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Parental Preferences and the Motherhood Penalty*

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Abstract

The motherhood penalty is a major source of gender inequality, yet it varies substantially across women. We exploit the random gender of the firstborn in Finnish register data to study how parental preferences for family time interact with occupational constraints to generate this heterogeneity. We document a consistent preference for daughters across education groups, reflected in fertility behavior and maternal leave duration. Despite similar preferences, long-run labor market consequences differ sharply by maternal education. Ten years after birth, university-educated mothers experience a 10% larger earnings penalty when their first child is a son, whereas less educated mothers incur a 5% larger penalty when the first child is a daughter. These differences are consistent with lower employment among non-tertiary-educated women and with job sorting into more family-friendly positions among tertiary-educated women following the birth of a firstborn daughter. Our findings show that parental preferences, mediated by education-specific labor market opportunities, generate substantial heterogeneity in the motherhood penalty.

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1 Introduction

A large empirical literature documents substantial and persistent earnings losses for women following childbirth (Angelov et al., 2016; Goldin, 2014, 2023; Kleven et al., 2019b). This motherhood penalty is a central source of gender inequality in modern labor markets, with important consequences not only for individual welfare but also for aggregate productivity and the allocation of talent in the economy (Goldin et al., 2022; Hsieh et al., 2019; Kleven et al., 2023). A prominent set of explanations emphasizes reductions in labor supply, employer discrimination, gender norms, and institutional constraints as key drivers of these patterns (Adda et al., 2017; Andresen and Nix, 2022; Boelmann et al., 2021; Correll et al., 2007; Goldin, 2014; Kleven et al., 2019b, 2021; Kleven, 2022; Olivetti and Petrongolo, 2016). Importantly, the magnitude of the motherhood penalty varies markedly across women. It is particularly large among highly educated women, especially in professions such as law, finance, and business, where rigid work schedules and steep career ladders make employment interruptions especially costly (Azmat and Ferrer, 2017; Bertrand et al., 2010; Bütikofer et al., 2018; Costa Dias et al., 2020; Kuziemko et al., 2018; Noonan et al., 2005; Olivetti et al., 2024). While these mechanisms account for important features of women's post-childbirth outcomes, they largely abstract from the role of parental preferences and from how such preferences interact with the structure of jobs.

This paper we shows that parental preferences for family time, mediated by education-specific labor market opportunities, play a central role in shaping the motherhood penalty.[1] We use population-wide register data from Finland covering all first births between 2000 and 2009, and follow men's and women's earnings and labor market participation from five years before to ten years after the birth of their first child. Exploiting exogenous variation in the gender of the firstborn, we show that similar parental preferences translate into markedly different long-run earnings trajectories across women with different educational backgrounds. We further identify the mechanisms underlying this heterogeneity in the motherhood penalty by maternal education.

The economic literature has robustly established that parents often exhibit preferences for a specific child gender, which manifest as systematic differences in intra-household behavior and labor market outcomes (Bertrand and Pan, 2013; Dustmann and Landersø, 2021; Lundberg, 2005; Lundberg et al., 2007; Mammen, 2011; Raley and Bianchi, 2006).[2]

[1] Throughout the paper, we use the term *preferences* as a shorthand, acknowledging that it may reflect a combination of intrinsic preferences, social norms, and cultural expectations regarding involvement in family time.

[2] Dahl and Moretti (2008) document a "demand for sons" in the United States, reflected in higher fertility following the birth of daughters. Lundberg and Rose (2002) show that fathers increase their labor supply and earnings in response to having sons. Jayachandran and Kuziemko (2011) find that in India, parents shorten breastfeeding duration for girls to hasten the birth of a potential son. Even grandparents exhibit gender preferences: Duflo (2003) provides evidence that allocating pension income to grandmothers significantly improves the health of granddaughters.

We argue that these gender preferences shape the trade-offs parents face between work and family. Specifically, to the extent that parents derive differential utility from investing time or resources into a child based on their gender (whether rooted in social norms or the belief that they are better equipped to raise a child of their own sex) these preferences will systematically alter the perceived trade-offs between professional and domestic life. Consequently, we exploit the exogenous variation of firstborn gender as a proxy for parents' underlying willingness to adjust their labor-market behavior in response to childcare demands.

This paper first provides evidence that parents exhibit a preference for daughters. We follow Angrist and Evans (1998) and Dahl and Moretti (2008) and explore the fertility choices subsequent to the first children. The randomness of the gender of the firstborn child (which is also substantiated in our data) makes this event orthogonal to other parental and job characteristics, such as age at first birth and job-specific earnings trajectories. A firstborn son increases the probability of having a second child by 0.79 ppt (1.3% relative to the mean). Among families with two children, having two sons raises the probability of a third birth by 14 ppt (77% relative to the mean). This is true for both mothers with and without a university degree. The robustness of this finding is documented by the implementation of a novel strategy to assess the preference for a daughter or a son: the length of parental leave taken. This method allows us to observe mothers' and fathers' revealed choices separately, and to do so at very early ages, when differences between girls and boys are not yet pronounced and parental inputs remain limited. We observe that mothers, both with graduate degree and not, spend an average of 7 days less in parental leave if the firstborn is a male in the period when children are aged between nine months to three years old. We do not find any evidence of differential leave taken for a specific gender for fathers. After evaluating several alternative hypotheses, we interpret the observed patterns in fertility and parental leave as consistent with parental preferences for daughters relative to sons.

To study the motherhood penalty, an event-study design that follows the earnings trajectories of women and men from five years before to ten years after the birth of their first child, and compares them to those of individuals who have not yet become parents, is implemented (Kleven et al., 2019b). This framework is estimated separately by maternal education, distinguishing between families in which the mother has a university degree and those in which she does not, so that comparisons are made among women with the same education level and among men partnered with women of the same education level. This approach is further extended by distinguishing parents based on the gender of their firstborn child. By combining variation in maternal education with the randomness of firstborn gender, concerns related to the endogeneity of fertility timing and earnings profiles are mitigated (Bensnes et al., 2023; Kleven et al., 2019b; Melentyeva and Riedel, 2023). We find that the impact of firstborn gender differs sharply across education groups.

Among university-educated women, having a firstborn son leads to a larger long-run child penalty than having a daughter, whereas the opposite pattern holds for women without tertiary education. Ten years after birth, university-educated mothers experience a 10% larger earnings penalty when their first child is a son, while less educated mothers incur a 5% larger penalty when the first child is a daughter. The son earnings penalty among university-educated women emerges within two years after birth and remains stable and statistically significant throughout the ten-year horizon.

The mechanisms underlying these patterns suggest that preferences related to child gender interact with education-specific labor market opportunities to shape women's post-birth career trajectories. Among women without a university degree, labor market attachment is relatively weak even before childbirth, and the gender of the firstborn appears to operate primarily through the extensive margin: mothers of daughters are more likely to remain out of employment. In this group, the daughter earnings penalty therefore largely reflects differences in labor force participation. In contrast, among university-educated women, employment prior to childbirth is nearly universal and labor market attachment remains strong afterward, so that post-birth adjustments occur mainly within employment. We show that, at the transition to motherhood, women across all education groups become more likely to move into family-friendly jobs, as reflected in increased public-sector employment. However, among university-educated women, there is a pronounced gradient by firstborn gender: ten years after birth, having a firstborn daughter doubles the probability of working in the public sector. Because public-sector jobs carry a substantial wage premium for mothers (around 26% when accounting for selection using rich worker, firm, time, age, region, and firm fixed effects) this sorting mechanism helps explain the smaller motherhood earnings penalty observed when the firstborn is a daughter. Overall, these findings highlight how education-specific job characteristics mediate the relationship between parental preferences and the motherhood penalty.

The contributions of this paper are as follows. First, this paper shifts the focus in the study of the motherhood penalty toward the role of parental preferences for family time. The existing literature emphasizes institutional and cultural factors in the workplace and in society as key determinants of the motherhood penalty and its heterogeneity across women (Adda et al., 2017; Andresen and Nix, 2022; Azmat and Ferrer, 2017; Bertrand et al., 2010; Bütikofer et al., 2018; Cardoso et al., 2016; Cortes and Pan, 2018; Felfe, 2012a,b; Goldin, 2014; Goldin and Katz, 2016; Hotz et al., 2018; Noonan et al., 2005; Olivetti and Petrongolo, 2016). While there is evidence that preferences and expectations over time allocation change following childbirth, their role in shaping the motherhood penalty remains relatively understudied (Kuziemko et al., 2018). This paper uses preferences for child gender as a proxy for parental preferences over time allocation within the household. We show that similar preferences can lead to markedly different labor market outcomes depending on education-specific labor market institutions and career structures.

In particular, we document that a stronger preference for family time following the birth of a daughter is present among both university- and non-university-educated mothers, yet it translates into distinct adjustment margins across these groups. These findings highlight that shifts in parental preferences are an important and previously underexplored determinant of the motherhood penalty, and help explain its heterogeneity across women. More broadly, they point to a rich and policy-relevant dimension, suggesting that future research should further examine how preferences interact with labor market environments to influence post-birth career trajectories of parents and the resulting motherhood penalty.

The second contribution is methodological. This paper demonstrates how idiosyncratic shocks can be used to study the determinants of the motherhood penalty while addressing common identification challenges, such as the endogeneity of fertility timing (Adams et al., 2024; Kleven et al., 2019b). We implement a novel strategy that exploits the gender of the firstborn as an exogenous shock capturing shifts in parental preferences toward family time, and examine how these shifts affect mothers' labor market outcomes. This paper is among the first to use firstborn gender to study the motherhood penalty, with only one other paper, to our knowledge, applying a similar approach in a different context (Bhalotra et al., 2025). Because firstborn gender is as good as random, and because we stratify the analysis by maternal education, our approach avoids relying on assumptions about the exogeneity of the timing of first birth with respect to parental age and earnings trajectories (Bensnes et al., 2023; Melentyeva and Riedel, 2023). Identification instead comes from comparing otherwise similar parents within education groups whose first child is a son or a daughter.

The third contribution is the introduction of a novel proxy for parental gender preferences based on the duration of parental leave. The timing of return to work after childbirth has been widely used as an indicator of gender norms within the household (Aldén et al., 2023; Boelmann et al., 2021; Duvander, 2014; Haandrikman et al., 2021; Sundberg, 2024). In contrast, existing studies on gender preferences typically rely on later-life outcomes, such as subsequent fertility, parental well-being, or behavior (e.g., Angrist and Evans, 1998; Dahl and Moretti, 2008; Dustmann and Landersø, 2021), which capture preferences only after gender-specific traits have begun to emerge. This paper instead focuses on parental leave duration as an early-life measure of preferences. While fertility decisions are joint and do not easily reveal parent-specific preferences (Doepke and Kindermann, 2019), leave-taking allows us to separately observe maternal and paternal responses to the gender of the firstborn. We show that leave duration aligns with subsequent fertility behavior, and argue that it provides a clean and promising proxy for parental preferences, capturing responses before gender-differentiated investments and behaviors become entrenched.

The paper is organized as follows. Section 2 reviews the related literature on child gender preferences. Section 3 describes the institutional setting, and Section 4 presents

the data. Section 5 outlines the empirical framework. Section 6 presents the main results, and Section 7 explores the underlying mechanisms. Section 8 concludes.

2 Child Gender Preferences

A large literature documents systematic parental preferences over the gender of children. In many developing countries son preference manifests in unequal investments in child health: boys tend to experience better health outcomes than girls, reflecting higher levels of nutrition, vaccination, and medical care (Barcellos et al., 2014; Borooah, 2004; Ganatra and Hirve, 1994; Gupta, 1987; Pande, 2003; Jayachandran and Kuziemko, 2011). Sen (1992) argues that systematic gender bias in relative care has led to over 100 million premature female deaths globally.

A complementary strand of research studies differences in parental time allocation and parenting behavior by child gender. Fathers are consistently found to spend more time with sons than with daughters, particularly in interactive, engaged, or recreational activities (Lundberg, 2005; Raley and Bianchi, 2006; Mammen, 2011). Evidence from time-use surveys in the United States and other high-income countries further shows that fathers are more involved, more likely to reside with their children, and devote more developmental time when the child is a boy (Harris and Morgan, 1991; Lundberg et al., 2007; Yeung et al., 2001). Experimental and quasi-experimental studies similarly document gendered parenting investments, with boys receiving relatively more paternal time in cognitively stimulating activities, especially during early childhood (Bertrand and Pan, 2013; Baker and Milligan, 2016).

Taken together, these findings point to a robust and persistent "same-sex" pattern in parental involvement: especially fathers, respond more positively to sons. Related evidence also documents differences in parental happiness and well-being by children's gender, with patterns consistent with stronger paternal responses to sons. Kohler et al. (2005) find higher happiness among fathers following the birth of a firstborn son relative to a daughter in Denmark. In the United States, fathers generally show no differences in well-being when spending time with sons versus daughters, except among Asian fathers, who report significantly lower stress with sons (Song and Gao, 2023). Other studies interpret reductions in fathers' criminal behavior following the birth of a son as evidence of paternal preferences for sons (Dasgupta et al., 2022; Dustmann and Landersø, 2021). Arnaboldi et al. (2024) show that parents' portfolio choices are also affected by the gender of the firstborn child. Overall, this body of evidence suggests that parental investments and caregiving responsibilities tend to increase when parents and children share the same gender (Baker and Milligan, 2016; Bertrand and Pan, 2013; Lundberg, 2005; Mammen, 2011; Raley and Bianchi, 2006).

A common empirical approach in economics identifies parental preferences for sons or

daughters through fertility behavior, examining how the likelihood of having additional children varies with the gender of the first (or last) child or with the gender composition of existing children. Findings vary across countries and periods. Using the gender of the firstborn child, Dahl and Moretti (2008) document a preference for sons in the United States prior to 2000, while Blau et al. (2020) show a reversal of this pattern in favor of daughters after 2000. Similarly, Ichino et al. (2014) find evidence of a preference for daughters in the United Kingdom, Italy, and Sweden, where parents are more likely to have additional children following the birth of a firstborn son.

