Child-Related Uncertainties

Julius Ilciukas* Yidonglin Liu† Anson Zhou‡

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Abstract

We study how childcare uncertainty shapes gender inequality in a life-cycle model with endogenous fertility timing, credit constraints, and parental labor supply. Using the German Socio-Economic Panel, we document that childcare needs vary substantially and shape parents' time allocation. The calibrated model reproduces observed care and work responses to childcare shocks. Counterfactual experiments reveal that mothers' disproportionate caregiving burden exposes their employment to care shocks: childcare uncertainty reduces maternal participation and increases employment instability by magnitudes comparable to earnings risk. Fathers' higher costs of adjusting work arrangements amplify this asymmetry. The resulting unequal employment responses widen earnings gaps both within couples and across households.

JEL Classification: J13, J22, J16, D15, D81

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*Julius Ilciukas: Chinese University of Hong Kong
†Yidonglin Liu: The University of Hong Kong.
‡Anson Zhou: Faculty of Business and Economics, The University of Hong Kong.

1 Introduction

Raising children requires substantial parental time and limits the time available for paid work and leisure (Becker, 1965; Ghez and Becker, 1975). Mothers generally provide more childcare than fathers, and after a first birth, mothers' employment, hours, and earnings decline persistently relative to fathers' (Kleven et al., 2019a).

Most models of family labor supply treat childcare as a fixed and known cost (Attanasio et al., 2008). We document that childcare needs are substantially uncertain. Using the German Socio-Economic Panel (SOEP), we establish six facts. Total parental childcare declines as children grow older, yet care hours vary widely both across children of the same age and within individual children over time. Within-child changes account for 64 percent of the variation in care hours, and care shocks persist across child ages. Despite these fluctuations in total care, the division of care between parents remains sticky. Mothers' share stays close to three quarters at every child age and tends to rise with larger increases in total care. Work hours exhibit inaction: small care changes elicit little response, whereas large changes prompt substantial adjustments.

To study how childcare uncertainty affects labor supply and fertility, we develop a life-cycle model of household decisions. A married couple jointly chooses how each spouse divides time between market work and childcare. The couple also chooses consumption, saving, and the timing of a first birth. In addition to earnings risk and an age-dependent fecundity profile, parents face stochastic childcare demands. The initial care requirement is unknown when the couple decides to have a child, and after birth, care demands follow an age profile with persistent shocks.

The division of care depends on the productivity and opportunity cost of each parent's time. A CES technology combines maternal and paternal care, with maternal weights that vary across households but remain fixed within each household. When care needs rise, parents compare the care each spouse can provide against the earnings forgone by working less. Differences in care productivity and relative wages can therefore generate different work responses to the same care shock.

Adjustment costs create persistence in care and work arrangements. A fixed cost of changing care shares encourages couples to absorb small shocks within the established division. Each parent also faces a fixed cost of switching between nonemployment, part-time, and full-time work. The switching cost differs between mothers and fathers, while hours remain adjustable within each employment status.

These features interact to generate an asymmetric effect of childcare uncertainty on parents' labor supply. Gender specialization places a larger childcare burden on mothers. Complementarity between parental care inputs limits substitution, while the fixed cost of changing care shares creates an inaction region. When care shares remain unchanged, mothers provide most of the additional

care after a positive shock. Convex disutility of combined work and care then raises the marginal cost of maternal market work. Households weigh the benefit of releasing time for care against forgone earnings and work adjustment costs. Fathers' higher switching costs favor preserving paternal work arrangements, concentrating work reductions and subsequent recoveries on mothers. Repeated employment interruptions widen gender earnings gaps.

We calibrate the model using SOEP data on childcare and parental work. The childcare process matches how the level, dispersion, and persistence of care hours vary with child age. Care shares and parental work transitions discipline production and adjustment costs. We validate the model against parents' observed responses to care shocks. Mothers absorb 0.76 hours of each additional hour of unexpected care in the data, compared with 0.74 hours in the model. The model also reproduces the persistence of mothers' additional care burden. As in the data, simulated mothers change work status more often when care changes are large, and maternal work hours respond more than paternal hours to unexpected care.

Our main counterfactual removes childcare uncertainty. Care risk lowers maternal participation by 4.96 percentage points while leaving fathers' employment largely unchanged. Among employed mothers, average work hours rise. Childcare uncertainty therefore polarizes maternal labor supply, shifting work away from part-time arrangements toward both nonemployment and full-time work. Care-related work adjustments also make mothers' earnings less stable. The resulting asymmetric labor responses widen earnings gaps within couples and across households, particularly between low- and middle-income families. The form of adjustment varies across households because spouses' relative wages shape the opportunity cost of reducing work. A stronger paternal earning advantage favors maternal withdrawal from employment, whereas higher maternal relative wages favor part-time work over exit.

Childcare uncertainty lowers maternal participation and disrupts employment continuity in the same direction as earnings risk, with effects of comparable magnitude. At child ages 1 to 2, care risk lowers participation by 10.79 percentage points, compared with 15.86 points for earnings risk. From before the first birth through child age 12, care risk raises mothers' probability of at least one employment exit by 18.41 percentage points; the corresponding effect of earnings risk is 23.67 points. Both risks raise hours among employed mothers early in childhood. At later child ages, care risk continues to raise employed hours, whereas earnings risk lowers them. Under earnings risk, declining care needs make employment viable at lower wages and shorter hours, reducing average hours among workers. Care risk sustains a higher full-time share among employed mothers, as low care needs permit longer hours while high needs prompt exit. Birth timing responds much less to care risk than to earnings risk. After birth, households can reduce maternal work and draw on savings when care needs are high, then expand work as care needs ease. This flexibility in post-birth labor supply allows families to maintain nearly the same birth timing while concentrating the cost

of care shocks on maternal employment.

We vary work and childcare-share adjustment costs to identify how each friction shapes households' responses to care risk. The work-cost experiments show that gender differences in switching costs amplify inequality in employment responses. After unexpected increases in care, mothers account for 73.05 percent of moves to a lower work status. Removing paternal switching costs lowers the maternal share to 54.61 percent as fathers adjust work more often. Raising maternal switching costs to the paternal level sustains maternal employment despite care risk. Costly exits and subsequent returns give households an incentive to preserve existing employment. The baseline cost asymmetry provides stronger protection for fathers, while care shocks more readily overcome mothers' lower switching barriers. Removing the share-adjustment cost mainly induces increases in mothers' care shares, so greater flexibility in reallocating care can reinforce rather than reduce maternal specialization.

Since mothers absorb more care shocks through employment interruptions, improving childcare reliability can protect employment continuity. Greater flexibility in fathers' work arrangements can also spread the response to care shocks more evenly within couples. Evaluations of family policy should track mothers' employment continuity alongside fertility outcomes.

Related Literature

Our paper contributes to research on household labor supply and the economic costs of children (Attanasio et al., 2008; Bick, 2016). Blundell et al. (2018) examine how spouses allocate work and childcare to insure consumption against wage shocks. We establish childcare uncertainty as a distinct determinant of parental employment. High care demands increase the cost of maintaining market work. Our analysis shows that childcare uncertainty changes employment even when average care needs stay the same. The economic cost of parenthood therefore depends on the distribution of care needs, not only on their average level.

The interaction between childcare risk and work adjustment costs connects our paper to research on work flexibility and gender inequality (Bang, 2021; Erosa et al., 2022). Goldin (2014) emphasizes the role of work organization in gender pay gaps. Adda et al. (2017) link the career costs of children to employment interruptions and occupational choices. We show that work adjustment costs amplify the employment inequality generated by childcare uncertainty. Unexpected care demands create incentives to revise work arrangements. High adjustment costs for fathers discourage paternal responses and concentrate more of the adjustment on mothers. Work frictions thus influence how strongly a common household risk translates into unequal employment outcomes.

Our analysis also contributes to research on the joint determination of fertility and family labor supply (Jakobsen et al., 2025). Sommer (2016) shows how earnings uncertainty can delay childbearing. Earnings risk changes income at given work hours, whereas childcare uncertainty

changes the time burden of maintaining earnings. We show that households absorb care risk through maternal work adjustments after birth and maintain nearly the same birth timing. Small fertility responses can therefore coexist with substantial employment costs for mothers.

Empirical research documents parental labor responses to changes in children's health and care needs. Cheung et al. (2025) study parental responses to child disability (see also Vaalavuo et al., 2023). Jaume and Willén (2021) examine the effects of teacher strikes on parents. Evidence on recurring childcare disruptions also suggests that mothers adjust occupational choices in anticipation of future interruptions (Anstreicher and Jack, 2026). We provide a structural model that uses evidence on care dynamics to quantify the employment and welfare effects of childcare uncertainty across households and over time. The framework allows us to assess how household heterogeneity and gender differences shape the consequences of childcare uncertainty.

The rest of the paper is organized as follows. Section 2 documents childcare dynamics and parental responses in the SOEP. Section 3 presents the household model, and Section 4 describes calibration and validation. Section 5 reports the counterfactual results. Section 6 concludes.

2 Empirical Findings

2.1 Data and measurement

We use data from the German Socio-Economic Panel (SOEP), combining harmonized information on parents' weekday childcare, employment, and work hours with demographic links and fertility histories. We retain nine survey waves between 1999 and 2018. In each wave, we match mothers and fathers who are recorded as partners, identify the pair's first biological child, and focus on periods in which that child is aged 1 to 12. To organize the panel, we construct a time index t from the original survey-year variable. We assign $t = 1, \ldots, 9$ to 1999, 2001, 2003, 2005, 2007, 2009, 2013, 2015, and 2018, respectively. Consecutive values of t denote successive survey observations, although the intervals between observations differ in calendar time.

The empirical analysis uses three related samples. The child-age sample is the main sample for describing childcare hours, the division of care within the couple, inaction in that division, and care dynamics. After applying the age and childcare restrictions, it contains 9,776 couple-period observations from 5,006 parent pairs. A broader adult-age sample contains 55,043 person-period observations from 9,793 couples and is used to trace work hours and job uncertainty over adults' life cycles. The first-birth sample reorganizes the panel by time relative to the first birth to describe how labor-market outcomes change around the transition to parenthood.

Childcare hours come from each adult's report of time spent caring for children on a normal weekday. For each couple-period, total parental care is the sum of the mother's and father's reported

hours, and the mother's care share is her hours divided by that total.[1] We retain couple-periods with positive total care and exclude a couple-period if either parent reports at least 15 hours of weekday care. This rule limits the influence of extreme reports while keeping the two spouses on a common sample. Table 1 summarizes childcare and labor-supply variables for matched parents with a first child aged 1-12 years old.

Table 1. Descriptive Statistics

Variable	Mean	Std. dev.	Observations
Childcare allocation: hours per weekday			
Mother's childcare hours	6.34	3.36	9,776
Father's childcare hours	2.11	1.94	9,776
Total couple childcare hours	8.46	3.98	9,776
Mother's childcare share	0.74	0.19	9,776
Labor supply: hours per week			
Mother's work hours	15.89	15.86	9,662
Father's work hours	39.82	15.88	9,607

Notes: SOEP data are drawn from SOEP-core datasets. The sample includes couple-year observations with nonmissing childcare and labor-supply information.

Fact 1: Total childcare declines with child age, while gender shares remain stable.

Figure 1 plots parental childcare hours over the first child's early life. Total reported care falls steadily from 10.54 hours on a normal weekday when the first child is aged 1 to 2 to 7.19 hours at ages 11 to 12, a decline of about 32 percent. Both parents reduce their care as the child grows older, but mothers account for most of the total and most of the decline. Maternal care falls from 8.15 to 5.33 hours, while paternal care falls from 2.40 to 1.86 hours. The decline in total care is not accompanied by much change in how care is divided. Mothers provide 76.2 percent of parental care when the first child is aged 1 to 2, and their share remains close to three quarters in every subsequent age group. Childcare thus follows a pronounced age profile, while its unequal allocation between mothers and fathers remains largely unchanged. These patterns motivate a model with an age-dependent childcare requirement and a household decision over how care is divided between spouses.

Fact 2: Total childcare varies widely across and within children.

Although mean childcare follows a clear age profile, child age alone does not determine how much care individual households provide. Figure 2 plots the distributions of mothers' and fathers'

[1] More discussions of total childcare including non-parental care can be found in Robustness and Appendix A.8

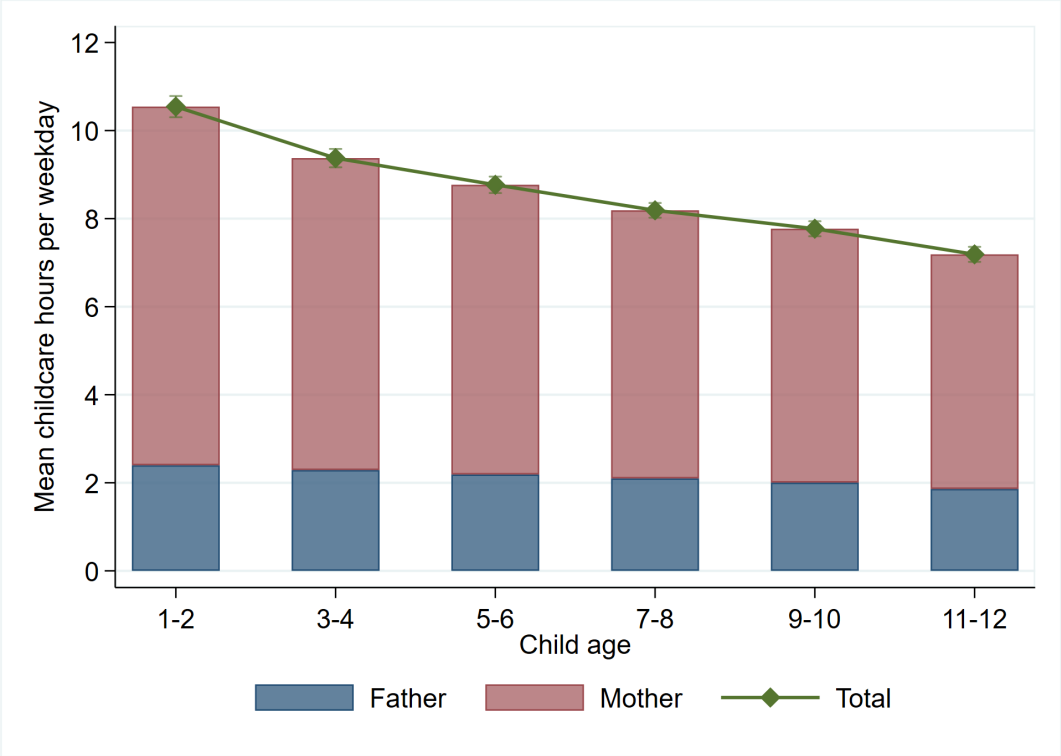


Figure 1. Parental childcare by child age

Notes: The figure reports mean weekday childcare hours by the age of the couple's first biological child. The bars show father and mother care, while the line shows their sum. Vertical bars give 95 percent confidence intervals for total parental care. Childcare allocations by parents' education are reported in Appendix Figure A1.

weekday childcare hours within each child-age group. Both distributions remain wide across all six groups. The maternal distributions lie farther to the right and extend over a wider range of hours, so mothers provide more childcare on average and show greater dispersion in absolute terms. This pattern is present throughout the child-age profile rather than being confined to the years immediately after birth. Whether this wide dispersion reflects permanent differences between families or changing needs over time matters for understanding the demands parents face.

Following Swamy and Arora (1972), we decompose variation in total parental childcare into differences between children and changes over time within the same child. Table 2 shows that within-child variation accounts for 63.64% of the variance in raw care hours and 60.50% after removing child-age effects. Parents thus face substantially varying demands on their time while raising the same child, making the coordination of care and market work a recurring household decision. The dominance of within-child variation also means that much of the dispersion in Figure 2 reflects temporal fluctuations rather than permanent household differences.

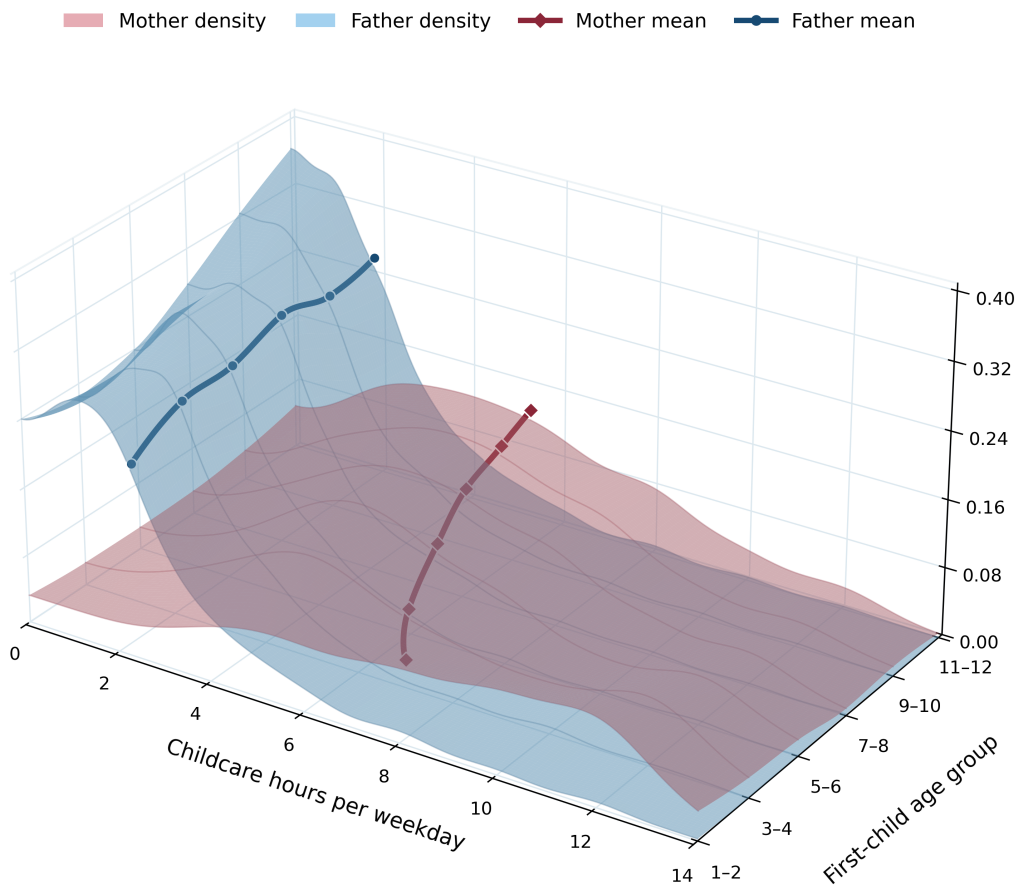


Figure 2. Dispersion in Parental Childcare by Child Age and Parent Gender

Notes: The figure plots kernel densities of reported weekday childcare hours separately for mothers and fathers within each first-child age group. The red surface represents mothers and the blue surface represents fathers. The dark red and blue paths mark the corresponding age-specific means. Each density integrates to one within its parent-gender and child-age cell. Surface height therefore measures the concentration of observations at a given number of care hours, rather than the amount of childcare provided. The figure uses the same main parental sample as Figure 1 and contains 9,776 couple-period observations.

