian gender attitudes and in 29% both hold traditional attitudes. In 21% of the couples, the father holds traditional and the mother egalitarian attitudes, while in 17% of the couples, the father holds egalitarian and the mother traditional attitudes. Sample: observed at least twice before and twice after the birth of the first child. The vertical error bars display 95% confidence intervals.

B.2 Labor supply of the fathers

In this section, we examine the relation of gender role attitudes and paternal labor supply decisions. We first split the sample based on gender attitudes of their (female) partner, and then examine differences based on their own gender attitudes.

Figure B.2 replicates Figure 2 for labor supply of the fathers. The groups are built based on gender role attitudes of their (female) partners. Figure B.3 employs splits by their own gender role attitudes. In both cases, we do not detect a difference in the paternal labor supply adjustment after childbirth by gender role attitudes.



(a) Uncond. working hours (means)

(b) Uncond. working hours (event study Δ)

(c) Labor force participation (means)

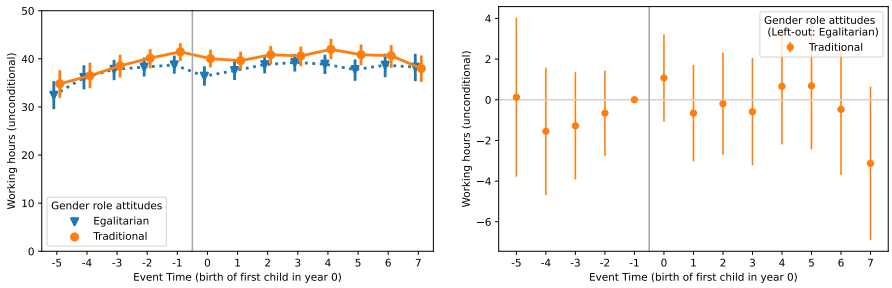
(d) Labor force participation (event study Δ)

(e) Cond. working hours (means)

(f) Cond. working hours (event study Δ)

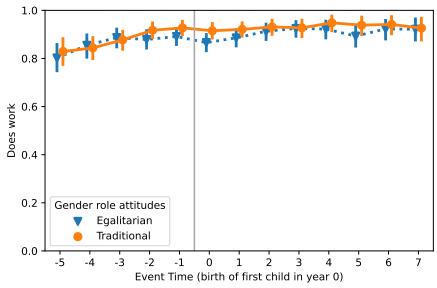
Figure B.2. Male labor supply around the birth of the first child by gender role attitudes of their partner

Notes: This figure replicates Figure 2 for labor supply of the fathers. The groups are built based on gender role attitudes of their (female) partners. Sample: observed at least twice before and twice after the birth of the first child.

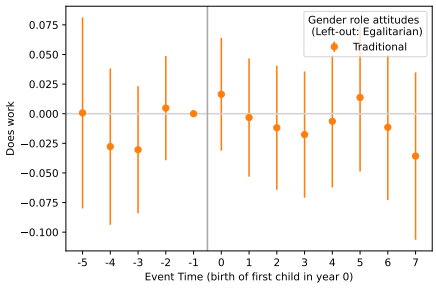


(a) Uncond. working hours (means)

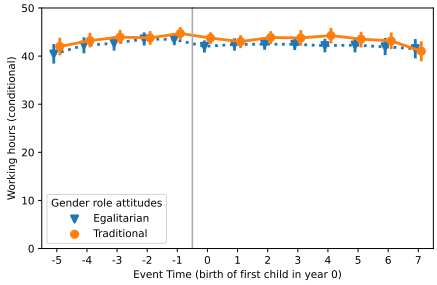
(b) Uncond. working hours (event study Δ)



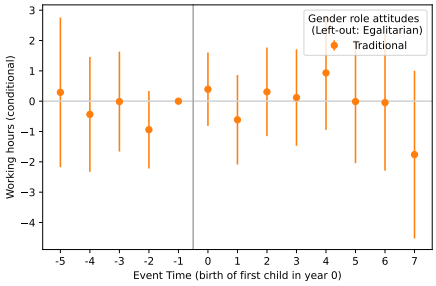
(c) Labor force participation (means)



(d) Labor force participation (event study Δ)



(e) Cond. working hours (means)



(f) Cond. working hours (event study Δ)

Figure B.3. Male labor supply around the birth of the first child by own gender role attitudes

Notes: This figure replicates Figure 2 for labor supply of the fathers. The groups are built based on their own gender role attitudes. Sample: observed at least twice before and twice after the birth of the first child.

C Components of the structural model

This section describes several components of the structural model and the empirical implementation of it in more detail.

C.1 Tax and transfer system

We implement the German tax and transfer system as of 2018. We use the GETTSIM package[22], which provides a detailed representation of taxes, social security contributions, several welfare transfers, as well as child-related transfers. We do not model unemployment benefits to avoid keeping track of the labor supply of the last period.

Taxes. The tax system adopts income splitting for married couples, which implies that each partner is taxed as if they earned half of the combined income. Due to the progressive nature of the tax rates, this arrangement provides substantial tax advantages to married couples that are increasing with the income gap and lead to high marginal tax rates for the lower-earning spouse. The tax rates are between 14 and 45%. We assume that all couples are married to avoid modeling the decision to marry.

Social security contributions. Social security contributions in Germany include health, long-term care, pension, and unemployment insurance. The employer and the employee pay all contributions at equal rates. The average contribution rates for an employee are 7.3% for health insurance, 1.275% for long-term care insurance, 9.3% for pension insurance, and 1.5% for unemployment insurance. No social security contributions and taxes are paid for monthly income below 450 EUR.