Building on the existing literature, we interpret preferences for child gender as capturing differences in parents' relative valuation of family time versus market work. In Appendix Appendix B, we outline a simple theoretical model that illustrates how child gender can shift the work–family trade-off faced by parents. In our framework, the gender of the firstborn child acts as a shifter of the work–family trade-off, insofar as parents may be more willing to allocate time and effort toward family activities when the child is of their preferred gender. Importantly, such preferences should be understood broadly. They may reflect intrinsic tastes for sons or daughters, but also gendered social norms, culturally mediated expectations about parenting roles, or shifts in within-household allocations of childcare responsibilities that are triggered by the child's gender. We do not attempt to disentangle these underlying mechanisms. Instead, we exploit the random assignment of child gender to examine how shifts in the relative valuation of family versus market activities translate into parental labor-market decisions. This approach is consistent with prior studies that exploit the gender of children as a plausibly exogenous shock to CEOs' preferences and individuals' political attitudes, allowing for the identification of causal effects across a range of contexts (Oswald and Powdthavee, 2010; Ronchi and Smith, 2026; Washington, 2008).

3 Institutional Setting

Fertility and Gender Gap in the Labor Market

Despite its reputation as a wealthy and gender-egalitarian country, Finland is not an exception to global trends. Like many other high-income nations, it has experienced a sustained decline in fertility rates and continues to exhibit significant gender gaps in the labor market. The total fertility rate has been falling steadily, reaching 1.26 in 2023, according to Statistics Finland, which is particularly concerning in the context of rapid population aging, and fertility is higher among highly educated women (Virtanen et al., 2024).

Although overall tertiary education attainment in Finland fell below the OECD average in 2023, women continue to outperform men in terms of educational attainment. Yet,

these achievements do not translate into equal labor market outcomes. Finland's average gender pay gap stood at 16% in 2021, placing it 38th among OECD countries in terms of pay equality.[3] The gender wage gap is approximately 18%, a figure comparable to that of the United States (Paukkeri et al., 2024). Interestingly, Finland exhibits the highest average motherhood penalty among Nordic countries, with an employment loss of 43%, significantly higher than in Denmark (14%), Sweden (9%), and Norway (3%).[4]

Parental Leave System

The parental leave system during the 2000s, the period studied in this paper, operated as follows.[5] Parents can take up to three years of parental leave with job protection. Maternity leave lasts four months and starts, at the latest, one month before the expected due date. This is followed by six months of shared parental leave, which parents can divide between them, although in practice most of this leave is taken by mothers. Parental leave benefits replace approximately 70% of prior earnings (increasing to up to 90% after 2007), with replacement rates declining at higher income levels. After the parental leave period, that is, when the child is around nine months old, parents become eligible for the Home Care Allowance (HCA). This benefit provides a flat-rate payment, which can be supplemented by municipal top-ups (Kosonen, 2014). The HCA is available until the child turns three, but eligibility ceases if the child is enrolled in public or private daycare.

4 Data and Descriptive Statistics

We use administrative registry data from Statistics Finland covering the entire Finnish population over the period 1987–2019. These data include detailed individual-level information on demographic and socioeconomic characteristics, such as age, education, nationality, language, earnings, and employment status. To observe parents' labor market outcomes from five years before to ten years after birth across different cohorts, we construct from these data a sample of first-time mothers who gave birth between 2000 and 2009 and for whom the father can be identified. We exclude single mothers and same-gender couples, which together account for less than 5% of all births in the period. To analyze parental leave behavior, we use administrative records from the Finnish Social Insurance Institution (Kela), which provide detailed information on all leave spells taken by both parents, including start and end dates and the type of leave. This dataset is based on a random sample of the population, covering approximately 60% of births between 2000 and 2009, and is linked to the Statistics Finland registers. Overall, our main

[3] `https://data-explorer.oecd.org/`

[4] `https://childpenaltyatlas.org/`

[5] Carnicelli (2024) provides a detailed description of the reforms in the 2000s and a history of family leave policies in Finland.

register data include 585 thousand births in Finland over the 2000–2009 period, of which 346 thousand are observed in the Kela data used for the parental leave analysis.

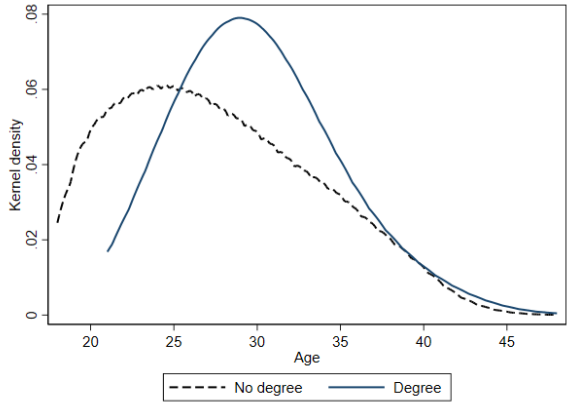
Given the focus of the paper on different groups of parents by their education, we focus the description of the data on several statistics that are relevant with respect to this dimension. University-educated parents are defined as those who achieved at least an undergraduate university degree one year before giving birth. In our sample, 29.9% of mothers hold a university degree, compared to 22.3% of fathers. There is some homogamy in terms of education. While 61.5% of parents have no degree, the share of couples where both have a degree is 13.7%, where the father has a degree and the mother has not is 8.6%, and where the mother has a degree and the father has not is 16.2%. During the period observed, only 12% of mothers and 8% of fathers obtained an undergraduate degree after becoming parents. These percentages are small and do not undermine our classification of parents' education at the time of birth. Consistent with this, we show that replicating the analyses excluding individuals who change their education status after becoming parents yields to unchanged findings, and that the gender of the firstborn is orthogonal to parents changing education qualification after the birth of the first child (see the robustness checks performed in Section 6.2).

Table A1 reports summary statistics for mothers and fathers, for the full sample and separately by individuals' highest educational qualification measured one year prior to the birth of their first child. Parents with a university degree exhibit substantially higher employment rates in the year before the first birth: 90% for mothers and 94% for fathers compared to 69% and 80%, respectively, among those without a degree. Public sector employment is also more prevalent among university-educated individuals. Our main outcome for estimating the child penalty is earnings, which include both labor income and entrepreneurial income. On average, men and women without tertiary education earn 52% and 57%, respectively, of the earnings of their counterparts with a university degree. A similar degree premium is observed for the other income measures reported in the table.

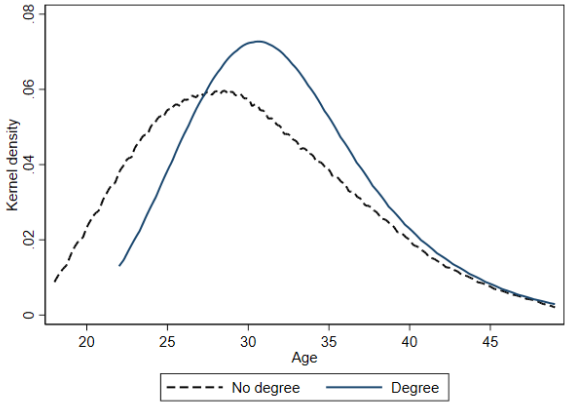
One important characteristic in which mothers with and without tertiary education differ is the age at first birth; higher-educated women have their first child at, on average, age 30, almost 3 years older than women without tertiary education. In Figure 1a and Figure 1b, the density of age at first birth is plotted for mothers and fathers by education level. The age differences in first birth by education level are very relevant to take into account when investigating the child penalty. This is especially important when combined with the fact that parents with different levels of education have different age-earning profiles, so that age at first birth is likely to be systematically related to earnings potential (Adams et al., 2024; Adda et al., 2017; Bütikofer et al., 2018). Indeed, Figure 1c Figure 1d show that in our sample of parents, the earnings trajectories of men and women with a university degree are much steeper than those of men and women without a university

Figure 1: Age at First Birth and Earning Trajectories by Education

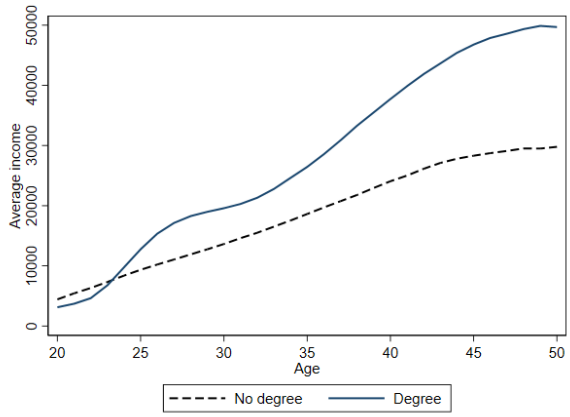
(a) Age: Mothers



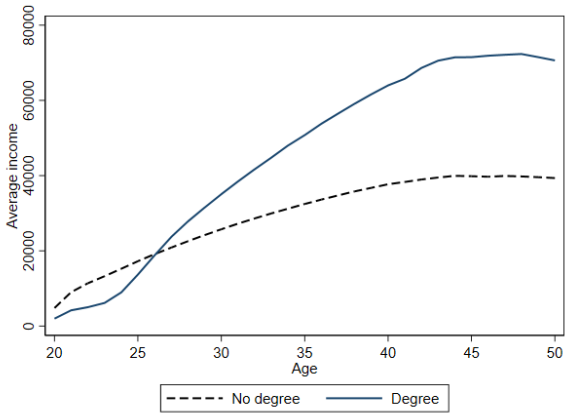
(b) Age: Fathers



(c) Earnings: Mothers



(d) Earnings: Fathers



Note: Panels (a) and (b) display the kernel density of age at first birth for mothers and fathers, by education level. Panels (c) and (d) show average earnings by age for mothers and fathers, separately by education level.

degree. Analyzing these two groups of parents (with and without a university degree) separately is relevant for investigating how a similar shock, such as the gender of the firstborn child, differently impacts women's and men's trajectories within groups, without confounding other effects such as age of birth and earnings trajectories.

5 Empirical Strategy

5.1 Estimation of Preferences for Child Gender

To assess whether parents respond differently to the birth of a son versus a daughter, we adopt two complementary revealed-preference approaches that exploit the random assignment of child gender at birth. First, we follow a well-established identification strategy in the economics literature that uses the random sex of the firstborn (or, in alternative specifications, of the first two children) to infer parental preferences for sons versus daughters through fertility responses (Angrist and Evans, 1998; Dahl and Moretti, 2008). Second, we introduce a novel approach that uses the duration of parental leave taken by mothers and fathers following the birth of the first child. While fertility responses capture preferences at the extensive margin of childbearing, parental leave choices reflect preferences at the intensive margin of time investment, allowing us to characterize child-gender preferences along two distinct but related dimensions of parental behavior.

Fertility Responses

We begin by examining fertility responses to the gender of the firstborn child. Specifically, we estimate the following equation:

$$y_i = \beta \text{Son}_i + \Gamma X_i + \varepsilon_i, \tag{1}$$

where y_i denotes a fertility outcome, Son_i is an indicator equal to one if the firstborn child is male (or, in an alternative specification, if the first two children are male), and X_i is a vector of parental characteristics, including education, mother tongue (Finnish or Swedish), employment status, age, region, and year of birth. Depending on the specification, y_i is either an indicator for whether the mother has an additional child or a continuous measure capturing completed fertility (total number of children). The coefficient β captures the differential fertility response to having a firstborn son relative to a daughter. The key identifying assumption underlying this interpretation is that the gender of the firstborn child is random, something we provide evidence in the first part of Section 6.

Parental Leave Responses

A growing literature shows that the length and timing of parents' return to work after childbirth are closely linked to traditional gender norms and within-household specialization (Aldén et al., 2023; Boelmann et al., 2021; Duvander, 2014; Haandrikman et al., 2021; Sundberg, 2024). Consistent with this interpretation, we view parental leave choices as reflecting how households translate preferences (shaped by norms, expectations, and intra-household bargaining) into time allocations at the onset of parenthood.

Parental leave decisions are typically made when children are very young, at a stage when systematic differences in the development of sons and daughters are still limited.[6] As a result, the length and timing of parents' return to work are less likely to reflect reactions to realized gender differences in children's skills or behavior, and instead capture parents' willingness to allocate time toward family relative to market work. Relative to other measures of child-gender preferences, parental leave choices are therefore plausibly less confounded by child-specific developmental trajectories and allow us to separately identify responses of mothers and fathers.

In the empirical analysis, we estimate the same specification as in Equation 1, defining y_i as the number of days of parental leave taken by the mother or the father following the birth of the firstborn child.

5.2 Estimation of the Motherhood Penalty

To estimate the motherhood penalty and examine how it varies by maternal education and the gender of the firstborn child, we adopt the event-study framework of Kleven et al. (2019b). We compare the earnings trajectories of mothers and fathers around the birth of their first child to those of individuals who have not yet become parents over the same period. Relative to the standard child-penalty analysis, we additionally disaggregate estimates by the gender of the firstborn child.

Our baseline specification is the following event-study model:

$$Y_{ist}^{pc} = \sum_{j \neq -1} \alpha_j^{pc} \cdot \mathbb{1}(t = j) + \sum_k \beta_k^{pc} \cdot \mathbb{1}(age_{is} = k) + \sum_y \gamma_y^{pc} \cdot \mathbb{1}(year = y) + \varepsilon_{ist}^{pc}, \qquad (2)$$

where Y_{ist}^{pc} denotes the outcome of interest (e.g., annual earnings) for individual i, of parent gender p and firstborn child gender c, in calendar year s, and event time t, defined relative to the birth of the first child. The specification includes age and calendar-year fixed effects to account for lifecycle earnings profiles and aggregate shocks. The omitted event time is $j = -1$, the year immediately preceding childbirth, so that each coefficient

[6] See Baker and Milligan (2016) for a review of biological and psychosocial determinants of gender differences in child development and the role of parental investment.

α_j^{pc} captures deviations from the pre-birth baseline. Following Kleven et al. (2019b), we express these estimates in percentage terms by normalizing them by the predicted counterfactual outcome absent childbirth:

$$P_t^{pc} = \frac{\alpha_j^{pc}}{\mathbb{E}\left[\tilde{Y}_{ist}^{pc} \mid t = j\right]} \tag{3}$$

Event-study designs rely on strong identifying assumptions, notably that childbirth timing is unrelated to unobserved determinants of earnings and that, absent childbirth, treated and control individuals would have followed parallel trends (Adams et al., 2024; Bensnes et al., 2023; Kleven et al., 2019b; Melentyeva and Riedel, 2023). These assumptions may be violated if fertility timing is systematically related to career stage or earnings growth. This is particularly relevant for education, as shown and discussed in Section 4. More educated women tend to delay childbirth and experience steeper earnings growth prior to parenthood (Goldin et al., 2022; Herr, 2015; James and Vujić, 2019). Adams et al. (2024) show that highly educated women often have children shortly after completing education, when earnings growth is rapid. In addition, fertility timing and spacing differ by education, affecting exposure to career interruptions and post-birth penalties. To address these concerns, we extend the standard event-study framework in two ways.