Table 2. Between- and within-child variation in parental childcare

Childcare-hours measure	Between-child variation (%)	Within-child variation (%)
Raw hours	36.36	63.64
Residuals after child-age dummies	39.50	60.50

Notes: Age-adjusted hours are residuals from a regression on single-year child-age indicators.

Fact 3: Childcare shocks have persistent effects.

The variance decomposition establishes that care hours change substantially within families, but it does not reveal whether these changes are predictable. To assess how well parents can forecast

future care needs, we relate next-wave care to current care and observed family characteristics. Following Guvenen (2009) and Blundell et al. (2016a), we estimate the following AR(1) process separately by the age group of the couple's first child[2]:

$$C^T_{c,t+1} = \alpha_k + \rho_k C^T_{c,t} + X'_{c,t}\gamma_k + \varepsilon^T_{c,k,t+1}, \tag{1}$$

where $C^T_{c,t}$ is the total weekday childcare reported by the mother and father in couple c, and k indexes the first child's age group in period t. The next period, $t+1$, refers to the couple's next observed SOEP wave. The baseline specification omits $X_{c,t}$, while the extended specification includes both parents' age, education, employment status, and access to flexible work. The coefficient ρ_k measures the persistence of total parental care. The residual $\varepsilon^T_{c,k,t+1}$ is the next-wave forecast error after conditioning on current care and the observed characteristics. We use this residual as the empirical measure of an innovation in total childcare.

Figure 3 reports the estimates. Panel (a) shows moderate persistence in total parental care. In the baseline specification, the estimated coefficient is about 0.36 when the first child is aged 1 to 4 and rises to 0.58 at ages 11 and 12. The controlled estimates range from 0.38 to 0.57 and follow the same broad age pattern. Lower persistence at younger child ages means that current care is a weaker predictor of future care during early childhood, precisely when care demands are highest. Panel (b) shows that adding current care reduces residual dispersion relative to the intercept-only process in every age group. The residual standard deviation ranges from 2.92 to 3.60 weekday hours in the baseline AR(1) specification and from 2.79 to 3.32 hours after adding the controls. These residual standard deviations amount to roughly 34 to 47 percent of mean total care in the corresponding samples. Families thus face substantial innovations in care alongside a persistent component, motivating an age-dependent stochastic childcare requirement.[3]

Fact 4: The gender division of childcare is sticky.

Facts 2 and 3 established that total parental care fluctuates substantially and unpredictably. The division of care between parents determines how these fluctuations translate into time demands on mothers and fathers. Figure 4 shows broadly dispersed changes in total care alongside frequent inaction in its division between spouses.

Figure 4(a) plots changes in total parental childcare across adjacent observations of the same couple. Changes are spread in both directions, with most lying within roughly ten weekday hours

[2]Appendix A.3 also reports analogous AR(1) estimates for the couple's childcare hours by parent gender and child age. Results also exhibit incomplete persistence and substantial residual variation. Appendix A.4 shows that this residual variation is not specific to the one-lag specification. Adding a second lag leaves residual dispersion largely unchanged, and care when the first child is aged one to two has limited predictive power for care at later child ages.

[3]Section 2.2 examines whether this variation is mechanically generated by mothers' employment termination.

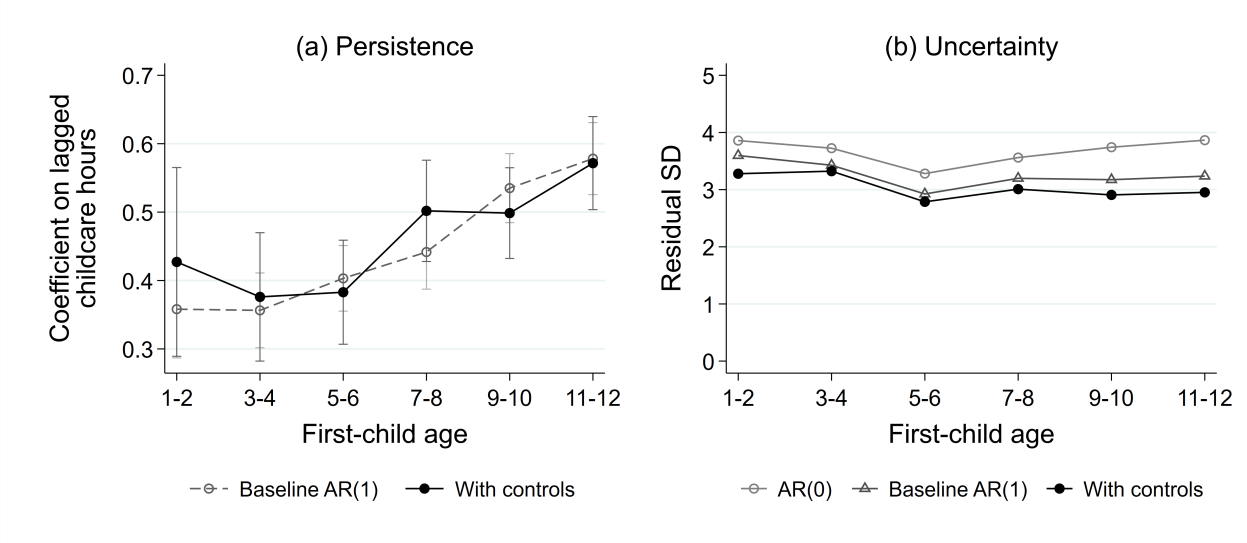


Figure 3. AR(1) Process for Total Parental Childcare

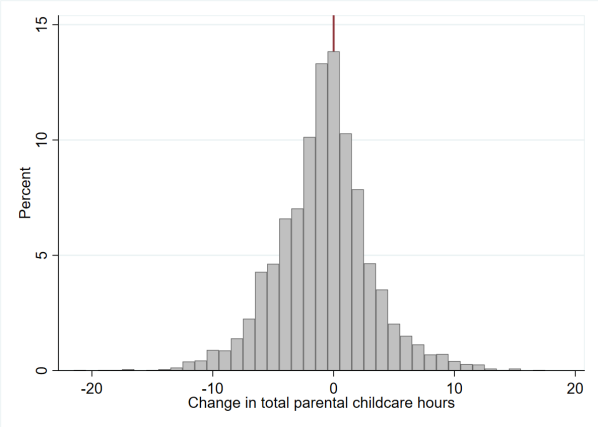
Notes: Total parental childcare equals the sum of mothers' and fathers' reported weekday childcare hours. Panel (a) plots coefficients on current total childcare from the AR(1) specification with and without controls; bars denote 95 percent confidence intervals. Panel (b) plots residual standard deviations from an intercept-only process, an AR(1) process, and an AR(1) process with controls. The next period is the next observed SOEP wave for the same couple.

of zero and no isolated mass at zero. Panel (b) shows a pronounced spike at zero in changes in the mother's share, together with adjustments extending well beyond the five-percentage-point inaction band. Households thus often absorb changes in total care within their existing division, while revisions to that division, when they occur, can be substantial. This combination of inaction and sizeable reallocations motivates a cost of revising the division of care.

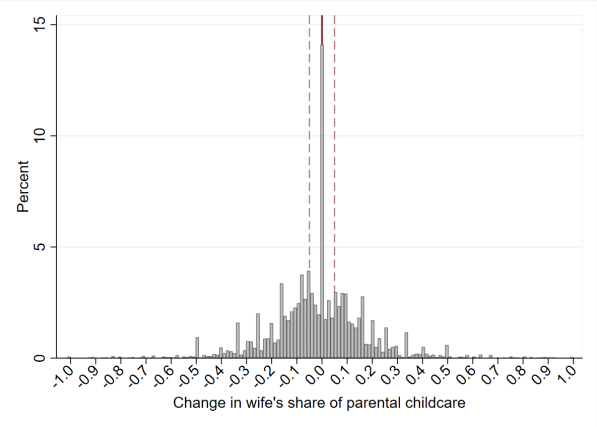
Fact 5: Large childcare increases fall disproportionately on mothers.

Fact 4 showed that the division of care often remains unchanged. When it does adjust, the direction of adjustment matters for understanding whose time is most affected. Figure 5 relates changes in the mother's care share to the size of the change in total care, dividing couple transitions into seven groups. When total care changes by no more than one hour in either direction, 39.4 percent of couples remain within the five-percentage-point inaction band. Larger absolute changes are associated with a wider distribution of share changes and less frequent inaction. The mean share change traces an S-shaped path: relatively flat for small changes in total care, turning negative for large declines and positive for large increases. When total care rises sharply, the mother's share tends to increase; when it falls sharply, her share tends to decrease.

The burden on mothers therefore operates through two channels. Because mothers already provide about three quarters of parental care, maintaining the existing division alone assigns them



(a) Histogram of Changes in Total Parental Childcare Hours



(b) Histogram of Changes in Mother's Share of Parental Childcare

Figure 4. Changes in Parental Childcare

Notes: Changes are calculated between adjacent observed SOEP waves for the same couple. The solid line marks zero and the dashed lines mark changes of minus and plus five percentage points. Summary of inaction shares in all samples is reported Appendix Table A1

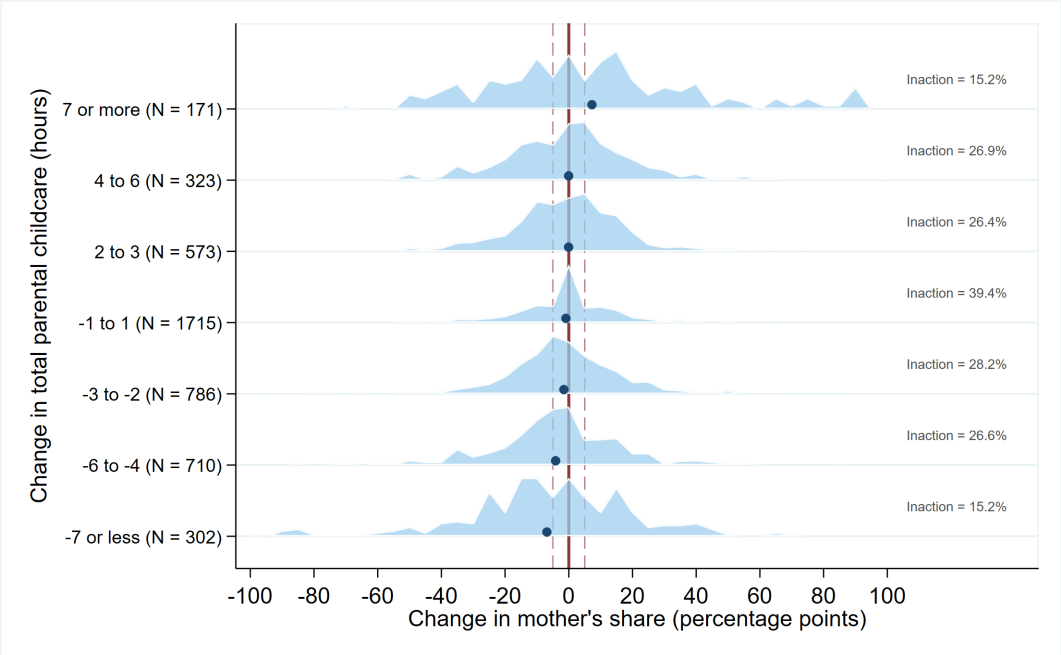


Figure 5. Changes in the mother's childcare share by changes in total parental care

Notes: Each density plots the change in the mother's share of parental childcare within the indicated range of changes in total parental care. The densities are scaled to have the same maximum height. Dark dots mark group-specific mean changes in the mother's share. The solid line marks zero and the dashed lines mark minus and plus five percentage points. Inaction means an absolute change in the mother's share of no more than five percentage points. The sample contains 4,580 couple transitions.

most of any additional care. When care rises sharply, a further increase in their share concentrates the time burden still more, so that mothers absorb an even larger fraction of the increase than their

existing share would imply. Both channels create pressure on mothers' market work.

Fact 6: Work-hour responses to childcare changes are nonlinear.

The work consequences of changing childcare needs depend on how readily parents can revise their work arrangements. Figure 6 plots work-hour adjustments associated with changes in each parent's own weekday care. For both parents, the response is relatively flat around small care changes and rises sharply toward either tail. A one-hour increase in daily care is associated with less than one hour of weekly work-hour adjustment, compared with 13–14 hours when care increases by at least seven daily hours.

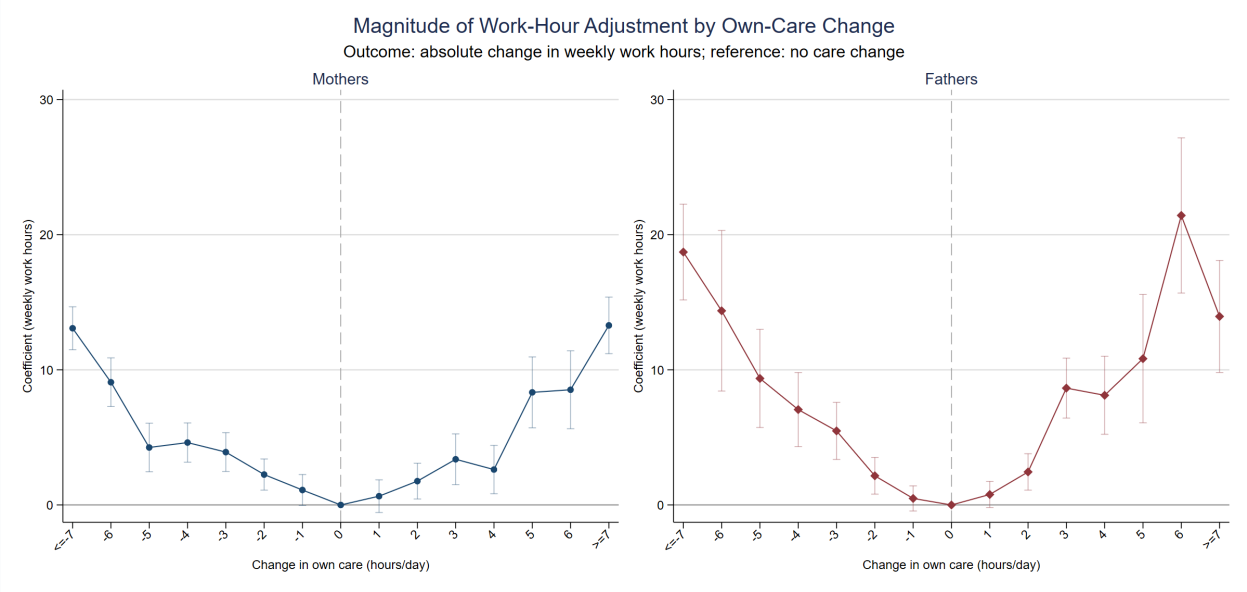


Figure 6. Magnitude of work-hour adjustment by changes in own childcare

Notes: Points report differences in mean absolute weekly work-hour changes relative to the zero-care-change group, whose mean absolute changes are 5.06 hours for mothers and 5.31 hours for fathers. Care changes are measured in hours per weekday. Vertical bars show 95 percent confidence intervals. Appendix Table A11 reports the full coefficients.

Appendix A.9 shows that large care increases are associated with hour reductions and large care decreases with expansions across alternative work-hour thresholds. The nonlinearity in hours arises partly because large care changes trigger discrete transitions between employment states. As the absolute change in own care rises from zero to at least seven daily hours, transition rates between nonemployment, part-time, and full-time work increase from 22.4 to 59.2 percent for mothers and from 4.9 to 50.7 percent for fathers. Status switchers adjust weekly hours by 20–36 hours on average, compared with 2–4 hours among parents who retain their status. Larger care changes thus make reorganizing paid work worthwhile, while modest changes can be accommodated within existing arrangements, consistent with adjustment frictions in labor supply (Chetty et al., 2011). The combination of inaction around small changes and discrete status transitions at larger changes

motivates gender-specific fixed costs of changing work status, alongside continuous hour choice within each status.

Other facts: Parenthood and responses to shocks

We also document familiar patterns in first-birth timing and parental labor supply. Appendix Figure A4a places the transition to parenthood within the adult life cycle: mothers have their first child at an average age of 26.7, compared with 29.5 for fathers. At the corresponding ages, employed mothers' hours begin to fall while fathers' continue to rise, widening the gender gap in market hours (Appendix Figure A4b).

Appendix Figure A4c relates this divergence directly to the first birth. Among employed mothers, weekly hours fall from 39.1 in the two years before childbirth to 26.3 two to three years afterward and remain low thereafter. Employed fathers work roughly 43 to 45 hours throughout the event window. The resulting gender gap widens from about 4 to 17 weekly hours, consistent with evidence on the gendered earnings effects of parenthood across countries (Kleven et al., 2019b).

A second dimension of the motherhood penalty appears in parents' job uncertainty. We measure this uncertainty using subjective probabilities (Manski, 2004). The SOEP asks employed respondents about their probability of leaving employment within two years and non-employed respondents about their probability of starting work over the same horizon. We use the implied probability of future employment, z_{it}, to define job uncertainty as $U_{it} = z_{it}(1 - z_{it})$. This measure equals zero when the future employment state is certain and rises as employment and nonemployment become more equally likely. We summarize job uncertainty using

$$U_{it}^g = \sum_{b \in \mathcal{B}} \mu_b^g \, \mathbf{1}\{B_{it} = b\} + \varepsilon_{it}^g. \tag{2}$$

We estimate this equation separately for five-year adult-age groups and two-year intervals relative to the first birth, with B_{it} denoting the relevant group. Each coefficient μ_b^g gives mean job uncertainty for gender g in group b.

The age profiles show that mothers face greater job uncertainty throughout the life cycle, with the largest gap at ages 25 to 29 (Appendix Figure A6). In Appendix Figure A4d, maternal uncertainty about employment around the first birth rises from 0.087 to 0.102, almost three times the paternal level of 0.037. Maternal uncertainty subsequently declines as children grow, while paternal uncertainty remains much lower throughout. Together, the work-hour and uncertainty profiles show that motherhood involves both a sustained reduction in realized hours and greater uncertainty about future employment.

