Beliefs and Realities of Work and Childcare After Childbirth*

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Abstract

When women plan for life after childbirth, they form beliefs about work, childcare, and how their careers will unfold. These expectations shape key decisions but are formed under deep uncertainty. We use a 2019 state-contingent survey of 11,000 Danish women linked to administrative data to compare pre-birth beliefs to realized outcomes. Mothers accurately anticipate their eventual return to work but underestimate the duration of the career interruption. This miscalibration stems from two belief errors—about partner leave and own labor supply—which interact and persist even among second-time mothers, with implications for labor supply, planning, and policy design.

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JEL classification: D31, D84, E24, J31

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1 Introduction

Imagine a mother-to-be thinking ahead to life after childbirth. She is thinking about working after child-birth, how caregiving will be shared, and whether her career plans will stay on track. Like many others, she forms expectations about what life with a child will look like. These beliefs shape key decisions—when to have children, how much to work, and how to plan financially—yet they are formed under deep uncertainty. To understand gender inequality in the labor market, we must understand not only how women respond to the realities of motherhood but also what they expect in advance, and whether those expectations are well-calibrated.

Despite major gains in female education and labor force participation, women continue to experience lower employment rates and earnings than men. A growing body of research pinpoints motherhood and the unequal division of childcare within couples as the central source of this inequality (Goldin, 2024). Employment penalties following childbirth remain substantial, even in contexts with generous leave and childcare policies, suggesting that structural, cultural, or interpersonal dynamics may limit sustained labor market engagement (Kleven et al., 2024; Cortés and Pan, 2023; Boneva et al., 2022). Yet a critical and understudied dimension of this issue is whether women foresee these challenges. Most economic models of female labor supply[1] assume that prospective mothers have perfect foresight or mean correct expectations and plan accordingly—but recent evidence suggests that many underestimate the labor market consequences of having children (Kuziemko et al., 2020).Understanding whether women accurately anticipate the career interruption of motherhood is crucial: if expectations are misaligned, women may enter parenthood unprepared for its consequences, with implications for labor supply, household dynamics, and policy design. This raises a fundamental empirical challenge: to assess whether expectations are accurate, we must elicit beliefs before childbirth and link them credibly to post-birth outcomes. Doing so requires rich, state-contingent data on beliefs about work and high-frequency outcome measures—resources that are rarely available. As a result, there is still almost no direct evidence on whether women's employment expectations around childbirth align with reality.

We address this empirical gap by combining a large-scale, state-contingent survey with administrative records. In 2019, we asked a representative sample of 11,000 Danish women to report their expectations about working if they were to have a child in the future, under scenarios that varied by whether their partner would take parental leave—a margin

[1] See for example, Attanasio et al. (2008); Blundell et al. (2016); Eckstein et al. (2019); Adda et al. (2017).

previously shown to influence mothers' return to work (Ekberg et al., 2013), and which we find to be important in this setting as well. Many of these women went on to have children, allowing us to link pre-birth, scenario-specific expectations to realized outcomes. This design makes it possible to assess belief accuracy by capturing expectations before childbirth and linking them to high-frequency administrative data on both post-birth employment and partner leave. We use this framework to measure misalignment and to decompose belief errors into two distinct components: mispredictions about whether the partner will take leave (state beliefs) and mispredictions about one's own employment given the partner's leave status (beliefs about state-contingent actions).

We find that most mothers form accurate expectations about their eventual return to work, particularly from 18 months after childbirth and onward. At the same time, they systematically overestimate how soon that return will occur. The most salient misalignment arises around the nine-month mark, a pivotal transition point when many expect to resume work if their partner takes leave. These errors reflect miscalibration along both dimensions: women mispredict whether their partner will take leave, and they overestimate their likelihood of returning to work even when the partner takes leave. The belief errors are not random. Misalignment is strongly patterned: women who expect strong partner involvement exhibit compounding errors, while those expecting little support exhibit offsetting ones. Strikingly, these patterns persist even among many second-time mothers, suggesting that experience alone does not correct miscalibrated expectations. These findings provide empirical guidance for how to model beliefs in studies of female labor supply and caregiving decisions.

Link to literature: Our analysis contributes to the growing literature on subjective expectations by showing how belief formation can break down even in highly routinized, policy-relevant contexts like the transition to parenthood. Unlike prior work, we decompose misalignment into distinct errors about states and state contingent responses—offering a sharper lens on the structure of expectation errors. We build on the insight of Kuziemko et al. (2020), who suggest that women may underestimate the costs of motherhood, and Gong et al. (2022), who examines anticipated employment effects. Our work complements broader research on the drivers of maternal employment reductions, including childcare availability and quality (Boneva et al., 2022), cultural norms around maternal roles (Kleven et al., 2024), and non-pecuniary costs of motherhood. It also contributes to the literature on child penalties, with Cortés and Pan (2023) providing a comprehensive overview.

Methodologically, we extend earlier work using this survey dataset (Briggs et al., 2023),

which showed that fertility and employment patterns are not driven by unobserved selection. We shift the focus to how expectations—particularly about partner leave—interact with outcomes. Our use of a state-contingent survey design linked to high-frequency administrative data is central to this contribution. This approach addresses recent calls for richer belief data (Almås et al., 2024; Caplin, 2025), combining subjective expectations, hypothetical scenarios, and objective records to improve our understanding of economic behavior. Leveraging Denmark's unique institutional and data environment, we show how this design can disentangle the sources of belief bias and reveal systematic heterogeneity in how expectations are formed and biased.

The rest of the paper proceeds as follows. Section 2 describes the institutional context and the data, including the design of the survey and the linked administrative records. Section 3 outlines our empirical strategy for comparing expected and realized employment outcomes. Section 4 presents the main results, documenting the systematic overestimation at nine months postpartum and decomposing belief errors into state and state-contingent components. We also examine how belief errors vary across groups and evolve with experience across births. Section 5 concludes.

2 Institutional Context and Data

2.1 Child Care and Parental Leave in Denmark

In Denmark the labor participation rate of working-age females is about 80 percent. This is facilitated by a well developed and heavily subsidized high-quality public child care system and maternity leave policies that protect employment. Public day care is organized by municipalities and it is the dominant type of day care provided. All children are eligible for day care from 26 weeks after child birth, except if a parent is on publicly funded maternity or parental leave. Opening hours for public day care are typically 6:30am to 5:00pm on weekdays, thus covering the entire work day throughout the work week for most people. Public day care is regulated by law and the objective is to ensure child care availability for all children and to secure child development and learning. To ensure that public day care in Denmark is of high quality, there are rules that regulate the type and quantity of staffing, physical surroundings, safety, and hygienic standards. Furthermore, municipalities are required by law to monitor child care institutions to ensure that the personnel have sufficient qualifications and that safety and hygienic standards are met. An important dimension of quality is the staffing. In nurseries (0-2 years) there are typically three children per employee and in kindergartens (3-5 years) there are typically six

children per employee and about half of the employees have formal pedagogical training. Public day care is heavily subsidized such that users typically pay about one third of the total cost. The typical monthly user cost for a nursery slot is about 3,000DKK (1USD ≈ 7DKK) and 1,700DKK for a kindergarten slot. The design of the public day care system has been in place since the 1970s, which means that child care opportunities are well known and predictable. 83 percent of all children aged 0-5 years are enrolled in public or publicly funded day care. In other words, day care is not a binding constraint in Denmark.