First, we stratify the analysis by maternal education, estimating Equation (2) separately by education group. Specifically, we estimate event-study profiles separately for two groups defined by maternal education: women with and without a university degree the year before birth, and, correspondingly, men partnered (at the time of the first birth) with women with and without a university degree. This stratification mitigates concerns about identification arising from endogenous childbirth timing by accounting for systematic differences in fertility timing, earnings potential, and labor market attachment *across* education groups (Adams et al., 2024; Goldin, 2014; Angelov et al., 2016). [7]

Second, we exploit quasi-experimental variation in firstborn gender. A large literature shows that firstborn gender is as-good-as-random with respect to parental characteristics (e.g. Dahl and Moretti, 2008; Lundborg et al., 2017), something we also provide evidence in our data in Section 6. Comparing mothers of sons and daughters differences out selection related to fertility timing and career stage, even *within* the same education group. If post-birth earnings trajectories diverge by child gender while pre-birth trends are parallel, this supports a causal interpretation based on differential post-birth responses rather than selection.

Taken together, these two approaches weaken the identifying assumptions required for causal inference. We require childbirth timing to be conditionally exogenous within edu-

[7] This approach has an additional advantage: it better captures within-household dynamics. While assortative mating by education is strong, some heterogeneity remains (as shown in Section 4). By classifying individuals based on the mother's education, we account for this residual variation and obtain more comparable estimates of the child penalty for men and women.

cation groups and assume that, absent childbirth, parents of firstborn sons and daughters would have followed similar earnings trajectories within those groups. Given the randomness of child gender, this assumption is relatively weak and directly testable through pre-trend analysis. Thus, by combining stratification by maternal education with variation in firstborn gender, our framework addresses key concerns in the recent literature regarding endogeneity of fertility timing and unobserved heterogeneity in event-study estimates of the child penalty. This allows for a more causally credible assessment of parental preferences, shifted by the randomness of firstborn gender, in the motherhood penalty across maternal education groups.

6 Results

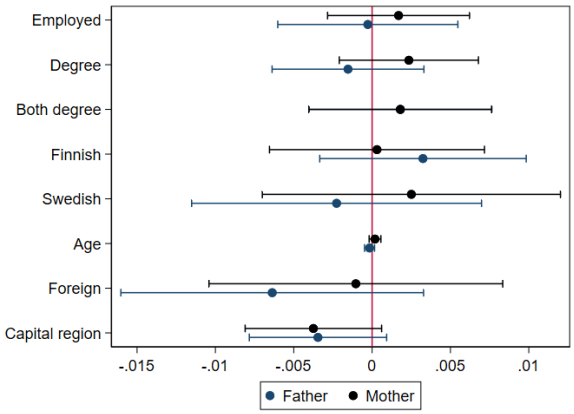
6.1 Evidence on Child Gender Preferences

Exogeneity of Firstborn Gender

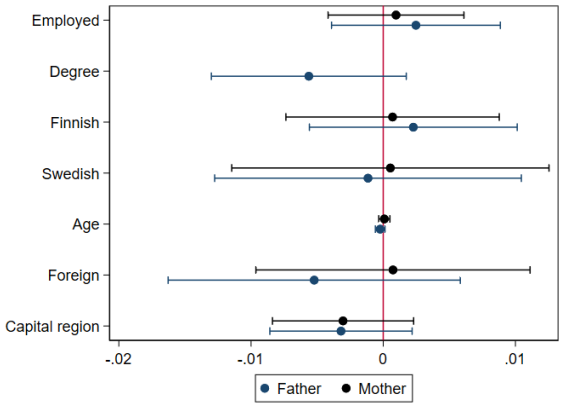
To investigate the impact of parental preferences on post-birth labor market outcomes, we exploit the gender of the firstborn child as a source of variation, as it can shift parents' preferences over work–life balance. For this strategy to be valid, the gender of the firstborn must be exogenous to pre-birth parental characteristics that could independently influence post-birth labor market trajectories. We provide evidence supporting this assumption in Figure 2. The figure shows no systematic relationship between parental characteristics and the probability that the firstborn child is male. Estimated coefficients are small and statistically insignificant across all specifications, both in the full sample and within maternal education groups. This suggests that the sex of the firstborn is effectively random with respect to observed parental traits. Additionally, when estimating multivariate regressions including all variables reported in Figure 2, both for the full sample and for subsamples by parental education, the F-statistics (reported in Table A2) are not statistically significant. The absence of selection on observables also makes selection on unobservables unlikely, supporting the validity of treating firstborn gender as an exogenous source of variation (Altonji and Mansfield, 2018).

Figure 2: Firstborn Gender and Parental Characteristics

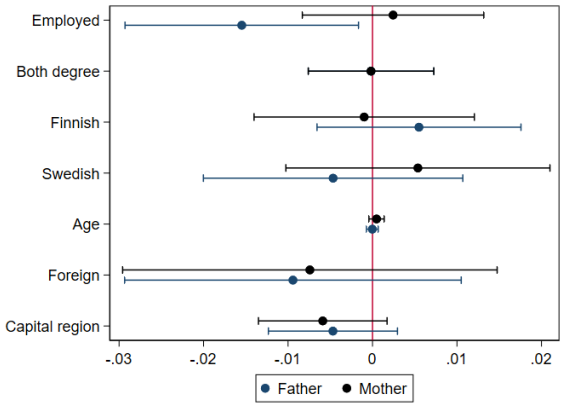
(a) All



(b) Mothers without degree



(c) Mothers with degree



Note: The figure reports estimates of the association between parental characteristics and the probability that the firstborn child is male. Each coefficient is obtained from a separate regression. Panels show results for the full sample (a), mothers without a university degree (b), and mothers with a university degree (c). Horizontal bars represent 95% confidence intervals.

Fertility Responses

Panel A of Table 1 presents estimates of the effect of the firstborn's gender on subsequent fertility. We find that having a male firstborn increases the probability of having a second child by 0.79 ppt (1.30% relative to the mean). If both first and second children are male, the probability of having a third child rises by 13.9 ppt (77% relative to the mean). Overall, women with a firstborn son exhibit a 0.78 ppt higher, although not statistically significant, total fertility compared to those with a firstborn daughter. There is no statistically significant difference in birth spacing between the first and second child based on the gender of the firstborn.[8] Panel B of Table 1 shows that fertility behavior does not differ significantly by maternal education level, except in the likelihood of having a third child when the first two children are male. University-educated women are 3.5 ppt less likely to have a third child under this condition compared to women without a degree. Nonetheless, the probability of having a third child in this group remains positive (11.7 ppt) and statistically significant at 1% level.

The fertility findings indicate a preference for daughters, consistent with existing evidence. Andersson et al. (2006), by looking at third-born gender, show that pre-2000, Finland was an outlier in terms of preferring sons compared to the other Nordic countries (Denmark, Norway, and Sweden). Riukula (2024) shows that while in the 1960s-1980s there was a preference for sons in Finland, in the 1990s a neutral environment and in the 2000s and 2010s a slight preference for daughters emerged.

[8] Adams et al. (2024) show that in Denmark birth spacing differs by mothers' education levels and can partly explain why highly educated women, despite later entry into motherhood, experience large immediate earnings penalties.

Table 1: Firstborn Gender and Subsequent Fertility

Panel A	2 or more kids	Third child	Total fertility	Spacing (days)
Son	0.0079**		0.0078	-0.7534
	(0.0033)		(0.0060)	(5.9982)
Two sons		0.1389***		
		(0.0042)		
Average	0.61	0.18	1.85	1047.15
N	72708	71168	72708	38939
Panel B				
Son	0.0072*		0.0057	4.2296
	(0.0040)		(0.0073)	(7.7561)
Degree	0.2503***	0.0887***	0.3737***	11.5802
	(0.0217)	(0.0176)	(0.0393)	(39.5228)
Son × Degree	0.0019		0.0062	-12.3960
	(0.0070)		(0.0127)	(12.2322)
Two sons		0.1512***		
		(0.0052)		
Two sons × degree		-0.0347***		
		(0.0087)		
Average	0.61	0.18	1.85	1047.15
N	72708	71168	72708	38939

Note: The table reports estimates from fertility regressions for mothers whose first child was born between 2000 and 2009. *Son* is a dummy variable equal to one if the firstborn child is male. *Two sons* is a dummy equal to one if the first two children are both male. The outcomes in columns (1)–(4) are: (1) an indicator for having two or more children, (2) an indicator for having a third child conditional on having two children, (3) total number of children, and (4) the spacing (in days) between the first and second child. Panel B additionally includes interactions with maternal education (*Degree*). Control variables include indicators for education, mother tongue (Finnish or Swedish), employment status, age, and region for both parents. All regressions include year fixed effects. Robust standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Parental Leave Responses

Table 2 investigates whether the gender of the firstborn child influences the length of maternal leave as per: (1) parental leave, (2) home care allowance (HCA), and (3) the combined duration of both. Panel A of Table 2 shows that, on average, mothers take 7 fewer days of leave if their firstborn is a son, an effect primarily driven by reduced uptake of HCA, which is available from the child's age of nine months until age three. We further explore heterogeneity by interacting the firstborn's gender with maternal education. Across all education levels, mothers take approximately 135 days of parental leave before the child reaches nine months of age as shown in see Table A3. However, mothers with a degree spend about 24% fewer days on HCA compared to less-educated mothers, likely due to higher opportunity costs, as HCA is not income-based. Panel B of Table 2 reports the estimated coefficient on the interaction term Son $\times$ Degree, capturing the effect of having a firstborn son for mothers with a university degree. There is no statistically significant difference in the maternal leave response between education groups. If anything, university-educated mothers of sons take 0.8 fewer days of parental leave than their less-educated counterparts, a difference significant at the 10% level.

Table 3 reports father's parental leave duration by the gender of the firstborn. Column (1) considers total days of leave, column (2) focuses on joint leave with the mother, and column (3) examines leave taken by the father alone. Looking at the different margins of leave-take for fathers could be relevant as there is growing evidence of fathers taking leave during the summer holiday season or during major sports events (Andresen and Nix, 2025; Carnicelli et al., 2024; González et al., 2024). Panel A of Table 3 shows that while all coefficients are positive, there is no robust evidence suggesting that fathers take longer leave for firstborn sons. Panel B of Table 3 shows that when interacted with paternal education, fathers of sons who hold a degree tend to take slightly fewer days of leave across all margins. However, these differences are not statistically significant. We interpret this as a lack of evidence of a preference for a particular gender among fathers while acknowledging that the lack of significance may reflect the short duration of paternal leave in the period under study, which is about 20 days.

Table 2: Firstborn Child's Gender and Mothers' Leave Outcomes

Panel A	Parental leave		HCA		Total	
Son	0.40*	0.40*	-8.16***	-7.60***	-7.76***	-7.19***
	(0.23)	(0.23)	(2.16)	(2.13)	(2.18)	(2.15)
Controls	No	Yes	No	Yes	No	Yes
Average	135.4	135.4	401.4	401.4	536.8	536.8
N	62367	62367	62367	62367	62367	62367
Panel B						
Son	0.64**	0.65**	-8.80***	-8.68***	-8.16***	-8.03***
	(0.27)	(0.27)	(2.67)	(2.65)	(2.68)	(2.66)
Degree	0.01	0.26	-60.79***	-44.95***	-60.77***	-44.70***
	(0.35)	(0.38)	(3.24)	(3.50)	(3.26)	(3.51)
Son × Degree	-0.80	-0.82*	2.66	3.03	1.86	2.21
	(0.49)	(0.49)	(4.48)	(4.45)	(4.50)	(4.47)
Controls	No	Yes	No	Yes	No	Yes
Average	135.4	135.4	401.4	401.4	536.8	536.8
N	62367	62367	62367	62367	62367	62367

Note: The table reports estimates of the effect of firstborn child gender on mothers' leave outcomes for first-time mothers between 2000 and 2009. *Son* is a dummy variable equal to one if the firstborn child is male. Panel B additionally includes interactions with maternal education (*Degree*). The outcomes in columns (1)–(6) are: parental leave days, home care allowance (HCA) days, and total leave days (the sum of parental leave and HCA), each estimated with and without controls. Control variables include indicators for education, mother tongue (Finnish or Swedish), employment status, age, and region for both parents. All regressions include year fixed effects and are restricted to firstborn children. Robust standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3: Firstborn Child's Gender and Fathers' Leave Outcomes

Panel A	Any leave		With mother		Without mother	
Son	0.18	0.16	0.06*	0.05	0.12	0.11
	(0.17)	(0.17)	(0.03)	(0.03)	(0.17)	(0.17)
Controls	No	Yes	No	Yes	No	Yes
Average	21.2	21.2	14.8	14.8	6.4	6.4
N	45569	45569	45569	45569	45569	45569

Panel B	Any leave		With mother		Without mother	
Son	0.23	0.22	0.08**	0.07*	0.16	0.15
	(0.19)	(0.19)	(0.04)	(0.04)	(0.19)	(0.19)
Degree	3.72***	2.90**	-0.29***	-1.05***	4.01***	3.95***
	(0.29)	(1.18)	(0.05)	(0.21)	(0.29)	(1.16)
Son × Degree	-0.21	-0.24	-0.07	-0.07	-0.13	-0.17
	(0.41)	(0.41)	(0.08)	(0.08)	(0.40)	(0.40)
Controls	No	Yes	No	Yes	No	Yes
Average	21.2	21.2	14.8	14.8	6.4	6.4
N	45569	45569	45569	45569	45569	45569

Note: The table reports estimates of the effect of firstborn child gender on fathers' leave outcomes between 2000 and 2009. *Son* is a dummy variable equal to one if the firstborn child is male. Panel B additionally includes interactions with paternal education (*Degree*). The outcomes in columns (1)–(6) are: an indicator for taking any leave, leave taken jointly with the mother, and leave taken without the mother, each estimated with and without controls. Control variables include indicators for education, mother tongue (Finnish or Swedish), employment status, age, and region for both parents. All regressions include year fixed effects and are restricted to firstborn children. Robust standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Other Possible Factors

To provide suggestive evidence that the observed differences in fertility and parental leave lengths by firstborn gender are not driven by alternative explanations, we assess whether these patterns can be accounted for factors such as partnership stability or differential healthcare needs of boys and girls.[9]

We consider whether mothers' longer parental leave ans lower fertility when having a firstborn daughter could be linked to relationship dynamics. Prior studies suggest that the gender of the firstborn may influence partnership stability (e.g., Lundberg and Rose, 2003; Lundberg, 2005; Lundberg et al., 2007). We test whether cohabitation between parents (indicated by sharing the same family code) is affected by the child's gender. As shown in Figure A1, the probability of cohabitation increases prior to birth and declines thereafter, but trends do not differ significantly by the gender of the firstborn five years before and ten years after the birth of the first child.

