Child Penalties and Fertility across Sectors (Preliminary)*

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Abstract

Women working in female-dominated industries tend to have higher fertility rates. These industries are characterized by lower working hours, limited overtime, reduced child penalties, and lower returns to hours, but they also offer lower wages. We find that women exhibit significantly higher probabilities of switching to these industries before childbirth, as these sectors provide greater flexibility and lower 'per-child' penalties, enabling higher fertility. Using a heterogeneous agent model with fertility and industry choice, we show that women strategically use sector choice and the time-expenditure trade-off to minimize child penalties. While industries with higher female concentration show greater child penalties overall, this relationship is driven by higher fertility rates among women in these sectors. Our findings highlight the endogeneity of fertility and child penalties, which must be considered when comparing groups across countries or studying their evolution over time. In an era of low and declining fertility, attempts to address gender inequality, driven mainly by child penalties, might be confounded by fertility choices.

Key words: child penalty, fertility, sectoral gender segregation, job switch, quality-quantity trade-off

JEL Codes: E24, J13, J22, J24

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1 Introduction

Women suffer income losses compared to men after the birth of a child, known as "child penalties". There is a significant amount of work documenting the heterogeneity of child penalties across different groups of people, various countries, or the evolution of child penalties over time (Kleven, 2022; Kleven, Landais and Leite-Mariante, 2023). At the same time, given low and declining fertility rates in the developed world, there is an effort to understand heterogeneity in fertility decisions, as well as the impact of policies aiming at decreasing the burden of children on families (Albanesi, Olivetti and Petrongolo, 2023; Bloom, Kuhn and Prettner, 2023; Doepke, Hannusch, Kindermann and Tertilt, 2023; Wang, 2022). However, there is little evidence of the endogeneity of child penalties and fertility when comparing groups of people, which is the key concern we address in this paper. Not accounting for such interactions might lead to biased implications, where policies might fail to address the actual aim.

Women and men work in different types of occupations and industries. Despite occupational gender convergence (Blau and Kahn, 2017), sectoral segregation remains (Adsera and Querin, 2023) and is growing further together with higher female participation and shown to be driven by changing preferences of married women in those sectors rather than discrimination(Alon, Coskun and Olmstead-Rumsey, 2022). The gender structure of the labor market is important not only for gender inequality but also due to its implications on other outcomes, such as fertility, as shown by Coskun and Dalgic (2023). Moreover, Goldin (2014) argues that women are sorted into "linear" jobs with lower and predictable hours but with lower returns to experience. Erosa et al. (2022) show that gender differences in home production time can account for observed gender differences in occupational sorting and wages.

This paper analyzes child penalties and fertility across different sectors and individuals' strategic job-switching behavior around the time of the first birth. We use the administrative records from the Netherlands between 2006 and 2023, covering the entire Dutch population. The advantage of using Dutch data arises not only because of its rich administrative records (incl. birth records, job histories, household compositions, etc.) which allows us to exploit heterogeneity with good sample size but also because the Netherlands is a country with relatively high gender hours gap (13 hours per week, in Nordic countries, in Denmark for instance, this number is 7.7 (Alon, Coskun and Olmstead-Rumsey, 2022)), for which we expect to see stronger responses of women to the birth of a child. Moreover, the overall child penalty is also on the high side (47%, Artmann, Oost-

erbeek and van der Klaauw, 2022), compared to, for instance, 20% in Denmark (Kleven, Landais, Posch, Steinhauer and Zweimüller, 2019b).

We find that fertility (on the intensive margin) is significantly higher in female-dominant sectors (Figure 1).[1] One could think that female-dominant sectors have certain characteristics that allow women to stay attached to the workforce by easing the work-childrearing balance. Overall, total child penalties (calculated conventionally) in these sectors are high as well (Figure 4). However, when we restrict our sample to women who only had one child at the end of the observation period in 2023, we estimate fertility being higher in sectors where the one-child penalty is lower, which points towards a self-selection mechanism of women who plan higher fertility. Indeed, we document that women, relative to men, have significantly higher sector switching probabilities, which peak four years before the birth of the first child and remain high after that as well (Figure 5). Moreover, this higher switching probability is entirely driven by switches towards female-dominant sectors (the opposite is observed for male-dominant sectors). We further show that women exhibit strategic behavior not only before the birth of the first child but also after if they plan more children (Figure 6).

We build a heterogeneous agent model where women decide on fertility, how much time to spend with their children, which sector to work in, as well as switch possibilities between periods. Our model features endogenous child penalties from three sources. First, women spend time with their children to contribute to their human capital, which means they spend less time working. Second, due to working less, there is a sector-specific wage reduction. Third, women with high fertility preference might choose to work in linear sectors even though their non-linear sector productivity is higher, in order to reduce implied child penalty.

We show that women with a strong preference for fertility tend to sort into the linear industry, which offers lower average wages but also lower returns to working hours. In our model, women who are productive in both industries initially work in the nonlinear industry but later switch to the linear industry, enabling them to have more children without incurring large child penalties. Beyond the traditional quality-quantity trade-off, women also face a time-expenditure trade-off, allowing them to allocate either more resources or more time to invest in their children's quality. Highly productive women typically choose spending resources over time, enabling them to sustain longer working hours and avoid child penalties. Using our model, we calculate motherhood penalties

[1] The same pattern is observed when only the intensive margin is considered, see Figure 15.

that also take into account industry choice; some women can work in the linear industry to have more children even though they are more productive in the non-linear industry. However, we find that this effect is very small; women essentially use the time-expenditure trade-off to escape child penalties.

Our findings suggest that female-dominant sectors have certain characteristics that appeal not only to women who wish to become mothers but also to men who would like to have more than one child. Adsera and Querin (2023) suggests that women's jobs generally require more contact with others, less autonomy in decision-making, and less time pressure; and mothers receive a lower return to these occupational characteristics than fathers do. Mas and Pallais (2017) shows that women are more likely to select flexible work arrangements than men; they do place a higher value on working from home and avoiding irregular work schedules than men, which is particularly true for women with young children. As Goldin (2014) suggests, more flexible practices in the workplace could possibly alleviate the remaining part of the gender gap. Aaronson, Dehejia, Jordan, Pop-Eleches, Samii and Schulze (2020) argue that the declining female labor supply response to fertility is particularly strong in wage work that is likely the least compatible with concurrent childcare. Pepin and VanderBerg (2021) find that children increase multidimensional occupation-skill mismatch among working mothers where improvements in labor market outcomes among fathers in response to children, rather than worsening labor market outcomes among mothers, seem to drive child penalties. Albanesi, Olivetti and Petrongolo (2023) suggests that widening motherhood penalties across recent cohorts might be because women increasingly enter professional occupations that tend to penalize career breaks and shorter hours, feeding into higher motherhood penalties. Fontenay, Murphy and Tojerow (2021) shows that in Belgium, sector-level child penalty and specific sectors' characteristics (such as work-life balance, atypical schedule, and irregular hours) are correlated. Using German data, Bächmann, Frodermann and Müller (2020) find that organizational family-friendly measures positively influence women's return to the labor market after childbirth and thus result in benefits for both firms and employees. This evidence indicates that child penalties are not entirely driven by gender norms or preferences. If this was the case, we would not expect such strategic behavior in switching types of jobs that will allow women to have children. It is more appropriate to conclude that women have fertility preferences (both on the extensive and intensive margin) and, given the asymmetry in the labor market, make strategic choices to minimize the overall child penalty accordingly.

Our contribution with this paper is threefold. First, using the heterogeneity across sectors and a unified setting, we show how child penalties and fertility levels are linked to each other empirically and how certain measurement comparisons might be misleading due to changing fertility and its impact on the level of child penalty. To highlight the importance of this endogeneity when making cross-country or over time comparisons in child penalties, one might think of an example where observed child penalties decline over time, which might be entirely driven by the decline in fertility. Second, although several studies mention the possibility of such a strategic behavior of women while planning to have a child (Rabaté and Rellstab, 2022), clear documentation does not exist to the best of our knowledge. Further, we provide evidence that women not only self-select into certain sectors in general but also particularly self-select before the birth of the first child and continue to do so if they plan more children. Third, by using a heterogeneous agent model, we highlight different channels in this strategic behavior, such as quality-quantity trade-off, and we quantify the effect of job switching on observed child penalties.

On the one hand, below replacement-level fertility rates in the developed world raise concern for policymakers, and there has been an effort for decades in many of these countries to address the concern. On the other hand, gender inequality in labor market outcomes is explained largely by motherhood in the developed world (Kleven, Landais and Leite-Mariante, 2023). Hence, we argue that fertility decisions and child penalties are largely endogenous, which affects women's sorting behavior in the realization of fertility, which in turn affects their labor market outcomes. A thorough understanding of the characteristics of female-dominant sectors is crucial to address both concerns: low fertility and high gender inequality.

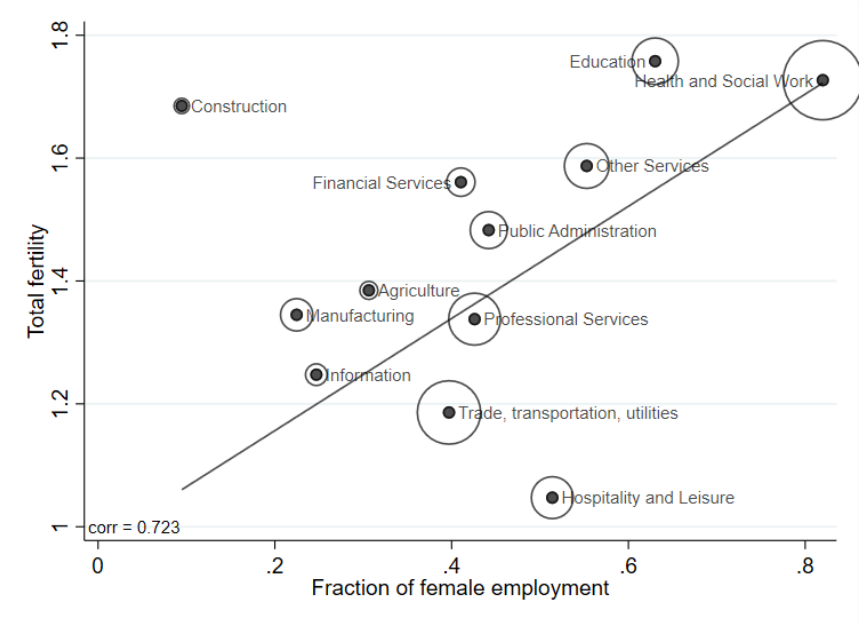
2 Facts on fertility and sectors of employment

In this section, we summarize two facts on fertility and our findings from the child penalty estimation in the Netherlands. We use the Statistical Classification of Economic Activities in the European Community (NACE 1st level), which originally includes 21 sectors. Still, we regroup some small sectors that are close in tasks/ topics and use 13.[2] Our findings align with Artmann, Oosterbeek and van der Klaauw (2022), where they also investigate the heterogeneity of child penalties in the Netherlands and find

[2]We exclude the mining (B) sector from our analysis due to the low number of observations. See the Appendix for the definition of NACE sectors and how we re-group them.

substantial differences across fields of study.

Figure 1: Fertility and Female Share across Sectors



Notes: The figure plots the sector-level employment share of women and the total number of children (by the end of 2023) excluding the childless, i.e., the intensive margin. We also report the weighted correlation coefficient by the sector size within female employment.

2.1 Fertility is higher in female dominant sectors

In Figure 1, we show the female employment fraction on a sector level and the final number of children at the end of the observation period (in 2023).[3] We reweigh the sectors according to their size within female employment to obtain a meaningful correlation coefficient of total fertility and female employment share. We show a significant positive correlation; sectors that employ more women are sectors where working women have more children on average.

2.2 Sector Characteristics

Female-dominated sectors have been shown to have different characteristics. In Figure 2, we show that sectors with a higher share of women tend to have, on average, lower

[3]We include childless men and women as well so that the figure captures the intensive and extensive fertility margins. We pool the calendar years 2016 to 2018 of the employment records to recover the employment sector. Focusing only on men and women who become a parent at some point up until 2023 (i.e., only the intensive margin) does not change this pattern, as shown in Figure 15.

annual incomes (panel (a)), lower working hours (panel (b)), and are less likely to have employees work overtime (panel (c)). The latter two are in line with higher flexibility in terms of work-life balance, which could explain why women sort into these sectors around the birth of their first child (or if they have higher fertility preferences).