Danish parents are entitled to up to 52 weeks of leave in connection with having a child. 18 weeks, starting four weeks before child birth, are earmarked to the mother and two weeks are earmarked to the partner during the period we study. The remaining 32 weeks can be shared between parents as they prefer.[2] The parental leave scheme guarantees job security and a parental leave benefits corresponding to about the level of unemployment insurance benefits. For a full time employee this amounts to about 20,000DKK per month before taxes in 2020.These rules have been in place since 2002.[3] We refer to Andersen (2018) for a more detailed description of the history of the parental leave system.

2.2 Data Collection in Denmark

2.2.1 The Custom Survey

The core survey instruments collect probabilities of working at horizons $s = -12, -3, 3, 9$, 18, and 36 months (i.e., distributions over outcomes) after having the child. Following each question, respondents are shown a slider with a random initial starting point. As respondents slide left and right to choose the probability, the slider updates the selected number so respondents can see their selected percent chance.

We ask respondents to report their beliefs contingent on being in certain states. Because our outcome variable, female employment at different horizons, is Bernoulli, collecting the subjective state-contingent beliefs about outcomes entails collecting the probability of working at different horizons if respondents have a child. We utilize conditional

[2] In the period we study, mothers were required to inform their employer about the expected due date and planned leave no later than three months before the due date. Partners had to notify their employer about planned paternity leave no later than four weeks before taking leave.

[3] In August 2022, parental leave entitlements were restructured to promote a more gender-equal division of leave. However, our analysis does not exploit this reform. Most births in our sample occurred before the change, and our empirical design does not rely on variation induced by the reform. We focus instead on the broader institutional environment of generous, flexible leave and high-quality childcare that prevails throughout the study period.

probabilities to collect these distributions

- "Suppose that you have a child in the next 4 years. What is the percent chance that your partner will take parental leave of at least two months in the first year after the child is born?" We denote this $\hat{p}_i$.[4]

- "Suppose you have a child in the next 4 years and your partner **does** take at least two months parental leave. In this scenario, what is the percent chance you will be working exactly [[12/3] months before/[3/9/18/36] months after] your child is born?" We denote this subjective probability of working contingent on partner taking leave $\widehat{W}_{ik}^1$ where $k \in \{-12, -3, 3, 9, 18, 36\}$.

- "Suppose you have a child in the next 4 years and your partner **does not** take at least two months parental leave. In this scenario, what is the percent chance you will be working exactly [[12/3] months before/[3/9/18/36] months after] your child is born?" We denote this subjective probability of working contingent on the partner not taking leave $\widehat{W}_{ik}^0$ where $k \in \{-12, -3, 3, 9, 18, 36\}$.

Respondents report their answers to the second and third questions listed above in a set of stacked sliders, where each line corresponds to a different horizon.

Note that the questions are framed explicitly about employment effects of the next child. This means that respondents are asked to imagine a situation where they should consider the employment effect of having one child more disregarding the effects of any potential additional children.

Finally, we ask about age, education, and whether the mother of the respondent was not working, working part-time or full-time when the respondent was a child. We also ask about the level of earnings in 2018, Lusardi and Mitchell's 'Big Five' financial literacy question battery[5], and gender attitudes using the inventory from The International Social Survey Programme.[6] These questions are listed in the appendix.

2.2.2 Sampling and Link to Registry Data

The sample invited to participate in the Danish survey is recruited from the population registry. The population registry is a complete registry of all persons who are born or have ever had a registered address in Denmark. It contains the CPR-number, which is

[4] Throughout we use hat notation to indicate expectations.

[5] https://gflec.org/education/questions-that-indicate-financial-literacy/

[6] https://issp.org.

a personal identifier applied universally to record any contact an individual has with the public sector. For the purpose of conducting our survey we have been given access to a random sample of women aged 18-40 on December 31, 2018. The survey was fielded in May 2019. Invitations to participate were sent out using an official email account called *e-boks* which all Danes are equipped with. 51,000 emails were sent out, and we collected 11,090 responses.

In addition to the survey data we also use third-party reported administrative register data compiled by Statistics Denmark from various government agencies. In particular, we use the registries that document household composition, including how many children women have and when they were born. We also rely heavily on data from an administrative register, called the *e-income* registry, that contains employer-reported monthly wages and salaries for employees. All firms in Denmark have to report earnings and hours supplied for each employee, and hence whether the person is working, to the tax agency (SKAT). Since tax evasion on wage income is known to be very limited (Kleven et al. (2011)) we believe this data resource is accurate and precise. This registry has been in place since January 2008 and has previously been used for research purposes by Kreiner et al. (2016) among others. This information is currently available up to and including March 2024. We complement this with information about the receipt of public transfer income and with information about household composition and various background characteristics. Registry data are available for the entire population, and for the purposes of this study, the administrative data have been merged with all women who received invitations to participate. In Table A1 in the Online Appendix we display summary statistics for participants and non-participants. The Table shows that participants are slightly older, slightly more likely to have a partner and to have kids, be Danish citizens, have slightly higher income and have slightly longer educations. While these differences are often statistically significant, in most cases the quantitative differences are modest.

3 Estimating realized employment around child birth

In order to compare realized employment around child birth with expected employment we compare survey responses to realized employment observed in administrative records for the same women who participated in the survey and for the period which expectations pertain to. Specifically, we compare average employment expectations among women who had children after the survey was collected with ATTs using an event study approach with realized labor supply data. To do this we identify our survey respondents who have given birth to children during the period May 2019 to April 2023.

For these child births we follow the labor supply of the mother at a monthly frequency for the period covering 24 months before and up to 36 months after child birth. In order to quantify the employment response around child birth we estimate the following regression:

$$W_{it} = \sum_{k \in K} D_{it}^{k} \delta_k + \gamma X_{it} + u_{it}. \tag{1}$$

W_{it} is a dummy variable taking the value one if individual i is working in month t. D_{it}^{k} is a dummy for the child being born k periods ago and δ_k measures the effect of the child birth k periods around birth. The month 12 months before child birth is omitted, so $k \in K = \{-24, -23, \ldots, 36\} \setminus \{-12\}$. X is a vector of dummy variables controlling for the timing of adjacent children that the mother has also given birth to. We do this because many women tend to space the arrival of children within 2-3 years. Thus, to make estimated realized employment effects comparable to the elicited expectations, which only concern the next child, it is important to control for the impact of adjacent children on employment. Equation (1) is estimated on a sample of women who all have children but at different points in time, and δ_k can therefore be interpreted as an estimate of the average treatment effect on the treated (ATT).

For expectations, we follow the exact same approach, except we only have expectations data pertaining to months -12, -3, 3, 9, 18, 36. We do not include the timing of adjacent children that the mother has also given birth to as the survey questions specifically pertain to the next child.