Health differences between sons and daughters could also affect parental leave and subsequent fertility decisions, for instance, if daughters were to experience more health issues in early childhood. We examine this possibility using data on sick leave benefits. In Finland, either parent may take leave when a child is ill, but the data do not specify whether sick leave is taken for their own or the child's illness. Moreover, some employers provide private sick leave, creating potential measurement error. However, as these characteristics are orthogonal to the child's gender, they would likely increase standard errors rather than introduce bias. Figure A2 shows that while mothers take more sick leave during the year of childbirth, across the entire period considered, there is no significant difference between male and female firstborns. This suggests that health differences between firstborn daughters and sons do not seem to explain the observed leave patterns.

Taken together, the evidence in this section suggests a mild preference for daughters, as reflected in longer parental leave for mothers with firstborn daughters and higher subsequent fertility when the firstborn is male. These facts are valid for both women with and without a tertiary education.

6.2 Firstborn Gender and the Motherhood Penalty

We present event-study estimates of the child penalty, progressively refining the analysis by focusing on more homogeneous groups of parents defined by maternal education and firstborn gender.

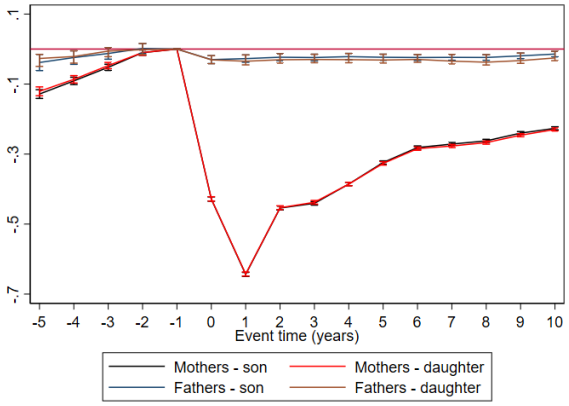
[9]Note that these additional analyses also reveal no differential pre-birth trends in these dimensions by firstborn gender, further strengthening the interpretation of firstborn gender as an idiosyncratic shock.

Baseline Event-Study Estimates and Heterogeneity by Maternal Education

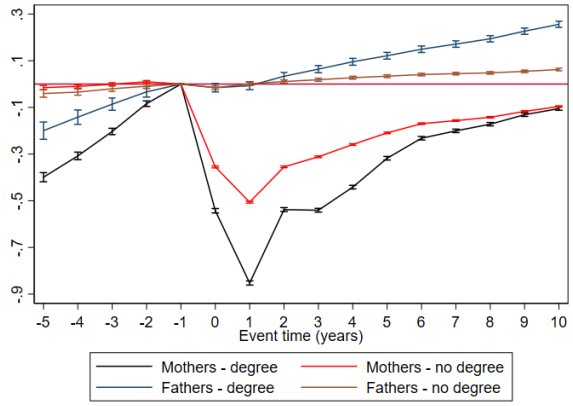
Figure 3a reports event-study estimates for the full sample of parents, spanning five years before and ten years after the birth of the first child. Estimates are normalized to zero in the year prior to birth and are expressed in percentages; negative values indicate lower earnings following the birth of a son relative to a daughter. The figure makes clear that the child penalty is, in fact, a motherhood penalty: fathers experience no meaningful change in earnings following the birth of their first child. In contrast, mothers' earnings drop sharply after childbirth. One year after giving birth, mothers earn about 64% less than in the year prior to birth. Earnings recover only partially over time and remain well below pre-birth levels even ten years after childbirth, stabilizing at a loss of around 23%, consistent with previous evidence (Sieppi and Pehkonen, 2019).

Figure 3: Child Earnings Penalty: Overall and by Maternal Education

(a) Earnings: All



(b) Earnings: By Maternal Education



Note: The figure reports event-study estimates of earnings around the birth of the first child. Panel (a) shows results for the full sample, while panel (b) presents results separately by maternal education. The event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

Figure 3b replicates the event-study analysis separately by mothers' educational attainment one year before birth. Each line shows the difference in earnings, at each event time, between individuals who have had a first child and individuals of the same education level who have not yet had children, normalized to zero in the year before birth. The red and brown lines report these differences for women without a university degree and their partners, respectively, while the black and blue lines show the corresponding estimates for women with a university degree and their partners.

Men's earnings trajectories remain largely unaffected by the transition to fatherhood. Fathers partnered with women without a university degree exhibit flat earnings profiles, whereas fathers partnered with university-educated women follow an upward earnings trajectory. In contrast, both university-educated mothers and mothers without a university degree experience substantial and persistent earnings losses following the birth of their

first child. The largest decline occurs one year after birth and amounts to approximately a 85% loss for women with a university degree and a 50% loss for women without a degree. Although earnings partially recover over time, losses remain sizable: ten years after childbirth, earnings are still about 10% below pre-birth levels for both groups.

Firstborn Gender Earnings Penalty by Maternal Education

We next examine heterogeneity in the earnings child penalty by maternal education and the gender of the firstborn child. Figure 4a and Figure 4b present event-study estimates for mothers without and with a university degree, respectively, alongside corresponding estimates for fathers partnered with these women. Before childbirth, earnings differences between parents of sons and daughters are small and statistically indistinguishable from zero across both education groups, supporting the identifying assumption of the event-study design.

For fathers, we do not observe meaningful divergence in earnings trajectories by the gender of the firstborn child. In contrast, mothers exhibit clear divergence in earnings trajectories after childbirth, and these patterns differ sharply by education. Among women without a university degree, the earnings penalty is larger when the firstborn is a daughter. Among university-educated women, the opposite pattern emerges: the earnings penalty is larger when the firstborn is a son.

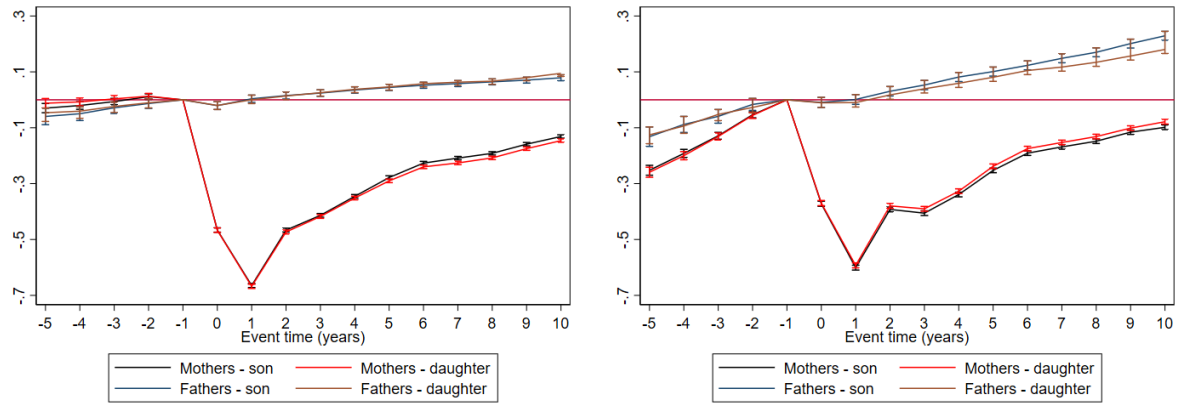
This pattern is illustrated more directly in Figure 4c, which plots the difference in event-study estimates of mothers' earnings between those whose firstborn is a son and those whose firstborn is a daughter, separately by maternal education. Tables A5 and A4 report the corresponding son–daughter differences in earnings penalties within each group. Prior to childbirth, earnings differences between mothers of sons and daughters are statistically insignificant for both education groups. After childbirth, however, the trajectories diverge markedly. Among women without a university degree, the son–daughter gap becomes positive and statistically significant between five and ten years after birth: ten years after childbirth, mothers of sons earn approximately 1 ppt more than mothers of daughters. In contrast, among university-educated women, the gap turns negative shortly after birth and widens steadily over time, becoming statistically significant from three to ten years post-birth. Ten years after childbirth, mothers whose first child is a son earn about 2 ppt less than mothers whose first child is a daughter.

Overall, the gender of the firstborn generates persistent differences in mothers' earnings trajectories, with opposite signs across education groups. Women without tertiary education experience a larger earnings penalty when their firstborn is a daughter, whereas the opposite holds for university-educated women. These differences accumulate over time and contribute to substantial heterogeneity in long-run earnings losses following childbirth. To benchmark magnitudes, note that the gender earnings gap between mothers and fathers is approximately 25 ppt six years after first birth and 20 ppt ten years after

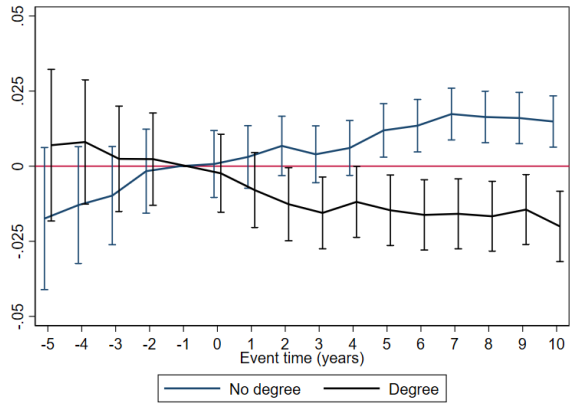
Figure 4: Firstborn Gender and Earnings Penalties by Maternal Education

(a) Mothers without a degree

(b) Mothers with a degree



(c) Mothers' Earnings: Difference Firstborn Son vs. Daughter



Note: Panels (a) and (b) report event-study estimates of mothers' and fathers' earnings around the birth of the first child, separately by maternal education. Panel (c) shows the difference in mothers' earnings between those with a firstborn son and those with a firstborn daughter within each education group. Event time is measured in years relative to the birth of the first child. All regressions include year and age fixed effects. Vertical bars represent 95% confidence intervals.

(see Figure 3a). Correspondingly, at six and ten years after birth, the firstborn gender gap amounts to 1.4 and 1 ppt among women without a university degree, and 1.6 and 2 ppt among university-educated women (see Table A4 and Table A5). Taken together, these figures imply that, at six and ten years after birth, the effect of firstborn gender accounts for about 5% of the overall motherhood earnings penalty among women without a university degree, and approximately 6.5% and 10% among university-educated women, respectively. Overall, firstborn gender has a non-negligible impact on the earnings motherhood penalty, particularly among university-educated women, for whom the effect emerges immediately after birth and increases over time.

Robustness Checks

In this section, we conduct additional analyses to assess the robustness of our findings to potential threats to the identification of the causal effect of the gender of the firstborn on earnings penalties.

Maternal education is defined based on educational attainment one year prior to childbirth. However, as anticipated in Section 4, some women acquire tertiary education after giving birth. If this change were correlated with the gender of the firstborn, it could bias the identification of the causal effect. To address this concern, we examine whether the probability of acquiring additional education is related to the gender of the firstborn. Table A6 shows that this is unlikely. For both mothers and fathers, the probability of acquiring a university degree (columns 1 and 3) or obtaining a qualification higher than the one held at $t-1$ (columns 2 and 4) is not statistically significantly associated with the gender of the firstborn child. Consistent with this evidence, our estimates of the gender-specific motherhood penalty remain unchanged when we exclude women who obtain a university degree after the birth of their first child (see Figure A3).

Adams et al. (2024) highlight an important issue in the child penalty literature: accounting for the timing of educational completion is crucial when estimating child penalties. First births often occur shortly after graduation, particularly among highly educated women, so failing to control for time since graduation may confound the effects of childbirth with early-career earnings growth. Splitting the sample by maternal education helps address this concern (Melentyeva and Riedel, 2023). We nevertheless estimate an alternative specification of the firstborn-gender-specific earnings penalty by augmenting our baseline model in Equation 2 with fixed effects for the year in which the mother's highest qualification was obtained. The results remain qualitatively unchanged, as shown in Figure A4.

Our baseline measure of earnings combines both wage and entrepreneurial income. We re-estimate our specification using salary only, excluding entrepreneurial income. This allows us to isolate adjustments in standard employment, which accounts for the largest share of total earnings. The results are virtually unchanged, see Figure A5, indicating that

our findings are not driven by changes in entrepreneurial income but reflect adjustments in wage employment.

7 Mechanisms

This section investigates why similar parental preferences are associated with different long-run earnings trajectories across mothers. While mothers with and without tertiary education exhibit comparable preferences for daughters, the gender-specific motherhood penalty differs markedly across these groups. Empirically, we document a son earnings penalty among university-educated women and a daughter earnings penalty among women without a degree. The key question is therefore why similar underlying preferences translate into opposite earnings patterns across education groups.

A natural hypothesis is that the mechanisms differ across groups through heterogeneous labor market adjustments following childbirth. In particular, the motherhood penalty may arise through differential responses along the extensive margin, such as subsequent fertility and labor force participation, or along the intensive margin, including changes in job characteristics and workplace environments (Angelov et al., 2016; Bütikofer et al., 2025; Cortés and Pan, 2023; Kleven et al., 2019b; Gicheva, 2013; Goldin, 2014). We examine these mechanisms in turn. We first study extensive-margin adjustments through subsequent fertility and employment. We then turn to intensive-margin responses, focusing on changes in work–family job characteristics such as sector of employment and workplace composition.

Extensive Margin: Fertility and Labor Supply

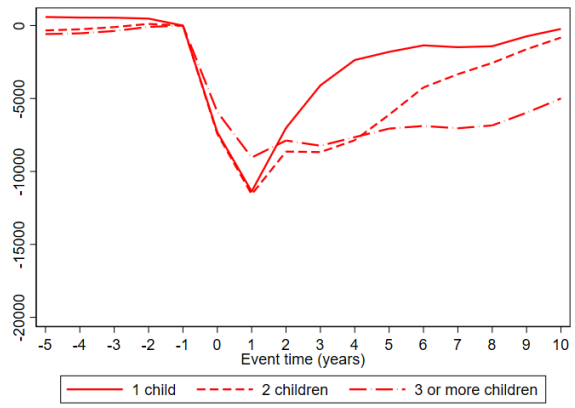
We begin by examining whether differences in subsequent fertility account for the gender-specific earnings patterns. Because a firstborn son is associated with a higher probability of additional births, we first document earnings and employment trajectories by completed fertility.