In light of gender gaps in careers/ earnings, one question is whether the higher flexibility in female-dominated sectors comes with a cost of slower career advancement. Having shown that fertility is higher in female-dominated sectors, we next investigate how fertility relates to sector characteristics such as returns to employment and riskiness. To calculate the returns to employment in each sector, we calculate the year-to-year log wage growth and use its standard deviation as a measure of sector riskiness.[4] As shown in Figures 3a and 3b, sectors that are riskier and have higher returns to employment have lower fertility rates. Looking closely shows that female-dominated sectors (e.g., health and social work or education) are sectors with lower returns and lower riskiness. Interestingly, these sectors show a lower one-child penalty, i.e., the child penalty (relative loss in earnings due to the arrival of the first child) of mothers vs. fathers who only have one child.

2.3 Child Penalty and Fertility Across Sectors

To estimate child penalties, we built on the framework developed by (Kleven, Landais and Søgaard, 2019a) and estimate the following regression separately by gender (g):

$$Y_{ist}^g = \sum_{j \neq -1} \alpha_j^g I[t = j] + \sum_k \beta_k^g I[k = age_{is}] + \sum_y \gamma_y^g I[y = s] + \nu_{ist}^g \tag{1}$$

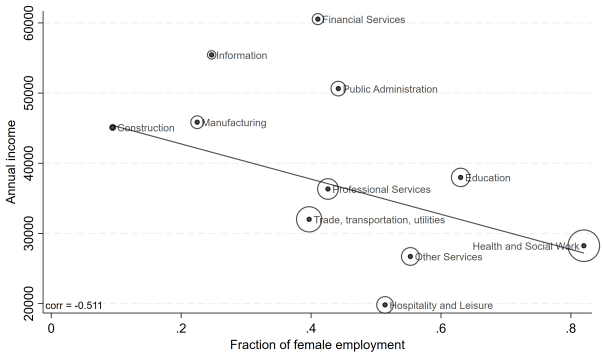
where Y_{ist}^g denotes the earnings of individual i, in calendar year s, at event time t. The first term captures a full set of event time dummies, where event time $t = 0$ marks the birth of the first child[5].

To understand whether and how child penalties relate to sectors regarding their female representation and other characteristics, we compare motherhood penalties across sectors for mothers with multiple children and those who have one child only. We argue

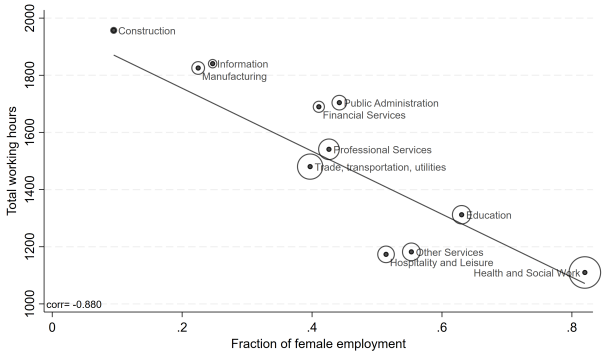
[4]Since part-time employment is very prevalent in the Netherlands, we calculate all employment measures in full-time equivalents.

[5]We compute motherhood (and fatherhood) penalties following (Kleven, Landais and Søgaard, 2019a), i.e., we estimate the loss in labor earnings eight years after the first child's birth relative to the mother's (or father's) labor income one year before the birth of the first child. More details can be found in Section B.

Figure 2: Sector Characteristics and Female Employment Share



(a) Annual Income



(b) Total Working Hours



(c) Overtime Occurrence

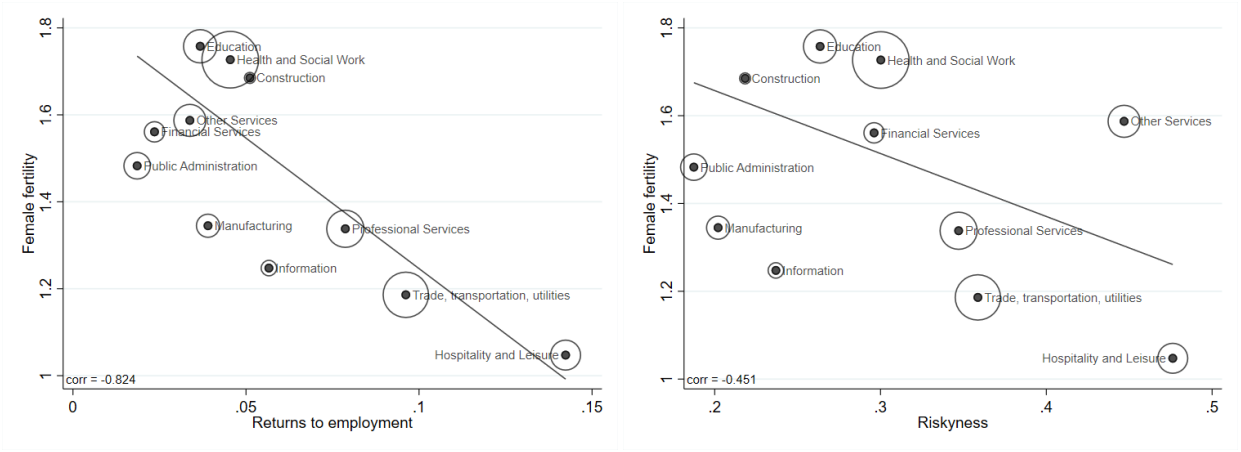
Notes: This figure shows how different employment characteristics correlate with the female employment share across sectors. Panel (a) plots the annual income, panel (b) annual working hours, and panel (c) whether overtime occurs. The sectors are reweighed according to sector size within female employment to obtain meaningful correlation coefficients (reported in the bottom left corner of each panel).

that a part of the child penalty is endogenous; women choose to have more or less children, which influences the amount of income loss they face after giving birth.

Panel (a) in Figure 4 shows that female dominant sectors have higher overall child penalty when calculated in a conventional way. This observation is counterintuitive however panel (b) shows a strong correlation between the sector-level one-child penalty of mothers and the sector-level final fertility. This means that women who are sorted into sectors with lower one-child penalties end up having more children, which might be the rationale behind their sorting[6].

[6]In Appendix Figure 12, we report 1-child and multiple child penalties for men and women separately.

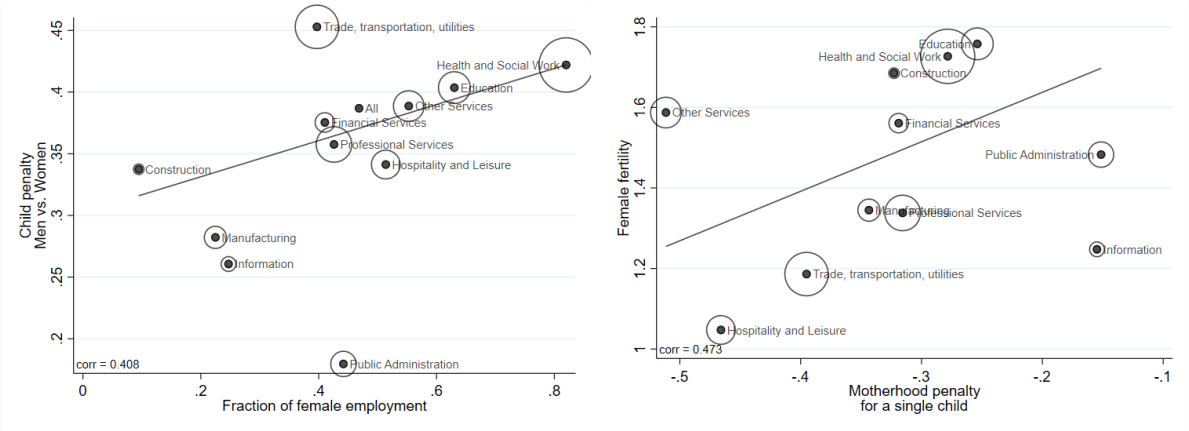
Figure 3: Fertility and sector characteristics



(a) Returns to employment (b) Riskiness

Notes: The graph in panel (a) plots the returns to employment by sector and how it relates to total fertility rates. In panel (b), each sector's riskiness is plotted against total fertility rates. Correlation coefficients are reported in the bottom left corner.

Figure 4: Child Penalties and Fertility across Sectors



(a) Overall Penalty and Female Share (b) One-Child Penalty and Fertility

Notes: The figure plots the sector-level employment share of women and the total number of children (by the end of 2023) including the childless, i.e., the intensive margin. We also report the weighted correlation coefficient by the sector size within female employment.

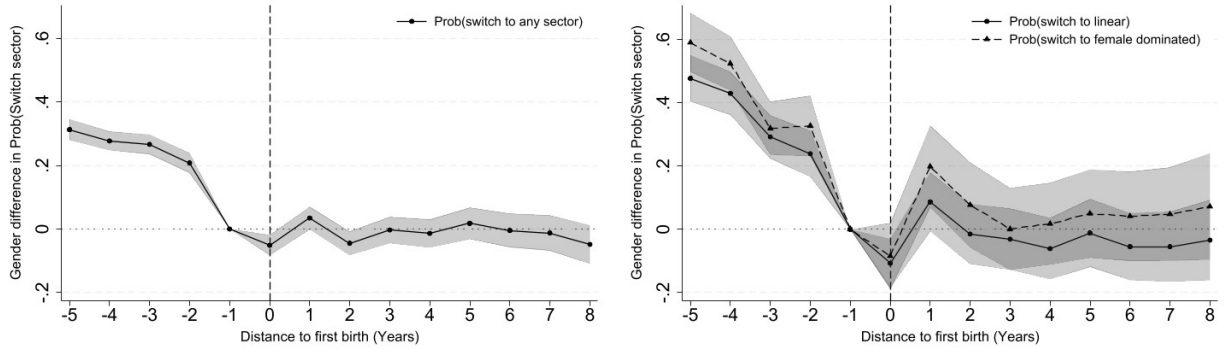
2.4 Women switch to female dominant sectors, especially before birth

We are interested in how women and men switch between sectors (or groups of sectors) around the time of their first birth. For this purpose, we extend the framework developed by Kleven, Landais, Posch, Steinhauer and Zweimüller (2019b) as follows:

$$
\begin{aligned}
Y_{ist} = & \sum_{j=-5, j\neq -1}^{8} \alpha_j I[t=j] + \sum_{j=-5, j\neq -1}^{8} \alpha_j^F \left(I[t=j] * female\right) \\
& + \sum_k \beta_k I[age=k] + \sum_k \beta_k^F \left(I[age=k] * female\right) \\
& + \sum_s \gamma_s I[year=s] + \sum_s \gamma_s^F \left(I[year=s] * female\right) \\
& + \delta female + \nu_{ist}
\end{aligned} \tag{2}
$$

where Y_{ist} indicates whether i switched the employment sector, in calendar year s, at event time t. The coefficients of interest are the α_j^F's capturing the difference in women's vs. men's probability of switching to another sector (or to a female-dominated sector). To scale the effects (and gender differences) we convert the coefficients into percentage changes due to the arrival of the first child.[7] We plot the gender difference in the average decrease in the switching probability relative to one year before the first child's arrival in Figure 5. Panel (a) considers the probability of switching to any sector, and panel (b) focuses on the probability of switching to a female-dominated/ linear sector.

Figure 5: Sector Switching around Birth



(a) Any Sector

(b) Female Dominant/ Linear Sectors

Notes: The graphs plot the α_j^F's of regressions estimated using specification (2). In panel (a), the switch to any sector, and in panel (b), the switch to a female-dominated/ linear sector is considered. We define female-dominated sectors as P (Education), Q (Human Health and Social Work Activities), S (Other Service Activities) and T (Activities of Households as Employers). See Appendix Table 6 for the definition of linear sectors.