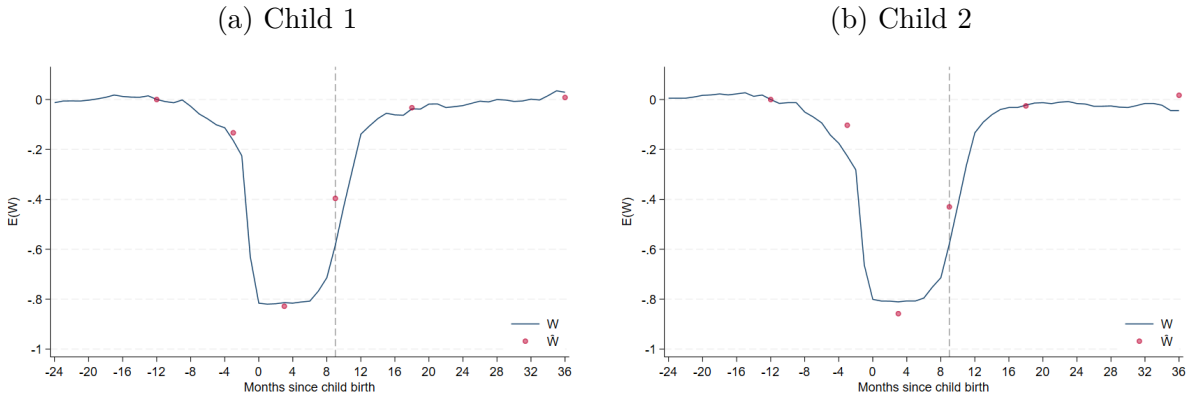
4 Results

4.1 How Unconditional Expectations Align with Reality

We compare expected and realized employment for first- and second-time mothers who had a child during the period from May 2019 to April 2023 and who participated in the survey. A total of 1,574 mothers had their first child and 1,501 had their second child during this window.

Figure 1 compares average realized employment outcomes, estimated using equation (1), to average unconditional employment expectations. These expectations are calculated as a weighted average of expectations under the scenarios where the partner does and does

Figure 1: Expected and realized employment by 1st and 2nd child



Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) with a solid line, and average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$, with dots. Panel (a) includes first-time mothers. Panel (b) includes second-time mothers. The dashed line marks nine months after childbirth ($k = 9$).

not take parental leave, weighted by the mother's stated probability that the partner will take leave:

$$\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}_i^0.$$

Figure 1a shows that first-time mothers, on average, form well-aligned expectations. They accurately anticipate ceasing work prior to childbirth, being out of the labor force three months postpartum, and returning to work by 18 and 36 months postpartum. These patterns are likely shaped by Denmark's long-standing parental leave and childcare policies, which have contributed to predictable employment trajectories. For visual clarity, confidence bands are omitted; however, realized employment does not significantly deviate from expectations at $k = 3, 18, 36$. At nine months postpartum, however, we observe a pronounced belief error: mothers overestimate their likelihood of working. The gap between realized employment (W) and expected employment ($\widehat{W}$) at this point is -0.187.

Figure 1b shows that results are similar for second-time mothers. They have a systematic belief error at nine months postpartum of -0.145 between expected and actual work participation.

To assess the robustness of our findings, we explore heterogeneity in belief accuracy across

a range of observable characteristics. Specifically, we estimate equation (1) separately by education, age, pre-childbirth earnings, gender attitudes, financial literacy, and childhood exposure to maternal employment. We also examine whether belief accuracy differs for women who are still partnered with the same person at childbirth as at the time of the survey. These dimensions are chosen for their potential relevance to planning, information processing, or caregiving expectations.

Across all subgroups, we find no systematic variation in belief errors. For example, contrary to the hypothesis proposed by Kuziemko et al. (2020), we find no difference in belief accuracy by education level. Similarly, expectations among women with high earnings, progressive gender attitudes, or strong financial literacy do not appear more accurate than among their counterparts. Even among mothers with stable partnerships, expectation patterns closely mirror the overall results. Full details and graphical results for these subgroup analyses are presented in the Online Appendix.

Taken together, these subgroup analyses support the main finding: unconditional expectations and realized employment are broadly aligned, except at nine months postpartum, where a persistent and systematic belief error emerges.

4.2 Partners' Leave and Maternal Employment Expectations and Outcomes

Our survey includes state-contingent questions about maternal employment expectations under two scenarios: (1) the partner takes at least two months of parental leave, and (2) the partner does not. (Henceforth, we refer to these as the partner taking leave or not.) These questions allow us to examine how expectations and outcomes differ depending on anticipated partner involvement.

Figure 2 plots realized employment and corresponding state-contingent expectations for first- and second-time mothers. The blue solid line shows the average employment rate among mothers whose partner actually took leave, W^1, while the blue dot shows their average belief in that scenario, $\widehat{W}^1$. The red solid line shows employment when the partner did not take leave, W^0, and the red dot indicates the corresponding belief, $\widehat{W}^0$.

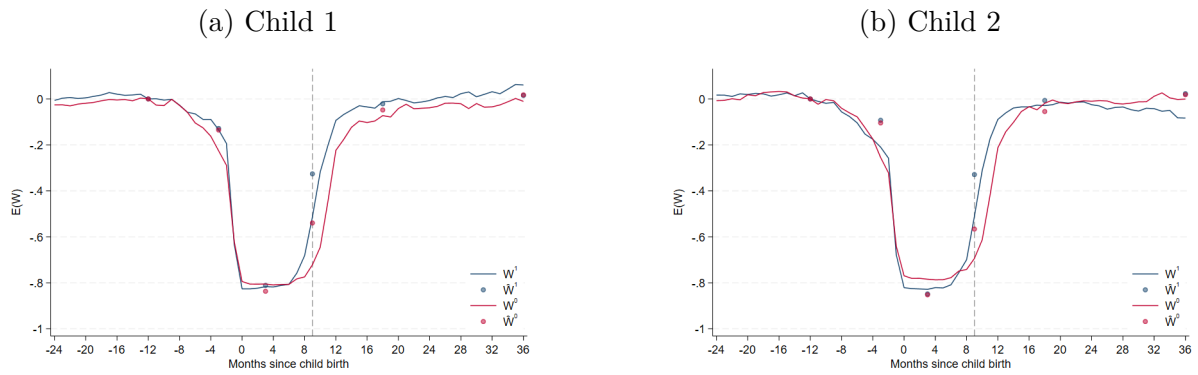
The comparison of realized outcomes (solid lines) reveals that partner leave-taking matters for when mothers return to work. At nine months postpartum, the employment gap between mothers whose partner did versus did not take leave is 0.208 for first-time mothers and 0.183 for second-time mothers.

State-contingent beliefs generally align with realized outcomes, except at $k = 9$, where mothers overestimate their likelihood of being back at work. Among first-time mothers, the difference between actual employment when the partner takes leave (W^1) and the corresponding belief ($\widehat{W^1}$) is 0.187. The gap between actual and expected employment when the partner does not take leave is similarly large at 0.181.

Figure 2b shows comparable patterns for second-time mothers. The belief-outcome gap is 0.182 when the partner takes leave, and 0.128 when not.

Taken together, these results indicate that mothers' state-contingent beliefs are generally well-formed—closely tracking observed behavior—except around the nine-month mark. Mothers tend to anticipate their eventual return to work accurately but systematically overestimate how soon it will occur. The magnitude of these belief errors at nine months is striking: it is on par with the actual employment difference between mothers whose partner does and does not take leave.