To examine how parents adjust care and work in response to shocks, we follow Blundell et al. (2016a) and estimate how innovations in total care and parents' wages pass through to their care and

work choices. Appendix A.6 describes the construction of these innovations and the pass-through specification, while Appendix Table A5 reports the full results.

The care pass-through estimates show that the unequal allocation persists when childcare needs change unexpectedly. When total weekday care is one hour above its AR(1) prediction, mothers' care rises by 0.743 hours and fathers' care by 0.256 hours. The roughly 74-to-26 split closely matches the average division of existing parental care, indicating that unexpected care is absorbed in the same proportions as routine care. The mother's share also rises by 0.005, or half a percentage point, for every additional hour of unexpected care. This response is small for a one-hour innovation, but it grows with the size of the shock. A five-hour positive innovation, for example, raises the mother's share by 2.5 percentage points. Larger care shocks therefore both expand care along the existing division and shift a greater share of the burden toward mothers. Wage innovations produce much smaller reallocations. A 10 percent increase in the mother's wage residual shifts 0.008 hours of care from her to the father, while the same increase in the father's wage residual shifts about 0.014 hours in the opposite direction.

The labor-supply responses are more uneven. A one-hour positive total-care innovation reduces mothers' weekly work hours by 1.081 hours, compared with 0.328 hours for fathers. Mothers absorb most of the additional childcare and make the larger adjustment in market work. The asymmetry in work responses is wider than the asymmetry in care absorption, reflecting the interaction between mothers' greater care burden and the frictions that govern when parents change their work arrangements.

2.2 Robustness

Employment termination can change how mothers allocate time to childcare, and the reason for leaving work matters for interpreting these changes. Voluntary exits may respond to childcare needs, whereas involuntary job loss may raise reported care even when underlying care requirements are unchanged. Our checks show that total parental care remains broadly unchanged following involuntary termination, while these mothers are substantially more likely to search actively for work than mothers who leave voluntarily. The stable care hours after involuntary job loss suggest that job loss does not drive the measured variation in childcare (Appendix A.5).

Three additional sets of robustness checks address whether the main findings depend on how childcare and its intrahousehold allocation are measured. First, Appendix Figures A2 and A3 confirm that the division of care is persistent and not an artifact of a particular inaction threshold or reporting environment. Second, Appendix A.4 reassesses the dynamics of childcare hours using an AR(2) forecasting equation and long-horizon projections from care when the first child is aged one to two. Residual dispersion changes little after adding a second lag, while early childcare becomes less predictive at later child ages. The childcare uncertainty documented above is therefore not an

artifact of the one-lag AR(1) specification. Third, the childcare measure is broadened to include formal and informal non-parental care reported in the SOEP child questionnaires. Appendix Table A7 describes the resulting sample. Appendix Figures A13, A14, and A15 repeat the age-profile and dynamic analyses, while Appendix Table A8 re-estimates the shock pass-through regressions. Mothers remain the largest individual source of care, and childcare hours continue to exhibit persistence and substantial residual dispersion. The central findings on childcare dynamics and the concentration of labor-market adjustment among mothers persist when non-parental care is included.

2.3 Summary

The six facts show why childcare uncertainty creates unequal pressure to adjust work. Established care divisions assign mothers most additional care, and persistent shocks can prolong the pressure on maternal employment. The nonlinear relationship between care changes and work adjustments indicates that small care fluctuations are absorbed within existing work arrangements, while large changes trigger discrete employment transitions.

A complete analysis requires a dynamic household framework in which first-birth timing, market work, and childcare allocation are determined jointly. The household chooses when to have its first child and, after birth, how the spouses divide market work and childcare while saving for the future. Childcare needs vary with the child's age and evolve stochastically. The household faces a fixed cost of changing the division of care and gender-specific fixed costs of switching work status; hours remain adjustable within each status. Both spouses face their own wage processes and gender-specific costs of the total time burden. Within this framework, the unequal absorption of childcare shocks and the larger labor-supply penalties among mothers arise endogenously from household choices. Section 3 develops this framework.

3 Model

The empirical findings show that childcare needs are uncertain, that the division of care between parents is sticky, and that large care changes trigger discrete work adjustments concentrated on mothers. To analyze these patterns jointly, we develop a life-cycle model in which a married couple chooses consumption, saving, fertility timing, market work, and childcare allocation. The couple faces earnings risk, age-dependent infertility, and stochastic childcare demands. A childcare production technology and fixed costs of changing care shares and work status govern how households accommodate care requirements. This framework allows us to trace how childcare risk is shared within the couple and transmitted to each parent's labor supply.

3.1 Demography and endowments

The model economy is populated by a continuum of married households in which both spouses are the same age. Each household is unitary and makes decisions for both spouses. One model period corresponds to two years. Households enter the model childless at age 18 and make working-life decisions over $T = 24$ periods, ending at ages 64–65. Rather than modeling retirement explicitly, we summarize the value of consumption from period $T + 1$ onward using a terminal continuation value.

Each spouse $g \in \{\male, \female\}$ faces an idiosyncratic stochastic wage process. For $t \geq 2$, the couple's log wage offers are

$$\begin{pmatrix} \log w_t^{\male} \\ \log w_t^{\female} \end{pmatrix} = \begin{pmatrix} \log w_0^{\male} + h_{\male}(t) \\ \log w_0^{\female} + h_{\female}(t) \end{pmatrix} + \begin{pmatrix} \rho_{\male} & 0 \\ 0 & \rho_{\female} \end{pmatrix} \begin{pmatrix} \epsilon_{t-1}^{\male} \\ \epsilon_{t-1}^{\female} \end{pmatrix} + \begin{pmatrix} \psi_t^{\male} \\ \psi_t^{\female} \end{pmatrix} + \begin{pmatrix} \nu_t^{\male} \\ \nu_t^{\female} \end{pmatrix}. \tag{3}$$

Here, $h_g(t)$ governs the gender-specific average age profile of wages, and $\nu_t^g \sim N(0, \sigma^2_{\nu,g})$ is a transitory wage shock received in each period. The persistent component follows a first-order autoregressive process with persistence ρ_g, innovations $\psi_t^g \sim IID(0, \sigma^2_{\epsilon,g})$, and initial condition $\epsilon_1^g = 0$.

The innovations to the two spouses' wage processes may be contemporaneously correlated. Writing $\boldsymbol{\psi}_t = (\psi_t^{\male}, \psi_t^{\female})'$ and $\boldsymbol{\nu}_t = (\nu_t^{\male}, \nu_t^{\female})'$, their covariance matrices are $\mathrm{Var}(\boldsymbol{\psi}_t) = \begin{pmatrix} \sigma^2_{\epsilon,\male} & \sigma_{\epsilon,mf} \\ \sigma_{\epsilon,mf} & \sigma^2_{\epsilon,\female} \end{pmatrix}$ and $\mathrm{Var}(\boldsymbol{\nu}_t) = \begin{pmatrix} \sigma^2_{\nu,\male} & \sigma_{\nu,mf} \\ \sigma_{\nu,mf} & \sigma^2_{\nu,\female} \end{pmatrix}$, respectively. This cross-spouse correlation allows, for instance, local labor-market conditions to move both wages in the same direction, or assortative matching in occupations to generate common exposure to sectoral shocks.

3.2 Childcare requirements and allocation

Following the birth of the first child, the household faces a childcare requirement that depends on the child's age and an idiosyncratic shock. Let k denote the child's age index and D_t denote the childcare requirement. The requirement is given by

$$D_t = \alpha_k + \rho_k^D D_{t-1} + u_t, \qquad u_t \mid k \sim N(0, \sigma_k^2), \tag{4}$$

The parameter α_k captures the deterministic component of childcare requirements at child age k, ρ_k^D measures the persistence of childcare requirements across adjacent periods, and u_t is the innovation. In the first period after birth, $D_t = \alpha_0 + u_t$. This process mirrors the empirical AR(1) dynamics documented in Fact 3: care needs have both a predictable age profile and persistent shocks whose magnitude varies with child age.

The household allocates childcare between the two spouses. Let $l_t^{\male}$ and $l_t^{\female}$ denote their respective childcare hours. Effective parental childcare is produced according to a CES technology:

$$L_t = \left[\alpha_n^L (l_t^{\female})^\rho + (1-\alpha_n^L)(l_t^{\male})^\rho\right]^{1/\rho}, \tag{5}$$

and the household must satisfy

$$L_t = D_t.$$

The curvature parameter ρ governs the substitutability between maternal and paternal care. When $\rho < 0$, the two inputs are complements: one parent's time cannot easily replace the other's, so reallocating care between spouses is costly in terms of effective childcare. This complementarity helps explain why established care divisions persist even as total care needs change (Fact 4).

To allow heterogeneity in households' childcare divisions, we let the maternal childcare weight vary across households:

$$\alpha_n^L = \bar{\alpha}^L + \eta_n, \qquad 0 < \alpha_n^L < 1$$

where $\bar{\alpha}^L$ is the mean maternal care weight and η_n is a household-specific component with mean zero. We calibrate the dispersion of η_n to match the observed cross-household dispersion in mothers' shares of total parental childcare. Household n draws and observes η_n before its first fertility decision, and the weight remains fixed thereafter. Appendix B describes the numerical distribution of η_n.

The mother's share of total parental childcare hours is

$$s_t = \frac{l_t^{\female}}{l_t^{\male} + l_t^{\female}}.$$

Before the first birth, $l_t^{\male} = l_t^{\female} = 0$, and the household does not face the childcare requirement.

3.3 Adjustment costs

The data show that total childcare fluctuates substantially while the division of care often remains unchanged (Fact 4, Figure 4). Reallocations, when they occur, can be sizeable. We capture the effort required to reorganize established caregiving responsibilities with a fixed cost of changing the care share. For child-age periods $k = 1, \ldots, 8$, the adjustment cost is

$$\Phi(s_t, s_{t-1}; k) = \begin{cases} 0 & \text{if } k = 0; \\ \kappa_s \mathbb{1}\{s_t \neq s_{t-1}\} & \text{if } 1 \leq k \leq 8, \end{cases}$$

where $\kappa_s > 0$ is the fixed cost of changing the childcare division. The household does not pay an adjustment cost in the first period after birth ($k = 0$) because no previous childcare allocation exists. The fixed cost generates persistence in s_t, while the childcare technology and gender-specific time costs determine the allocation toward which households adjust when the existing division becomes sufficiently far from optimal.

The data also show that work hours respond little to small care changes but adjust substantially when care changes are large (Fact 6, Figure 6). A household can absorb a modest change in care within its current work arrangement, while a larger change may make switching between employment states worthwhile. We therefore introduce gender-specific fixed costs of changing work status.

For each spouse $g \in \{♀, ♂\}$, let $e_t^g \in \{0, 1, 2\}$ denote no work, part-time work, and full-time work, respectively. The chosen market hours h_t^g determine the current work status e_t^g according to the corresponding hours thresholds. The household's optimization over h_t^g therefore also selects e_t^g, while the previous status e_{t-1}^g is predetermined. From the second adult period onward, the work-status adjustment cost is

$$\Phi^g(e_t^g, e_{t-1}^g) = \kappa_e^g \mathbb{1}\{e_t^g \neq e_{t-1}^g\},$$

where $\kappa_e^g > 0$ is the fixed cost of changing spouse g's work status. Allowing the cost to differ by gender captures the empirical finding that mothers switch work status far more frequently than fathers in response to care changes.

3.4 Preferences and child utility

Household utility combines consumption, utility from children, and a convex disutility of each spouse's total time devoted to work and care. The per-period utility function is

$$U(c_t, c_t^k, h_t^♀ + l_t^♀, h_t^♂ + l_t^♂) = u(c_t) + \theta u(c_t^k) - v^♀(h_t^♀ + l_t^♀) - v^♂(h_t^♂ + l_t^♂), \tag{6}$$

where c_t is parental consumption and c_t^k is child-related consumption for the first child at age k. For each spouse $i \in \{♀, ♂\}$, h_t^i and l_t^i denote market work and childcare time, so $h_t^i + l_t^i$ is the total time burden. Because disutility is convex in this total, an increase in childcare hours raises the marginal cost of market work. This interaction is central to the model: when care needs rise, the cost of maintaining employment increases, and the household must decide whose work to reduce.

Households with a dependent child also face a subsistence child-consumption requirement, $c_t^k \geq \underline{c}^k$.[4] By limiting expenditure adjustment after childbirth, this commitment can amplify the

[4]Implementing the subsistence child-consumption requires an iterative algorithm. The first step is to guess a

effect of uncertainty on the timing of the first birth. The functions $u(\cdot)$ and $v^i(\cdot)$ are given by $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ and $v^i(h+l) = \zeta_i \frac{(h+l)^{1+\kappa_i}}{1+\kappa_i}$. The parameter θ governs the utility weight on child consumption, while ζ_i and κ_i govern the level and curvature of spouse-specific time disutility. When no dependent child is present, flow utility reduces to $U(c_t, h_t^{\female}, h_t^{\male})$.

Following Gourinchas and Parker (2002) and Graham and McDowall (2026), we close the model with a terminal value that depends on accumulated assets, resembling a warm-glow bequest motive (De Nardi, 2004):

$$V_{T+1}(a_{T+1}) = \omega \frac{a_{T+1}^{1-\gamma}}{1-\gamma}$$

where $T+1$ is the terminal stage at retirement. The terminal function summarizes utility from period $T+1$ onward.

3.5 Infertility risk

As in Sommer (2016), age-dependent infertility risk creates a cost of postponing childbirth. Before having the first child, the household faces a binary idiosyncratic infertility shock $f_t \in \{I, F\}$ that arrives at the beginning of each period with probability p_t^I. Only households that remain fertile can choose to have a child. Infertility is absorbing: if $f_t = I$, then $f_{t+j} = I$ for all $j \geq 0$. Households therefore weigh the benefits of accumulating resources before parenthood against the rising risk of losing the opportunity to have a child.

3.6 Dynamic program of fertile childless households

At the beginning of period t, a fertile childless household decides whether to have its first child. Let $x_t = (a_t, w_t^{\male}, w_t^{\female}, \epsilon_t^{\male}, \epsilon_t^{\female}, e_{t-1}^{\male}, e_{t-1}^{\female}, \eta_n)$ denote its state. The household solves

$$V_t(x_t) = \max \left\{ E_{D_0} \left[W_{t,0}(x_t, D_0) \right], \widetilde{V}_t(x_t) \right\}. \tag{7}$$

The first term is the expected value of having a child, where $W_{t,0}$ denotes the value function W_t evaluated in the birth period with $k = 0$ and $D_t = \alpha_0 + u_t$. The expectation is taken over the unknown initial care requirement. The second term is the value of remaining childless.

If the household postpones childbearing, it remains childless while still fertile and solves

particular value of $\underline{c^k}$. The second step is to calibrate remaining parameters to fit our targeted moments. The third step is to compute the $\underline{c^k}$'s fraction in average child consumption. The algorithm iterates until it finds that the percentage is consistent with external statistics and all other targeted moments fit well.

$$\widetilde{V}_t(x_t) = \max_{c_t, a_{t+1}, h_t^{\male}, h_t^{\female}} \Bigg\{ U(c_t, h_t^{\female}, h_t^{\male}) - \sum_{g \in \{\female, \male\}} \Phi^g(e_t^g, e_{t-1}^g) + \beta \left[(1 - p_{t+1}^I) E_t[V_{t+1}] + p_{t+1}^I E_t[Q_{t+1}] \right] \Bigg\}, \tag{8}$$

subject to

$$a_{t+1} = (1 + r) \left(a_t + w_t^{\male} h_t^{\male} + w_t^{\female} h_t^{\female} - c_t \right), \qquad t \leq T. \tag{9}$$

The household chooses $c_t > 0$, $a_{t+1} \geq 0$, and $h_t^g \geq 0$ for each spouse. The continuation value reflects the possibility that the household becomes infertile next period with probability p_{t+1}^I, in which case it transitions to the no-fertility-choice problem Q_{t+1}.

3.7 Dynamic program after the first birth

After the first birth, the household's choice set expands to include child expenditures, childcare allocation, and the division of care between spouses. Let z_t collect the child-related states:

$$z_t = \begin{cases} (0, D_0), & k = 0, \\ (k, D_{t-1}, u_t, s_{t-1}), & k = 1, \ldots, 8. \end{cases}$$

At $k = 0$ the household observes only the initial care draw. From $k = 1$ onward, the state includes the previous care requirement, the current innovation, and the previous care share, which determines whether a share-adjustment cost is incurred. Together with the adult state x_t, the household's value function is

$$W_t(x_t, z_t) = \max_{c_t, c_t^k, a_{t+1}, h_t^{\male}, h_t^{\female}, l_t^{\male}, l_t^{\female}} \Bigg\{ U(c_t, c_t^k, h_t^{\female} + l_t^{\female}, h_t^{\male} + l_t^{\male}) - \sum_{g \in \{\female, \male\}} \Phi^g - \Phi(s_t, s_{t-1}; k) + \beta \mathcal{C}_{t+1,k+1} \Bigg\}. \tag{10}$$

The continuation value depends on the child's age:

$$\mathcal{C}_{t+1,k+1} = \begin{cases} E_t[W_{t+1}(x_{t+1}, z_{t+1})], & k = 0, \ldots, 7, \\ E_t[Q_{t+1}(x_{t+1})], & k = 8, \end{cases}$$

When the child reaches age index $k = 8$, care requirements end and the household transitions to

the no-fertility-choice problem. The household faces the budget constraint

$$a_{t+1} = (1+r)\left(a_t + w_t^{♂} h_t^{♂} + w_t^{♀} h_t^{♀} - c_t - c_t^k\right), \qquad t \le T.$$

$$a_{t+1} \ge 0, \quad c_t^k \ge \underline{c}^k,$$

$$L_t = \left[\alpha_n^L (l_t^{♀})^\rho + (1-\alpha_n^L)(l_t^{♂})^\rho\right]^{1/\rho} = D_t,$$

The borrowing constraint $a_{t+1} \ge 0$ prevents households from borrowing against future earnings, so they must finance current consumption and child expenditures from assets and current income. Combined with the minimum child-consumption requirement, this constraint can force parents to maintain market work even when care needs are high, or to draw down savings accumulated before birth.