We find that women, compared to men, have a significantly higher likelihood of switch-

[7]We employ the percentage loss conversion as in the conventional child penalty estimation by comparing the coefficients (here α_F) to the predicted outcome (here switch probability) absent of the first child.

ing sectors before birth, which is driven by the switch to female-dominant/ linear sectors (education, health, and other services) as shown in Figure 5b. Furthermore, we observe that the differential switch probability to female dominant/ linear sectors peaks five years before birth and remains positive. In particular, the average probability of switching sectors one year before birth is 9.44%. As shown in panel (a) of Figure 5b, before the birth of the first child, women compared to men are more than 20% more likely to switch sectors relative to one year before birth. However, these gender differences vanish after birth (though the switch probabilities of both genders remain positive). The higher switch probabilities are mainly driven by switches into female dominated/ linear sectors, as shown in panel (b) of figure 5b. These results indicate a strategic behavior of women when they plan their first and even subsequent children.

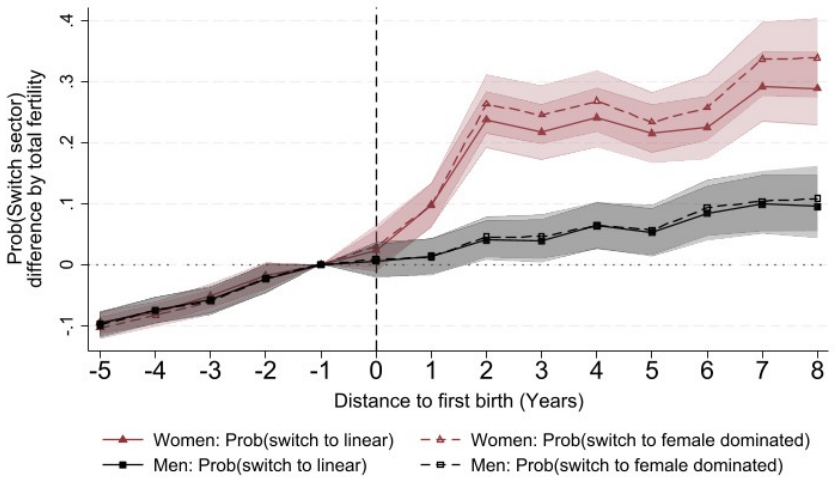
Next, we analyze differential switches to female sectors for mothers and fathers with one vs. more children. To do this, we adjust specification (2). We interact the event dummies with an indicator for having one child only (vs. more) and an indicator for being employed in a female-dominated sector (vs. a male or neutral sector).[8] Figure **??** reports these triple interaction coefficients, i.e., the differential switching probability of mothers (in red triangles)/ fathers (in black squares) who have one vs. more than one child at the end of the observation period, and whether the mother/ father switches to female dominant or other sectors. Again, we translate the estimated coefficient into percentage changes relative to one year before the first child's birth, where the probability to switch sectors is on average 10.94%. Before the birth of the first child, we find no difference in the switch probability relative to one prior to birth between women with different fertility preferences. However, after the birth of the first child, women who, in the end, have more than one child are more likely to switch to female-dominant/ linear sectors than to other sectors compared to women with one child only.[9] This result indicates that women who have strong fertility preferences self-select into female-dominant sectors. This selection seems to intensify strongly after the birth of the first child. In particular, women who have more than one child at the end of 2023 are more likely to switch to female-dominated sectors rather than any other sector compared to single-child mothers. Furthermore, although fathers who, in the end, have more than one child

[8] We use a fully interacted model, i.e., controlling for the interacted time- and life-cycle trends.

[9] The numbers plotted here report a triple interaction. For example, the red filled triangle at 2 indicates that women with higher fertility preferences (i.e., with more children at the end of the observation period) are on average 24% more likely to switch to female dominated/ linear sectors rather than other sectors compared to women with lower fertility preferences measured relative to their switch probability one year before birth.

also exhibit a similar pattern, the pattern is a bit flatter, and the differences are smaller in magnitude.

Figure 6: Switch to Female Dominant/ Linear Sectors



Notes: The graph plots the triple interaction coefficients from an extension of specification 4 in which we interact the entire model with a dummy for having multiple vs. one child and switching to a female-dominated vs. another sector, with switches as an outcome. Coefficients are translated into percentage changes relative to one year before the birth of the first child. We define female-dominated sectors as P (Education), Q (Human Health and Social Work Activities), S (Other Service Activities), and T (Activities of Households as Employers).

Finally, although the decision to have a child is more important to women due to its impact on future labor market outcomes, men also might exhibit strategic behavior if they want to have one or more children. We show that men who work in female-dominant sectors also have more children [10] and receive earning bonuses in those sectors if they have more than one child (which is not explained by overtime work) (Figure 12d). Furthermore, men are also more likely to switch to those sectors (Figure 6). According to Bang (2022), when a husband's job exhibits low flexibility, couples are more likely to specialize, with the wife dropping out of the labor market after childbirth and the husband increasing hours worked. In contrast, more flexible couples show less labor supply adjustment to childbirth.

[10] We can calculate male fertility only for fathers listed in the birth records, which leads to an overestimation of fertility on the intensive margin due to the possibility that men in stable relationships being more likely to be registered and have more children.

3 Model

In this section, we build a heterogeneous agent model of fertility and industry choice where child penalties are endogenous. The purpose of the model is to quantify the effect of fertility heterogeneity on the sector choice, the switch between sectors, and implied child penalties. Motivated by lower returns to experience and lower income in sectors where women work more and have more children (Figure 2 and 3) and they switch to those sectors both prior to after birth (Figure 5 and 6), we quantify child penalties which take into account endogenous industry choice.

The model is in the spirit of Erosa et al. (2022) and Adda et al. (2017). There are two sectors in the economy (linear vs non-linear as in Erosa et al. (2022) and Goldin (2014)). In the model, women live for two periods. They make decisions regarding consumption (c_t)-saving (b_0), fertility (n_t) and quality of children (q_t), and which industry to work in (s_t). They are heterogeneous with respect to their fertility preference (γ_i) and productivity in each sector (z_{sit}) where s is a sector, some individuals have higher productivity in services vs. manufacturing, etc.). The parameter γ_f governs the fertility preference difference between two periods, in order to account for high average age at the first child. Women face the following time constraint,

$$(h_t + \tau)n_t + l_t = 1$$

where l_t is the labor supply.

$$\begin{aligned}
\max_{c_0,c_1,n_0,n_1,q_0,q_1,h_0,h_1,e_0,e_1} V = &\log(c_0) + \beta \log(c_1) + \gamma_i \frac{(n_0 q_0)^{1-\eta}}{1-\eta} + \beta \gamma_f \gamma_i \frac{(n_1 q_1)^{1-\eta}}{1-\eta} \\
c_0 + (e_0 + \bar{e})n_0 + b_0 &= w_{s0}\left(1 - h_0 n_0 - \tau n_0\right) \\
c_1 + (e_1 + \bar{e})\, n_1 &= w_{s1}\left(1 - h_1 n_1 - \tau n_1\right) + b_0 R
\end{aligned}$$

Wage is composed of industry-specific productivity (z_{sit}), returns to experience in sector s (μ_s)[11], fixed time cost of children (τ), and endogenous child penalty by the time away from the market and spent with children (h_t). $\bar{e}$ is an exogenous fixed cost of children, and e_t is a resource spent for children, which contributes to the human capital of children and families choose.

[11] Wage formulation is similar to Erosa et al. (2022) in the sense that time spent for children both reduces the work hours and their hourly wages.

$$w_{s0} = z_{si0}\left(1 - h_0 n_0 - \tau n_0\right)^{\mu_s} \tag{3}$$
$$w_{s1} = g_{zi} z_{si1}\left(1 - h_0 n_0 - \tau n_0\right)^{\mu_0}\left(1 - h_1 n_1 - \tau n_1\right)^{\mu_1}$$

Wage growth g_{zi} is defined as $g_{zi} = z_{si0}^{g\mu_0}$ where g is a fixed parameter. This form implies that people who have high productivity in the first period also see high income growth. At the same time, if the person is in the linear sector, the income growth is smaller than the one in the non-linear sector. As a result, the wage in the second period depends on the wage in the first period, a fixed growth rate depending on the sector in the first period, and how much the person is penalized because of a child both in the first and in the second period. We emphasize that wage depends positively on working hours. The more a woman works, the higher the wage she earns, which reflects returns to experience and/or returns to overtime and bonus. Returns to working more depend on the parameter μ_s which is industry specific. Certain industries have higher returns to experience and/or higher overtime.

γ_i is a woman-specific child utility parameter, some women derive higher utility from having children than others. Women get utility from both the quantity and the quality of children. The quality of children is determined by time and good cost of children;

$$q_t = \left(\omega h_t^{1-\sigma} + (1-\omega) e_t^{1-\sigma}\right)^{\left(\frac{1}{1-\sigma}\right)}$$

Our model features endogenous child penalties from three sources. The first source captures that women spend time with their children to contribute to their human capital (h), which means they spend less time working. The second source of child penalty is the wage reduction due to working less (experience and/or overtime loss)(Equation 3). The last source is the endogenous industry choice. Women with high fertility preference might choose to work in linear sectors even though their non-linear sector productivity is higher, in order to reduce implied child penalty.

Calibration

We assume one model period is 15 years where we have women at age 20-35 in the first period and at age 35-50 in the second period. We consider two industries ($s = L, NL$), one with high returns to experience and one with low returns to experience. The only

difference between these industries is the value of μ, i.e., how much wage depends on working. We simulate a large number of women who are heterogenous with respect to 3 dimensions: productivity in linear (z_{li}) and nonlinear (z_{ni}) sectors and fertility preference (γ_i). z_{li}, z_{ni} and γ_i are jointly normally distributed $\mathcal{N}(M, \Sigma)$, where Σ is the variance covariance matrix (See Section D.1 for details). We look at the choices of women with high vs low utility for children (γ_i). We solve the model using the parameters in Table 1. Table 2 shows targeted and untargeted moments generated by our model.

Variable	Description	Value
β	Time Discount	0.90
R	Interest Rate	1.11
γ_f	Fertility Discount	4.05
σ	Elasticity Quality	2.00
η	Fertility Curvature	2.00
τ	Basic Time Cost	0.03
$\bar{e}$	Basic Good Cost	0.26
μ_0	Linear Sector - Returns	0.10
μ_1	Non-Linear Sector - Returns	0.30
g	Income Growth	3.00
$\bar{z}_0$	Linear Sector - Mean	1.00
$\bar{z}_1$	Non-Linear Sector - Mean	1.10
$\bar{\gamma}$	Fertility Pref.- Mean	0.05
$\sigma(z_0)$	Linear Sector - Std	0.25
$\sigma(z_1)$	Non-Linear Sector - Std	0.25
$\sigma(\gamma)$	Fertility Pref.- Std	0.50
σ_0	Linear Sector - Fertility Pref Corr	0.15
σ_1	Non-Linear Sector - Fertility Pref Corr	-0.10
σ_2	Linear - Non-Linear Sector Corr	0.40

Table 1: Parameters

Targeted Moments	Definition	Data	Model
n_0	Fertility in period 0	0.55	0.53
n_1	Fertility in period 1	1.07	1.05
$P(nonlinear)_0$	Fraction of women in nonlinear sector in period 0	0.52	0.61
$P(nonlinear)_1$	Fraction of women in nonlinear sector in period 1	0.45	0.58
$P(switch\|linear)$	Probability of sector switch if linear in period 0	0.03	0.03
$P(switch\|nonlinear)$	Probability of sector switch if nonlinear in period 0	0.12	0.06
Untargeted Moments			
$n_0\|nonlinear$	Fertility in period 0-nonlinear sector	0.41	0.53
$n_1\|nonlinear$	Fertility in period 1-nonlinear sector	1.08	1.03
$n_0\|linear$	Fertility in period 0-linear sector	0.69	0.53
$n_1\|linear$	Fertility in period 1-linear sector	1.04	1.06
$Penalty(L-L)$	Penalty of women in linear jobs both period	-0.34	-0.41
$Penalty(NL-NL)$	Penalty of women in nonlinear jobs both period	-0.46	-0.45
$Penalty(L-NL)$	Penalty of women in first L, then NL jobs	-0.33	-0.4
$Penalty(NL-L)$	Penalty of women in first NL then L jobs	-0.49	-0.44

Table 2: Data Targets

4 Results

In this section, we emphasize the significance of sector choice and the quality-quantity trade-off in our model. We demonstrate that women with a strong preference for fertility tend to work in the linear sector, both initially and as they transition to the linear sector in the second period. In our framework, women face a time-expenditure trade-off in addition to the traditional quality-quantity trade-off. Women can maintain longer working hours by allocating more resources rather than time to their children's quality. High-wage women, in particular, choose to invest more in resources than time to reduce child penalties.