Figure 2: Expected and Realized Employment by Whether Partner Taking Parental Leave

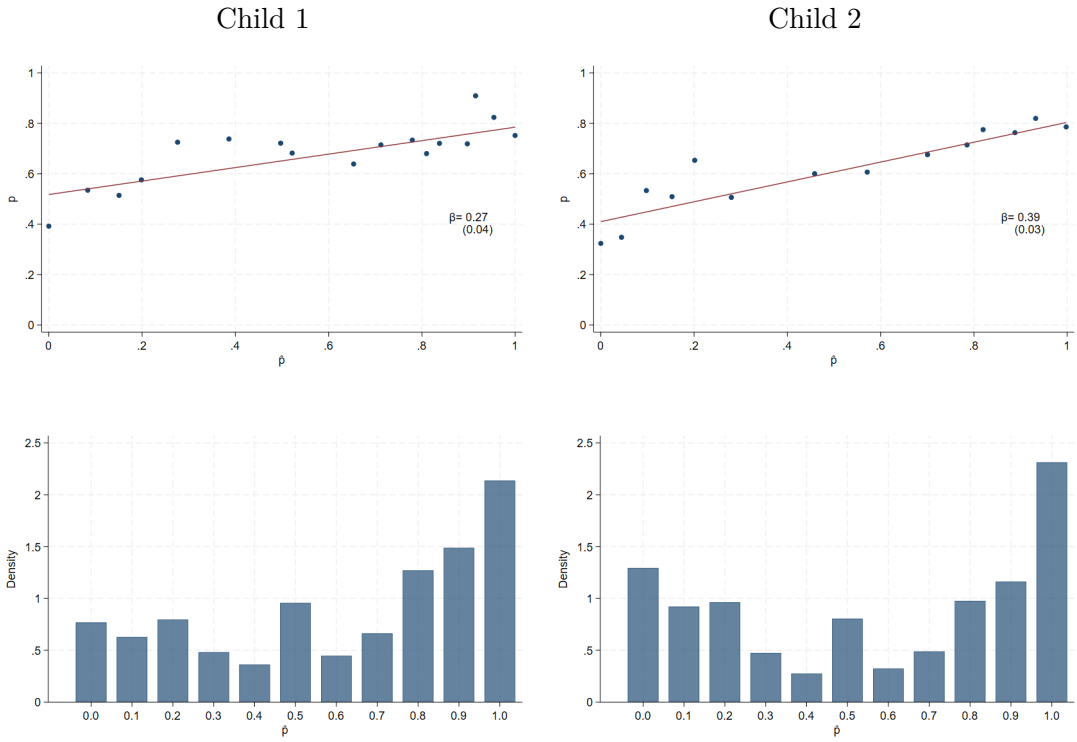


Notes: This figure shows actual employment around child birth estimated according to (1). Solid lines shows the probability of working for women whose partner actually take leave (W^1) with blue and does not take leave (W^0) with red. State contingent beliefs ($\widehat{W^1}$ and $\widehat{W^0}$) are shown with dots. Panel (a) includes first time mothers. Panel (b) includes second time mothers. The dashed line marks nine months after child birth, $k = 9$.

4.3 Beliefs about Partner's Parental Leave

The previous section shows that partner leave is important for womens' beliefs about when they return to work and when they actually return to work. Next, we consider

Figure 3: Realized Partner Leave by Woman's Expectation about Partner Leave



Notes: The top row of this figure shows a binned scatter plot of the fraction of partners taking parental leave, p against the expectation of the mother that the partner will take leave, $\hat{p}$. Below are shown histograms of $\hat{p}$. The left panels is for mothers giving birth to their first child, the right panels for mothers giving birth to their second child.

womens' beliefs about whether the partner will take leave.

The survey asks mothers to report their expectation of whether their partner will take leave. Using administrative data, we observe whether the partner actually took leave when a child was born. This enables a direct comparison between mothers' state beliefs and actual partner behavior.

The upper-left panel of Figure 3 shows the relationship for first-time mothers. The slope of the regression line is 0.27, indicating that mothers' expectations explain only a small share of the variation in actual partner leave. This weak association suggests that beliefs about partner leave are not based on consistent or coordinated planning.

For second-time mothers (upper-right panel), the relationship is slightly stronger, with a slope of 0.39. This may reflect some learning after the first child, though the alignment between beliefs and outcomes remains modest overall.

The lower panels show the distribution of stated beliefs about partner leave. Mothers report beliefs across the full support from 0 to 1, suggesting substantial heterogeneity rather than rounding or focal-point responses. Despite this wide range, the weak correlation between beliefs and outcomes implies meaningful bias in state beliefs—with many mothers either overestimating or underestimating their partner's likelihood of taking leave.

We also analyze the subsample of mothers who were pregnant at the time of the survey—those for whom leave planning was likely more concrete. In this group, the correlation between expected and realized partner leave is somewhat higher: the slope rises to 0.39 for first-time and 0.47 for second-time mothers. Still, even among this group, the misalignment remains even when decisions are imminent.

The pattern of heterogeneity in state beliefs is particularly important. If beliefs were well-calibrated, the regression lines would lie along the 45-degree line. Instead, we observe that mothers with low $\hat{p}$ tend to underestimate, while those with high $\hat{p}$ tend to overestimate the likelihood that their partner will take leave. These opposing biases offset one another in the aggregate, resulting in an average belief that is close to the average realized probability. This cancellation, however, masks significant underlying belief heterogeneity, reinforcing the need to examine belief errors beyond the average. The fact that there is miscalibration matters because it implies women may systematically underprepare—financially, professionally, or emotionally—for how long they will be out of work after childbirth.

4.4 Decomposing systematic Belief Errors at $k = 9$

Our results show that future mothers generally have accurate expectations about their return to work from 18 months after childbirth. However, around 9 months postpartum, a clear deviation between beliefs and outcomes emerges: mothers tend to overestimate their likelihood of returning to work at that point. The preceding analysis has documented this misalignment but has not yet disentangled the underlying sources. To address this, we implement a formal decomposition of the belief error in employment expectations observed at nine months after birth.

To facilitate empirical implementation we collect individuals into groups indexed by g. Let $\mathbb{E}_g[\widehat{W}_i^0]$ denote the average stated probability of working if the partner does *not* take

leave, and $\mathbb{E}_g[\widehat{W}_i^1]$ the average stated probability of working if the partner *does* take leave for people in group g. Let $\mathbb{E}_g[W_i^0]$ and $\mathbb{E}_g[W_i^1]$ denote the corresponding realized employment probabilities in the data. The average realized employment in group g is given by:

$$\mathbb{E}_g[W_i] = (1 - p_g)\mathbb{E}_g[W_i^0] + p_g\mathbb{E}_g[W_i^1] + \mathrm{Cov}_g(D_i, W_i^1 - W_i^0),$$

where $p_g = \mathbb{E}_g[D_i]$ is the fraction of individuals in group g whose partner actually took leave, and $\mathrm{Cov}_g(D_i, W_i^1 - W_i^0)$ captures within-group sorting on treatment effects.

Similarly, the average subjective belief about employment is:

$$\mathbb{E}_g[\widehat{W}_i] = (1 - \mathbb{E}_g[\hat{p}_i])\mathbb{E}_g[\widehat{W}_i^0] + \mathbb{E}_g[\hat{p}_i]\mathbb{E}_g[\widehat{W}_i^1] + \mathrm{Cov}_g(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0),$$

where $\mathbb{E}_g[\hat{p}_i]$ is the average subjective belief that the partner will take leave in group g, and $\mathrm{Cov}_g(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0)$ reflects belief-based sorting.