Welfare transfers. We model the three most relevant welfare transfers in Germany. While social assistance (Arbeitslosengeld II) is paid to households with no or very little income, households who have income but not enough to cover all necessary expenses receive housing allowance (Wohngeld) and, in case they have children, child allowance (Kinderzuschlag). The benefits depend on the households' income and assets, the number of household members and children, and the housing costs.

Parental leave. Paid parental leave is available for up to fourteen months, where each parent can claim at most 12 months. The replacement rate is 67% of the parent's decline in net income, but at least 300 EUR and at most 1,800 EUR per month. We assume that the mother takes up parental leave benefits during the twelve months after childbirth and the father does not take up any parental leave benefits. To calculate the benefit, we further assume that the mother worked full-time the year before childbirth.

22. See https://gettsim.readthedocs.io/en/stable/.

Child benefits. Child benefits are paid for each child up to the age of 17 (we abstract from the fact that children can get child benefits until 25 if they are still in education). In 2018, they amounted to 194 EUR for the first and second child and 200 EUR for the third child.

To save computation time, we pre-compute the tax and transfer system for a grid of gross income values of both partners, number of children, age of the youngest child, and human capital. We then estimate the relation of these variables to disposable household income using a flexible OLS regression, including interactions and quadratic terms. During the estimation of the model, we use these coefficients to predict disposable household income.

C.2 Initial conditions

During the estimation of the model and for counterfactual analyses, we simulate lifetime trajectories for $N_{sim} = 10.000$ subjects. The initial state variables for these subjects are drawn from the *estimation sample*, as described in Section 2, at age 24. In particular, we use information on observed gender role attitudes, the number of children, and the age of the youngest child. Furthermore, we use observed hourly wages, which we transform to initial human capital using the estimated human capital function. If the hourly wage is unobserved at age 24, we also wage information prior to or past that age. We use survey weights as provided by pairfam to draw the simulation sample. As weights vary over survey waves on the individual level, we use the mean of the weights over all observations.

C.3 Childcare costs

We follow Geyer, Haan, and Wrohlich (2015) and set monthly childcare costs for a child younger than three years to 219 EUR for part-time care and 381 EUR for full-time care. For a child aged between three and six years, part-time childcare costs 122 EUR and full-time childcare 128 EUR.

We assume that if the youngest child is younger than three years old and the household has more than one child, the second youngest child is between three and six years old.

C.4 Partner income

Following van der Klaauw (1996) and several other studies, we model the wage of the partner w_t^m as a quadratic function of the age of the woman to reduce the state space.

$$\log w_t^m = \chi_0 + \chi_1 \text{age}_t + \chi_2 \text{age}_t^2 \tag{13}$$

We estimate the (χ_0, χ_1, χ_2) parameters separately for egalitarian and traditional mothers. When the partner is older than 45, we hold his income fixed at the level of a 45-year-old partner.

C.5 Fertility

We estimate fertility as a quadratic function of the woman's age if the mother has no child. If she already has a child, the probability of having another child is a quadratic function of both her age and the age of the youngest child. Fertility drops to zero if the mother has three children or if she reaches age 45.

D Numerical implementation details

This section describes the numerical implementation of the solution and simulation of the structural model and its estimation in more detail. The solution and estimation is done using the software package LCM (2023), while the estimation uses the package estimagic (Gabler (2022)) in combination with the optimizer **tranquiloSoftwarePackageOptimizer2023**.

D.1 Solution

We solve the model over $t = 1, \ldots, 42$ periods. The recursive formulation of the model is given by

$$V_t(S_t) \;=\; \max_{l_t} \{U(C_t, l_t, o_t; A) + \beta \mathbb{E}[V_{t+1}(S_{t+1})]\}\,.$$

In the last period, the second term vanishes, which allows us to solve the model via backward induction. Since the model only contains discrete stochastic variables, the expectation can be replaced by a weighted sum

$$\mathbb{E}[V_{t+1}(S_{t+1})] \;=\; \sum_{s_{t+1}} \mathbb{P}[S_{t+1} \;=\; s_{t+1}] \cdot V_{t+1}(s_{t+1}).$$

We discretize the continuous variables in the model and compute the value function on all possible combinations of the discretized (and initially discrete) state variables. If we require to evaluate the value function on a point that is not in the grid, we use linear interpolation.

The continuous variable human capital is approximated by a grid of 250 uniformly spaced points between 0 and 21.

D.2 Simulation

We simulate labor supply decisions for $N_{sim} = 10.000$ subjects. Each simulated individual is endowed with an initial state S_0. In Section C.2, we describe how the initial states are computed from the data. Given the model solution, we can compute the optimal labor supply decision in state S_t for each time period t. After choosing the labor supply, the state variables are updated according to the stochastic transition equations, and we continue. The optimal decision is computed using forward iteration of the recursive formulation. Given the initial state S_0, we compute the optimal decision l_0^* as

$$l_0^* = \underset{l_0}{\operatorname{argmax}} \{U(C_0, l_0, o_0; A) + \beta \mathbb{E}[V_1(S_1)]\},$$

where V_1 is taken from the solution step above. Note that this approach assumes that the agent does not know how their state variables evolve when making the decision.

D.3 Estimation

For the estimation we utilize the package estimagic (Gabler (2022)), which allows us to easily apply bounds on the parameters during the method of simulated moments estimation. The minimization of the criterion function is done using the state-of-the-art non-linear least-squares optimizer **tranquiloSoftwarePackageOptimizer2023**. We perform a multistart optimization with 15 local optimizations that start near the initial parameter values.