4.1 Sector Choice and Fertility

In our model, women with higher fertility preference (γ_i) have higher fertility in both periods, as shown in Figure 7. Moreover, women with higher fertility preference are less likely to work in non-linear sectors and more likely to switch from non-linear to linear sectors (Figure 8).

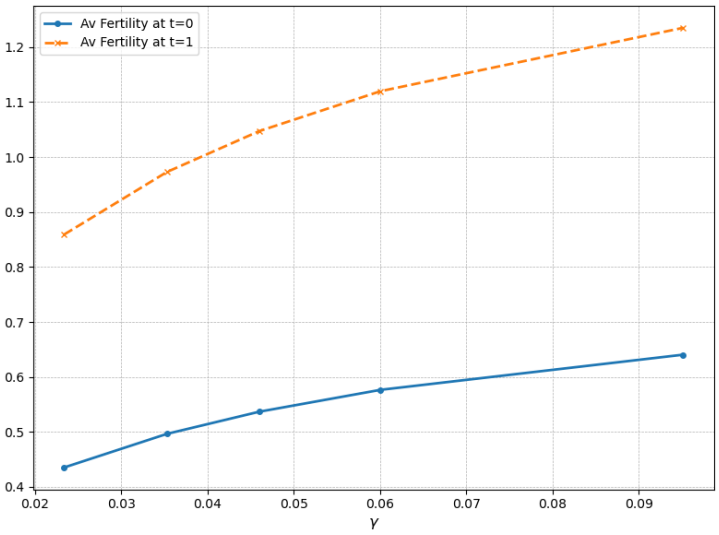


Figure 7: Fertility with respect to preferences

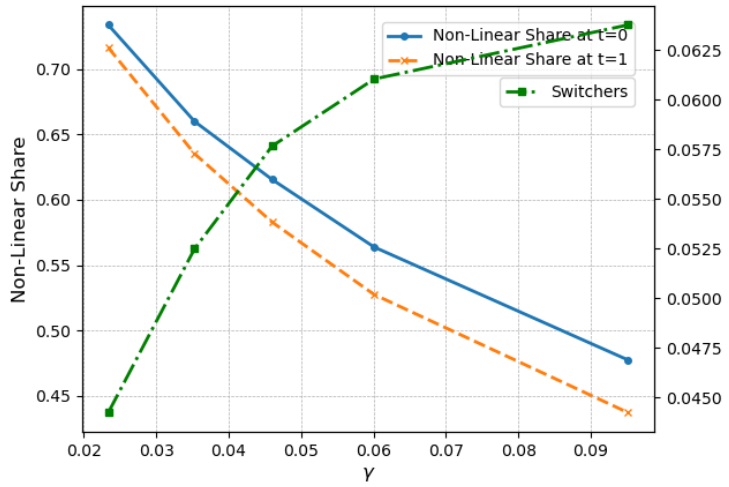


Figure 8: Sector Choices with respect to preferences

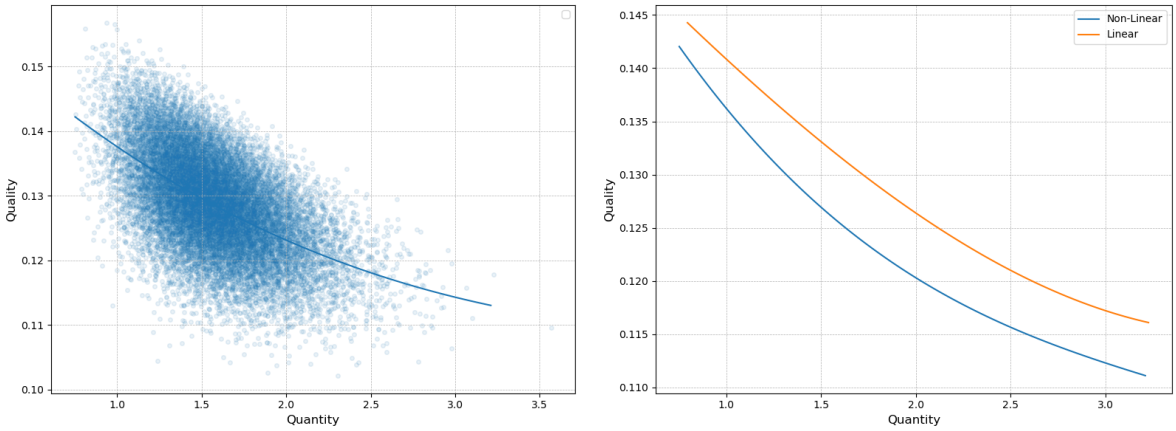
In the model, women who place higher utility to children to self-select into more 'family-friendly' industries. In our framework, the family friendliness of an industry is summarized by the parameter μ_i: how much the wage rate depends on working hours. Women self-select into industries in which working less (therefore spending more time with children) is penalized the least. Still, highly productive women (high z_i) can still opt to have

more children but spend less time with them. Instead, they can replace (though not perfectly) time with spending more on their children (e) through the time-expenditure trade-off.

In Appendix Section D.2, we replicate this exercise by grouping with respect to sector productivities (z_0 and z_1). We show that switchers tend to have higher productivity in both sectors. Thus, being able to switch industries allows highly productive women also to enjoy high fertility.

4.2 Quality-Quantity Trade-off

Fertility decision is linked to quality investment made for children (Doepke (2015)). It has been shown that there is a negative fertility-income relationship (Jones et al. (2010)) and a positive quality-income relationship. However, the extent of the trade-off between quality and quantity of children has changed recently due to a lower education gradient on fertility decisions (Doepke et al. (2023)) and due to marketization (Bar et al. (2018)). In other words, the number of children does not vary as much with respect to income or education as it did in previous cohorts. This observation crucially depends on how flexible families are in the quality-quantity trade-off. Our model reveals important insights about quality-quantity trade-off by taking into account heterogeneity in fertility preferences and sector choices. Our Figure 9a shows that our model simulations capture the negative relationship between quality and quantity of children. Additionally, Figure 9b shows how the degree of quality-quantity trade-off differs across women in linear and non-linear sectors at the end of the second period. Women in linear sectors have more children and higher quality on average. It is important to note that quality is determined by both parental time investment and resource expenditure; hence, by working in linear sectors, women can have more time both for quality and quantity, which results in a lower wage reduction compared to non-linear sectors. The average fertility preference of women in linear sectors is 1.73, while it is 1.49 in non-linear sectors. Hence, higher fertility preference implicitly results in a lower preference for private consumption. Moreover, as Figure 9b shows, the degree of the trade-off is different for linear and non-linear sectors; in other words, the slope is flatter in linear sectors. For an additional child, women in linear sectors should decrease quality less. In a sense, the quality-quantity trade-off is less binding, which has implications for inequality in educational investments (De La Croix and Doepke (2003)).



(a) Overall (b) Across Sectors

Figure 9: Quality-Quantity Trade-off

In the model, women choose not only between quality and quantity, but also how to obtain quality; through time or expenditure. Figure 10 shows how expenditure-time tradeoff plays in the model. Women with higher wages substitute time spent with their kids with good expenditure to avoid child penalties.

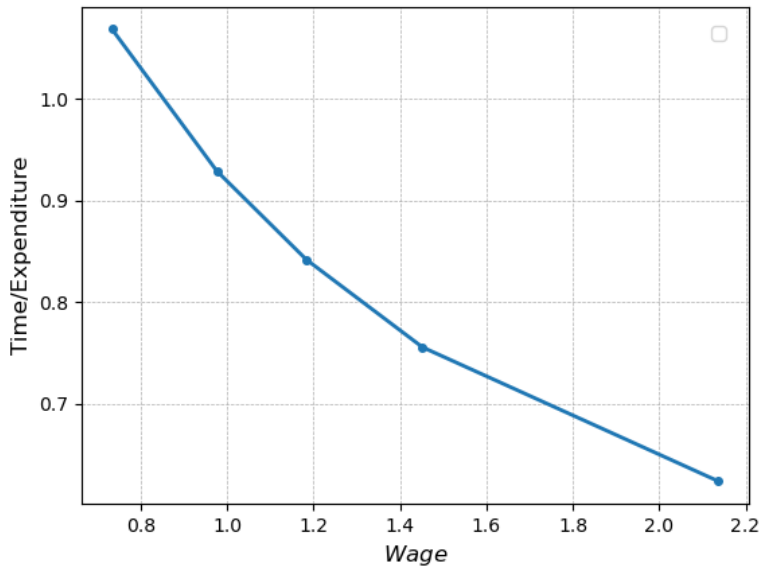
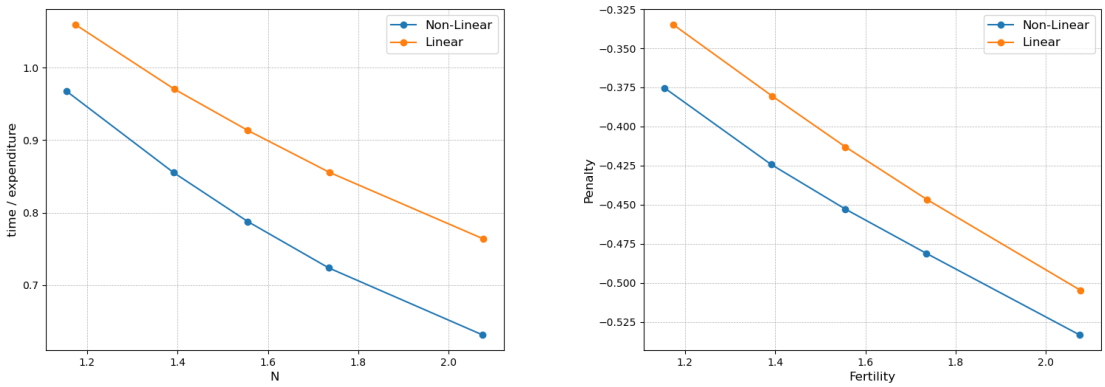


Figure 10: Time-Expenditure Trade-off and Fertility

Figure 11 shows the time-expenditure tradeoff across two sectors. Even though both sectors display the trade-off, it is sharper for the non-linear sector because time is much

more costly due to high returns to hours (Figure 11a). Note also that women in the linear sector spend more time with their children (as opposed to making expenditures). Women in both sectors incur child penalties, but penalties are lower in the linear sector. Women in the linear sector spend significantly more time with their children but incur lower motherhood penalties due to low returns to hours. (Figure 11b)



(a) Across Sectors (b) Motherhood Penalty

Figure 11: Time-Expenditure Trade-off

4.3 Counterfactual Analysis

In the model, women with high fertility preference choose the linear sector, which has lower wages but also lower child penalties. While calculating motherhood penalties, ex-ante sectoral choice is not considered because productivity is not observed. In this section, we calculate motherhood penalties taking into consideration the industry choice. We calculate the motherhood penalty as the hypothetical income received by women if they incurred zero child penalties in their current industry. We calculate the motherhood penalty with industry choice as the hypothetical income women would have received if they incurred zero child penalties, and they chose the industry which provides them the highest lifetime income.

5 Conclusion

This paper analyzes fertility, child penalties, and industry choice behavior in a unified framework. In addition to the literature that stresses the importance of social norms in determining child penalties (Kleven, Landais, Posch, Steinhauer and Zweimüller,

2019c), we argue that child penalties are endogenously determined by women's fertility preferences and strategic job (sector) choices. We show that women have a higher switching probability to specific (female-dominated) sectors before birth, and those who work in female-dominated sectors have more children on average. As the literature suggests, these sectors exhibit slightly lower 'one-child penalties' and have other characteristics, such as regular hours and less overtime work. This allows women, especially those who have higher fertility preferences, to sort into employment sectors by minimizing the losses due to children.