A resulting decomposition of the unconditional belief error in group g is:

$$\begin{aligned}\mathbb{E}_g[W_i] - \mathbb{E}_g[\widehat{W}_i] = \; & \underbrace{(1 - p_g)(\mathbb{E}_g[W_i^0] - \mathbb{E}_g[\widehat{W}_i^0]) + p_g(\mathbb{E}_g[W_i^1] - \mathbb{E}_g[\widehat{W}_i^1])}_{\text{Error, state-contingent beliefs}} \\ & + \underbrace{(p_g - \mathbb{E}_g[\hat{p}_i])(\mathbb{E}_g[\widehat{W}_i^1] - \mathbb{E}_g[\widehat{W}_i^0])}_{\text{Error, state beliefs}} \\ & + \underbrace{\mathrm{Cov}_g(D_i, W_i^1 - W_i^0) - \mathrm{Cov}_g(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0)}_{\text{Residual sorting terms}} \end{aligned} \tag{2}$$

This decomposition isolates three sources of belief error. The first component reflects errors in state-contingent beliefs—errors in predicting employment for a given partner-leave status. The second component captures errors in state beliefs—miscalibration about whether the partner will take leave. The final line contains residual covariance terms, which capture sorting on treatment effects and expectations.[7]

Table 1 presents the decomposition at 9 months postpartum, stratified by terciles of $\hat{p}$, the stated probability that the partner will take leave. Although the total bias is relatively similar across groups, the decomposition reveals substantial heterogeneity in the sources of error.

Mothers with low $\hat{p}$ systematically underestimate the probability that their partner will

[7] We refer to the Online Appendix for the derivation of the decomposition.

Table 1: Decomposition of Expectation Bias at $k = 9$, by Levels of $\hat{p}$

	Child 1			Child 2		
	Low	Medium	High	Low	Medium	High
(1) State-contingent belief error						
$(1-p_g)(\mathbb{E}_g[W_i^0] - \mathbb{E}_g[\widehat{W}_i^0])$	-0.082	-0.063	-0.041	-0.125	-0.034	0.023
$p_g(\mathbb{E}_g[W_i^1] - \mathbb{E}_g[\widehat{W}_i^1])$	-0.166	-0.141	-0.087	-0.163	-0.145	-0.038
Subtotal: State-contingent error	**-0.248**	**-0.204**	**-0.128**	**-0.288**	**-0.179**	**-0.015**
(2) State belief error						
$(p_g - \mathbb{E}_g[\hat{p}_i])(\mathbb{E}_g[\widehat{W}_i^1] - \mathbb{E}_g[\widehat{W}_i^0])$	0.078	-0.006	-0.061	0.072	0.012	-0.076
(3) Residual sorting terms						
$\text{cov}(p, W^1 - W^0)$	0.000	0.002	0.004	0.007	-0.028	0.018
$\text{cov}(\hat{p}, \widehat{W}^1 - \widehat{W}^0)$	-0.002	0.001	0.002	-0.001	-0.026	0.005
Total bias	**-0.168**	**-0.209**	**-0.187**	**-0.208**	**-0.169**	**-0.078**

Note: The table presents a decomposition of belief bias according to equation (2). 'Low', 'Medium', and 'High' indicate terciles of the distribution of $\hat{p}$. The subtotal under (1) aggregates belief errors conditional on caregiving state; (2) reflects miscalibration about whether the partner will take leave; and (3) includes residual sorting terms. The individual components of the decomposition, p, $\mathbb{E}[\hat{p}]$, $\mathbb{E}[W^1]$, $\mathbb{E}[W^0]$, $\mathbb{E}[\widehat{W}^1]$, $\mathbb{E}[\widehat{W}^0]$, are tabulated in Online Appendix Table A3.

take leave (positive state belief error). At the same time, they overestimate their likelihood of working if the partner does not take leave (negative state-contingent belief error). These errors partially offset each other—because they incorrectly assume their partner will not take leave, they anticipate taking on more caregiving, which makes their overall employment expectation more pessimistic, but also unintentionally closer to reality.

By contrast, mothers with high $\hat{p}$ tend to overestimate both the probability of partner leave and their likelihood of working conditional on it. In their case, state and state-contingent belief errors reinforce each other, resulting in similar overall bias levels as the low-$\hat{p}$ group, but driven by different mechanisms.

We also find evidence of learning between births. Among mothers with high $\hat{p}$, belief errors decline between the first and second child, suggesting more accurate expectations about both their own behavior and their partner's leave-taking. Among mothers with low $\hat{p}$, this learning appears more limited.

Descriptive characteristics (see Online Appendix Table A2) show that mothers in the upper tercile of $\hat{p}$ tend to be older, more educated, earn more, express less gender-conservative views, and score higher on financial literacy. Their state-contingent beliefs are more accurate, yet they exhibit state belief errors of similar magnitude (though opposite sign) as those in the lower tercile. Human capital appears to help women predict their own actions given their partners behavior but does not help predict whether the

partner will take leave.

Together, these findings underscore the importance of the state-contingent survey design. Without disaggregating beliefs into their component parts, one would overlook meaningful differences in how expectation errors arise. The decomposition demonstrates that similar average levels of belief error can mask distinct patterns of misperception—and that the formation of beliefs around work and childcare varies systematically across groups. Critically, it reveals that some women primarily misjudge the distribution of leave-taking within the couple, while others misjudge their own ability to work conditional on the partner's leave status. These differences are not random: they correlate with education, earnings, and gender attitudes. This distinction matters for both theory and policy—because models that assume homogeneous or mean-correct expectations will miss key behavioral mechanisms, and interventions to improve planning will be more effective when tailored to the specific types of belief errors different women are prone to make.

5 Conclusion

This paper examines how accurately mothers anticipate their return to work after childbirth, using a unique combination of state-contingent survey data and high-frequency administrative records. Our framework distinguishes between two types of belief error: misjudging whether the partner will take leave and misjudging one's own employment given the partner's leave status. This distinction helps clarify how expectations about work and childcare are formed—and where they go awry.

We find that while mothers generally anticipate their eventual return to work correctly, they systematically overestimate how quickly they will resume employment—particularly around nine months postpartum, a key moment when leave policies expire and many expect to be back on the job. This misalignment reflects both types of belief error and varies predictably with expectations about partner involvement. Mothers who expect little partner support tend to underestimate actual leave-taking by their partner but also overestimate their own ability to work without it, leading to partially offsetting errors. In contrast, those who expect strong partner involvement tend to misjudge both the partner's actions and their own, producing compounding errors. Strikingly, these patterns persist even among second-time mothers, suggesting that experience alone does not fully correct miscalibrated expectations. These findings highlight belief formation itself—not just preferences or constraints—as a key mechanism shaping women's employment trajectories.