Figure 5 reports average earnings and employment profiles by education group and total number of children. Mothers with only one child experience a recovery in earnings approximately four years after the first birth, coinciding with the expiration of eligibility for the Home Care Allowance (HCA). In contrast, no comparable recovery is observed among mothers with multiple children. For mothers with two children, earnings begin to converge toward those of one-child mothers only after approximately eight years, while employment rates remain persistently lower. Mothers with three or more children exhibit large and persistent gaps in both earnings and employment that remain even ten years after the first birth. These patterns are qualitatively similar across education groups, although levels differ. Overall, the descriptive evidence indicates that higher fertility is

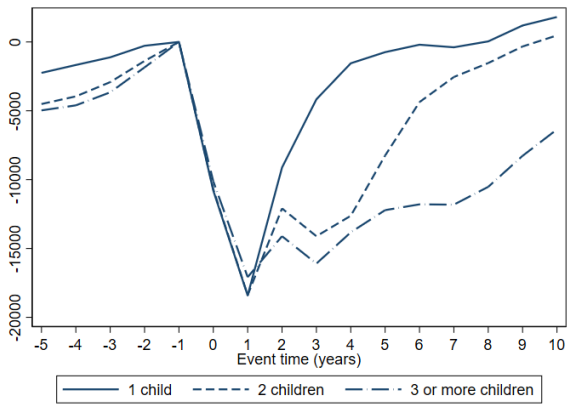
associated with a larger and more persistent motherhood penalty. While this pattern is consistent with the higher fertility observed among women whose first child is a son, similar fertility–earnings trajectories across education groups cannot explain why the gender-specific earnings penalty differs by maternal education.

Figure 5: Mothers' Earnings and Employment Trajectories by Total Fertility and Maternal Education

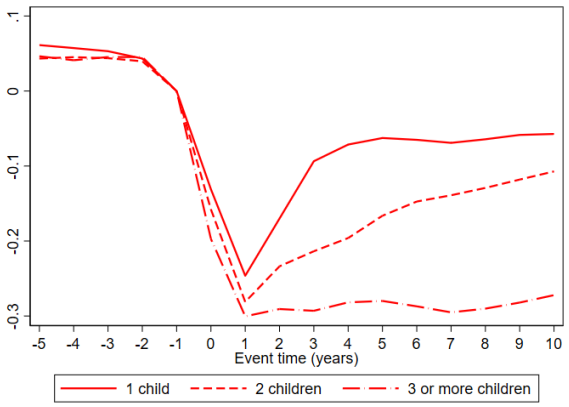
(a) Earnings – Mothers without a degree



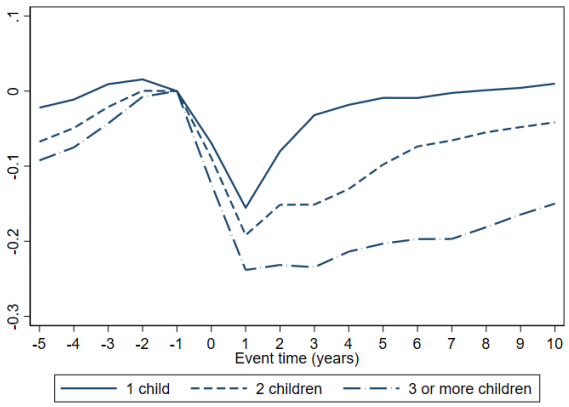
(b) Earnings – Mothers with a degree



(c) Employment – Mothers without a degree



(d) Employment – Mothers with a degree



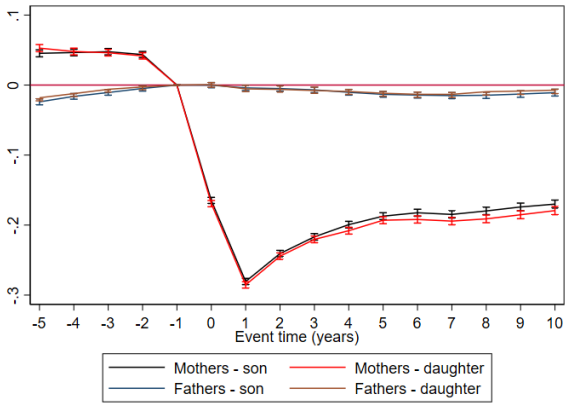
Note: The figure shows event-time profiles of mothers' earnings and employment around the birth of the first child, separately by maternal education and total number of children. Panels (a) and (b) report average earnings, while panels (c) and (d) report employment rates. Event time is measured in years relative to the birth of the first child.

We next examine labor force attachment. Employment prior to childbirth differs substantially across education groups: among university-educated women, 90.4% are employed in the year before the first birth, compared with 67.9% among women without a degree. Ten years after the first birth, employment rates remain very similar: 92.5% of mothers with a degree and 77% of mothers without a degree were employed. Furthermore, 94% (85%) of mothers with (without) a degree that were employed at $t-1$ were employed

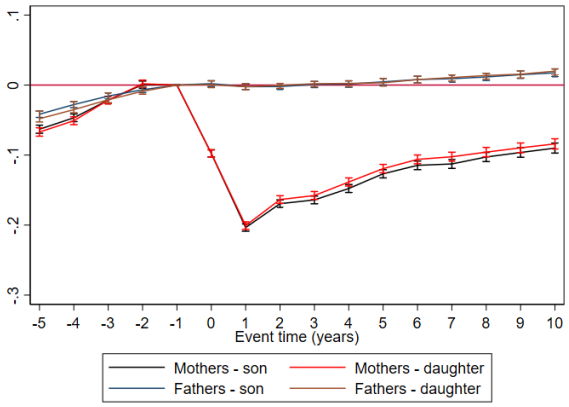
ten years after the first birth.[10] These differences imply that labor supply adjustments may operate differently across education groups. Figure 6 examines whether the gender of the firstborn affects employment trajectories. Among women without a degree, having a firstborn son increases the probability of employment relative to having a daughter. Among university-educated women, the pattern is reversed: having a firstborn son is associated with a slightly lower probability of employment. These effects are modest, around 1 ppt, but precisely estimated and persistent among women without a degree.

Figure 6: Firstborn Gender Employment Penalties by Maternal Education

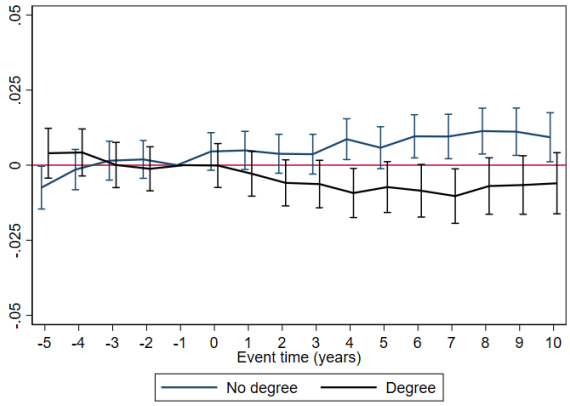
(a) Mothers without a degree



(b) Mothers with a degree



(c) Mothers' Employment: Difference Firstborn Son vs. Daughter



Note: Panels (a) and (b) report event-study estimates of mothers' and fathers' employment around the birth of the first child, separately by maternal education. Panel (c) shows the difference in mothers' employment between those with a firstborn son and those with a firstborn daughter within each education group. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

A limitation of this exercise is that our employment measure classifies women on maternity leave as non-employed, thereby conflating fertility-related leave with labor market

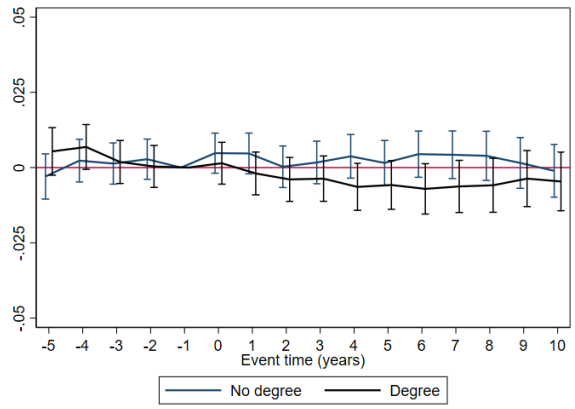
[10]Table A7 reports the statistics on activity status at $t-1$ overall and by maternal education.

exit. To address this issue, we restrict the sample to women who were employed one year before the first birth. Conditioning on pre-birth employment substantially reduces transitions into inactivity or unemployment around childbirth, as these women exhibit stronger labor market attachment (see Figure A6). Figure 7a shows that, within this sample, differences in employment trajectories by firstborn gender are no longer precisely estimated. However, the gender-specific earnings penalties persist. As shown in Figure 7b, university-educated women continue to exhibit a clear son-related earnings penalty. From the second year after birth onward, mothers with a degree experience a persistent earnings loss that is larger when the firstborn is a son. This gap remains substantial and lasts for at least ten years after the first birth, reaching around 2 ppt by year ten.

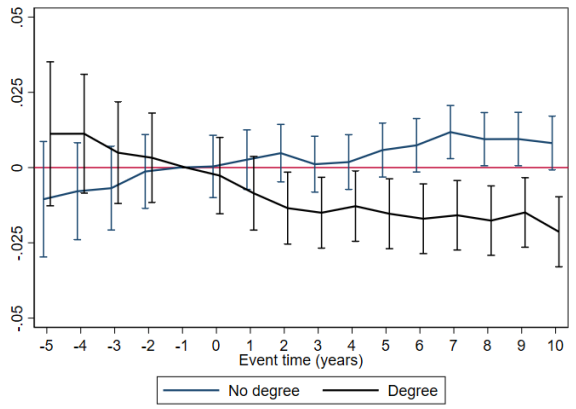
Taken together, these results suggest that the mechanisms underlying gender-specific earnings penalties differ by maternal education. Among women without a university degree, labor market attachment is already relatively weak prior to childbirth, and there is suggestive evidence that the gender of the firstborn mainly operates through the extensive margin: mothers of daughters are more likely to remain out of employment. In this group, the daughter earnings penalty therefore likely reflects differences in labor force participation. In contrast, among university-educated women, employment before childbirth is nearly universal and labor market attachment remains strong afterward. The son earnings penalty observed for these women is therefore unlikely to be driven by labor market exit, and instead appears to reflect adjustments within employment.

Figure 7: Firstborn Gender and Employment and Earnings Penalties by Maternal Education (Employed Women at $t-1$)

(a) Employment: Difference Firstborn Son vs. Daughter



(b) Earnings: Difference Firstborn Son vs. Daughter



Note: The figure reports event-study estimates of the difference in employment (panel a) and earnings (panel b) between mothers with a firstborn son and those with a firstborn daughter, separately by maternal education. The sample is restricted to mothers who are employed at $t-1$, i.e. the year before giving birth. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

Intensive Margin: Job Sorting

Another possible margin of adjustment after childbirth is switching into jobs that offer better work–family balance. Because family-friendliness is not directly observed, we proxy it with public-sector workplace, which the literature has shown to be associated with better conditions for combining paid work and caregiving. For primary caregivers, such job characteristics represent a salient dimension of labor market adjustment. Given their strong labor market attachment, highly educated women may be more likely to adjust along the intensive rather than the extensive margin, making job characteristics a natural channel through which preferences for family-friendly jobs may operate.

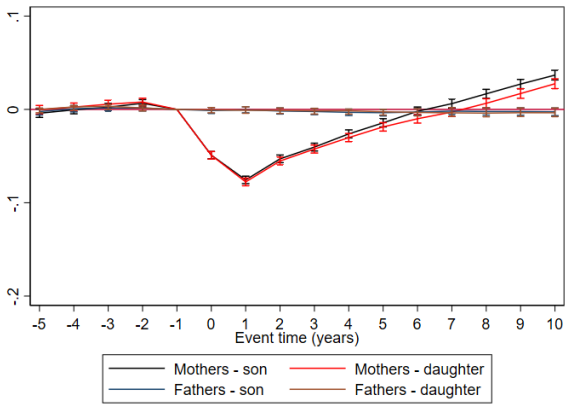
A large literature documents that public-sector jobs, often female-dominated workplaces, tend to offer more favourable work–family conditions, reflecting more regulated hours, greater schedule predictability, and more linear pay–hours profiles (Goldin, 2014; Budig et al., 2012). Female-dominated occupations, such as education and pharmacy, feature greater worker substitutability and more controllable hours, which facilitate work–family balance and are associated with smaller child penalties (Cortes and Pan, 2018; Gallen, 2024; Goldin and Katz, 2016). Firms employing a high share of women or mothers also tend to adopt more family-friendly practices, resulting in smaller earnings penalties following childbirth (Kleven et al., 2019a). These institutional differences are also present in Finland. Labor force survey data from 2009–2024 show that private-sector employees worked an average of 1,595 hours per year, compared with 1,497 hours in the public sector. Register-based evidence further indicates that female-dominated fields with high public-sector employment shares, such as education and health, exhibit higher fertility levels and smaller fertility declines than private-sector-oriented fields such as ICT and business (Hellstrand et al., 2024).

We replicate our event-study analysis by considering as outcome whether working in a public sector job.[11] It is worth noting that, as shown in Table A1, at baseline, 38% of university-educated women are employed in the public sector, more than twice the share among non-university-educated women (15%). This suggests that, in terms of post-birth intensive-margin adjustments, there is greater scope for adjustment among the former group than among the latter. Figure 8 shows that, following childbirth, all mothers, regardless of their education level, become increasingly likely to work in the public sector. This pattern is consistent with the public sector offering a more family-friendly work environment. Among university-educated mothers, however, having a firstborn daughter is associated with a higher likelihood of working in the public sector, particularly around the time of school entry of the firstborn child. No comparable pattern is observed among less educated mothers. If anything, they exhibit the opposite, although less precisely

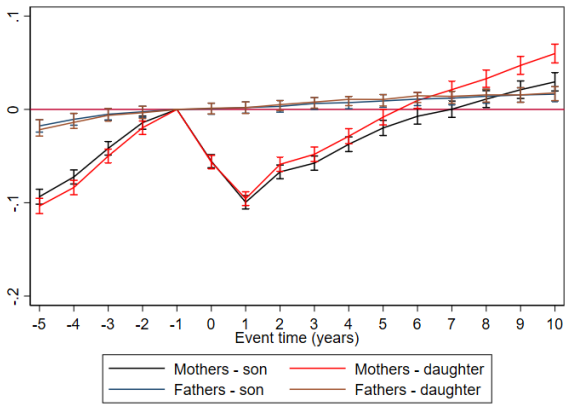
[11] Separate analyses examining changes in region and firm reveal no systematic patterns by parental education and the gender of the firstborn child. These null results suggest that job characteristics related to work–family balance are the most relevant intensive-margin adjustments in this setting.