Furthermore, we demonstrate that women's strategic sector choices are complemented by a time-expenditure trade-off, where they can allocate resources or time to their children's quality while maintaining employment. Using a heterogeneous agent model with fertility and industry choice, we show how women effectively use industry characteristics and the trade-off to mitigate child penalties. We also identify similar strategic behavior among fathers in the data, who are more likely to switch to female-dominated sectors around the time of birth and exhibit higher fertility in these sectors.

We contribute to the literature in two ways. First, using a sector-level estimation, we highlight the interplay between heterogeneity in child penalties and fertility across different industries. Second, we show that women self-sort into sectors with "family-friendly" characteristics, such as lower working hours and child penalties, in line with their fertility preferences and minimize economic losses due to child penalties. Our findings highlight the importance of incorporating industry characteristics and fertility preferences when analyzing child penalties and gender inequality in the labor market.

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A Data

In the empirical analysis, we rely on Dutch administrative data maintained by Statistics Netherlands (Centraal Bureau voor de Statistiek, CBS) covering the entire Dutch population. The data includes information on individual and family characteristics and employment histories. We can follow the entire Dutch population's employment starting from 2006 with details on their employment contract such as working hours, employment sector, overtime, bonuses, and other information.

Documentation for each data file used below can be found at the embedded link. Please note that these are only available in Dutch.

Personal background information and fertility outcomes are combined using gpapersoontab, and kindoudertab. Labor market histories (including sector of employment) and income data are extracted from spolisbus and integraal persoonlijk inkomen.

A.1 Sample

In the estimation of the child penalties, we use a balanced sample of men and women that we can follow five years before up to eight years after the birth of the first child. Including calendar years 2006 to 2023, the children in our sample are from the birth cohorts 2011 to 2015. Table 3 provides means and standard deviations of our male and female samples. The average at the birth of the first child is 30 for women and 32 for men; around 23% of men and women are university-educated, and half of each sample switches their employment sector over our observation window. In particular, 42.76% of women and 45.94% of men switch between female-dominated, male-dominated, and neutral sectors. Allowing for switches within a sectorgroup, i.e., changing sector among the female-dominated sectors, this fraction increases to 58.8% for women and 60.87% for men. Using this balanced sample of men and women, we find that the relative child penalty eight years after the first child's birth is 38.7%. Figure 14 a) plots the event study results of our penalty estimation. In contrast to Kleven et al. (2019a)'s results from Denmark, before birth, men and women do not have parallel labor income trends. However, our results are in line with Artmann et al. (2022), who also use Dutch data from 1999 to 2019 and find different pre-trends for men and women, especially when the non-college-educated population is considered. For college-educated men and women, a parallel trend before birth is shown, accompanied by the typical decline in earnings for women but an increase in earnings after the birth of the first child. Our sample

comprises mostly non-college-educated men and women, leading to different pre-trends overall. Still, when only college-educated men and women are considered, we find the same patterns as Artmann et al. (2022). We estimate an overall penalty of 38.7%, which is a bit less than Artmann et al. (2022) and can be explained by the difference in calendar years considered. Additionally, anchoring the estimates three years instead of one year before the birth of the first child also leads to parallel pre-trends and increases the penalty after eight years to 41.96%, which is comparable to the findings of Rabaté and Rellstab (2022), who also use Dutch data (for the years 1999-2016) and estimates penalties (anchored three years before birth) between four years before and seven years after the first child's birth.

Table 3: Estimation sample - summary statistics

	Women	Men
Age at first birth	29.76	32.19
	[4.517]	[5.101]
University education	0.2275	0.2304
	[0.4192]	[0.4211]
STEM field degree	0.0340	0.3450
	[0.1811]	[0.4754]
Always in female dominated sector employed	0.1352	0.0384
	[0.3420]	[0.1921]
Never in female dominated sector employed	0.3586	0.7979
	[0.4796]	[0.4016]
Always in neutral sector employed	0.1104	0.1529
	[0.3134]	[0.3598]
Switch between sectors (across groups)	0.4276	0.4594
	[0.4947]	[0.4983]
Switch between sectors (incl. within groups)	0.5860	0.6087
	[0.4925]	[0.4880]
Observations	283,993	278,665

A.2 Variable definitions

To estimate returns to employment and the riskiness of a sector, we first transform all labor income variables into full-time equivalents. To do this, we recover a part-time

factor, determined per job per pay period by Statistics Netherlands, and captures the ratio of weekly working hours to the usual full-time working hours per week according to collective labor agreements. Returns to employment within a sector are measured using the year-to-year log-income growth based on individuals employed in a given sector for at least two years (irrespective of full- or part-time employment and whether they were employed continuously within a year). We take the standard deviation of the year-to-year log income growth as a riskiness measure. This means riskiness captures possible income fluctuations due to promotions, demotions, or discontinuous employment within a given sector. For these measures, we pool the calendar years 2016 to 2018 and include all men and women employed at some point over this time frame.

A.3 Definition of NACE sectors

A	Agriculture, Forestry and Fishing
B	Mining and Quarrying
C	Manufacturing
D	Electricity, Gas, Steam and Air Conditioning Supply
E	Water Supply; Sewerage, Waste Management and Remediation Activities
F	Construction
G	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
H	Transportation and Storage
I	Accommodation and Food Service Activities
J	Information and Communication
K	Financial and Insurance Activities
L	Real Estate Activities
M	Professional, Scientific and Technical Activities
N	Administrative and Support Service Activities
O	Public Administration and Defence; Compulsory Social Security
P	Education
Q	Human Health and Social Work Activities
R	Arts, Entertainment and Recreation
S	Other Service Activities
T	Activities of Households as Employers; Undifferentiated Goods and Services Producing Activities of Households for Own Use
U	Activities of Extraterritorial Organisations and Bodies

Table 4: NACE Industry Classification

For some of the analysis, we define female dominated sectors as P, Q, S, T when we restrict ourself to switch between sectors.

A	Agriculture, Forestry and Fishing
B	Mining and Quarrying
C	Manufacturing
D (incl. E, G, H)	Electricity, Gas, Steam and Air Conditioning Supply
	Water Supply; Sewerage, Waste Management and Remediation Activities
	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
	Transportation and Storage
F	Construction
I (incl. R)	Accommodation and Food Service Activities
	Arts, Entertainment and Recreation
J	Information and Communication
K (incl. L)	Financial and Insurance Activities
	Real Estate Activities
M (incl. N)	Professional, Scientific and Technical Activities
	Administrative and Support Service Activities
O	Public Administration and Defence; Compulsory Social Security
P	Education
Q	Human Health and Social Work Activities
S (incl. T, U)	Other Service Activities
	Activities of Households as Employers;
	Undifferentiated Goods and Services Producing Activities of Households for Own
	Activities of Extraterritorial Organisations and Bodies

Table 5: Re-grouped NACE Industry Classification

A.4 Linear and Non-Linear Sectors

In order to determine model relevant determination of linear and non-linear sectors, we analyze several characteristics of sectors. These include total hours per year, overtime occurrence, riskiness (defined as standard deviation of income), and return to employ-

ment (defined as log income growth). We define a total ranking of these 4 characteristics as the sum of individual rankings. Table 6 below shows the value and ranking of each characteristic. A lower value in each characteristic means more linear or family friendliness. Hence, a lower value in overall ranking corresponds to linear sectors coming from a composite measure. We also investigate gender-specific measures for each sector and characteristic and conclude that the ranking of these sectors does not change whether the measure is based on the full or gende-specific sample.

Linear Sectors	Annual Hours	rank	Overtime Occurrence	rank	Returns to Emp	rank	Riskiness	rank	Total Rank
P	1312	4	0.03	1	0.04	4	0.26	5	14
K	1690	8	0.07	2	0.02	2	0.30	6	18
Q	1110	1	0.10	5	0.05	6	0.30	7	19
O	1704	9	0.23	8	0.02	1	0.19	1	19
S	1182	3	0.08	3	0.03	3	0.45	11	20
Nonlinear Sectors									
C	1825	10	0.36	12	0.04	5	0.20	2	29
J	1841	11	0.13	6	0.06	8	0.24	4	29
I	1173	2	0.09	4	0.14	12	0.48	12	30
M	1541	6	0.24	9	0.08	9	0.35	8	32
F	1957	12	0.33	11	0.05	7	0.22	3	33
D	1480	5	0.24	10	0.10	10	0.36	9	34
A	1556	7	0.22	7	0.10	11	0.43	10	35

Table 6: Linear and Nonlinear Sectors

B Empirical Specification of penalty estimation

To estimate child penalties, we built on the framework developed by (Kleven, Landais and Søgaard, 2019a) and estimate the following regression separately by gender (g):

$$Y_{ist}^{g} = \sum_{j \neq -1} \alpha_j^g I[t = j] + \sum_k \beta_k^g I[k = age_{is}] + \sum_y \gamma_y^g I[y = s] + \nu_{ist}^g \tag{4}$$

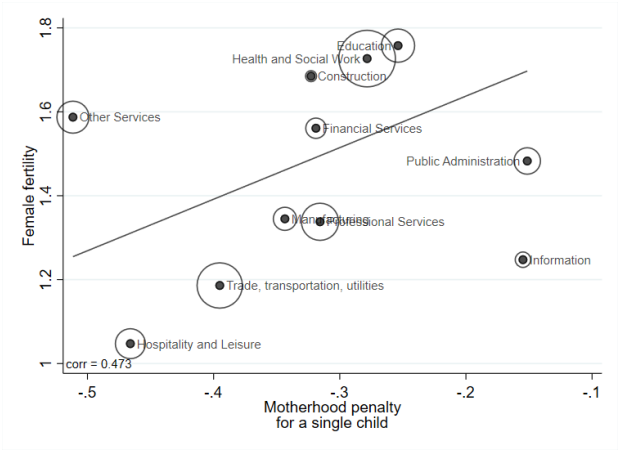
where Y_{ist}^{g} denotes the earnings of individual i, in calendar year s, at event time t. The first term captures a full set of event time dummies, where event time $t = 0$ marks the birth of the first child. Since we exclude $t = -1$, the coefficients measure the impact of the first child relative to the year before birth. The second term controls for life-cycle and the third for time trends by including sets of dummies for the age of individual i and calendar year s, respectively. The effects of all three sets of dummies are identified

by the variation in age at first childbirth after conditioning on age and year (see, Kleven, Landais and Søgaard, 2019a, for details of the method). After estimating the effect of children on men and women separately, we convert estimated level effects into percentages: $P_t^g = \frac{\hat{\alpha}_t^g}{E[\tilde{Y}_{ist}^g|t]}$ with $\tilde{Y}_{ist}^g$ capturing the predicted earnings without the contribution of the event time dummies (i.e., excluding the first term from Equation 4). We apply this transformation to interpret P_t^g as the percentage loss of average earnings that individual i of gender g experiences due to having a child in $t = 0$, i.e., to get the motherhood/ fatherhood penalty (or bonus).

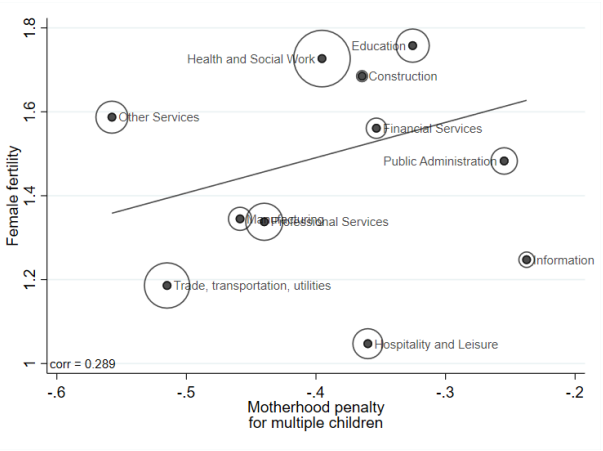
Additionally, we calculate a relative parenthood penalty, P_t, measuring the relative loss women compared to men experience at event time t due to children: $P_t = \frac{\hat{\alpha}_t^{md} - \hat{\alpha}_t^w}{E[\tilde{Y}_{ist}^w|t]}$.