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Online Appendix

A Summary Statistics and Balance Table

Table A1: **Summary statistics for participants and nonparticipants**

	(1)	(2)	(3)
Variable	Non-participants	Participants	Difference
Age	28.624	29.413	0.789
	(6.606)	(6.454)	(0.069)
Partner	0.522	0.607	0.085
	(0.500)	(0.488)	(0.005)
Number of Children	0.700	0.782	0.082
	(1.045)	(1.026)	(0.011)
Had baby in 2017	0.034	0.039	0.005
	(0.180)	(0.193)	(0.002)
Non-DK citizenship	0.190	0.094	-0.096
	(0.392)	(0.292)	(0.003)
Income (1000DKK)	175.536	227.750	52.214
	(16.738)	(193.482)	(2.048)
Liquid assets (1000DKK)	74.988	87.297	12.309
	(484.323)	(206.467)	(3.120)
House owner	0.239	0.339	0.100
	(0.426)	(0.473)	(0.005)
Student	0.306	0.310	0.004
	(0.461)	(0.462)	(0.005)
Educ basic	0.220	0.125	-0.095
	(0.415)	(0.331)	(0.004)
Educ high school	0.206	0.184	-0.022
	(0.404)	(0.388)	(0.004)
Educ vocational	0.214	0.208	-0.005
	(0.410)	(0.406)	(0.004)
Educ middle	0.122	0.190	0.068
	(0.327)	(0.392)	(0.004)
Educ College	0.148	0.231	0.083
	(0.355)	(0.421)	(0.004)
Observations	39,336	11,312	50,648

Notes: Characteristics are obtained from administrative registries and are measured in 2018. Standard deviations in parentheses in columns (1) and (2). Standard errors in parenthesis in column (3).

B Questions

B.1 Earnings in 2018

What was your total salary income in 2018? By this, we mean your gross income, i.e., before taxes are deducted. (Please answer as accurately as possible. It is okay to round off if you do not know the exact amount.)

Please provide your answer in Danish kroner.

B.2 Gender Attitudes

1. A preschool child is likely to suffer if his or her mother works.
2. All in all, family life suffers when the woman has a full-time job.
3. A woman and her family would be happier if she goes to work.
4. Both the man and the woman should contribute to the household income.
5. Having a full-time job is the best way for a woman to be independent.
6. A man's job is to earn money; a woman's job is to take care of the home and family.
7. Children need their father to be as closely involved in their upbringing as their mother.
8. Employers should make a special effort to help mothers combine work and childcare.
9. A single parent is just as good at raising children as a couple.

All the questions have the following answer categories: 'Strongly agree', 'Agree', 'Neither agree nor disagree', 'Disagree', or 'Strongly disagree'. A respondent is coded gender conservative if she answer 'Agree' or 'Strongly Agree' to questions 1, 2, 6, and if she answers 'Disagree' or 'Strongly disagree' to the other questions.

B.3 Financial Literacy Questions

1. Imagine you have 100 DKK in a savings account, and the annual interest rate is 2 percent. How much money do you think will be in the account if you leave it for five years?
    - More than 102 DKK

- Exactly 102 DKK
- Less than 102 DKK
- Don't know
- Prefer not to answer

2. Imagine the interest rate on your savings account is 1% per year, and the inflation rate is 2% per year. If you leave the money in the account for one year, what would you be able to buy?
   - More than today
   - Exactly the same as today
   - Less than today
   - Don't know
   - Prefer not to answer
3. Buying a stock in an individual company is a safer investment than investing in a mutual fund.
   - True
   - False
   - Don't know
   - Prefer not to answer
4. Imagine you roll a fair six-sided die 1,000 times. Out of those 1,000 rolls, how many times do you think the die will land on an even number?

   [Slider]
5. In a lottery, there is a 1% chance of winning 100,000 DKK. What is your best guess for how many people will win the 100,000 DKK if 1,000 people each buy a lottery ticket?
   - 1
   - 10

- 100
- 1000

B.4 Question About Your Mother's Employment Situation

Please indicate which statement best reflects your mother's situation when you were under five years old.

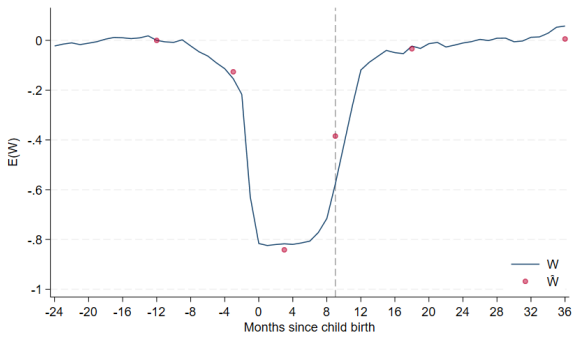
- My mother was in full-time employment
- My mother worked part-time
- My mother was a stay-at-home parent
- None of the above

C Additional Analyses

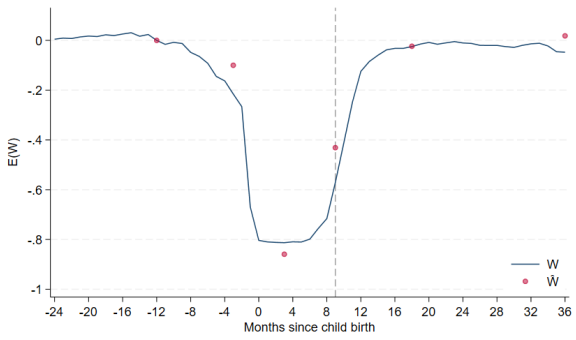
C.1 Conditioning on Having the Same Partner as at Interview

Figure A1: Expected and realized employment by 1st and 2nd child

(a) Child 1



(b) Child 2



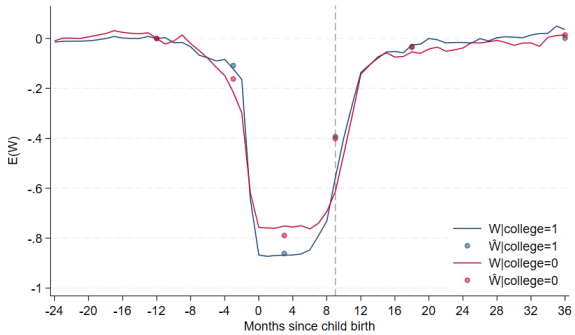
Notes: This figure shows actual employment around child birth estimated according to (1) with a solid line and unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}_i^0$, with dots. The estimations are performed on samples of women who have the same partner as they had at the time of the survey. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

C.2 Heterogeneity Along Different Dimensions

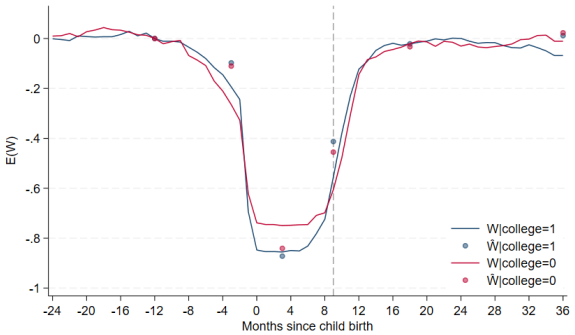
We examined heterogeneity along several dimensions, including education, age, pre-childbirth earnings, gender attitudes, financial literacy, and maternal employment during the respondent's childhood. These analyses found no significant evidence of heterogeneity in the employment gap. Detailed results are presented below.