3.8 Dynamic program without future fertility choice

Households that no longer face a fertility decision solve a standard consumption-saving and labor-supply problem without childcare. This state applies both to childless households that have become infertile and to parents whose child has reached the end of the dependent period:

$$Q_t(x_t) = \max_{\{c_j, a_{j+1}, h_j^{♂}, h_j^{♀}\}_{j=t}^{T}} E_t \left\{ \sum_{j=t}^{T} \beta^{j-t} \big(U(c_j, h_j^{♀}, h_j^{♂}) - \sum_{g \in \{♀,♂\}} \Phi^g \big) + \beta^{T+1-t} V_{T+1}(a_{T+1}) \right\}, \tag{11}$$

subject to the constraint 9 in every period $j = t, \ldots, T$. Work-status adjustment costs continue to apply, so employment persistence carries over from the child-rearing period. Mothers who exited employment during high-care episodes face these costs when re-entering the labor market, linking the child-rearing period to subsequent labor-supply decisions.

4 Identification and Calibration

The model is estimated in two stages. In the first stage, we estimate the gender-specific wage process directly from SOEP wage histories, separately from the household problem. In the second stage, we calibrate 16 structural parameters by matching simulated moments of childcare, work, and first-birth timing to their SOEP counterparts. We then validate the calibrated model against untargeted moments that capture how parents respond to unexpected changes in childcare.

4.1 Estimation strategy

The wage process is estimated from age profiles and covariance moments of observed wages among employed parents. Persistent and transitory components are identified separately by gender, with cross-spouse covariance allowed. The resulting wage parameters, along with standard preference and financial inputs, are reported in the upper panel of Table 3 and held fixed throughout the structural calibration.

The second stage calibrates the 16 parameters listed in the lower panel of Table 3. These govern the childcare-need process, the care production technology, the adjustment costs for care shares and work status, and the utility weight on children. We choose these parameters by minimizing the equally weighted sum of squared relative deviations between 16 SOEP moments and their simulated counterparts, as reported in Table 4. For each candidate parameter vector, we solve the household problem and simulate 10,000 households. The solution discretizes the state space using five persistent and five transitory wage nodes per spouse, eleven childcare-need nodes, 30 asset nodes, and 15 childcare-share nodes. Common simulation draws are held fixed across parameter candidates, so the criterion compares differences in household choices rather than simulation noise (following Eisenhauer et al., 2015).

Because childcare need is a latent variable in the model, the care-process targets use observed parental care hours as auxiliary evidence on the underlying requirement. Worker-hour targets draw on the broader adult-age labor sample, while care and first-birth moments use their corresponding family samples. The work-switching targets use the model's structural no-work, part-time, and full-time states; the alternative status classification described below is used only for validation. Appendix C gives the formal criterion and further details on the target and validation measures.

The 16 moments identify different household decisions. The initial care level and dispersion, the child-age trend, persistence, and innovation standard deviation discipline the stochastic process for childcare demand. The within-household mother-to-father care ratio and its gradient across relative-wage quartiles pin down the CES production weights, while the frequency of unchanged care shares identifies the fixed share-adjustment cost. Gender-specific worker hours and work-status transition rates jointly determine the time disutility scales and the work-status switching costs. Mean first-birth age anchors the utility weight parents place on having a child.

4.2 Estimation results

Table 3 reports all model parameters, separating those determined outside the structural calibration from the 16 estimated parameters. Table 4 compares each target moment with its model counterpart. We organize the discussion of the fit around three groups of moments: the care process, the division of care, and labor supply.

The care-process moments in Table 4 convey the scale of the risk that parents face. At child ages 1–2, parents supply 10.54 daily hours of care on average, with a standard deviation of 4.09 hours. The initial mean and dispersion discipline the starting distribution of care need. The negative child-age slope of the AR(1) intercept contributes to falling expected need as the child grows, while persistence and innovation variance carry uncertain demand across periods. Families therefore confront both a large initial care commitment and substantial uncertainty about its future path.

The care-division moments discipline the production technology and the cost of changing shares. The mean within-household mother-to-father care ratio is 3.79. The fitted reference CES weight is 0.974, and the curvature of -2.684 implies a substitution elasticity of 0.271. Maternal and paternal care are thus strongly complementary, so one parent's time cannot easily replace the other's. Despite the high maternal weight, paternal care remains productive: at a fixed total amount of parental care, effective care output is highest when mothers supply about 73% and fathers about 27%. The observed frequency of unchanged care divisions identifies the share-adjustment cost. Together, these parameters generate maternal-centered care divisions that change little when total care need rises, consistent with the empirical patterns in Fact 4.

The work moments connect the care division to labor supply. Employed women work 31.93 hours per week, compared with 43.16 for men, while mothers change work status in 32.02% of continuing observations versus 10.00% for fathers. These hours and switching frequencies jointly discipline the time disutility scales and the work-status adjustment costs. The fitted paternal switching cost is 17.52 times the maternal cost, making fathers' work the more persistent labor-market commitment and mothers' work the more flexible margin when care needs change. Mean first-birth age disciplines the child consumption weight. The model matches all 16 target moments closely, as Table 4 shows.

4.3 Validation

The calibration targets discipline the model's care process, care division, and average work patterns. However, the counterfactual experiments in Section 5 rely on how the model allocates unexpected care between parents and translates care shocks into work adjustments. These responses are not directly targeted. We therefore validate the model against them, using the same empirical specifications applied to both SOEP and simulated data.

Mothers absorb most unexpected childcare

The first validation asks how couples divide unexpected care between spouses. This division determines whose time must adjust when care needs deviate from their predicted path. As a preliminary check, mean maternal care shares are 74.3% in SOEP and 72.6% in the model, and

Table 3. Calibration Parameters

Exogenous parameters

Parameter	Symbol	Female	Male	Parameter	Symbol	Value
Persistent shock SD	$\sigma_{\epsilon,g}$	0.197	0.193	Gross interest rate	$1+r$	1.04
Transitory shock SD	$\sigma_{\nu,g}$	0.345	0.257	Risk aversion	γ	0.68
Wage persistence	ρ_g	0.919	0.925	Discount factor	β	0.986
Wage age profile	$h_g(t)$	SOEP, 1999–2018		Preference curvature	$\kappa_{\female} = \kappa_{\male}$	1.4
Spousal covariance: $\sigma_{\epsilon,mf} = 0.012$, $\sigma_{\nu,mf} = -0.003$				Terminal-value scale	ω	0.8

Estimated parameters

Parameter	Symbol	Female	Male	Parameter	Symbol	Value
Work status adjustment cost	κ_e^g	0.0017	0.0291	Care share adjustment cost	κ_s	0.0002
Time disutility scale	ζ_g	7.307	7.383	First child's utility weight	θ	1.683
Care need process		*Constant*	*Age slope*	Reference maternal weight	$\bar{\alpha}^L$	0.974
Intercept		0.359	-0.028	Childcare CES curvature	ρ	-2.684
Persistence		0.057	0.051	Initial care need: location	D_0	0.444
Innovation SD		0.132	0.0009	Initial care need: dispersion	σ_0	0.148

Notes: Exogenous parameters are fixed outside the estimation; estimated parameters are chosen to match the targeted moments. The index $g \in \{\female, \male\}$ denotes gender. SD denotes standard deviation; ϵ and ν denote persistent and transitory wage shocks, respectively. Wage age profiles are computed from the 1999–2018 SOEP. The reference maternal weight applies to childcare production. Age slopes refer to child age.

Table 4. Targeted Moments

Target moment	SOEP	Model	Target moment	SOEP	Model
Care process					
Initial total care: mean (h/day)	10.54	10.53	Initial total care: SD (h/day)	4.09	4.09
AR(1) intercept: constant	6.13	6.14	AR(1) intercept: age slope	-0.36	-0.36
AR(1) persistence: constant	0.30	0.30	AR(1) persistence: age slope	0.02	0.02
AR(1) innovation SD: constant	3.46	3.46	AR(1) innovation SD: age slope	-0.03	-0.04
Care division and fertility					
No childcare-share adjustment (%)	13.91	13.90	Within-household care ratio (F/M)	3.79	3.80
Care-division wage-gap elasticity	0.19	0.19	Mean first-birth age (years)	28.10	28.09
Work					
Women's worker hours (h/week)	31.93	31.94	Men's worker hours (h/week)	43.16	43.16
Women's structural switching (%)	32.02	32.01	Men's structural switching (%)	10.00	10.01

Notes: Data moments are computed from the 1999–2018 SOEP and targeted in the estimation. The first-birth age target is the household-weighted mean of mothers' and fathers' ages at first birth. SD denotes standard deviation; age slopes refer to child age. F/M denotes the female-to-male care ratio within a household. Worker hours are conditional on employment. Structural switching refers to changes in work status.

the mean and standard deviation of changes in total daily care between consecutive observations are -0.82 and 3.93 hours in the data, compared with -0.77 and 3.98 hours in the model. The model therefore captures both the predominant maternal role in childcare and the scale of care

fluctuations.

To measure care absorption more precisely, we estimate the same two-stage specification in SOEP and simulated data, separately within five groups defined by the mother's previous care share. In the first stage, we regress total daily care on its lag and current child-age fixed effects. The residual, $\widehat{u}_{c,t}$, serves as unexpected care. In the second stage, for each parent $p \in \{\text{♀}, \text{♂}\}$, we estimate

$$\Delta C^p_{c,t} = \alpha^p_g + \beta^p_g \widehat{u}_{c,t} + \lambda^p_{g,k(c,t)} + e^p_{c,t}, \tag{12}$$

where $\Delta C^p_{c,t}$ is the change in parent p's daily care, g indexes previous-share groups, and $\lambda^p_{g,k(c,t)}$ denotes current child-age fixed effects within each group. We average the group-specific response coefficients β^p_g using SOEP group frequencies.

Mothers absorb 0.76 hours of each additional hour of unexpected care in SOEP, compared with 0.74 hours in the model. Fathers absorb the remainder: 0.24 hours in SOEP and 0.26 hours in the model. The close match in these marginal responses shows that the model correctly allocates unexpected childcare between spouses, with mothers absorbing roughly three quarters of the adjustment.

To assess whether this unequal absorption persists over time, we estimate local projections (Jordà, 2005) in both SOEP and simulated data, tracing the effects of a one-hour positive care innovation through the next two observations. Figure 7 compares each parent's response relative to care before the innovation. On impact, mothers provide an additional 0.685 hours of daily care in SOEP and 0.732 hours in the model. Their responses decline to 0.266 and 0.121 hours over the next two observations in the data, closely matched by 0.232 and 0.098 hours in the model. Fathers' responses remain smaller at each horizon. The simulated paths reproduce both the persistence of mothers' additional care burden and the gradual narrowing of the gap between parents' responses. The model also captures the stronger maternal response among households where the mother already provides a larger share of care (Appendix Figure A17).

Work responses to care shocks. The second validation examines whether the model reproduces how parents adjust their work arrangements in response to childcare shocks. We begin by comparing work-status distributions by child age, which describe the employment context in which households absorb care risk. Figure 8 shows that the model reproduces the decline in mothers' low-hour share as children grow older and fathers' persistently high full-time share.

Within couples, mothers are far more likely to be the one who changes work status. Table 5 documents this pattern. In Panel A, only the mother's work state changes in 28.0% of SOEP observations and 28.4% of model observations; paternal-only changes occur in 6.3% and 6.4%, respectively. Panel B groups couples by changes in total daily care to assess how switching varies with the care burden. Maternal switching becomes more frequent when care changes by more than

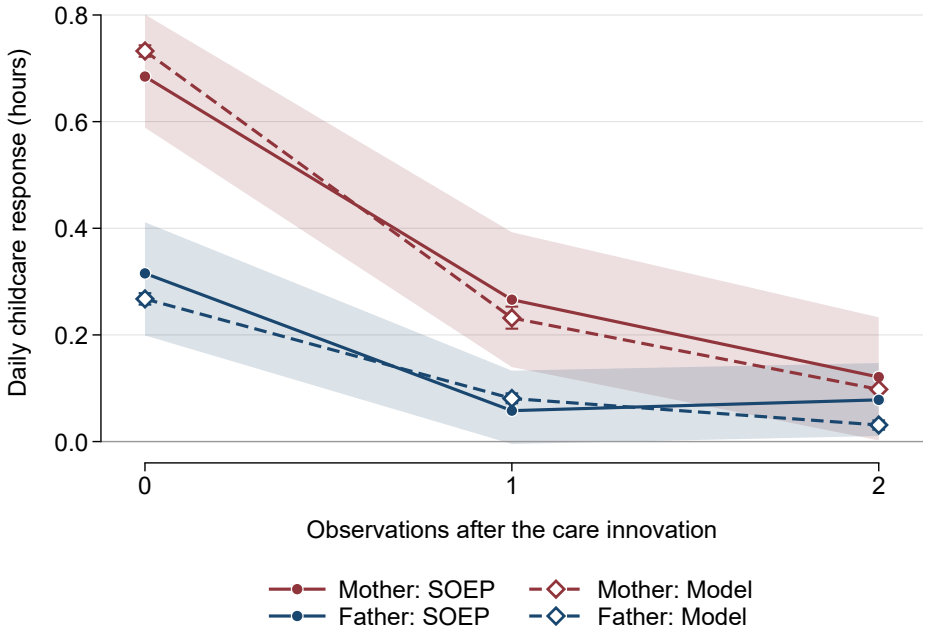


Figure 7. Dynamic childcare responses to an unexpected increase in care

Notes: Responses are local-projection coefficients for a one-hour positive innovation in daily care, measured relative to care in the preceding observation. Shaded areas (SOEP) and whiskers (model) show pointwise 95% percentile confidence intervals.

two hours in either direction. The model closely matches these adjustment frequencies and their relationship with the magnitude of care changes.

We next compare how parents' work responds to care innovations along two margins: transitions between work states and changes in weekly hours. For work-state transitions, we use the care innovations defined above and compare upward and downward moves. When daily care exceeds its prediction by more than two hours, mothers' and fathers' probabilities of moving to a lower work state are 17.6% and 6.6% in SOEP, compared with 20.9% and 9.3% in the model. When care is more than two hours below its prediction, the corresponding upward probabilities are 31.1% and 7.4% in SOEP and 35.9% and 10.6% in the model. The model captures the concentration of these adjustments among mothers in both directions.

For work hours, we measure the intensity of adjustment by regressing each parent's absolute change in weekly hours on the magnitude of the care innovation, controlling for child age and previous maternal care share. A one-hour increase in the magnitude of unexpected daily care is associated with 0.66 additional hours of maternal weekly-hours adjustment in SOEP and 0.70 in the model; the paternal estimates are 0.33 and 0.42 hours. Mothers account for about 62% of the marginal response, and the model reproduces this concentration. To assess net hour reductions following positive care innovations, we average age-specific responses using the full SOEP care

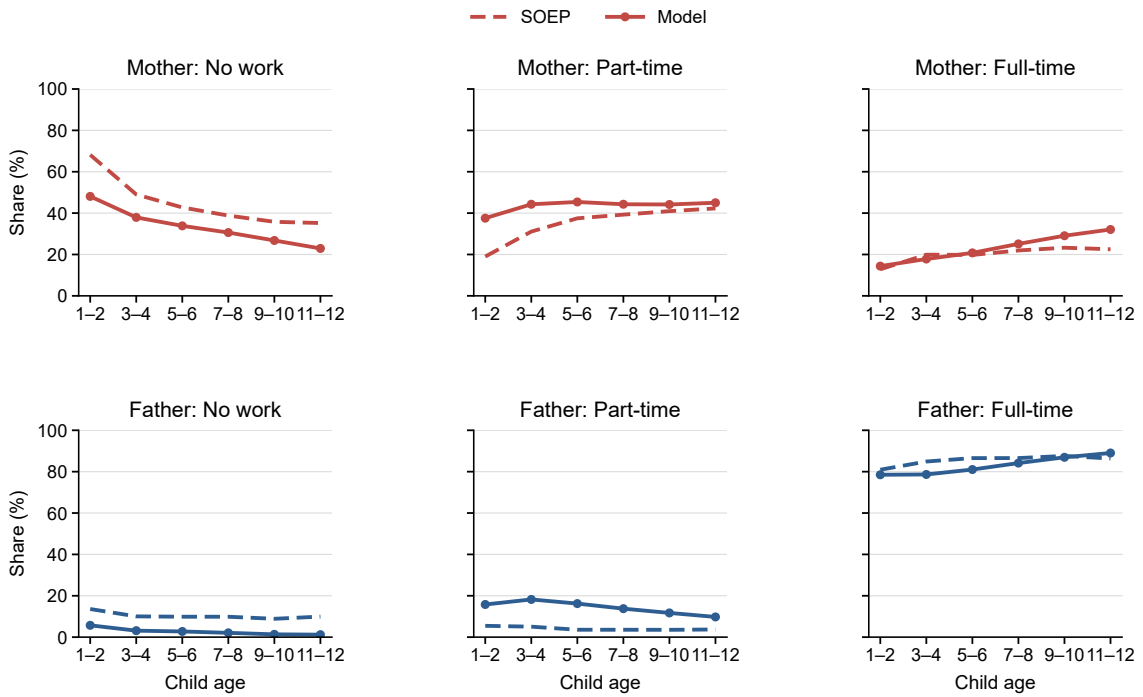


Figure 8. Work-status shares by child age

Notes: The figure compares SOEP and model work-status shares by the first child's age. The three categories use weekly-hour thresholds of 8 and 30: at most 8, above 8 through 30, and above 30 hours.

Table 5. Work-status adjustment within couples

Panel A. Which parent changes work status?		
	SOEP (%)	Model (%)
Neither parent	62.0	61.6
Mother only	28.0	28.4
Father only	6.3	6.4
Both parents	3.7	3.6
Panel B. Mother / father switching by change in daily care		
	SOEP (%)	Model (%)
Fall over 2 hours	39.0 / 11.0	37.5 / 11.6
Change within 2 hours	26.7 / 8.5	24.3 / 8.0
Rise over 2 hours	36.1 / 13.6	32.6 / 9.9

Notes: Continuing couples with a child aged 3–12 at the later observation. SOEP uses adjacent observed waves; the model uses adjacent two-year periods. Work states are zero, above zero through 30, and above 30 weekly hours. Panel A entries are percentages of couple-periods. Panel B cells list mother / father switching percentages conditional on the signed change in parents' combined observed weekday care hours.

sample's age distribution. The additional maternal reduction relative to fathers is 0.37 weekly hours per additional daily hour of unexpected care in SOEP and 0.39 in the model.

Taken together, the validation results show that the model reproduces three key patterns that are not directly targeted: mothers absorb the majority of unexpected care, this unequal absorption persists over time, and mothers make the larger adjustment in market work. These features provide a foundation for the counterfactual experiments in the next section, which examine how removing childcare uncertainty would change parents' employment and earnings.