C Additional Figures

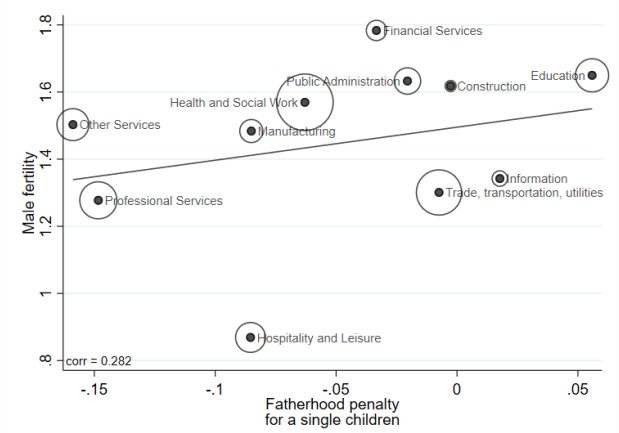
Figure 12: Child Penalty and Fertility across Sectors



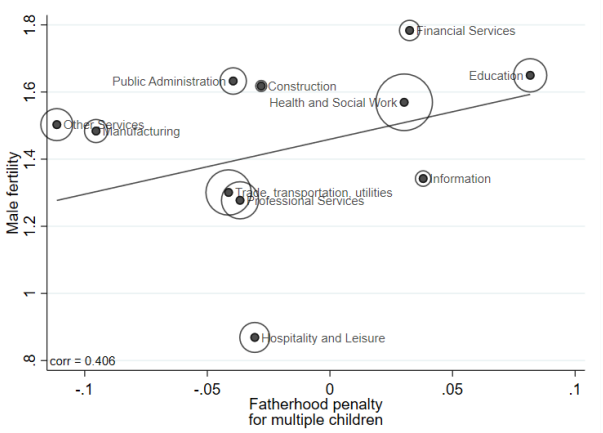
(a) Women: 1 Child



(b) Women: More than 1 Child



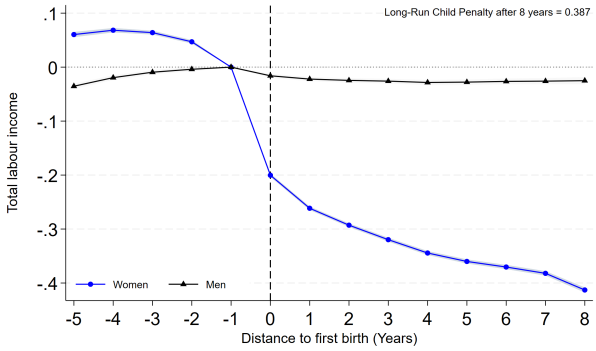
(c) Men: 1 Child



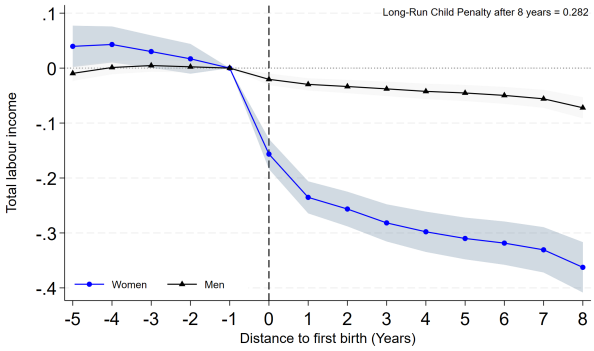
(d) Men: More than 1 Child

Notes: We report the weighted correlation coefficient by the sector size within female/male employment depending on which gender is plotted. For the motherhood/father penalty value, we use the penalty eight years after the birth of the first child, i.e., the percentage of earnings loss women/ men experience between one year before and eight years after the birth of their first child.

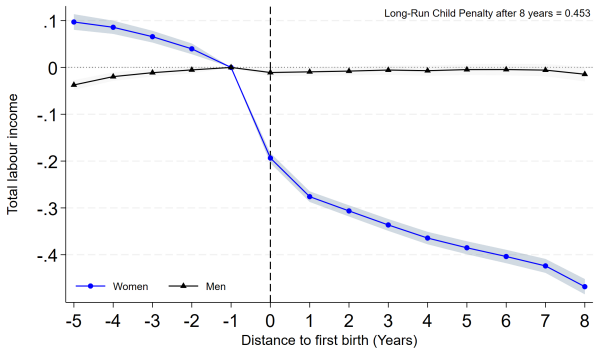
Figure 13: Child penalties by sector of employment



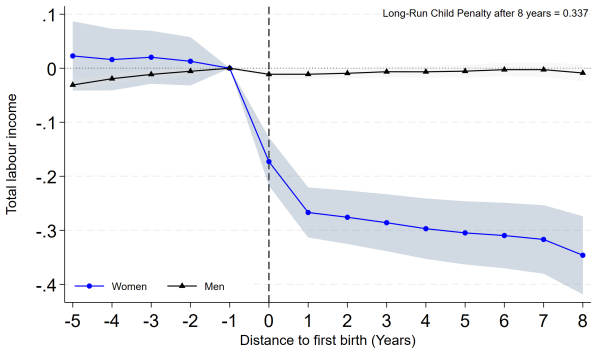
(a) Any sector of employment



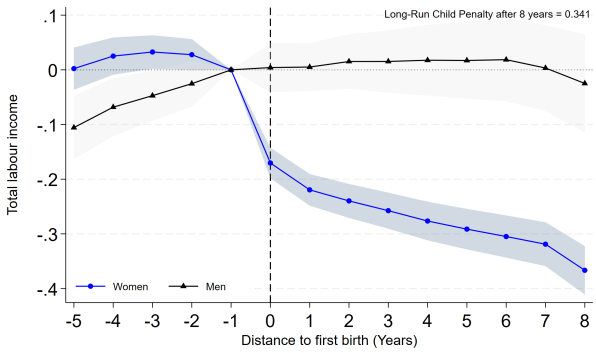
(b) Manufacturing



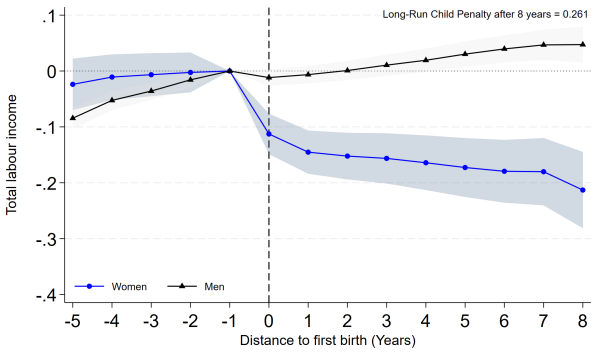
(c) Electricity, Wholesale, Transportation



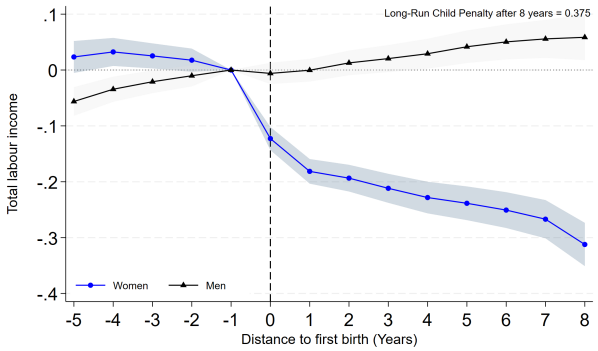
(d) Construction



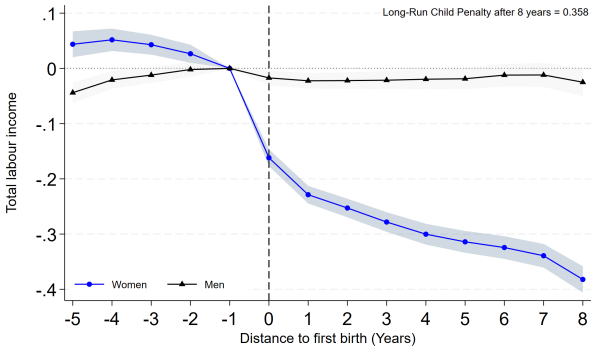
(e) Arts, Accommodation, Food service



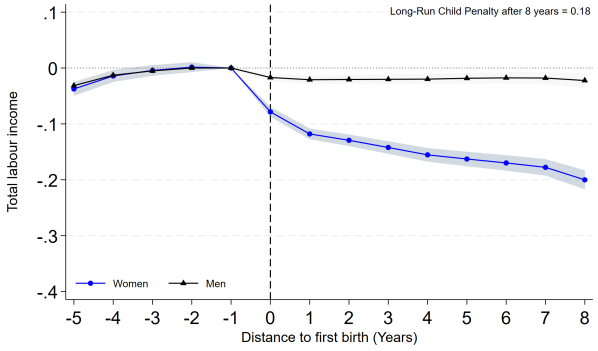
(f) Information and communication



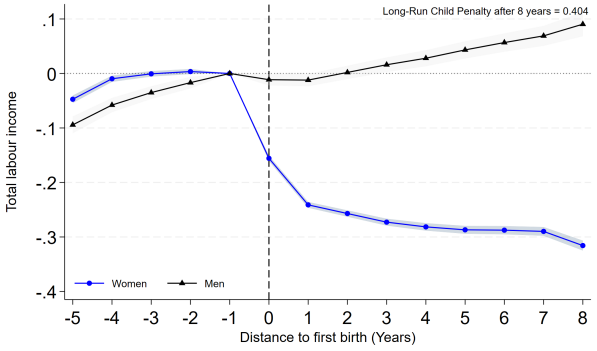
(g) Financial, insurance, real estate activities



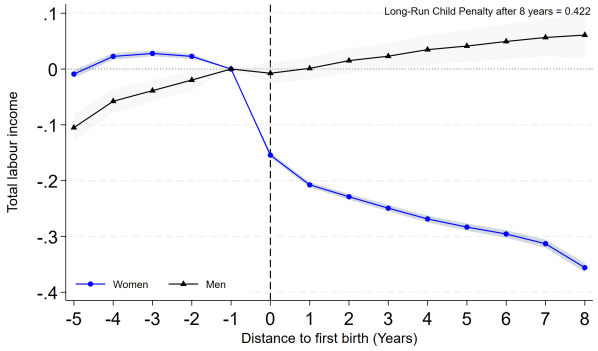
(h) Professional, scientific, technical, administrative activities



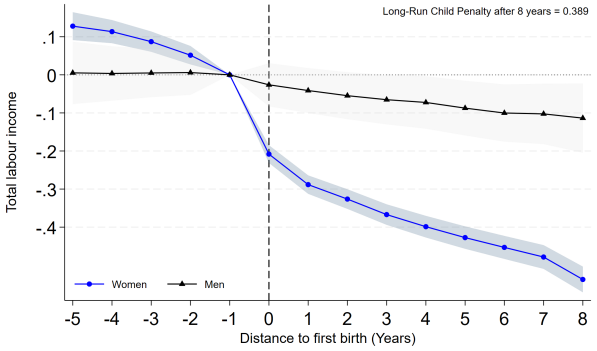
(i) Public administration



(j) Education



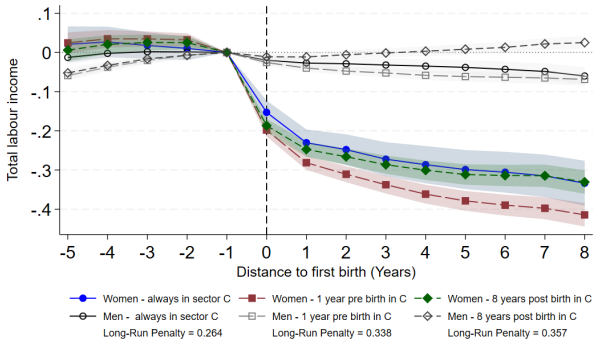
(k) Health and social work



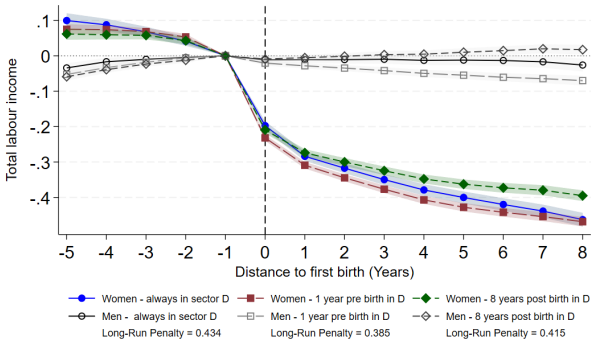
(l) Other

Notes: Each panel shows the evolution of mothers' (blue dots) and fathers' (black triangles) total labour income from 5 years before and to 8 years after the birth of their first child. Each panel considers a different employment sector, in which the mothers/ fathers were employed between 5 years before and 8 years after the birth of their first child. Event time 0 marks the birth of the first child. The long-run child penalty that women face after 8 years (i.e., the relative loss women experience compared to men) is reported in the top right corner of each sub-graph. The value at t = -1 is normalized to zero so that coefficients measure the impact of the first child relative to the year before birth. The shaded areas indicate the 95 percent confidence interval.