Figure A2: Expected and realized employment by 1st and 2nd child by education

(a) Child 1



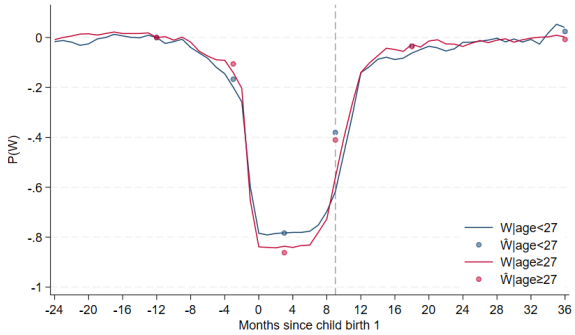
(b) Child 2



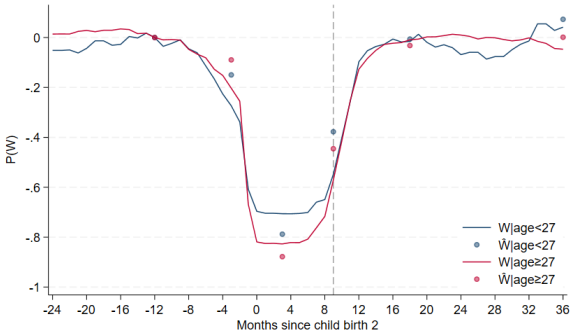
Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately for mothers with (blue) and without (red) a college degree. Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

Figure A3: Expected and realized employment by 1st and 2nd child by age

(a) Child 1



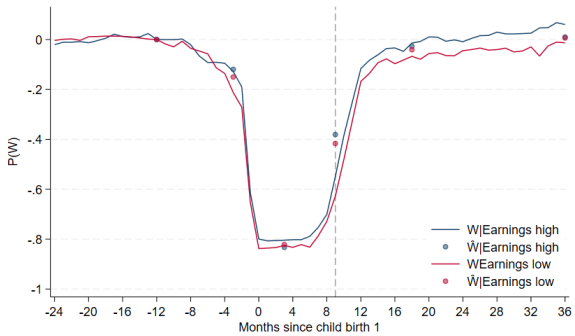
(b) Child 2



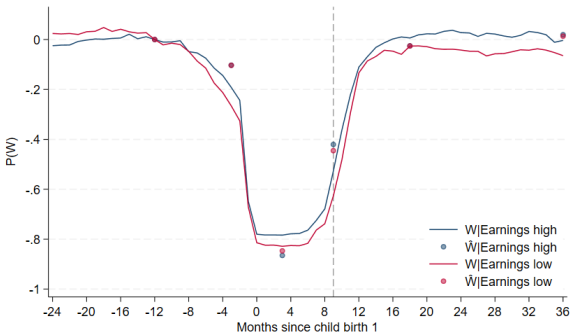
Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately for mothers aged less than 27 (blue) and aged at least 27 (red). Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

Figure A4: Expected and realized employment by 1st and 2nd child by level of earnings

(a) Child 1



(b) Child 2

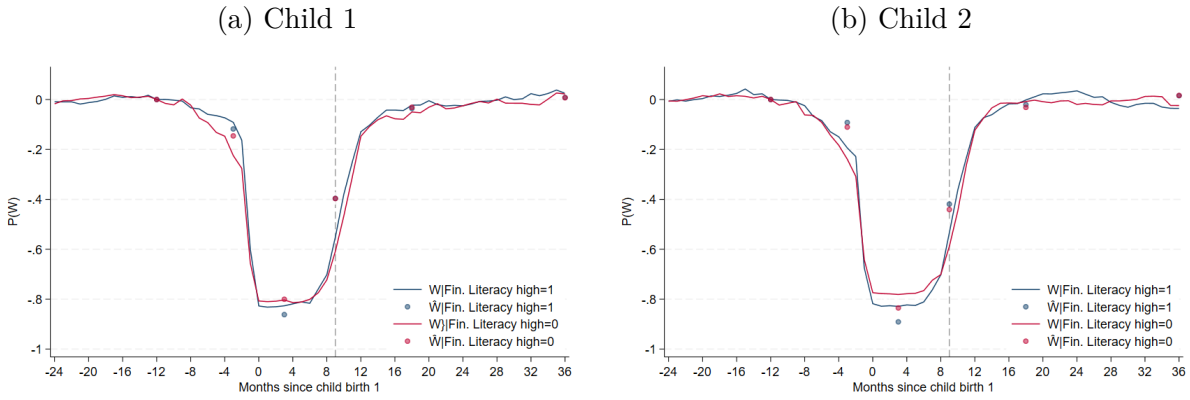


Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately for mothers with above median earnings (blue) and below median earnings (red). Median earnings of first/second time mothers is 300k/330k DKK. Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

Figure A5: Expected and realized employment by 1st and 2nd child by gender conservativeness

Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately by whether the mother is gender conservative (blue) or not (not). Gender conservativeness is defined from answers to questions listed in Appendix B.2. Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

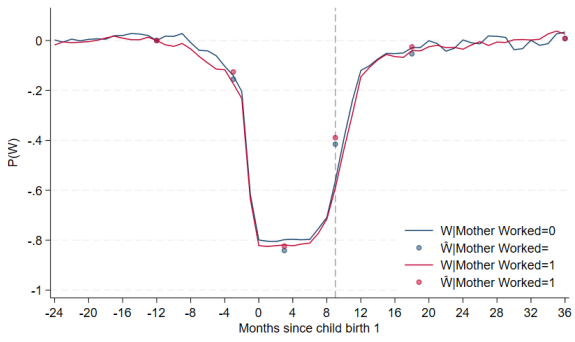
Figure A6: Expected and realized employment by 1st and 2nd child by financial literacy



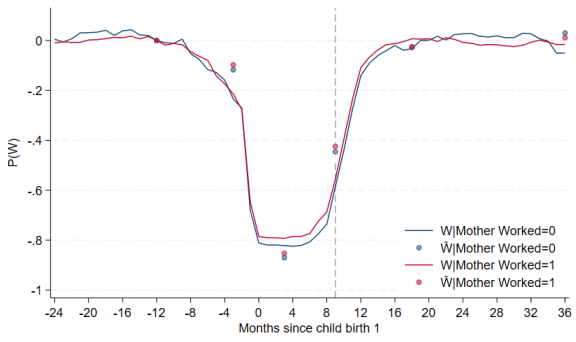
Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately for mothers with high (blue) and low (red) scores in the financial literacy test. Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

Figure A7: Expected and realized employment by 1st and 2nd child by whether mother of respondent worked when she was a child

(a) Child 1



(b) Child 2



Notes: This figure shows average actual employment, W_i, around childbirth estimated according to (1) and estimated separately for respondents whose own mother did not work (blue) and worked (red) when the respondent was a child. Solid lines are estimated actual employment and dots are average unconditional expected employment, $\widehat{W}_i = \hat{p}_i \times \widehat{W}_i^1 + (1 - \hat{p}_i) \times \widehat{W}i^0$. Panel (a) includes first time mothers. Panel (b) includes second time mothers.

Table A2: Summary Statistics for Terciles of $\hat{p}$

	Child 1			Child 2		
	Low	Medium	High	Low	Medium	High
Age	27.914	27.382	28.156	29.679	29.452	30.325
Earnings (1000DKK)	273.767	273.695	294.175	292.237	315.315	353.031
College	0.454	0.579	0.585	0.449	0.565	0.669
Gender Conservative	0.408	0.355	0.363	0.442	0.437	0.398
Financial Literacy	1.98	2.114	2.283	1.881	1.966	2.32

D Belief Error Decomposition

Appendix D: Decomposition of Belief Errors

This appendix derives the decomposition of belief errors presented in Section 4.4. The goal is to separate total belief misalignment into distinct components: errors in state-contingent beliefs, errors in state beliefs, and residual sorting terms.