Figure 8: Firstborn Gender and Public Sector Employment by Maternal Education

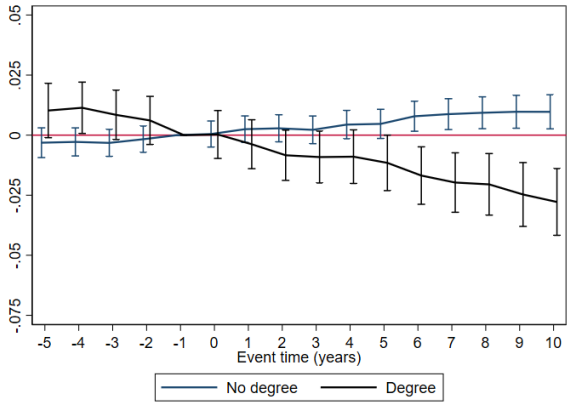
(a) Mothers without a degree



(b) Mothers with a degree



(c) Mothers' Public Sector Employment: Difference Firstborn Son vs. Daughter



Note: Panels (a) and (b) report event-study estimates of the probability of working in the public sector around the birth of the first child, separately by maternal education. The outcome is an indicator equal to one if the individual is employed in a government authority, government enterprise, or public corporation. Both employed and unemployed individuals are included in the sample. Panel (c) shows the difference in this probability between mothers with a firstborn son and those with a firstborn daughter within each education group. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

estimated and smaller tendency: having a firstborn son is associated with a slightly higher likelihood of working in the public sector. At six and ten years after birth, university-educated mothers of daughters (sons) are more likely to work in the public sector by 1% (-0.7%) and 5.9% (2.9%), respectively.

To reduce potential confounding from selection into employment (which may be particularly relevant among women without tertiary education, as discussed above) the analysis is replicated restricting the sample to women who were employed in the year prior to childbirth. The results, shown in Figure 9, reveal an even clearer pattern: among women with tertiary education, there is a gradual shift toward public sector employment, especially from the time children enter primary school and continuing through the end of the observed period.

Overall, the findings from Figure 8 and Figure 9 show that, among university-educated women, ten years after the birth of the first child, having had a firstborn daughter increases the probability of working in the public sector by 100% among all women and by 37% among women employed at $t-1$ relative to having had a son. These patterns are consistent with increased sorting into jobs offering better work–family balance among highly educated mothers of daughters. Such sorting may reflect changes in time allocation or within-household norms following the birth of a daughter, as documented in the literature (Baker and Milligan, 2016; Bertrand and Pan, 2013; Bhalotra et al., 2025; Lundberg, 2005; Mammen, 2011; Raley and Bianchi, 2006) and rationalized within our theoretical framework (Appendix B); therefore, this channel may contribute to the heterogeneous earnings responses observed across education groups.

To further assess whether having a daughter is associated with sorting into more family-friendly workplaces, we examine as an additional outcome the share of women at the firm.[12] Figure A7 reports event-study estimates for all women (and, as usual, for partnered men) regardless of their employment status prior to childbirth. The results show that among tertiary-educated women, having a firstborn daughter is associated with a higher probability of working in firms with a greater share of female employees. No comparable patterns emerge among less educated mothers.

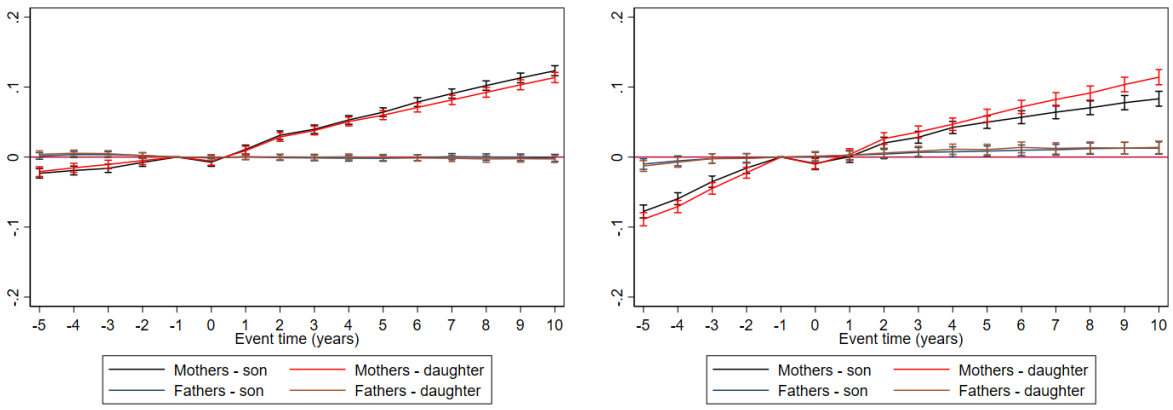
To examine how sorting into family-friendly workplaces influences earnings, we draw on evidence showing that exogenous shifts toward such roles can increase both wages and total labor income while mitigating the motherhood penalty (Hotz et al., 2018). A primary mechanism for this effect is higher worker substitutability, which lowers the cost of flexibility and allows parents to better balance professional responsibilities with caregiving. Motivated by this evidence, we estimate wage regressions to assess whether the types of jobs associated with greater work–family balance in our setting are also associated with higher wages among mothers. We estimate specifications with progressively richer

[12]Firms are defined using the unique business identifier provided by Statistics Finland and include private businesses, entrepreneurs, and the self-employed.

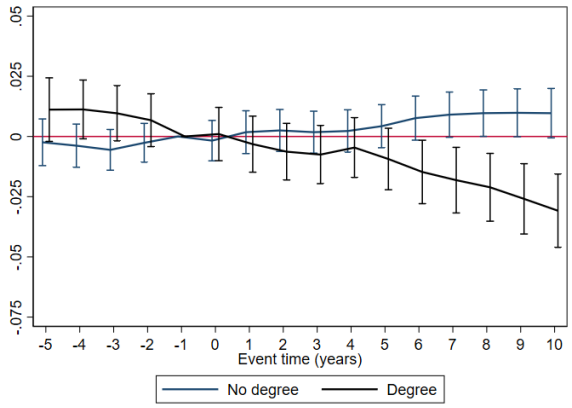
Figure 9: Firstborn Gender and Public Sector Employment by Maternal Education (Employed Women at $t-1$)

(a) Mothers without a degree

(b) Mothers with a degree



(c) Mothers' Public Sector Employment: Difference Firstborn Son vs. Daughter



Note: Panels (a) and (b) report event-study estimates of public sector employment around the birth of the first child, separately by maternal education. The sample is restricted to mothers who are employed one year prior to birth. The outcome is an indicator equal to one if the individual is employed in a government authority, government enterprise, or public corporation. Panel (c) shows the difference in public sector employment between mothers with a firstborn son and those with a firstborn daughter within each education group. Event time is measured in years relative to the birth of the first child. All regressions include year and age fixed effects. Vertical bars represent 95% confidence intervals.

sets of fixed effects, including worker, year, age, firm, and region fixed effects, following the approach in Rattsø and Stokke (2024). Although private-sector wages are higher on average in the overall economy (Maczulskij, 2013; Maczulskij and Viinikainen, 2024), the estimates reported in Table 4 show that, among mothers, employment in the public sector is associated with a wage premium relative to the private sector. This premium is present for both university-educated and non-university-educated women and is larger for the former. The estimated premium increases from 4% to 27% as additional fixed effects are included (see columns 1-5 in Table 4), consistent with negative selection into public-sector employment along dimensions such as worker productivity and regional or industry characteristics.[13] Overall, the wage regressions suggest that, among university-educated women, the son earnings penalty operates through a higher likelihood of shifting into public-sector employment when the firstborn is a daughter, which is associated with higher earnings.

[13]Employment in firms with a higher share of women or mothers is not associated with a meaningful wage premium; the corresponding coefficients are close to zero as reported in Table A8. This is consistent with the low correlation between the share of women and public-sector employment (0.23) and to share of female being measured as a continuos variable, while public employment is a dummy.

Table 4: Female Wage Regressions: Public vs. Private Sector

Panel A	ln wage (1)	ln wage (2)	ln wage (3)	ln wage (4)	ln wage (5)
Public	0.0439***	0.0564***	0.1722***	0.1714***	0.0257***
	(0.0020)	(0.0020)	(0.0028)	(0.0028)	(0.0099)
Degree	0.3327***	0.3246***	0.5069***	0.5099***	0.4604***
	(0.0022)	(0.0022)	(0.0040)	(0.0040)	(0.0038)
Constant	9.5574***	9.5557***	9.4335***	9.4326***	9.5408***
	(0.0017)	(0.0017)	(0.0020)	(0.0020)	(0.0045)
N	2424070	2424070	2418633	2418633	2349028
Panel B					
Public	0.0556***	0.0616***	0.1320***	0.1324***	-0.0284***
	(0.0025)	(0.0025)	(0.0036)	(0.0036)	(0.0102)
Degree	0.3441***	0.3296***	0.4652***	0.4695***	0.4032***
	(0.0033)	(0.0032)	(0.0047)	(0.0047)	(0.0045)
Public × Degree	-0.0256***	-0.0113***	0.0943***	0.0914***	0.1174***
	(0.0040)	(0.0039)	(0.0051)	(0.0051)	(0.0051)
Constant	9.5535***	9.5539***	9.4469***	9.4456***	9.5614***
	(0.0019)	(0.0019)	(0.0021)	(0.0021)	(0.0046)
N	2424070	2424070	2418633	2418633	2349028
Year & age FE	✓	✓	✓	✓	✓
Region FE		✓	✓		✓
Worker FE			✓	✓	✓
Firm FE					✓

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports estimates from log wage regressions for women. *Public* is a dummy variable equal to one if the individual is employed in the public sector. *Degree* is a dummy equal to one if the individual has a university degree. Panel B additionally includes the interaction between public sector employment and education. Specifications progressively include fixed effects for year and age, region, worker, and firm, as indicated in the table. Robust standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

8 Conclusion

Despite significant gains in women's educational attainment and labor market participation, motherhood remains a primary driver of gender inequality. The persistence of the motherhood penalty across countries (Kleven et al., 2023), the continued rise in female university attendance (OECD, 2024), growing career–family trade-offs (Cortés and Pan, 2023), and fertility declines linked to unequal caregiving burdens (Doepke and Kindermann, 2019; Goldin, 2025) underscore the importance of understanding why motherhood penalties arise and why they are most pronounced at the top of the skill distribution.

This paper has investigated how parental preferences over time allocation interact

with maternal education to generate differential long-run earnings trajectories. To do so, we operationalize preferences for firstborn gender as a source of variation to elicit shifts in underlying preferences for work–life balance. We emphasize that this is an empirical strategy tailored to our specific context; our objective is not to identify a causal "daughter" or "son" earnings penalty *per se*. Rather, we utilize this variation to provide evidence on how the interaction between parental preferences and the institutional environment serves as a primary determinant of the magnitude and persistence of the child penalty.

Our results reveal a striking heterogeneity in the margins of adjustment. Among mothers without tertiary education, limited opportunities to transition into family-friendly roles mean that preferences for home production operate primarily at the extensive margin. Specifically, mothers of firstborn daughters in this group exhibit lower employment rates, consistent with an observed daughter earnings penalty. In contrast, for university-educated women, these preferences operate along the intensive margin. In this group, having a firstborn daughter is associated with increased sorting into more family-friendly jobs, such as public-sector employment. In our setting, this sorting is linked to higher relative wages and labor income for mothers, resulting in a relative son earnings penalty.

These findings suggest that the child penalty is not an inevitable consequence of preferences alone, but rather a product of how those preferences collide with occupational career structures. In high-skilled occupations where convex wage structures and rigid long-hours requirements amplify earnings losses (Goldin, 2021; Kleven et al., 2019b), the ability to sort into family-friendly sectors provides a critical buffer. Ultimately, our analysis suggests that a complete characterization of gender inequality requires a framework that integrates heterogeneous preferences with the structural features of the labor market. Future research should continue to examine how these factors jointly shape the long-run labor market trajectories of parents, and especially women, across the skill distribution.