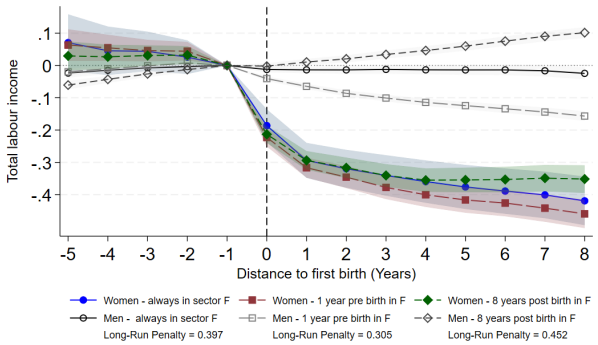
Figure 14: Child penalties by sector of employment depending on timing



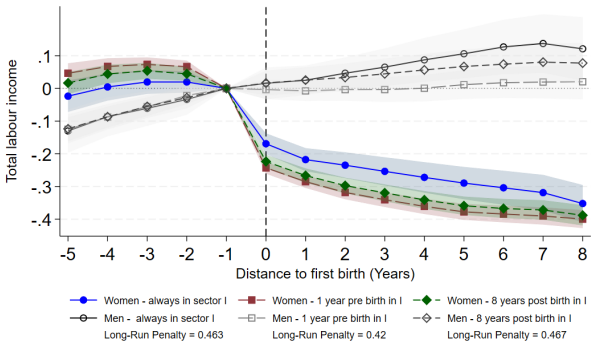
(a) Manufacturing



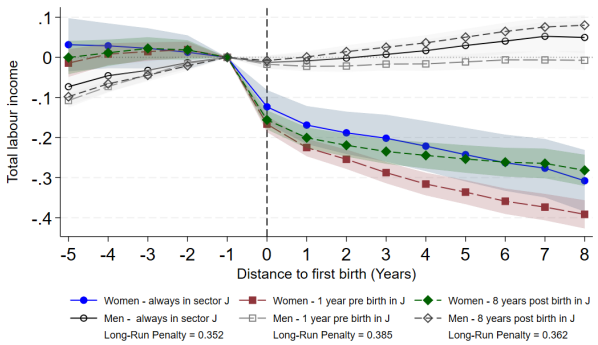
(b) Electricity, Wholesale, Transportation



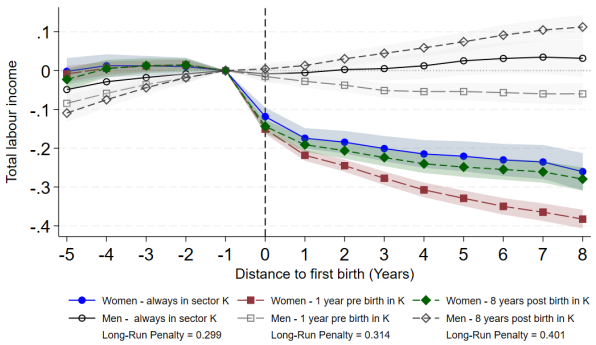
(c) Construction



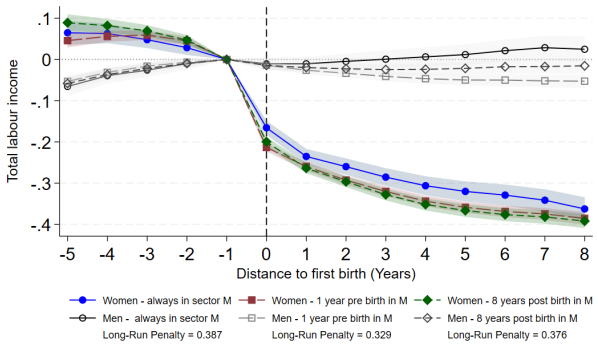
(d) Arts, Accommodation, Food service



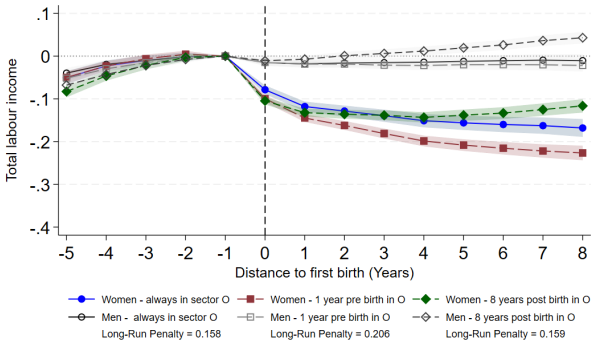
(e) Information and communication



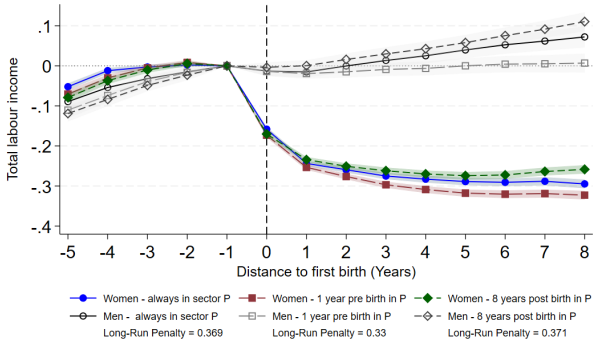
(f) Financial, insurance, real estate activities



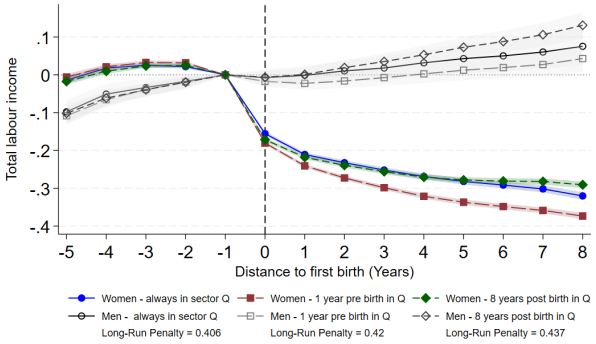
(g) Professional, scientific, technical, administrative activities



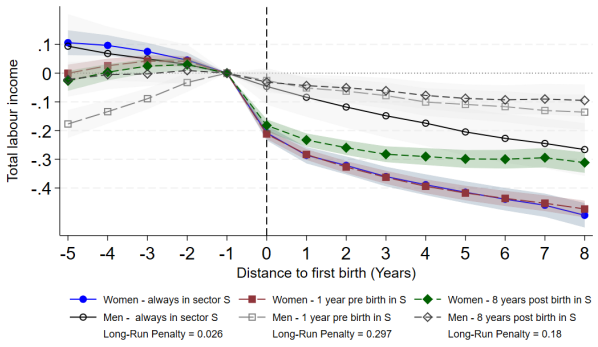
(h) Public administration



(i) Education



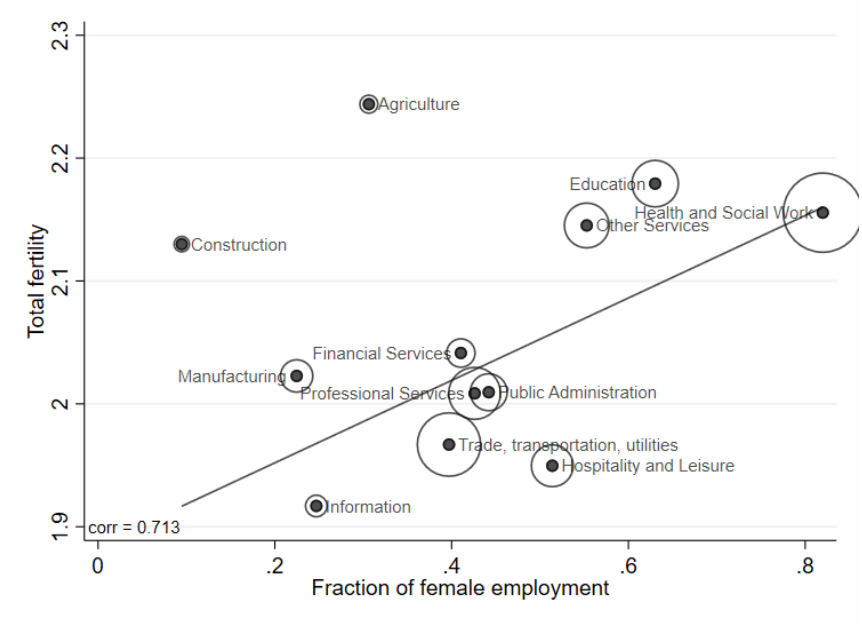
(j) Health and social work



(k) Other

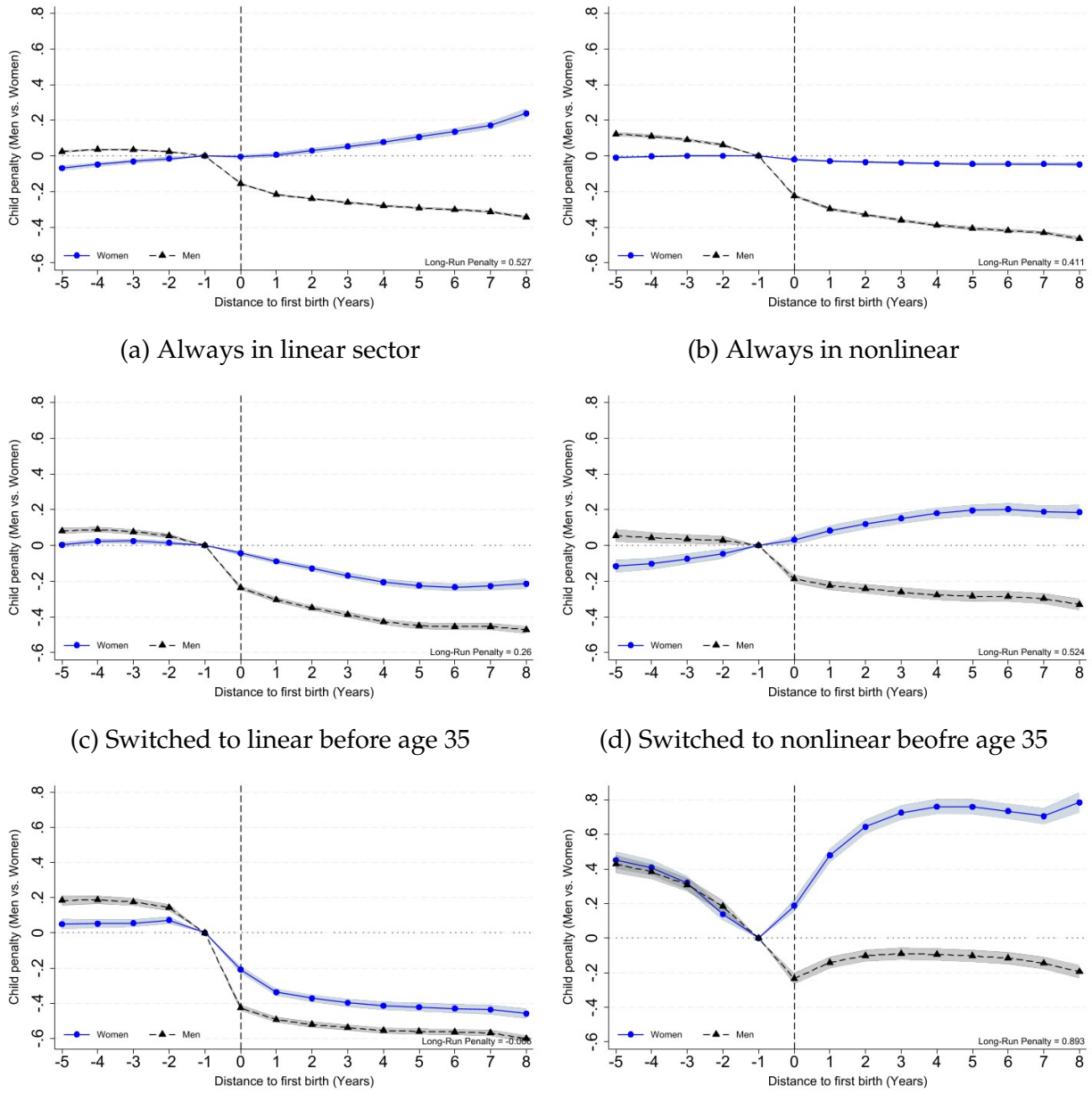
Notes: Each panel shows the evolution of mothers' (blue, green, red) and fathers' (black and gray) total labour income from 5 years before and to 8 years after the birth of their first child. Each panel considers a different employment sector, in which the mothers/ fathers were employed between 5 years before and 8 years after the birth of their first child. The baseline timing of sector choice is distinguished between, the sector one year prior to the birth (squares), the sector eight years after the birth (diamonds), and the same sector throughout the entire time (circles). Event time 0 marks the birth of the first child. The long-run child penalty that women face after 8 years (i.e., the relative loss women experience compared to men) is reported at the bottom of each sub-graph. The value at t = -1 is normalized to zero so that coefficients measure the impact of the first child relative to the year before birth. The shaded areas indicate the 95 percent confidence interval.