Individual-Level Framework

We define the following notation for each individual i:

- $D_i \in \{0, 1\}$: indicator for whether the partner took leave.
- $p_i = \mathbb{E}[D_i]$: true probability that the partner will take leave.
- $\hat{p}_i$: stated (subjective) probability that the partner will take leave.
- W_i^1: latent probability of working if the partner takes leave.
- W_i^0: latent probability of working if the partner does not take leave.
- $\widehat{W}_i^1$: stated probability of working if the partner takes leave.
- $\widehat{W}_i^0$: stated probability of working if the partner does not take leave.

The realized outcome is:

$$W_i = D_i W_i^1 + (1 - D_i) W_i^0.$$

The belief is:

$$\widehat{W}_i = \hat{p}_i \widehat{W}_i^1 + (1 - \hat{p}_i) \widehat{W}_i^0.$$

Taking expectations and applying the identity $\mathbb{E}[XY] = \mathbb{E}[X]\mathbb{E}[Y] + \mathrm{Cov}(X, Y)$, we obtain:

$$\begin{aligned}
\mathbb{E}[W_i] &= p_i \mathbb{E}[W_i^1] + (1 - p_i)\mathbb{E}[W_i^0] + \mathrm{Cov}(D_i, W_i^1 - W_i^0), \\
\mathbb{E}[\widehat{W}_i] &= \mathbb{E}[\widehat{W}_i^0] + \mathbb{E}[\hat{p}_i]\mathbb{E}[\widehat{W}_i^1 - \widehat{W}_i^0] + \mathrm{Cov}(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0).
\end{aligned}$$

Thus, the belief error is:

$$\begin{aligned}\text{Bias}_i &= \mathbb{E}[W_i] - \mathbb{E}[\widehat{W}_i] \\ &= (1-p_i)(\mathbb{E}[W_i^0] - \mathbb{E}[\widehat{W}_i^0]) + p_i(\mathbb{E}[W_i^1] - \mathbb{E}[\widehat{W}_i^1]) \\ &\quad + (p_i - \mathbb{E}[\hat{p}_i])(\mathbb{E}[\widehat{W}_i^1] - \mathbb{E}[\widehat{W}_i^0]) \\ &\quad + \text{Cov}(D_i, W_i^1 - W_i^0) - \text{Cov}(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0).\end{aligned}$$

The first two terms capture miscalibration in beliefs about employment within each state. The third term reflects miscalibration in beliefs about the partner's behavior (state belief error), and the final two covariance terms capture residual sorting:

- $\text{Cov}(D_i, W_i^1 - W_i^0)$ reflects whether treatment assignment (partner leave) is correlated with employment treatment effects.
- $\text{Cov}(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0)$ reflects whether stated expectations about partner leave correlate with expected gains from partner leave.

These terms are not directly estimable because only one of (W_i^1, W_i^0) is observed for each individual.

Group-Level Aggregation

To facilitate empirical implementation, we aggregate the individual-level decomposition to the group level. Let g index a group (e.g., defined by terciles of $\mathbb{E}[\hat{p}_i]$ or the entire sample), and let $\mathbb{E}_g[\cdot]$ denote the expectation taken over individuals $i \in g$. Let $\text{Cov}_g(\cdot, \cdot)$ denote the corresponding within-group covariance.

We define the following group-level quantities:

- $p_g = \mathbb{E}_g[D_i]$: realized fraction of partners taking leave in group g.
- $\mathbb{E}_g[\hat{p}_i]$: average subjective probability that the partner will take leave in group g.
- $\mathbb{E}_g[W_i^1]$: average probability of working if the partner takes leave.
- $\mathbb{E}_g[W_i^0]$: average probability of working if the partner does not take leave.
- $\mathbb{E}_g[\widehat{W}_i^1]$: average stated probability of working if the partner takes leave.
- $\mathbb{E}_g[\widehat{W}_i^0]$: average stated probability of working if the partner does not take leave.

The group-level realized outcome is:

$$\mathbb{E}_g[W_i] = p_g \mathbb{E}_g[W_i^1] + (1 - p_g)\mathbb{E}_g[W_i^0] + \mathrm{Cov}_g(D_i, W_i^1 - W_i^0),$$

and the group-level belief is:

$$\mathbb{E}_g[\widehat{W}_i] = \mathbb{E}_g[\widehat{W}_i^0] + \mathbb{E}_g[\hat{p}_i]\mathbb{E}_g[\widehat{W}_i^1 - \widehat{W}_i^0] + \mathrm{Cov}_g(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0).$$

The resulting group-level bias is:

$$\begin{aligned}
\mathrm{Bias}_g &= \mathbb{E}_g[W_i] - \mathbb{E}_g[\widehat{W}_i] \\
&= (1 - p_g)(\mathbb{E}_g[W_i^0] - \mathbb{E}_g[\widehat{W}_i^0]) + p_g(\mathbb{E}_g[W_i^1] - \mathbb{E}_g[\widehat{W}_i^1]) \\
&\quad + (p_g - \mathbb{E}_g[\hat{p}_i])(\mathbb{E}_g[\widehat{W}_i^1] - \mathbb{E}_g[\widehat{W}_i^0]) \\
&\quad + \mathrm{Cov}_g(D_i, W_i^1 - W_i^0) - \mathrm{Cov}_g(\hat{p}_i, \widehat{W}_i^1 - \widehat{W}_i^0).
\end{aligned}$$

Each term has a natural interpretation:

- The first two terms reflect average miscalibration in state-contingent beliefs.
- The third line captures average miscalibration in state beliefs about partner leave.
- The final line includes sorting terms, which capture how partner leave is correlated with realized or expected treatment effects within group g.

The first sorting term is not directly estimable, since individual-level counterfactuals (W_i^1, W_i^0) cannot be jointly observed. However, given that all the other terms are observable, this term can be derived residually.

D.1 Components of the decomposition

Table A3: Components of the decomposition at $k = 9$, by levels of $\hat{p}$:

	Child 1			Child 2		
	Low	Medium	High	Low	Medium	High
p_g	0.568	0.690	0.722	0.444	0.655	0.743
$\mathbb{E}_g[\hat{p}]$	0.174	0.723	0.959	0.093	0.601	0.967
$\mathbb{E}_g[W_i^1]$	0.353	0.479	0.574	0.281	0.441	0.632
$\mathbb{E}_g[W_i^0]$	0.259	0.302	0.290	0.217	0.336	0.433
$\mathbb{E}_g[\widehat{W}_i^1]$	0.646	0.684	0.695	0.647	0.662	0.683
$\mathbb{E}_g[\widehat{W}_i^0]$	0.449	0.506	0.438	0.442	0.434	0.342
$\text{cov}(p, W^1 - W^0)$	0.000	0.002	0.004	0.007	-0.028	0.018
$\text{cov}(\hat{p}, \widehat{W}^1 - \widehat{W}^0)$	-0.002	0.001	0.002	-0.001	-0.026	0.005

Note: The table presents the componets enterin the decompisition, cf. equation (2). 'Low','Medium', and 'High' indicates the strata defined by the lower, middle and upper tercile of the distribution of $\hat{p}$.