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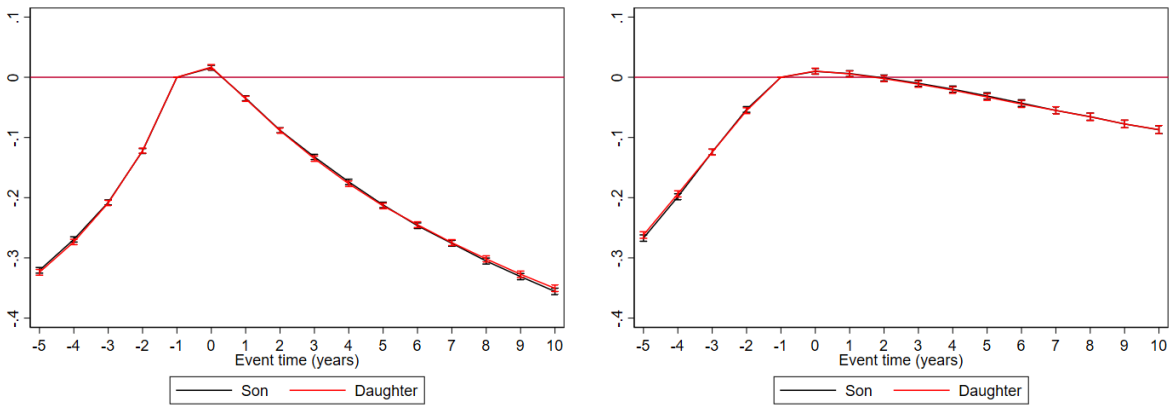
Appendix

A Figures

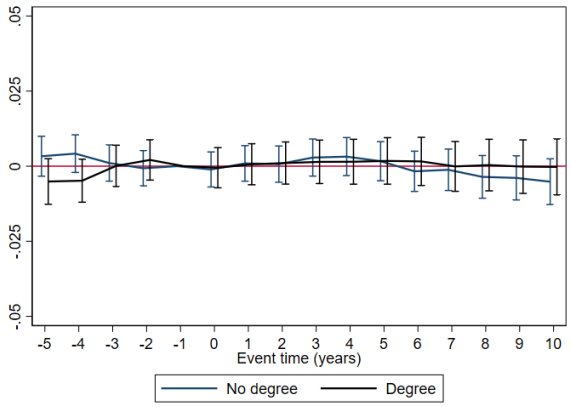
Figure A1: Union Stability by Firstborn Gender and Maternal Education

(a) Mothers without a degree

(b) Mothers with a degree



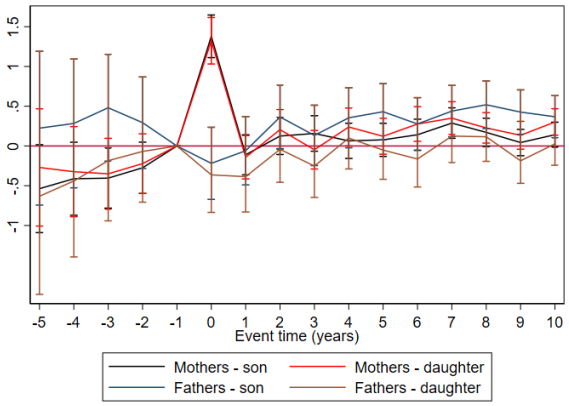
(c) Difference Firstborn Son vs. Daughter



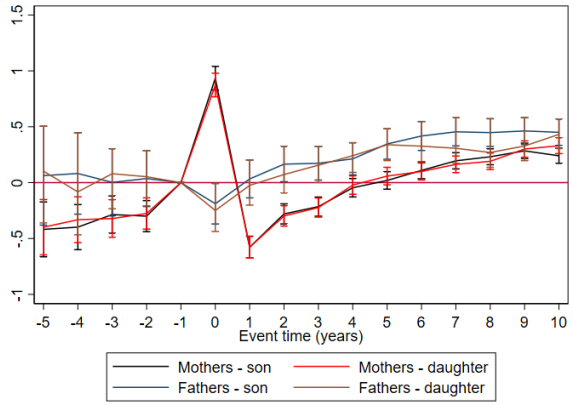
Note: Panels (a) and (b) report event-study estimates of the effect of having a firstborn son (relative to a daughter) on union stability, where the outcome is an indicator equal to one if the parents share the same family code. Panel (c) shows the difference in union stability between those with a firstborn son and those with a firstborn daughter within each education group. All regressions include year fixed effects and are restricted to firstborn children. Vertical bars represent 95% confidence intervals.

Figure A2: Sick Leave by Firstborn Gender and Maternal Education

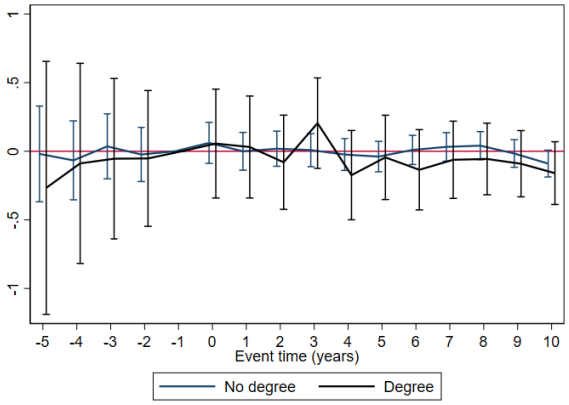
(a) Mothers with a degree



(b) Mothers without a degree



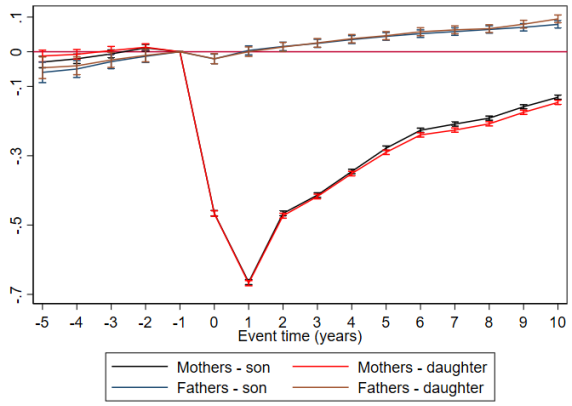
(c) Difference Firstborn Son vs. Daughter



Note: The figure reports event-study estimates of the effect of having a firstborn son (relative to a daughter) on the amount of sick leave taken. Panels are shown separately by maternal education, and panel (c) shows the difference in sick leave take-up between those with a firstborn son and those with a firstborn daughter within each education group. All regressions include year and age fixed effects. Vertical bars represent 95% confidence intervals.

Figure A3: Earnings of Mothers without a University Degree

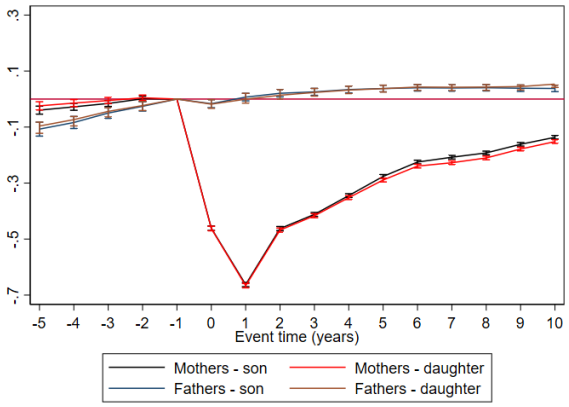
(a) Earnings



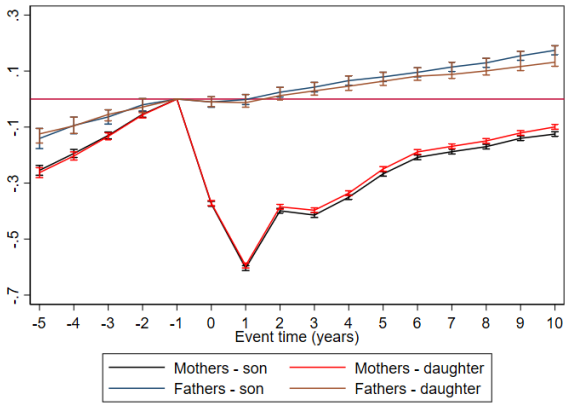
Note: The figure reports event-study estimates of earnings around the birth of the first child for mothers who never obtain a university degree. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

Figure A4: Earnings by Maternal Education and Firstborn Child's Gender (with Year of Graduation Fixed Effects)

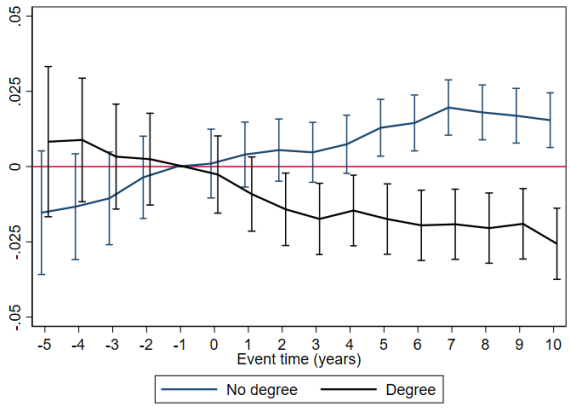
(a) Mothers without a degree



(b) Mothers with a degree



(c) Difference Firstborn Son vs. Daughter

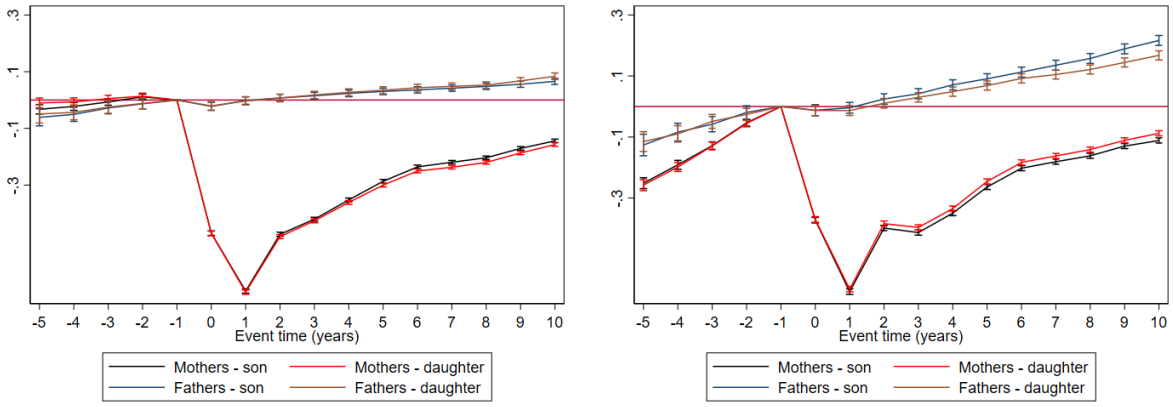


Note: The figure reports event-study estimates of earnings around the birth of the first child, separately by maternal education. Estimates include year of graduation (of highest qualification achieved) fixed effects. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

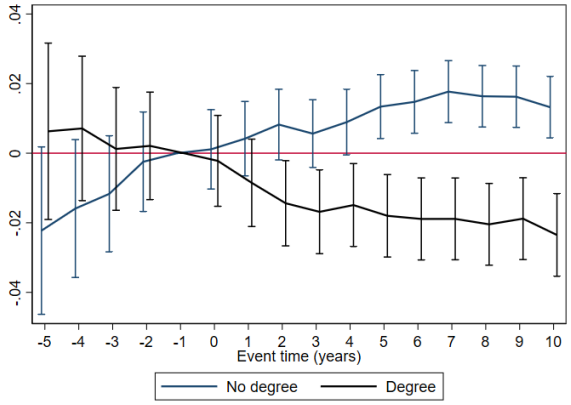
Figure A5: Salary by Firstborn Child's Gender and Maternal Education

(a) Mothers without a degree

(b) Mothers with a degree



(c) Difference Firstborn Son vs. Daughter

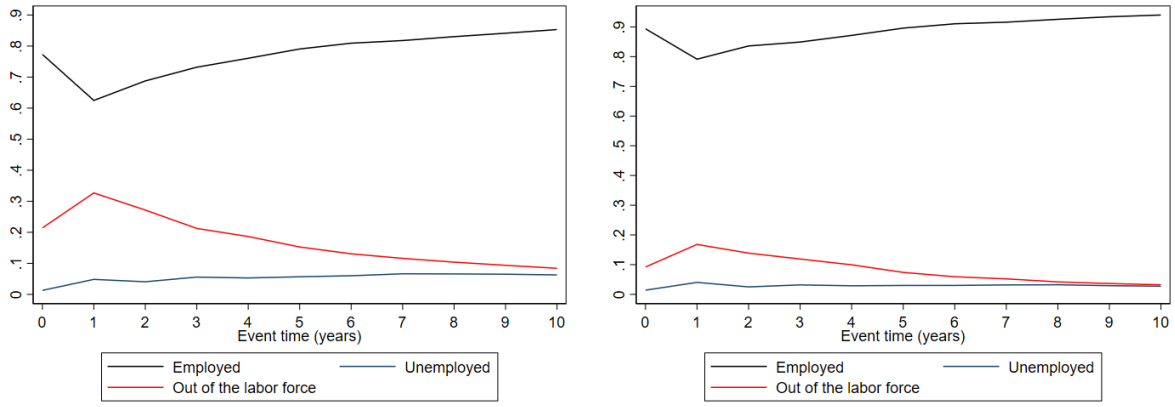


Note: The figure reports event-study estimates of salary around the birth of the first child, separately by maternal education. Panel (a) shows mothers without a university degree, and panel (b) shows mothers with a university degree. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

Figure A6: Labor Force Activity Status of Mothers Employed at $t-1$

(a) Mothers without a degree

(b) Mothers with a degree

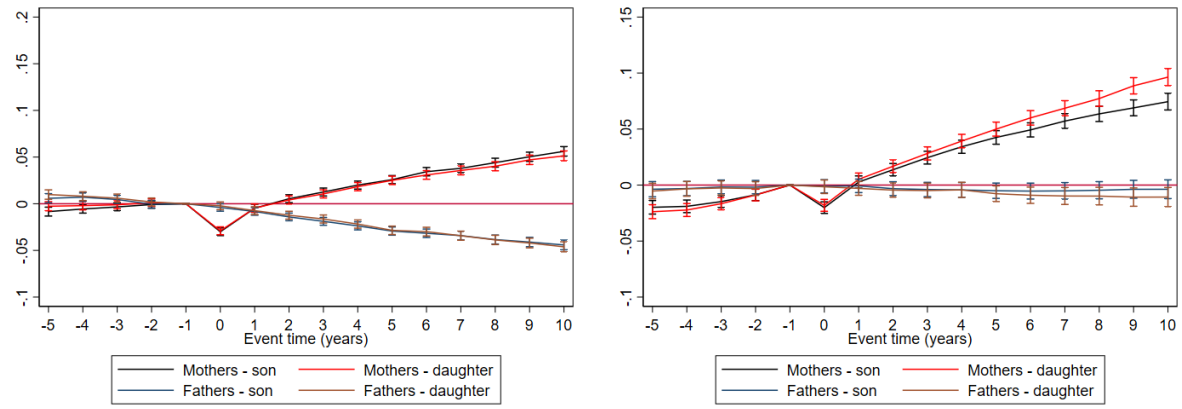


Note: The figure shows the evolution of mothers' labor force status around the birth of the first child, separately by maternal education and by labor market status one year before birth among mothers employed one year before birth. In each panel, the lines report the shares employed, unemployed, and out of the labor force over event time.