5 Counterfactuals

We use the calibrated model to assess how childcare uncertainty shapes parental employment. The central experiment removes all variation in childcare demand, placing each family on the deterministic child-age mean path while retaining earnings risk. A second experiment instead removes earnings risk, replacing each parent's wage offers with their gender- and age-specific means while retaining childcare uncertainty. Both counterfactual economies are re-solved at the estimated parameter vector, and care-risk effects are measured as differences between the baseline and the deterministic-care economy. Appendix E contains additional results.

5.1 Childcare uncertainty concentrates employment adjustment on mothers

Figure 9 compares maternal employment across the baseline and deterministic-care economies by child age. Across child ages 1–12, care risk lowers maternal participation from 96.72% to 91.77%, a reduction of 4.96 percentage points, while raising average weekly hours among employed mothers from 18.32 to 20.49. The effects are largest early in the child's life: at ages 1–2, participation falls by 10.79 percentage points and employed mothers work 3.57 more hours per week. Fathers, by contrast, remain employed at near-full rates and work about 41.4 hours per week with and without care risk. Care uncertainty therefore widens the gender participation gap through mothers' extensive-margin adjustment, consistent with the shock-response evidence in Appendix Table A5.

These participation reductions disrupt mothers' employment continuity. Because employment exhibits state dependence (Hyslop, 1999), exits can have persistent effects on future labor supply. Childcare uncertainty raises the probability that a mother leaves employment at least once by 18.41 percentage points. The probability of remaining out of work for at least four consecutive years rises by 6.69 percentage points. More mothers therefore spend extended periods without labor earnings during child-rearing.

The simultaneous decline in participation and rise in employed hours reflects a polarization of maternal labor supply. Care risk reduces the part-time share by 9.04 percentage points while raising nonemployment and full-time work by 4.96 and 4.08 points, respectively. High care needs

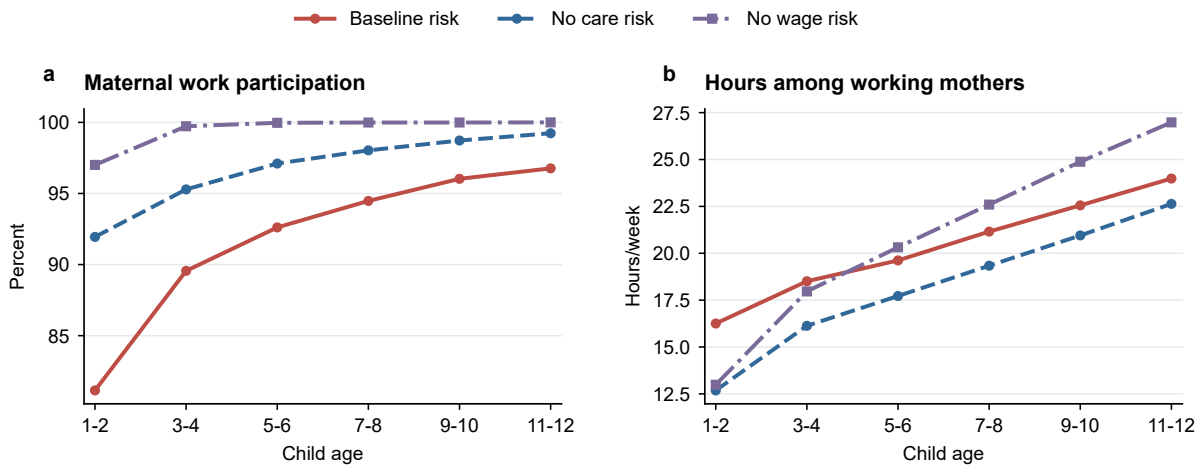


Figure 9. Maternal work by child age under childcare and wage risk

Notes: Each scenario uses parents with complete child-age 1–12 records. Participation is positive weekly market work; hours among workers condition on employment in each economy. No care risk and No wage risk remove the respective uncertainty while preserving its baseline age-specific mean and retaining the other risk.

push some mothers out of employment entirely, while low care needs allow others to work longer hours. Because the mothers who remain employed are disproportionately those in favorable care states, the composition of the employed group shifts toward full-time work, raising average hours among workers.

Table 6 decomposes these aggregate effects by the distance between each household's care realization and the child-age mean. The hours column follows mothers who are employed in both the baseline and the deterministic-care economy. Near the age mean, weekly hours fall by only 0.15. When care needs exceed the age mean by more than 1.5 standard deviations, care risk lowers participation by 28.38 percentage points and weekly hours by 15.09. When care needs fall more than 1.5 standard deviations below the age mean, participation rises by 3.25 points and weekly hours by 18.98. The large adjustments in the tails of the care distribution are consistent with the nonlinear relationship between care changes and work responses documented in Figure 6.

Work responses across care states reflect a trade-off between earnings and time costs. Because disutility is convex in the combined burden of work and care, high care needs raise the marginal cost of market work. Households forgo maternal earnings to relieve this time burden. When care needs are low, the marginal cost of working falls and additional earnings become less costly to obtain. Childcare uncertainty thus generates endogenous earnings risk: household income falls when care shocks reallocate maternal time from market work to childcare.

To trace the earnings consequences of care shocks more directly, we compare two simulations of the same household. In the shock simulation, we raise care needs from the conditional median to the

Table 6. Effects of childcare uncertainty on maternal work

Childcare need deviation (SD)	Participation rate change (percentage points)	Working hour change (hours/week)
< -1.5	$+3.25$	$+18.98$
-1.5 to -0.5	$+2.38$	$+9.09$
-0.5 to $+0.5$	-2.93	-0.15
$+0.5$ to $+1.5$	-12.82	-8.03
$> +1.5$	-28.38	-15.09

Notes: Matched household-periods at child ages 1–12. Groups and child-age-specific SDs use baseline care requirements. Without childcare risk, care requirements equal the child-age mean.

90th percentile in a single period, holding pre-shock conditions and wage paths fixed. Subsequent care needs follow the estimated stochastic process in both simulations, using the same random draws (Guren, 2018). Panel A of Table 7 reports the results. Mothers' earnings fall by 36.46% on impact, compared with 9.17% for fathers. Two years later, mothers still earn 5.92% less than on the reference path, while the paternal shortfall narrows to 1.04%. Although earnings subsequently recover, discounted cumulative earnings over child ages 1–12 remain 6.39% lower for mothers and 1.32% lower for fathers.

Childcare uncertainty also exposes mothers to more frequent and sustained earnings shortfalls. We define a shortfall as earnings at least 20% below the same parent's earnings without care risk in the same period. Panel B of Table 7 shows that shortfalls occur in 31.75% of mothers' periods and 7.77% of fathers' periods. Shortfalls persist for at least four consecutive years for 41.03% of mothers, compared with 7.85% of fathers. To quantify uncertainty about cumulative earnings, we simulate alternative care paths from birth for each household, holding pre-birth conditions and wage paths fixed. The mean absolute deviation from each parent's expected cumulative earnings is 20.77% for mothers and 3.76% for fathers.

Maternal work adjustments also widen earnings disparities across families. Appendix Table A15 shows that removing care risk lowers the household earnings Gini by 2.51%, compared with 0.48% for the consumption Gini. The smaller consumption effect reflects intertemporal self-insurance: households save part of the additional earnings in low-care periods to finance consumption when care needs rise (Blundell et al., 2008).

Maternal employment responses by spouses' relative wages

Within a household, spouses' relative wages determine how much income is lost when either parent releases time for care. Angelov et al. (2016) document that the parenthood earnings gap varies with spouses' relative earnings potential. We compare maternal employment responses across fixed

Table 7. Childcare uncertainty and parental earnings

Outcome	Mothers	Fathers
A. Earnings response to a high care shock (%)		
At the shock	−36.46	−9.17
2 years later	−5.92	−1.04
4 years later	−0.65	+0.33
Cumulative earnings, child ages 1–12	−6.39	−1.32
B. Earnings shortfalls and uncertainty (%)		
Shortfall frequency	31.75	7.77
Persistent shortfalls (≥4 years)	41.03	7.85
Deviation from expected earnings	20.77	3.76

Notes: Panel A reports percentage changes in mean earnings relative to the reference path. The shock replaces the conditional median care realization with the 90th percentile. Cumulative earnings are discounted. In Panel B, shortfalls are earnings at least 20% below the same parent's same-period earnings without care risk. Frequency is the share of periods; persistence is the share of parents with at least four consecutive years of shortfalls. The last row reports the average absolute percentage deviation of cumulative earnings from each parent's expected earnings across alternative care paths from birth.

quartiles of the father-to-mother wage ratio, with higher quartiles indicating a stronger paternal earning advantage.

Figure 10 compares maternal work-state responses in high- and low-care states. The form of adjustment varies sharply across the wage distribution. In high-care states, care risk mainly shifts mothers from full-time to part-time work in Q1, where mothers' wages are relatively high, whereas nonemployment becomes the dominant margin in Q4, where fathers' earning advantage is largest. The increase in nonemployment rises from 6.8 to 27.7 percentage points between these groups. The intuition is straightforward. When maternal wages are high, full withdrawal sacrifices a valuable income source, so part-time work offers a way to release time for care while maintaining earnings. When fathers' earning advantage is large, suspending maternal work is less costly for household income and preserves the father's higher-return market work. In low-care states, the time cost of earning additional income falls and maternal full-time work increases across all quartiles. Relative wages therefore shape which labor-supply margin households use to buffer care fluctuations.

Work-state choices accumulate into mothers' employment histories. Table 8 reports how often mothers leave work and the average duration of nonemployment over child ages 1–12. Care risk generates more frequent, shorter periods out of work in every quartile. In Q4, the average number of nonemployment spells rises from 0.19 to 0.49 per mother, while average duration falls from 5.56 to 4.14 years. This pattern arises because care fluctuations introduce temporary exits among mothers who would otherwise remain employed: high care raises the value of releasing maternal time, while

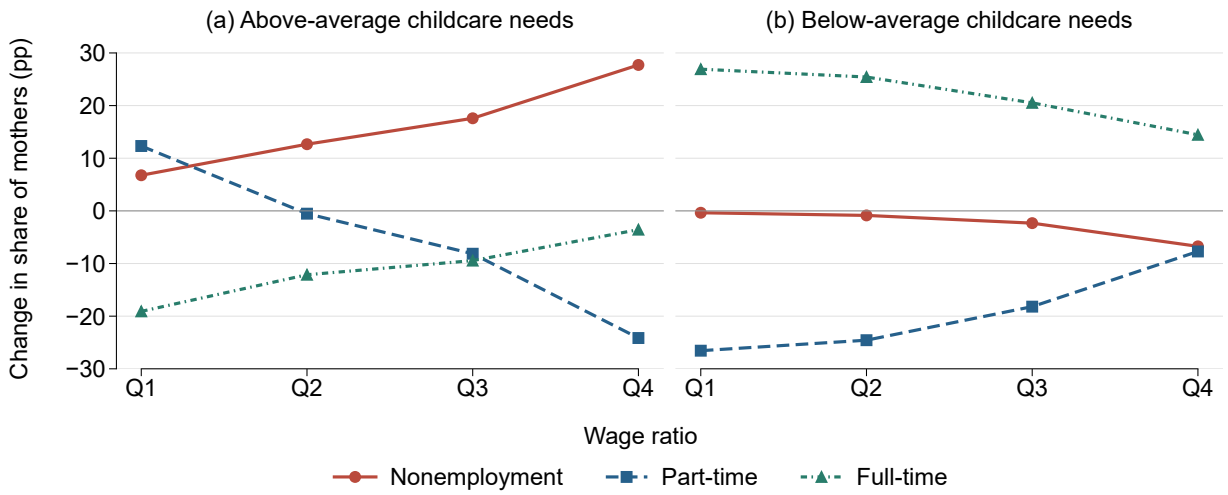


Figure 10. Effects of childcare risk on maternal employment

Notes: Points report differences in maternal work-state shares: childcare risk minus no care risk. Comparisons use the same household-periods at child ages 1 to 12. Without care risk, care needs equal the child-age mean. Panels (a) and (b) cover baseline care needs more than 0.5 age-specific standard deviations above and below the child-age mean, respectively. Quartiles rank the father-to-mother wage ratio.

subsequent relief makes market work attractive again. The additional short spells raise the average count and lower the average duration. Together with saving, these temporary withdrawals allow households to shift earnings toward periods when care is less demanding. Household self-insurance thus places part of the cost of care risk on mothers' employment continuity, consistent with the empirical patterns in Section 2.

Table 8. Maternal work and welfare by relative wages

Quartile	Times out of work (per mother)		Average duration (years)		Welfare gain (CEV, %)
	No care risk	Care risk	No care risk	Care risk	
Q1	0.02	0.13	2.53	2.41	+0.49
Q2	0.04	0.21	3.20	2.90	+0.31
Q3	0.09	0.31	3.66	3.14	+0.92
Q4	0.19	0.49	5.56	4.14	+1.18

Notes: Employment outcomes cover child ages 1–12. Each continuous period without paid work counts once. Duration is averaged across nonemployment periods. CEV measures lifetime welfare gains from removing care risk as a percentage of parental consumption.

The final column of Table 8 reports the welfare gain from removing childcare uncertainty. The consumption-equivalent gain is largest in Q4 (1.18%) and smallest in Q2 (0.31%). This pattern may appear paradoxical: mothers in Q4 households forgo less income when they stop working, yet their households gain more from removing care risk. The resolution lies in the interaction

between specialization and convex time costs. Q4 households concentrate employment adjustment on mothers precisely because maternal work is the cheaper margin to adjust. But once a mother leaves work, further increases in care cannot be absorbed through additional work reductions. The entire care burden then falls on her nonmarket time. Convex disutility makes each additional hour of care progressively more costly as the burden rises. Removing care risk relieves the time burden in these demanding states and reduces employment interruptions. Lower forgone earnings can therefore coexist with higher welfare costs of childcare uncertainty.

5.2 Childcare uncertainty produces employment losses comparable to earnings risk

To place the effects of childcare uncertainty in perspective, Figure 9 also reports outcomes under the no-wage-risk economy. At child ages 1–2, earnings risk lowers maternal participation by 15.86 percentage points and raises employed hours by 3.27 per week. The corresponding care-risk effects are 10.79 points and 3.57 hours. Childcare uncertainty is therefore a substantial source of early maternal work adjustment, generating effects roughly two-thirds the size of earnings risk on the participation margin.

By ages 11–12, the two risks affect employed hours in opposite directions: care risk still raises employed hours by 1.35 per week, while earnings risk reduces them by 3.00. Both risks shift work away from part-time arrangements toward nonemployment and full-time work, but they do so through different channels over time. The reversal in the earnings-risk hours effect reflects a changing selection into employment. Early in the child's life, combining work with intensive care is unattractive at low wages, so employed mothers are concentrated in favorable wage states and work longer hours. As care needs decline, shorter-hour work becomes viable at lower wages, drawing more mothers into employment and pulling down average hours among workers. Accumulated assets also help households sustain consumption in low-wage states, reducing the need for longer hours. Care risk, by contrast, continues to generate both low-need periods that permit additional work and high-need periods that prompt exit, sustaining a higher full-time share among employed mothers even at later child ages.

The effects on employment continuity are also comparable in magnitude. Over the period from before the first birth through child age 12, care risk raises the probability of at least one employment exit by 18.41 percentage points, compared with 23.67 points for earnings risk. Care risk raises the share experiencing at least four consecutive years of nonemployment by 6.69 points, compared with 11.21 points for earnings risk.

5.3 The role of adjustment costs

The preceding results show that childcare uncertainty concentrates employment adjustment on mothers. We now examine the role of adjustment frictions in amplifying this asymmetry. Work adjustment costs shape responses in two ways. First, because care shocks may be temporary, a work-status change today may require a costly reversal when care needs recede, making adjustment an intertemporal choice. Second, the calibrated paternal switching cost is 17.52 times the maternal cost, creating a large gender difference in the price of using employment transitions to accommodate care fluctuations.

Work adjustment costs amplify the asymmetric effect of childcare uncertainty

To isolate the role of work adjustment costs, we compare the calibrated economy with four alternatives: zero paternal cost, zero maternal cost, zero costs for both parents, and both costs set to the calibrated paternal level. Each setting is solved both with childcare uncertainty and under the deterministic child-age mean care path, holding all other parameters fixed. Panel A of Table 9 reports gender gaps in participation and work-state switching under each cost setting, with and without childcare uncertainty.

Lower paternal costs narrow the participation gap with and without childcare uncertainty, while lower maternal costs widen it. The column labeled "Difference" isolates the additional disparity attributable to care risk. In the baseline economy, childcare uncertainty widens the participation gap from 3.28 to 8.23 percentage points, an increase of 4.95 points. Removing paternal costs reduces this care-risk increment to 4.35 points, about 12% below the baseline. Removing both costs further reduces the increment to 3.31 points, although participation gaps are larger in both the care-risk and no-care-risk environments. Raising maternal costs to the paternal level closes the participation gap entirely: when both parents face high switching costs, neither adjusts employment in response to care fluctuations.

To examine which parent's employment absorbs care shocks under each cost setting, Figure 11 compares parents' work-state transitions around the same baseline childcare innovations. Panel a reports mothers' share of downward moves when care exceeds expectations; Panel b reports mothers' share of upward moves when care falls below expectations. In the baseline economy, mothers account for 73.05% of downward moves following positive innovations and 77.67% of upward moves following negative innovations. Maternal employment therefore serves as the primary adjustment margin in both directions.

Removing paternal costs lowers mothers' share of both downward and upward work-state moves, while removing maternal costs raises it. Following positive care innovations, removing paternal costs increases fathers' probability of a downward move from 6.33% to 14.31%, while

Table 9. Adjustment costs and household responses to childcare uncertainty

A. Work adjustment costs

Cost setting	Participation gap (pp) Fathers - mothers			Work-state switching gap (pp) Mothers - fathers		
	Care risk	No care risk	Difference	Care risk	No care risk	Difference
Baseline	8.23	3.28	4.95	21.99	15.59	6.41
Father's cost removed	7.06	2.71	4.35	7.84	1.51	6.33
Mother's cost removed	20.19	16.30	3.89	39.52	34.32	5.20
Both costs removed	19.03	15.72	3.31	25.28	20.22	5.07
Both costs high	0.00	0.00	0.00	9.01	6.87	2.14

B. Childcare-share adjustment costs

Care shock, u (hours/day)	Unchanged shares (%)		New adjustments (%)
	With share cost	Without share cost	Mother's share increases
All shocks	13.90	0.79	77.95
$u < -2$	16.00	0.47	74.83
$-2 \leq u < 0$	13.44	0.64	80.31
$0 \leq u \leq 2$	14.30	0.92	81.53
$u > 2$	11.64	1.14	75.64

Notes: In Panel A, participation covers child ages 1–12. Difference is care risk minus no care risk. Both high sets both work costs to the baseline father's cost. In Panel B, new adjustments occur when shares change without the cost but remain unchanged in the baseline. The last column gives the percentage that raise mothers' shares.

mothers' probability remains nearly unchanged. High switching costs make preserving fathers' work arrangements attractive when a temporary care increase may require both a contraction and a subsequent recovery. For larger positive innovations, fathers account for a greater share of downward moves because the higher care burden makes adjustment worthwhile despite the cost, consistent with the nonlinear work responses in Figure 6.