Figure 15: Intensive Fertility and Female Share across Sectors



Notes: The figure plots the sector-level employment share of women and the total number of children (by the end of 2023), only among mothers. We also report the weighted correlation coefficient by the sector size within female employment.

Figure 16: Child penalties by sector type of employment



(a) Always in linear sector

(b) Always in nonlinear

(c) Switched to linear before age 35

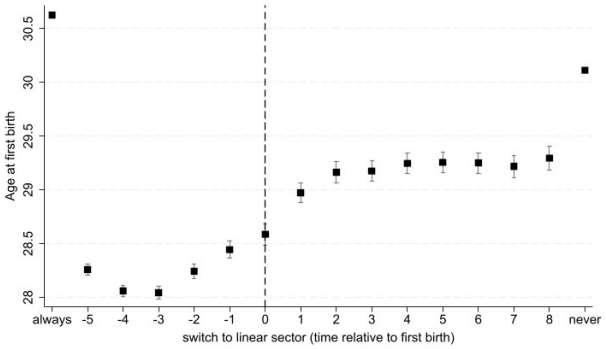
(d) Switched to nonlinear beofre age 35

(e) Switched to linear before first birth

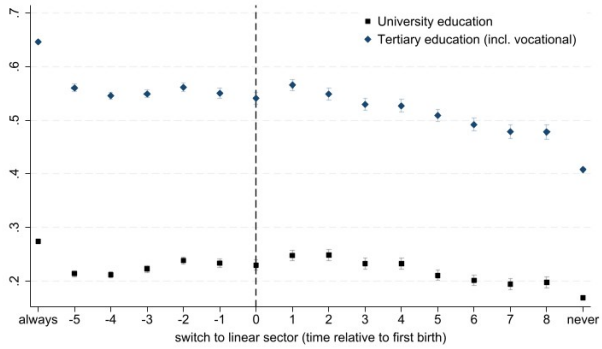
(f) Switched to nonlinear before first birth

Notes: Each panel shows the evolution of mothers' (blue circles) and fathers' (black trianlges) total labour income from 5 years before and to 8 years after the birth of their first child. Each panel considers a different employment sector type, in which the mothers/ fathers were employed between 5 years before and 8 years after the birth of their first child. Event time 0 marks the birth of the first child. The long-run child penalty that women face after 8 years (i.e., the relative loss women experience compared to men) is reported at the bottom of each sub-graph. The value at t = -1 is normalized to zero so that coefficients measure the impact of the first child relative to the year before birth. The shaded areas indicate the 95 percent confidence interval.

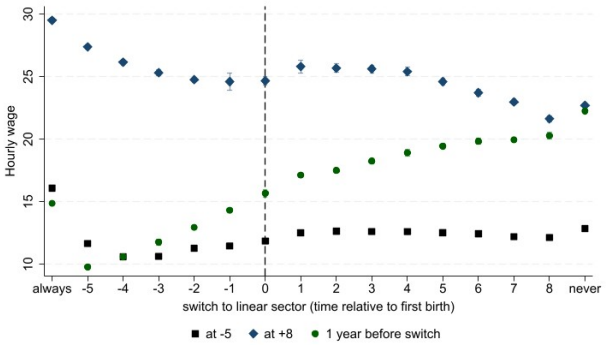
Figure 17: Sector characteristics by time of switch



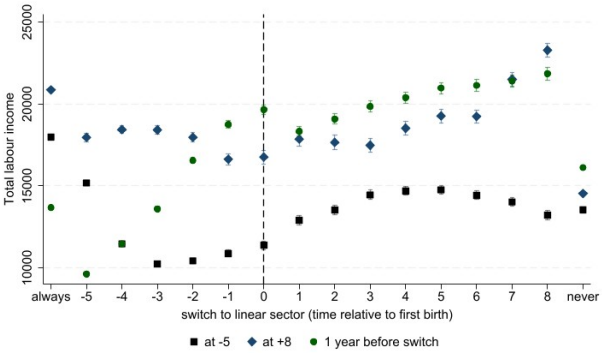
(a) Age at first birth



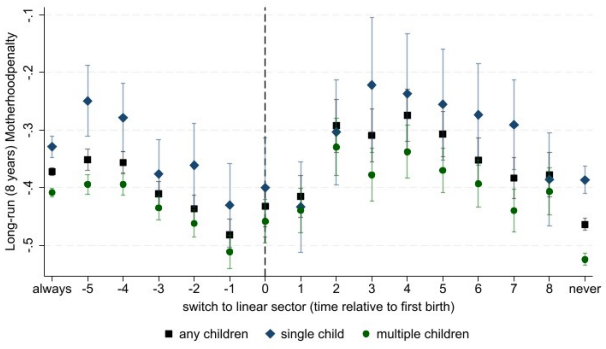
(b) Higher education



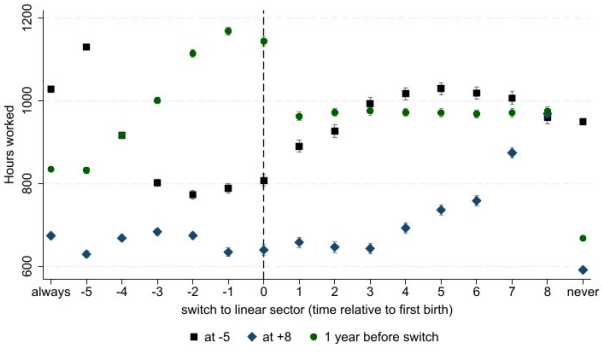
(c) Hourly wage rate



(d) Total annual income



(e) Motherhood penalty 8 years after birth



(f) Annual working hours

Notes: Each panel shows the avagere characteristics of women by the time they switched to a linear sector (relative to the birth of the first child). Event time 0 marks the birth of the first child. The bars indicate the 95 percent confidence interval.

D Model Results

D.1 Model Simulation

To simulate the model, we generate a large number of women who are heterogeneous with respect to linear and non-linear sector productivites (z_l and z_n) and fertility preference (γ). We draw these three random variables from a jointly normal distribution $\mathcal{N}(M, \Sigma)$, where

$$M = [\log(\bar{z}_l)\ \log(\bar{z}_n)\ \log(\bar{\gamma})]$$

is the mean, and $\Sigma = \Lambda C \Lambda'$ is the variance covariance matrix, Λ is the vector of standard deviations, and C is the covariance matrix.

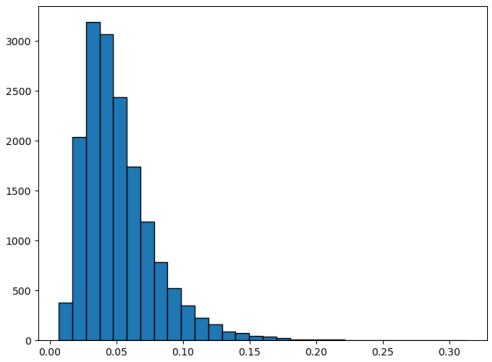
$$\Lambda = [\sigma_{z_l}\ \sigma_{z_n}\ \sigma_{\gamma}]$$

$$C = \begin{bmatrix} 1 & \sigma_2 & \sigma_0 \\ \sigma_2 & 1 & \sigma_1 \\ \sigma_0 & \sigma_1 & 1 \end{bmatrix}$$

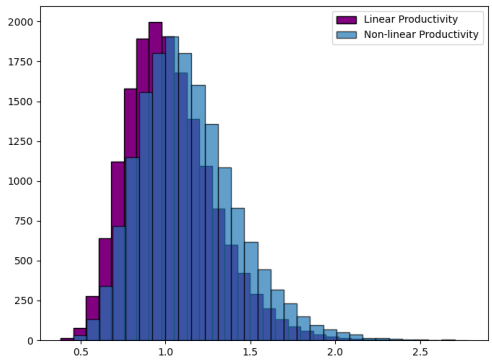
We use a Sobol sequence to generate quasi-random numbers from the above distribution. Sobol sequence allows for a more evenly distributed numbers close to population moments. Figure 18 plots histograms of the random sample used.

D.2 Industry Choice and Productivity

In Figure 19 we group model simulated women into groups based on their linear and non-linear sector productivity. Figure 19a (Figure 19b) shows that as linear (non-linear) sector productivity increases, women tend to sort more into linear (non-linear) sectors. In both cases, higher productivity implies a higher share of switchers (working in the non-linear sector at t=0 and switching to the linear sector at t=1). The interpretation is that switchers are women productive in both sectors. They enjoy high non-linear wage growth when they are young and switch to the linear sector and have more children at t=1.

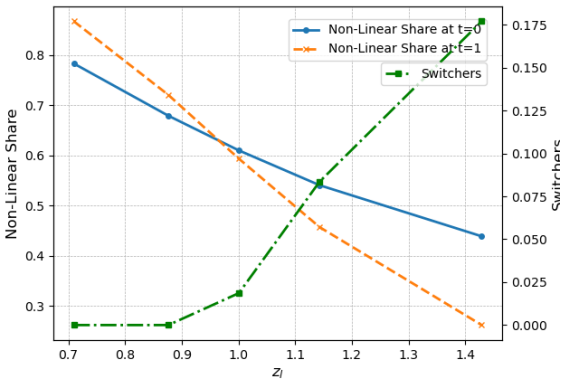


(a) Fertility Preference (γ)

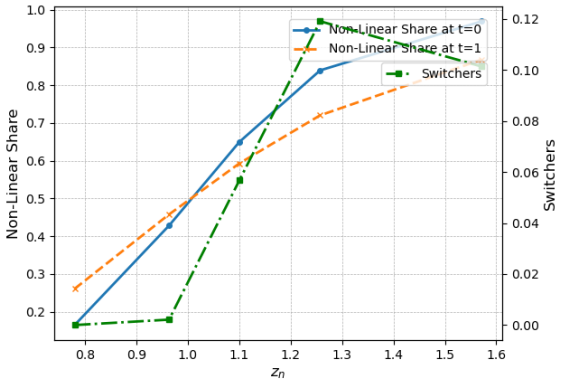


(b) Productivities (z_l and z_n)

Figure 18: Industry Choice and Productivity



(a) By Linear Sector Productivity (z_l)



(b) By Non-Linear Sector Productivity (z_n)

Figure 19: Industry Choice and Productivity