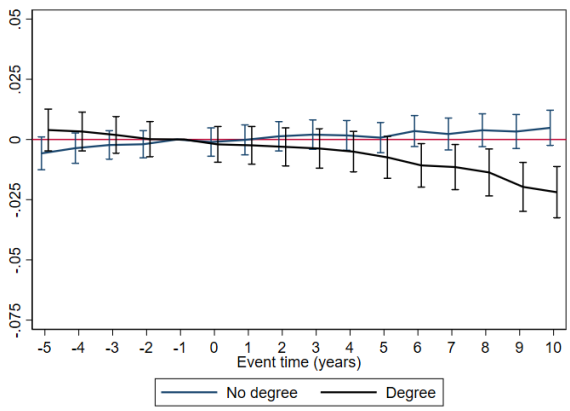
Figure A7: Firstborn Gender and Share of Female Employees by Maternal Education

(a) Mothers without a degree

(b) Mothers with a degree



(c) Mothers with a degree



Note: The figure reports event-study estimates of the share of female employees at the firm where the mother is employed, around the birth of the first child, separately by maternal education. Panel (a) shows mothers without a university degree, and panel (b) shows mothers with a degree. The sample is restricted to employed individuals. Event time is measured in years relative to the birth of the first child. Vertical bars represent 95% confidence intervals.

B Tables

Table A1: Summary Statistics

	Mothers		Fathers	
	mean	sd	mean	sd
Age	28.14	(5.74)	30.79	(6.74)
Bachelors degree (%)	29.96	(45.81)	22.33	(41.65)
Finnish (%)	89.47	(30.69)	89.97	(30.04)
Swedish (%)	4.37	(20.44)	4.63	(21.01)
Employed (%)	75.58	(42.96)	83.61	(37.02)
Public sector job (%)	22.11	(41.50)	11.23	(31.58)
Earnings (€)	17852.93	(13601.13)	25499.62	(18040.41)
Public sector wages (€)	23883.00	(9602.56)	28891.71	(14628.70)
Private sector wages (€)	21680.82	(12685.38)	28901.98	(17376.05)
Observations	64541		64541	
Degree				
Age	29.96	(4.17)	32.45	(5.49)
Finnish (%)	90.49	(29.34)	90.23	(29.69)
Swedish (%)	5.78	(23.33)	6.22	(24.16)
Employed (%)	90.49	(29.33)	94.27	(23.24)
Public sector job (%)	38.12	(48.57)	22.02	(41.44)
Earnings (€)	26762.30	(14246.16)	38161.98	(20334.18)
Public sector wages (€)	27413.49	(10254.24)	34523.17	(16055.07)
Private sector wages (€)	29229.21	(14365.51)	40578.83	(20120.99)
Observations	19334		14415	
No degree				
Age	27.36	(6.13)	30.32	(6.98)
Finnish (%)	89.04	(31.24)	89.89	(30.14)
Swedish (%)	3.76	(19.03)	4.17	(19.99)
Employed (%)	69.21	(46.16)	80.54	(39.59)
Public sector job (%)	15.27	(35.97)	8.13	(27.33)
Earnings (€)	14042.59	(11351.01)	21858.24	(15517.14)
Public sector wages (€)	20092.67	(7111.77)	24428.75	(11589.12)
Private sector wages (€)	18451.77	(10328.70)	25186.40	(14560.02)
Observations	45207		50126	

Note: The sample includes all first-time births in Finland between 2000 and 2009. Summary statistics are measured one year prior to the birth of the first child. The table reports means and standard deviations (in parentheses) separately for mothers and fathers, for the full sample and by maternal and paternal education (degree vs. no degree). Earnings measures include both labor and entrepreneurial income.

Table A2: F-statistics of Firstborn Gender Prediction

F-statistic	Fathers	Mothers
All	0.5155	0.4432
Degree	0.3934	0.6377
No Degree	0.4576	0.7262

Note: The table reports the F-statistic of the multivariate regressions when controlling for all variables presented in Figure 2.

Table A3: Parents's Average Leave by Maternal Education and Firstborn Child's Gender

Panel A: Mothers

	Daughter		Son	
With Degree				
	mean	sd	mean	sd
Parental leave	135.60	(28.28)	135.24	(28.13)
HCA	339.36	(257.51)	337.22	(254.46)
Total	474.94	(258.69)	472.23	(255.48)
Observations	17771		18655	
Without Degree				
	mean	sd	mean	sd
Parental leave	135.45	(28.18)	135.67	(28.24)
HCA	447.66	(301.81)	441.94	(299.82)
Total	582.92	(302.97)	577.52	(300.94)
Observations	42323		43717	

Panel B: Fathers

	Daughter		Son	
With Degree				
	mean	sd	mean	sd
Any leave	23.16	(19.96)	23.40	(20.53)
With mother	14.47	(3.70)	14.49	(3.68)
Without mother	8.69	(19.31)	8.90	(19.90)
Observations	11693		12183	
Without Degree				
	mean	sd	mean	sd
Any leave	19.48	(17.44)	19.70	(18.16)
With mother	14.81	(3.57)	14.83	(3.55)
Without mother	4.67	(17.05)	4.87	(17.85)
Observations	32448		33867	

Note: Panel A contains summary statistics of the length of parental leave and home care allowance (HCA) taken by education and child gender. Panel B contains summary statistics of the length of paternity leave by type, education, and child gender.

Table A4: Difference of Son-Daughter Estimates for Maternal Earnings, Employment and Public-Employment: Mothers without a degree

Time	Earnings	SE	Employment	SE	Public employment	SE
-5	-0.0183	0.0165	-0.0075**	0.0036	-0.0024	0.0049
-4	-0.018	0.0136	-0.0015	0.0034	-0.0038	0.0046
-3	-0.0117	0.0114	0.0015	0.0033	-0.0056	0.0043
-2	-0.0018	0.0098	0.0019	0.0032	-0.0026	0.0041
0	0.0009	0.0078	0.0046	0.0032	-0.0017	0.0043
1	0.0043	0.0073	0.0049	0.0032	0.0018	0.0045
2	0.0062	0.0069	0.0038	0.0033	0.0025	0.0044
3	0.003	0.0066	0.0037	0.0034	0.0018	0.0044
4	0.007	0.0064	0.0087**	0.0035	0.0023	0.0045
5	0.0117*	0.0062	0.0058	0.0036	0.0043	0.0046
6	0.0137**	0.0061	0.0096***	0.0037	0.0076	0.0047
7	0.0182***	0.006	0.0095**	0.0038	0.0091*	0.0048
8	0.0171***	0.006	0.0113***	0.0039	0.0097**	0.0049
9	0.0153**	0.006	0.0111***	0.004	0.0098*	0.0051
10	0.0099*	0.006	0.0093**	0.0042	0.0097*	0.0052

Note: The table shows the coefficients depicted in Figure 4c for earnings, employment, and public employment for mothers without a degree. * p<0.10, ** p<0.05, *** p<0.01.

Table A5: Difference of Son-Daughter Estimates for Maternal Earnings, Employment and Public-Employment: Mothers with a degree

Time	Earnings	SE	Employment	SE	Public employment	SE
-5	0.007	0.0129	0.004	0.0042	0.0111*	0.0067
-4	0.008	0.0105	0.0042	0.004	0.0112*	0.0062
-3	0.0024	0.009	0.0001	0.0038	0.0096	0.0059
-2	0.0023	0.0078	-0.0012	0.0037	0.0068	0.0056
0	-0.0024	0.0066	-0.0001	0.0037	0.001	0.0056
1	-0.008	0.0064	-0.0028	0.0038	-0.0032	0.0059
2	-0.0127**	0.0062	-0.0059	0.0039	-0.0063	0.006
3	-0.0156**	0.0061	-0.0063	0.004	-0.0075	0.0062
4	-0.0119**	0.006	-0.0093**	0.0042	-0.0046	0.0063
5	-0.0147**	0.006	-0.0073*	0.0043	-0.0094	0.0065
6	-0.0162***	0.006	-0.0085*	0.0045	-0.0147**	0.0067
7	-0.0159***	0.0059	-0.0103**	0.0046	-0.0181***	0.007
8	-0.0167***	0.0059	-0.0069	0.0048	-0.0211***	0.0072
9	-0.0145**	0.0059	-0.0066	0.005	-0.0259***	0.0074
10	-0.0201***	0.006	-0.006	0.0052	-0.0308***	0.0078

Note: The table shows the coefficients depicted in Figure 4c for earnings, employment, and public employment for mothers with a degree. * p<0.10, ** p<0.05, *** p<0.01.

Table A6: Firstborn Child's Gender and Parents' Human Capital Investments

	Mother		Father	
	Get degree	Get higher qualification	Get degree	Get higher qualification
Son	0.0017	-0.0005	-0.0043	-0.0007
	(0.0036)	(0.0032)	(0.0032)	(0.0030)
Average	0.18	0.24	0.20	0.24
N	45345	68333	51688	68645

Note: The table reports estimates of the effect of firstborn child gender on parents' human capital investments after the birth of the first child. *Son* is a dummy variable equal to one if the firstborn child is male. Columns (1) and (3) report the probability of obtaining a university degree, while columns (2) and (4) report the probability of obtaining a higher education qualification compared to the one had at $t-1$. Results are shown separately for mothers and fathers. Robust standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A7: Labor market status one year before birth

	E	U	N
All	75.03%	8.77%	16.2%
Degree	90.4%	4.45%	5.15%
No degree	67.9%	10.7%	21.3%

Note: The table reports the share of mothers employed (E), unemployed (U), and out of the labor force (N) one year before the birth of the first child. The statistics are shown for the whole sample and divided by those with and without an university degree.

Table A8: Female Wage Regressions: Share of Female Employees in the Firm

Panel A	ln wage (1)	ln wage (2)	ln wage (3)	ln wage (4)	ln wage (5)
Degree	0.3331***	0.2505***	0.4922***	0.5318***	0.4606***
	(0.0022)	(0.0041)	(0.0056)	(0.0040)	(0.0038)
Share female	-0.0044***	-0.0038***	-0.0023***	-0.0023***	-0.0012***
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	9.8777***	9.8025***	9.6772***	9.6550***	9.6348***
	(0.0032)	(0.0040)	(0.0050)	(0.0044)	(0.0082)
N	2424070	1487835	1482705	2418633	2349028
Panel B					
Degree	0.3966***	0.1861***	0.4224***	0.5009***	0.4074***
	(0.0061)	(0.0130)	(0.0157)	(0.0084)	(0.0083)
Share female	-0.0040***	-0.0039***	-0.0024***	-0.0025***	-0.0015***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Degree × share female	-0.0009***	0.0009***	0.0010***	0.0004***	0.0008***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Constant	9.8512***	9.8077***	9.6832***	9.6661***	9.6541***
	(0.0040)	(0.0041)	(0.0052)	(0.0051)	(0.0087)
N	2424070	1487835	1482705	2418633	2349028
Year & age FE	✓	✓	✓	✓	✓
Region FE		✓	✓		✓
Worker FE			✓	✓	✓
Firm FE					✓

Note: The table reports estimates from log wage regressions for women. *Degree* is a dummy variable equal to one if the individual has a university degree. *Share female* measures the share of female employees in the firm. Panel B additionally includes the interaction between education and the share of female employees. Specifications progressively include fixed effects for year and age, region, worker, and firm, as indicated in the table. Standard errors are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

B Appendix: Model

Child Gender Preference as a Proxy for Preferences for Family Time

This appendix adapts a simple time-allocation framework (in the spirit of Cortés and Pan, 2023) to clarify why *revealed* preferences over child gender can be interpreted as an indicator of the parent's willingness to substitute away from the work sphere toward the family sphere. The key idea is that, holding wages and constraints fixed, a parent who receives higher utility from time at home when the child is of their preferred gender will optimally choose more home time (e.g., longer parental leave, fewer market hours, inactivity). Observing systematically larger reductions in market work for one child gender therefore reveals a stronger weight on family time relative to work.

A household has two parents $i \in \{m, f\}$ and chooses market work hours $h_i \in [0, 1]$, where $1 - h_i$ denotes time at home with the child. Parent i earns a market wage w_i per unit of market time. Let $g \in \{\text{son}, \text{daughter}\}$ denote the child's gender. We model child-gender preference as a shift in the marginal utility from family time:

$$\beta_i^g \quad \text{with} \quad \beta_i^{\text{fav}} > \beta_i^{\text{non-fav}},$$

so that family time is more valuable when the child is the parent's preferred gender. We assume utility is additively separable in (i) household income and (ii) "effective" home time, with diminishing returns in the latter:

$$\max_{\{h_m, h_f\}} \; w_m h_m + w_f h_f \; + \; \beta_i^g \ln\Big(\alpha_m(1 - h_m) + \alpha_f(1 - h_f)\Big). \tag{4}$$

The term inside the logarithm is total effective home time, allowing parents' time to differ in productivity via $\alpha_m, \alpha_f > 0$ (e.g., due to comparative advantage or institutional constraints). The parameter β_i^g governs how willing parent i is to sacrifice the work sphere (market earnings) to gain family time. A higher β_i^g increases the marginal value of an additional unit of home time and therefore reduces optimal market work for that parent, all else equal.

Let's consider a plausible special case (mother chooses, father works full time). Consistent with the empirical setting where mothers take the majority of leave, assume the father works full time ($h_f = 1$). Then the mother's choice problem becomes

$$\max_{h_m \in [0,1]} \; w_m h_m + w_f \; + \; \beta_m^g \ln\big(\alpha_m(1 - h_m)\big). \tag{5}$$

The first-order condition implies

$$w_m \; = \; \frac{\beta_m^g}{1 - h_m},$$

so the interior optimum is

$$h_m^*(g) = 1 - \frac{\beta_m^g}{w_m}. \tag{6}$$

Comparative statics are:

$$\frac{\partial h_m^*(g)}{\partial \beta_m^g} = -\frac{1}{w_m} < 0 \quad \Longleftrightarrow \quad \frac{\partial (1 - h_m^*(g))}{\partial \beta_m^g} = \frac{1}{w_m} > 0. \tag{7}$$

Hence, if the mother prefers daughters to sons in the sense that $\beta_m^{\text{daughter}} > \beta_m^{\text{son}}$, then

$$1 - h_m^*(\text{daughter}) \; > \; 1 - h_m^*(\text{son}),$$

i.e., she optimally chooses more home time (longer leave / fewer market hours) when the child is a daughter.

Equation (6) shows that, with wages and constraints held fixed, differences in work reductions across child gender map directly into differences in β_m^g, the weight placed on family time relative to market work. In this sense, child-gender preference provides a revealed-preference proxy for the work–family tradeoff: parents are more willing to "give up" market work when the child is of their preferred gender, because the marginal utility of family time is higher. This logic underlies our interpretation of gender-differential parental leave taking and subsequent adjustments in labor supply and job characteristics as manifestations of heterogeneity in the work–family balance valued by parents.