The calibrated cost asymmetry thus protects fathers' employment from care shocks and concentrates both contractions and recoveries on mothers. The household's incentive to economize on switching costs amplifies gender inequality in the employment consequences of a risk that both parents share.

Share adjustment costs delay increases in mothers' childcare shares

Alongside work adjustments, households can reallocate childcare between parents. To assess how share-adjustment costs sustain existing care divisions, we set $\kappa_s = 0$ and re-solve the model.

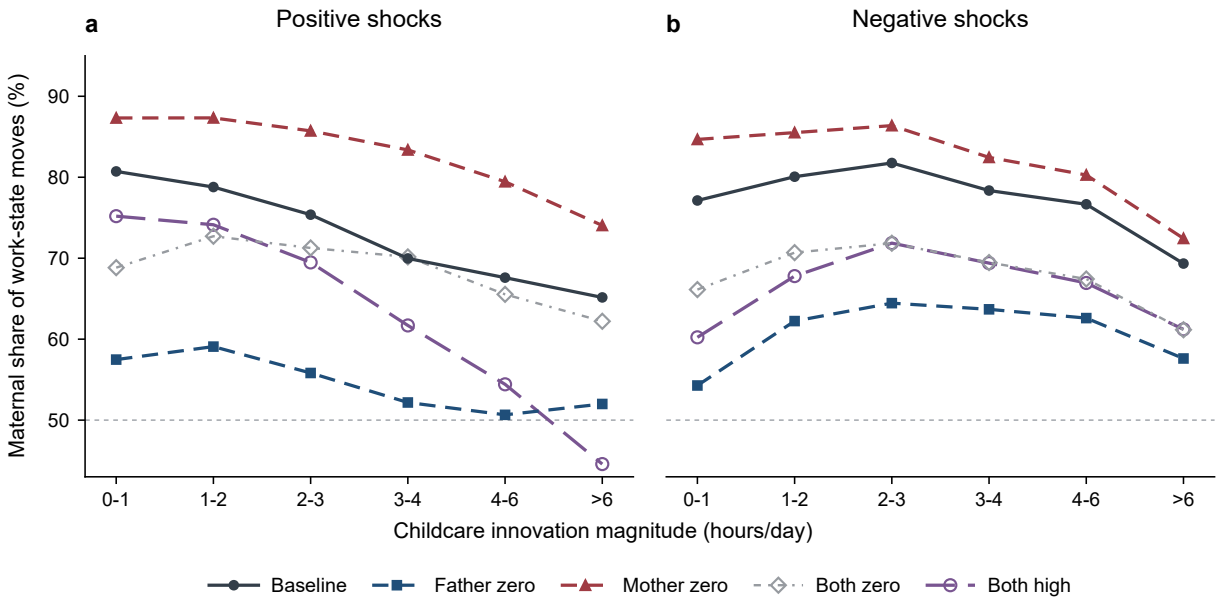


Figure 11. Work adjustment costs and the allocation of parental work responses

Notes: Panel a counts downward work-state moves; Panel b counts upward moves. Work states are nonemployment, part-time, and full-time. Within each innovation bin, the maternal share is $N_m/(N_m + N_f)$, where N_m and N_f count mothers' and fathers' moves. The horizontal line denotes equal shares.

The proportion of household-periods with unchanged care shares falls sharply, from 13.90% to 0.79%. Panel B of Table 9 shows that inaction in the baseline is more common after large negative shocks than after large positive shocks. Without the cost, inaction is rare regardless of the shock. The asymmetry in baseline inaction reflects an option value: when care needs fall, the existing arrangement imposes a small efficiency loss that the household can tolerate while waiting to see whether future needs require another costly reallocation. When care needs rise, the burden of retaining an ill-suited division is larger and prompt adjustment becomes more valuable.

The newly induced reallocations predominantly increase mothers' childcare shares. Among household-periods with unchanged shares in the baseline, 77.95% of the adjustments released by removing the cost raise the maternal share. The proportion is 75.64% after large positive shocks. Although individual adjustments are small, removing the share cost allows households to implement their preferred care division more promptly. Because the preferred division is typically more maternal, greater flexibility in reallocating care reinforces rather than reduces maternal specialization.

5.4 Households maintain birth timing by adjusting mothers' labor supply

The preceding counterfactuals focus on how households absorb childcare risk after birth. The model also allows couples to choose when to have their first child, and the timing of parenthood

may itself respond to the risks that follow it. Table 10 shows a striking contrast: removing wage risk advances first birth by 1.78 years, from 28.09 to 26.31, while removing childcare risk advances it by only 0.03 years, to 28.06.

Table 10. Birth timing and parental time after risk removal

Change from baseline	No wage risk		No care risk	
First-birth age (years)	-1.78		-0.03	
High-care periods (hours per weekday)	Mothers	Fathers	Mothers	Fathers
Childcare	+0.03	-0.09	-2.74	-1.28
Work	-0.17	+0.75	+1.62	+0.89
Total time burden	-0.15	+0.66	-1.12	-0.39

Notes: Time rows compare the same baseline high-care periods at child ages 1–12 for households with unchanged birth timing across economies. High care exceeds the child-age mean by more than 0.5 SD. Total time equals work plus childcare before rounding.

The large response to wage risk reflects a precautionary motive for delay. Parenthood creates a continuing expenditure commitment, including a minimum level of child consumption that limits expenditure adjustment when income falls (Chetty and Szeidl, 2007). As Sommer (2016) emphasizes, households work and accumulate assets before birth to buffer future income losses. Removing wage risk weakens this precautionary incentive and allows earlier childbearing.

Childcare risk has a fundamentally different character. Earnings risk threatens household income directly: a negative wage shock reduces earnings even when parents maintain their work hours. Childcare uncertainty, by contrast, creates unpredictable demands on parental time without directly changing wage offers. Postponing birth does not resolve this uncertainty, since it merely shifts the same child-age risk sequence to later parental ages. Waiting provides additional time to build a savings buffer but does not reveal future care needs. Earlier birth delivers child utility sooner and secures parenthood before infertility risk rises. After birth, parents can accommodate high care needs by adjusting work, drawing on savings, or accepting a higher combined work and care burden. Table 10 confirms this last channel: in high-care periods, both parents' additional care time exceeds their reduction in work, so they continue earning despite the extra care burden. Low care needs then allow parents to expand work or reduce their total time burden. Households thus maintain nearly the same birth timing while concentrating the cost of care shocks on maternal employment after birth.

6 Conclusion

This paper studies how unpredictable childcare needs shape gender inequality in employment. Using the SOEP, we document that childcare hours vary substantially within families over time, that care shocks are persistent, and that mothers absorb most additional care while making larger adjustments in market work. We embed these dynamics in a life-cycle model of household decisions over fertility timing, labor supply, and childcare allocation.

The calibrated model reproduces the observed division of unexpected care and the associated work responses, providing a basis for counterfactual analysis. Our central finding is that childcare uncertainty is a quantitatively important source of maternal employment instability and gender inequality in earnings. Care risk lowers maternal participation, increases the frequency of employment interruptions, and raises hours among employed mothers, polarizing the distribution of maternal work. These effects are of comparable magnitude to the employment consequences of earnings risk. Fathers' employment remains largely unchanged because gender differences in work adjustment costs encourage households to preserve paternal work arrangements and concentrate the response to care shocks on mothers.

A key insight from the analysis is that childcare uncertainty makes part of mothers' earnings risk endogenous to household decisions. When care needs rise, the household's optimal response is to reduce maternal market work. Persistent care specialization ensures that mothers bear most of this adjustment, while their employment flexibility helps families smooth consumption and sustain their preferred birth timing. The household's ability to absorb care shocks through maternal labor supply explains why childcare uncertainty has negligible effects on fertility timing despite substantial effects on mothers' employment. The cost of care risk is therefore borne not through delayed childbearing but through disrupted maternal careers.

These findings carry implications for the design of family policy. Because mothers absorb care shocks primarily through employment interruptions, policies that improve the reliability of childcare provision can protect maternal employment continuity. The adjustment cost experiments suggest that greater flexibility in fathers' work arrangements would spread the response to care shocks more evenly within couples, reducing the concentration of employment disruption on mothers.

Several extensions would deepen the analysis. Linking employment interruptions to future wage opportunities, as in Blundell et al. (2016b), would clarify how care risk shapes lifetime earnings inequality through foregone human capital accumulation. Incorporating occupational choice could capture mothers' anticipatory responses to expected care disruptions (Adda et al., 2017; Anstreicher and Jack, 2026). In societies facing low fertility and persistent gender gaps, understanding the employment risks created by childcare uncertainty is central to designing policies that support parenthood without imposing disproportionate costs on mothers.

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Appendix

A Additional Empirical Results

This section provides supplementary evidence on childcare allocation, childcare dynamics, employment termination, shock pass-through, and work-hour adjustments. The results support and extend the six facts documented in Section 2.

A.1 Childcare allocation in SOEP

Figure A1 reports childcare hours by parents' education pair and child age. The maternal-centered allocation documented in Fact 1 holds across all four education groups: mothers provide the majority of care regardless of whether either parent has higher education.

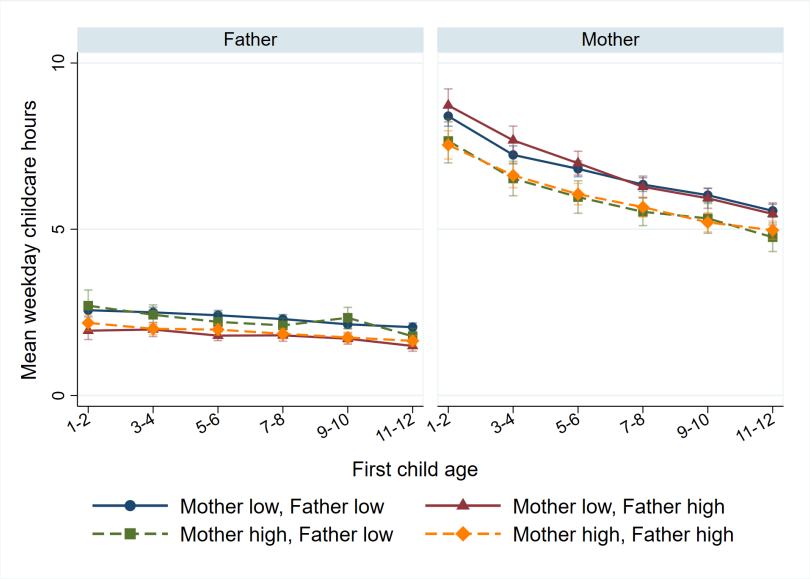


Figure A1. Childcare Hours by Parents' Education Pair

Notes: The figure reports mean weekday childcare hours by parent gender, first-child age, and the parents' education pair. High education includes Higher Vocational and Higher Education qualifications; all other categories are classified as low education.

Table A1 quantifies the frequency of inaction in the division of care under alternative bandwidth definitions. The share of transitions with no change in the mother's care share is 13.91%. Widening the band to 5 percentage points raises the inaction share to 30.50%, and a 10-percentage-point band captures 51.51% of transitions. The pronounced spike at zero in Figure 4b is therefore not an artifact of a narrow inaction definition; a substantial fraction of couples make no or only small adjustments to care shares between adjacent observations.

Table A1. Inaction Share

Inaction definition	Band	Inaction share (%)
No change in mother's childcare share	0	13.91
Absolute change no greater than 0.05	0.05	30.50
Absolute change no greater than 0.10	0.10	51.51

Notes: The table uses 4,580 transitions between adjacent observed SOEP waves for the same couple. The mother's care share is her weekday childcare hours divided by the parents' combined hours. A transition is classified as inactive when the absolute change in her share does not exceed the stated band.

Figure A2 examines whether the stickiness of care shares varies with the existing division. The distribution of share changes is centered near zero at every level of the previous maternal share, confirming that inaction is not confined to households with a particular initial division.

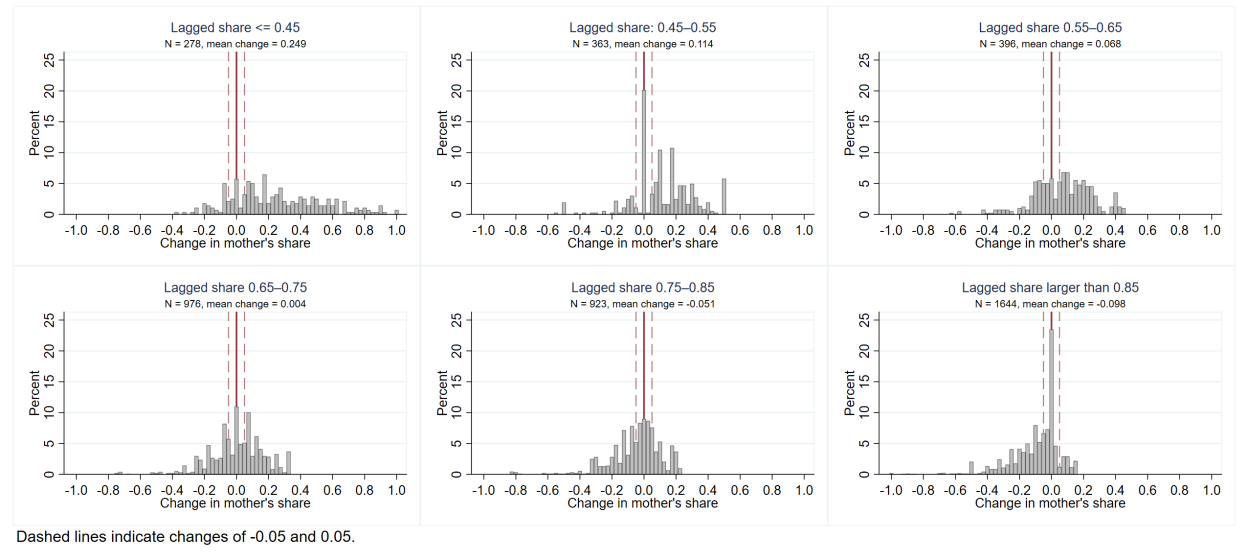
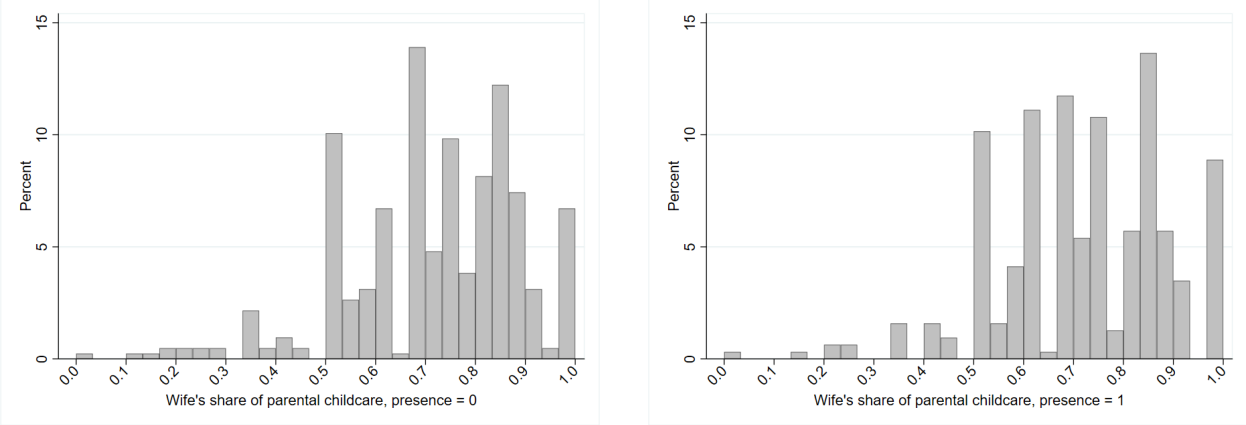


Figure A2. Changes in the mother's care share by previous-period share

Notes: Changes are calculated between adjacent observed SOEP waves for the same couple. The solid line marks zero and the dashed lines mark changes of minus and plus five percentage points. The figure groups transitions by the mother's care share in the preceding observation.

A concern with survey-reported childcare is that responses may depend on the reporting environment. Figure A3 compares the distribution of the mother's care share in observations where another person was present during the interview with observations where no other person was present. Using the 2015 and 2018 SOEP waves, which record this information, the two distributions are similar. The persistent maternal-centered division of care does not appear to be an artifact of social desirability or other reporting effects.



(a) No other person present

(b) Another person present

Figure A3. Distribution of Mother's Share by Interview Presence

Notes: The sample is limited to observations from 2015 and 2018 with usable presence information and an observed adjacent-wave transition. Presence is assigned at the couple-period level if either parent reports another person present.

A.2 Parenthood events and job uncertainty

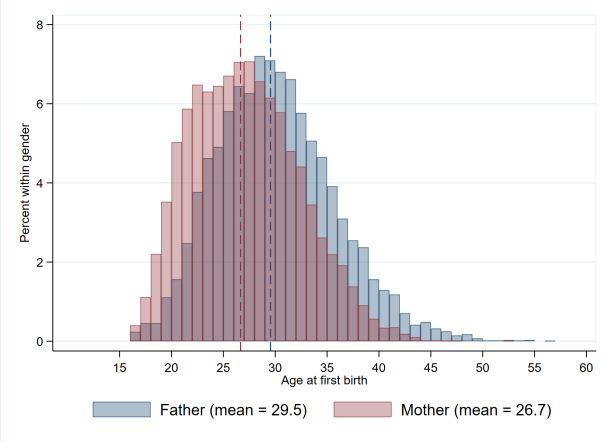
Figure A4 places the transition to parenthood within the adult life cycle. Panel (a) shows that mothers have their first child at an average age of 26.7, compared with 29.5 for fathers. Panels (b) and (c) document the gender gap in market hours: employed mothers' weekly hours fall sharply after birth and remain low, while fathers' hours are stable throughout. Panel (d) shows that maternal job uncertainty rises around the first birth while paternal uncertainty remains low. These patterns are consistent with evidence on the gendered earnings effects of parenthood across countries (Kleven et al., 2019b).

Figure A5 reports employed parents' weekly market hours by child age. Mothers' hours rise gradually as children grow older, narrowing the gender gap, while fathers' hours remain roughly constant throughout. The convergence is slow: even when the first child is aged 11–12, employed mothers work substantially fewer hours than employed fathers.

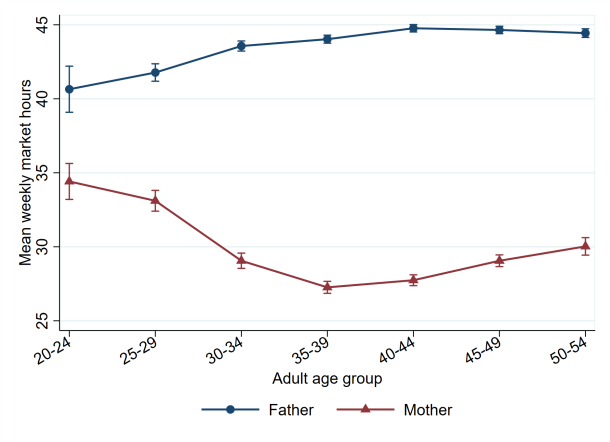
Figures A6 and A7 provide additional detail on parental job uncertainty. Figure A6 shows that the gender gap in uncertainty is present throughout the adult life cycle and is largest at ages 25–29, when many women transition to motherhood. Figure A7 decomposes uncertainty by child age and by the parents' education combination. Maternal uncertainty declines as children grow older but remains elevated relative to fathers across all education groups.

A.3 Parent-specific childcare dynamics

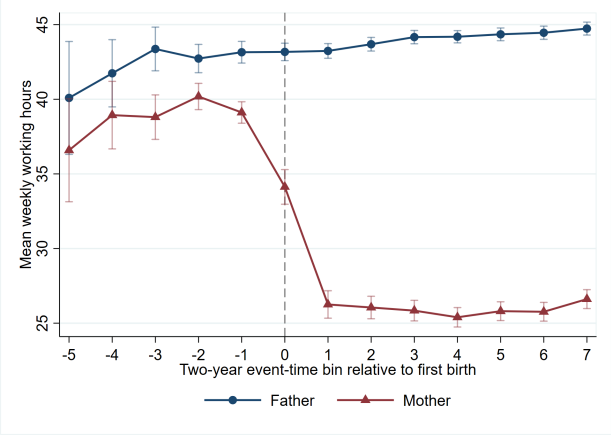
The main text estimates the dynamics of total parental childcare. This subsection reports the corresponding AR(1) processes separately for mothers and fathers, showing that incomplete persistence



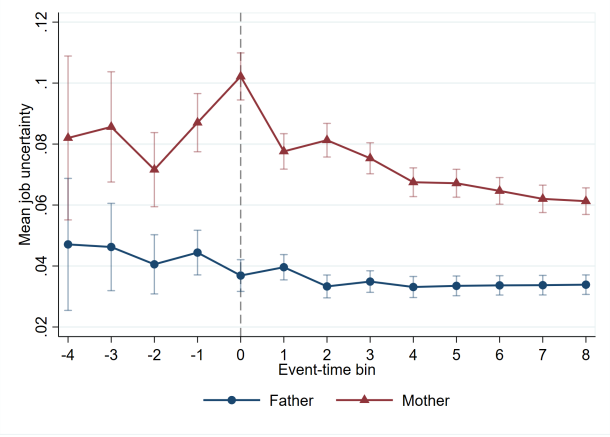
(a) Age at first birth



(b) Market hours by adult age



(c) Working hours around first birth



(d) Job uncertainty around first birth

Figure A4. First Birth and Gender Differences in Work

Notes: Panel (a) reports within-gender percentages of parent-couple spells by age at first birth in one-year bins; dashed lines mark gender-specific means. Panels (b) and (c) report mean weekly hours conditional on own employment. Panel (d) reports mean job uncertainty, $U = z(1 - z)$, where z is the implied probability of employment in two years, for employed and non-employed parents. Additional hours and uncertainty profiles appear in Appendix Figures A5, A6, and A7.

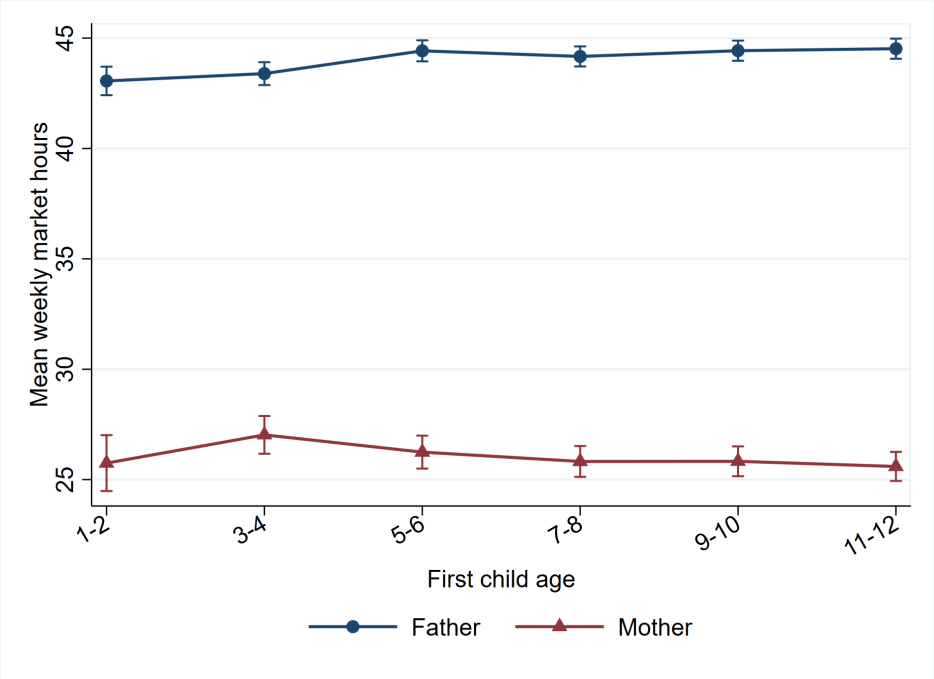


Figure A5. Work Hours over the Child Life Cycle

Notes: The figure reports mean weekly market hours by parent gender and the age of the couple's first biological child. The sample is restricted to parents who are employed in the observed survey wave.

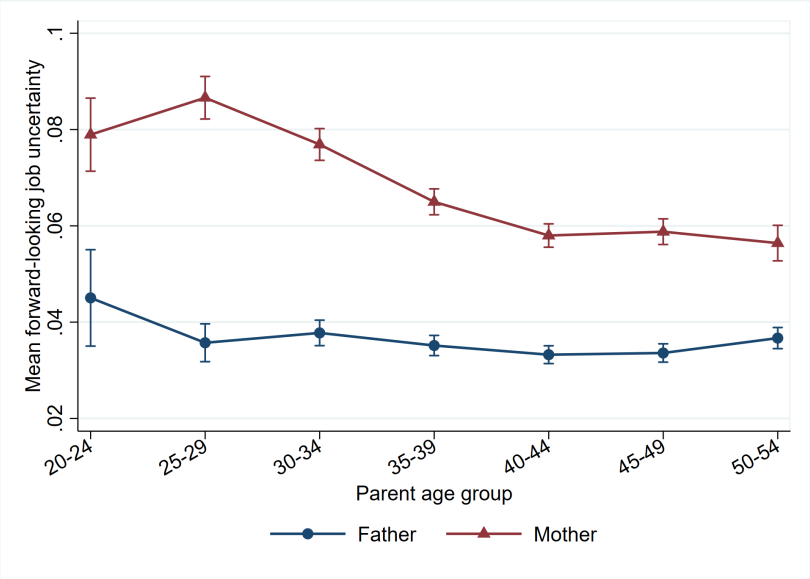
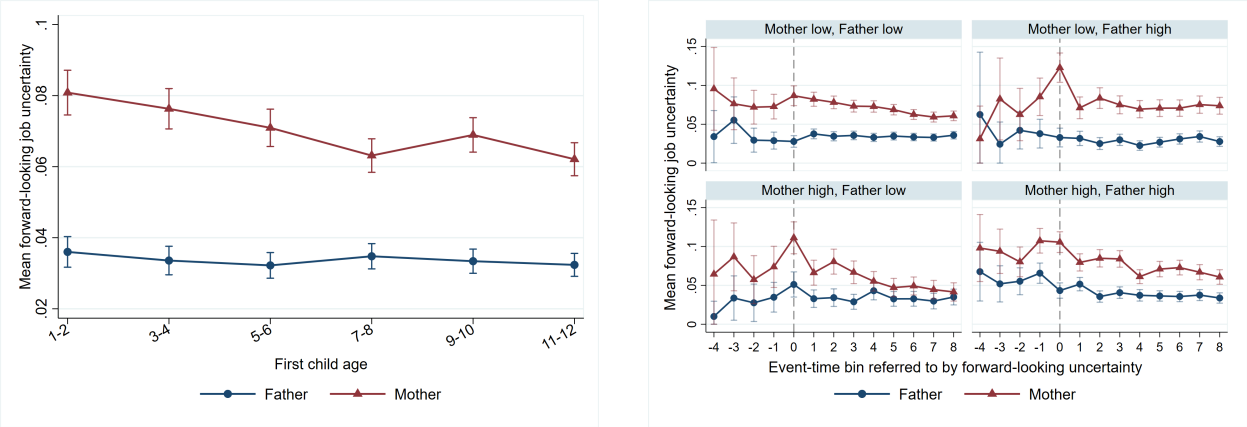


Figure A6. Job uncertainty by parent age and gender

Notes: Mean job uncertainty by gender and five-year parent-age group. Job uncertainty is $z(1-z)$, where z is the implied probability of employment in two years for employed and non-employed parents.



(a) Job uncertainty by child age and parent gender

(b) Job uncertainty around first birth by education

Figure A7. Parental Job Uncertainty over the Child Life Cycle

Notes: Panel (a) reports mean uncertainty by parent gender and first-child age. Panel (b) reports uncertainty around the first birth for the four parental education combinations. High education corresponds to Higher Vocational and Higher Education qualifications of the harmonized SOEP highest-education measure.

and substantial residual variation characterize each parent's individual care hours as well.

For parent i of gender g, we estimate the following process separately by the first child's age group k:

$$C_{i,g,t+1} = \alpha_{gk} + \rho_{gk} C_{i,g,t} + X'_{i,g,t}\gamma_{gk} + \varepsilon_{i,g,k,t+1}. \tag{13}$$

Here $C_{i,g,t}$ denotes parent i's reported childcare hours, g indexes the parent's gender, and k indexes the age group of the first child. The baseline specification omits $X_{i,g,t}$, while the extended specification controls for the parent's age, education, employment status, and access to flexible work. The coefficient ρ_{gk} measures persistence across adjacent observed survey waves. The residual $\varepsilon_{i,g,k,t+1}$ is the forecast error: the component of future care that cannot be predicted from current care and the included controls. The estimated innovation is

$$\widehat{\varepsilon}_{i,g,k,t+1} = C_{i,g,t+1} - \widehat{C}_{i,g,t+1}, \tag{14}$$

where $\widehat{C}_{i,g,t+1}$ is the fitted value from equation (13).

Figure A8 reports the persistence coefficients. Both mothers and fathers exhibit moderate persistence that generally increases with child age, mirroring the pattern for total care in Figure 3. Figure A9 reports the residual standard deviations. Adding the AR(1) lag reduces residual dispersion relative to the intercept-only process, but substantial unexplained variation remains for both parents at every child age. Maternal residual dispersion is larger in absolute terms, reflecting mothers' higher mean care hours.

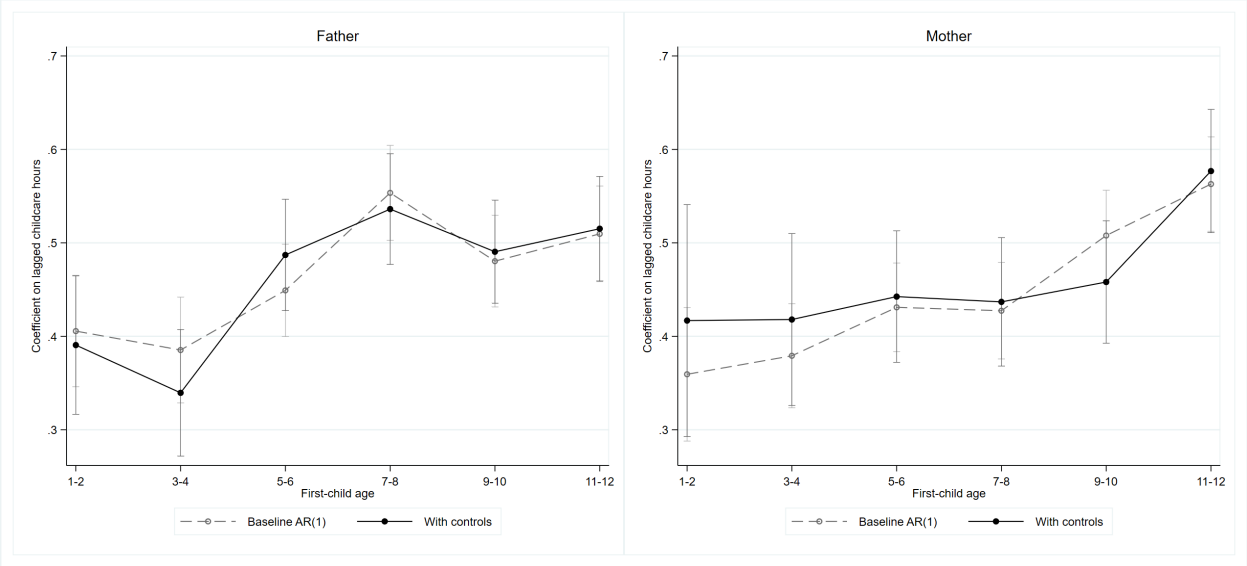


Figure A8. Childcare Persistence by Child Age and Parent Gender

Notes: The AR(1) specification includes current childcare hours, while the specification with controls also includes the parent's age, education, employment status, and access to flexible work. The dependent variable is childcare in the next observed survey wave. Vertical bars give conventional 95 percent confidence intervals.

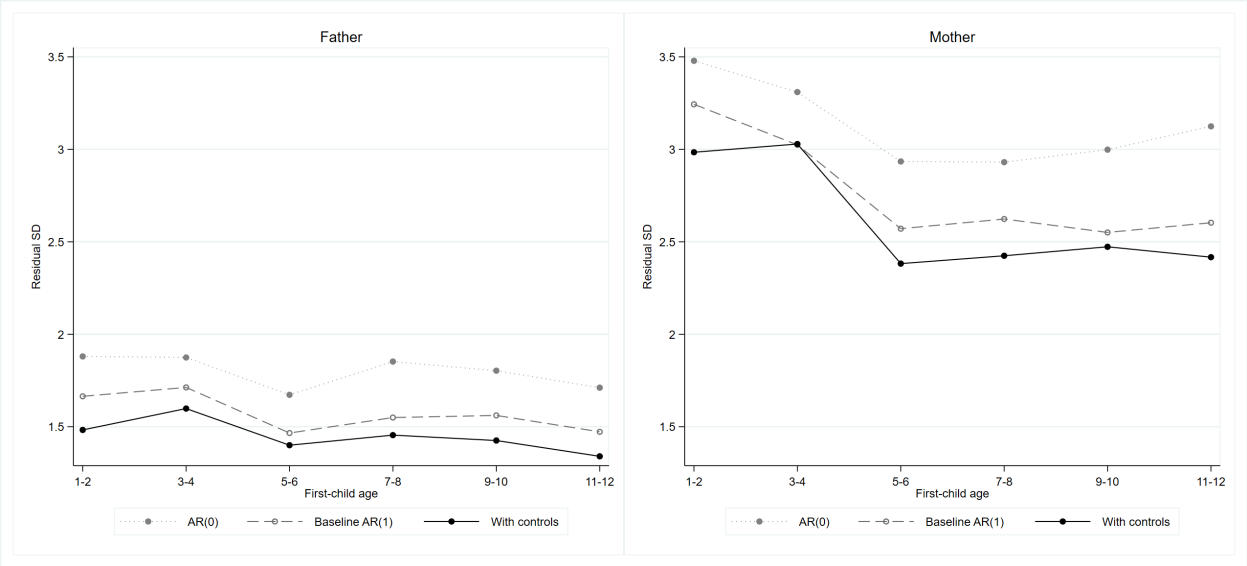


Figure A9. Residual Dispersion in Childcare by Child Age and Parent Gender

Notes: Residual dispersion is measured in weekday childcare hours.

A.4 Additional evidence on the dynamics of childcare hours

The AR(1) specification used in the main text conditions on a single lag of observed care. This subsection examines whether additional information reduces the unpredictable component of childcare. We conduct two exercises: adding a second lag of care and projecting later care on care observed when the first child was aged one to two.

AR(2) specification

We augment the baseline forecasting equation with care reported in the preceding observed wave:

$$C_{i,g,t+1} = \alpha_{gk} + \rho_{1,gk} C_{i,g,t} + \rho_{2,gk} C_{i,g,t-1} + \varepsilon^{AR(2)}_{i,g,k,t+1}, \qquad g \in \{\male, \female\}. \tag{15}$$

We estimate the AR(1) and AR(2) specifications separately by parent gender and the child's current age group, using the same three-observed-wave sample in each cell to ensure comparability.

Figure A10 shows that residual dispersion changes little when the second lag is added. This pattern holds across child-age groups for both parents. The additional lag therefore contains limited incremental information about next-period childcare, and substantial variation remains after conditioning on both current care and care in the preceding observed wave.

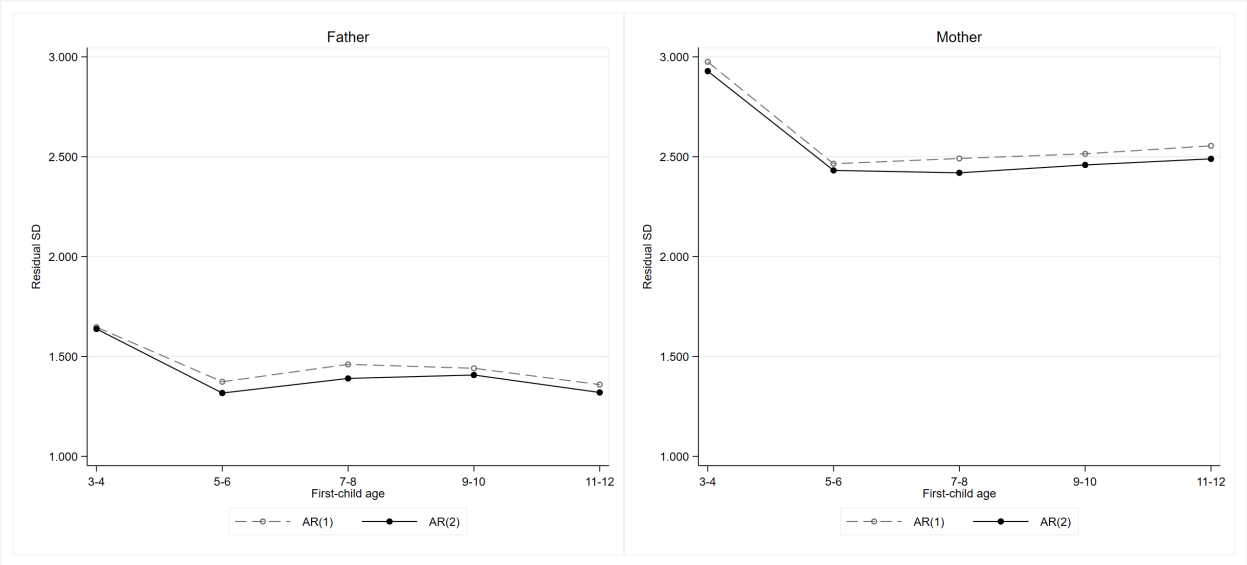


Figure A10. AR(1) versus AR(2) residual dispersion

Notes: The figure reports residual standard deviations from separate AR(1) and AR(2) regressions of next-observed-wave weekday childcare hours, estimated by parent gender and the first child's current age group. Both specifications use the same three-observed-wave sample within each parent-age cell, requiring nonmissing childcare hours in the preceding, current, and next observed SOEP waves. The AR(1) specification includes current childcare hours; the AR(2) specification additionally includes childcare hours in the preceding observed wave. The horizontal axis refers to the child's age in the current observation.

Long-horizon projections from early childcare

We also examine whether childcare arrangements established early in the child's life predict care at later ages:

$$C_{i,g,k} = \alpha_{gk} + \beta_{gk} C_{i,g,1\text{–}2} + e_{i,g,k}, \qquad g \in \{\male, \female\}. \tag{16}$$

We estimate this equation separately for each later age group and parent gender, retaining couples observed both when the child was aged one to two and in the relevant later age group. The coefficient β_{gk} measures the long-horizon predictive power of early care, and $e_{i,g,k}$ captures the residual.

Figures A11 and A12 show that early childcare does not determine subsequent care paths. For fathers, the projection coefficient declines from about 0.40 at ages three to four to 0.17 at ages eleven to twelve. For mothers, it falls from 0.37 to 0.11 by ages nine to ten, with a modest and imprecise increase in the final age group. Residual standard deviations remain between roughly 1.5 and 1.8 weekday hours for fathers and between 2.8 and 3.3 hours for mothers. Early childcare arrangements therefore predict later care only partially, leaving substantial uncertainty over the child life cycle.

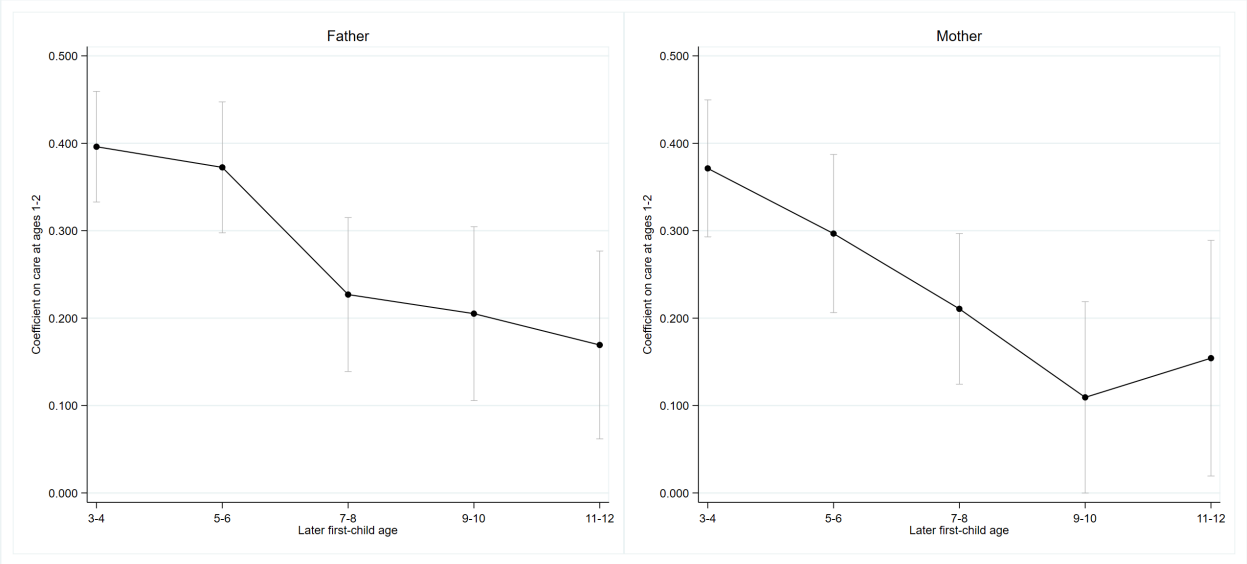


Figure A11. Long-horizon persistence of parental childcare from ages 1–2

Notes: The figure reports coefficients from separate regressions of weekday childcare hours at each later first-child age group on the same parent's childcare hours when the first child was aged one to two. Each regression includes parent-couples observed both at ages one to two and in the later age group shown on the horizontal axis. Vertical bars denote 95 percent confidence intervals.

Together, the AR(2) and long-horizon results confirm that the childcare uncertainty documented in the main text is not an artifact of the one-lag specification. Conditioning on additional history reduces residual dispersion only modestly, so parents face genuine uncertainty about future care needs throughout the child's early life.

A.5 Employment termination and childcare

A potential concern is that the measured variation in childcare could reflect changes in mothers' time availability following employment termination rather than changes in underlying care needs.

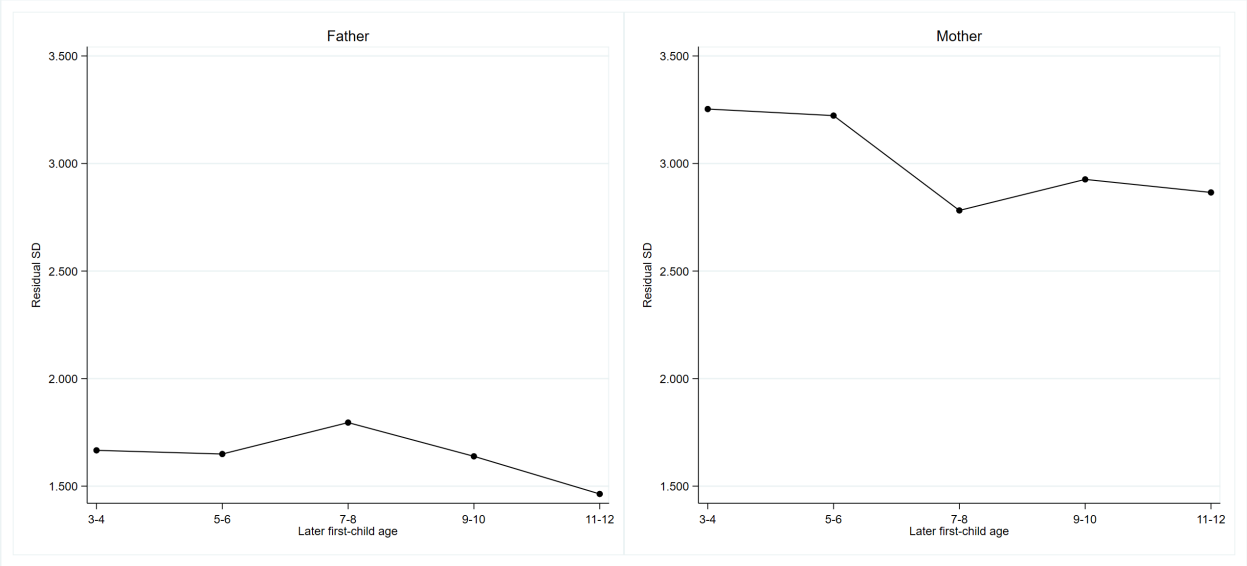


Figure A12. Long-horizon residual dispersion in parental childcare

Notes: The figure reports residual standard deviations from the long-horizon regressions used in Figure A11. Residuals measure the variation in later weekday childcare hours that is not predicted by childcare when the first child was aged one to two.

A mother who loses her job has more nonmarket time and may increase her reported childcare even if the household's care requirement is unchanged. To assess this possibility, we compare voluntary and involuntary employment terminations. Voluntary exits may be chosen jointly with childcare, whereas involuntary terminations are less likely to reflect a planned change in care needs. If measured care variation were driven by employment changes, we would expect reported childcare to rise after involuntary job loss as well.

Table A2 estimates changes in mothers' work hours and total parental childcare over a four-year window on either side of each termination event. After voluntary termination, mothers' weekly work hours fall by 3.363 hours and total daily parental care rises by 0.622 hours. After involuntary termination, total care changes by -0.046 hours, statistically indistinguishable from zero. The pooled specification yields a similar care change of -0.045 hours. Columns (7)–(12) restrict the sample to children aged at least two at termination, excluding cases where the termination may coincide with early postnatal adjustments. Care changes are 0.196 hours after voluntary termination and -0.227 hours after involuntary termination; neither estimate is statistically significant. Involuntary job loss is therefore not associated with a significant increase in reported childcare.

The pooled regression specification is

$$Y_{iet} = \alpha + \beta Post_{iet} + \delta Involuntary_e + \theta \left(Post_{iet} \times Involuntary_e \right) + X_{it}'\gamma + \varepsilon_{iet}, \qquad (17)$$

where i, e, and t index mothers, termination events, and survey years. A mother may contribute

Table A2. Employment Termination and Household Time Allocation

	Full sample						Child age $\geq$ 2 at termination					
	Voluntary		Involuntary		Pooled		Voluntary		Involuntary		Pooled	
	Work hours	Total care	Work hours	Total care	Work hours	Total care	Work hours	Total care	Work hours	Total care	Work hours	Total care
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post	-3.363^{***}	0.622^{***}	-1.431	-0.046	-3.379^{***}	0.621^{***}	-1.209	0.196	-0.420	-0.227	-1.333^{*}	0.206
	(0.739)	(0.190)	(1.242)	(0.306)	(0.738)	(0.189)	(0.813)	(0.203)	(1.277)	(0.310)	(0.803)	(0.201)
Involuntary					-0.603	-0.193					-0.438	-0.212
					(1.344)	(0.359)					(1.338)	(0.358)
Post $\times$ Invol.					1.990	-0.666^{*}					1.123	-0.451
					(1.415)	(0.357)					(1.439)	(0.359)
Pre-event mean	16.292	8.841	15.379	8.548	15.997	8.745	16.292	8.841	15.379	8.548	15.997	8.745
Observations	2,273	2,294	896	915	3,169	3,209	1,797	1,815	847	866	2,644	2,681
R^2	0.030	0.060	0.045	0.078	0.034	0.074	0.018	0.046	0.045	0.068	0.026	0.057

Notes: Standard errors clustered by mother are reported below coefficients. Within each sample, voluntary and involuntary regressions are estimated separately; pooled regressions use voluntary or planned terminations as the reference category. All regressions use event times $[-4, +4]$ and control for the mother's age and years of education. Post equals one at event times 0–4 and zero at event times -4 to -1; Invol. denotes involuntary termination. Columns (7)–(12) require the target child to be at least two years old in the termination year. First-difference results and job-search behavior by termination type appear in Appendix Tables A3 and A4, respectively. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

multiple events. Y_{iet} is weekly work hours or daily parental care. $Post_{iet}$ equals one at event times zero through four and zero at event times minus four through minus one. $Involuntary_e$ identifies involuntary termination, and X_{it} contains maternal age and education. The coefficient β measures the post-event change after voluntary termination, while θ captures the additional change after involuntary termination. Standard errors are clustered by mother.

Because SOEP waves provide unequal numbers of observations across termination events, Table A3 gives each event equal weight by collapsing pre- and post-event periods into means. We compute $\Delta\overline{Y}_{ie} = \overline{Y}_{ie}^{post} - \overline{Y}_{ie}^{pre}$ over the same windows, requiring at least one observation on each side. Regressing the mean change on an involuntary-termination indicator yields the voluntary mean change as the intercept and the difference between termination types as the slope.

Weekly work hours change by -1.624 hours after voluntary termination and by 0.110 hours after involuntary termination; the difference is not statistically significant. Daily parental care falls by 0.633 hours after voluntary termination and by 1.284 hours after involuntary termination.

Further evidence comes from job-search behavior. Table A4 compares active job search in the termination year using a linear probability model, controlling for maternal age and education with standard errors clustered by mother.

Mothers who experience involuntary termination are 42.4 percentage points more likely to search actively for work than mothers who leave voluntarily. The difference is 45.9 points when the child is at least two years old. Both estimates are significant at the 1 percent level. The combination

Table A3. Event Changes by Termination Type

	Work hours (1)	Total care (2)
Involuntary	1.734	-0.651^{*}
	(1.569)	(0.339)
Constant	-1.624^{*}	-0.633^{***}
	(0.883)	(0.206)
Number of events	605	616
Event window	$[-4, +4]$	$[-4, +4]$

Notes: Each observation represents one mother–termination event. For each event and outcome, the dependent variable is the mean outcome during event times zero through four minus the mean outcome during event times minus four through minus one. The voluntary mean change is the regression constant. Involuntary minus voluntary is the coefficient on the involuntary-termination indicator. Repeating the analysis among events for which the target child is at least two years old in the termination year produces identical estimates and sample sizes. This occurs because requiring both pre-event and post-event observations already excludes events in which the child is younger than two at termination. Standard errors clustered by mother are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table A4. Active Job Search at the Time of Employment Termination

	Full sample (1)	Child aged at least two (2)
Involuntary termination	0.424^{***}	0.459^{***}
	(0.037)	(0.041)
Constant	-0.049	-0.029
	(0.108)	(0.141)
Observations	745	533
R^2	0.218	0.237
Controls	Yes	Yes

Notes: The dependent variable equals one if the mother reports actively searching for work during the previous four weeks and zero otherwise. The sample is restricted to observations in the termination year. Voluntary termination is the omitted category. The coefficient on involuntary termination therefore measures the difference in active-search probabilities between involuntary and voluntary termination events. Column (2) restricts the sample to events for which the target child is at least two years old in the termination year. Both columns control for the mother's age and years of education. Standard errors clustered by mother are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

of stable care hours and active job search after involuntary termination indicates that these mothers were displaced from work rather than withdrawing in response to higher care needs. The measured variation in childcare is therefore not driven mechanically by employment changes.

A.6 Pass-through of wage and childcare shocks

This subsection describes the construction of wage and childcare innovations and estimates how they pass through to parents' care and work choices, adapting the framework of Blundell et al.

(2016a).

Construction of innovations

Wage residuals are obtained separately for mothers and fathers from gender-specific regressions of log hourly wages:

$$w_{i,g,t} = \alpha_g + \beta_{1g} age_{i,t} + \beta_{2g} age_{i,t}^2 + \gamma_g schooling_{i,t} + \tau_t^g + u_{i,g,t}^w, \tag{18}$$

where τ_t^g denotes gender-specific survey-wave fixed effects and w is the log real hourly wage, constructed as annual labor income divided by annual work hours. The residual $u_{i,g,t}^w$ serves as the wage innovation. The corresponding regression estimates are reported in Appendix A.7.

Total-care innovations are obtained from an AR(1) process for parents' combined weekday childcare hours:

$$C_{ct} = \alpha_C + \rho_C C_{c,t-1} + u_{ct}^C, \tag{19}$$

where C_{ct} is the sum of the mother's and father's reported weekday childcare.

Pass-through specification and results

The pass-through regression relates changes in each outcome to the three innovations:

$$\Delta Y_{ct} = \alpha_Y + \beta_Y^{\male} \widehat{u}_{\male,ct}^w + \beta_Y^{\female} \widehat{u}_{\female,ct}^w + \beta_Y^C \widehat{u}_{ct}^C + \lambda_Y Y_{c,t-1} + \varepsilon_{ct}^Y, \tag{20}$$

where Y_{ct} denotes either parent's work hours, childcare hours, or care share. The coefficient β_Y^C measures the adjustment associated with one additional hour of total weekday care above its AR(1) prediction.

Table A5 presents the results. The largest adjustments appear in response to total-care innovations. When total weekday childcare exceeds its prediction by one hour, mothers' care rises by 0.743 hours and fathers' care by 0.256 hours. The two coefficients sum to nearly one by construction, but their relative magnitudes show that mothers absorb about three quarters of the additional care. The mother's care share rises by 0.005, or half a percentage point. The labor-supply response is more uneven: mothers' weekly work hours fall by 1.081 hours, compared with 0.328 hours for fathers. Additional care is therefore divided much like existing care, while the associated reduction in market work falls disproportionately on mothers.

Wage residuals produce smaller but systematic reallocations of care. An approximately 10 percent increase in the mother's wage residual is associated with a 0.008-hour reduction in her care and an equal increase in the father's care, lowering her care share by 0.001. The same increase in

Table A5. Responses to Wage and Childcare Shocks

		Mother wage shock		Father wage shock		Total care shock	
Outcome	N	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Δ Mother work hours	3,199	0.027	0.033	-0.258	0.040	-1.081	0.064
Δ Father work hours	3,190	-0.043	0.030	-0.103	0.037	-0.328	0.059
Δ Mother care hours	3,293	-0.008	0.004	0.015	0.004	0.743	0.007
Δ Father care hours	3,293	0.008	0.004	-0.014	0.004	0.256	0.007
Δ Mother care share	3,293	-0.001	0.000	0.002	0.001	0.005	0.001
Δ Father care share	3,293	0.001	0.000	-0.002	0.001	-0.005	0.001

Notes: Each row reports a separate regression. Mother and father wage shocks are scaled by 0.1, so the reported coefficients measure the response to a 0.1 log-point, approximately 10 percent, wage shock, following the interpretation in Blundell et al. (2016a).

the father's wage residual shifts 0.015 hours of care toward the mother and 0.014 hours away from the father, raising the mother's share by 0.002. Wage realizations therefore affect which parent provides care, while innovations in total care determine how much additional care the household must absorb. These two margins provide the empirical basis for modeling how wage and childcare uncertainty jointly shape parents' time allocation.

A.7 Wage process estimates

This subsection reports the wage-process regressions that generate the residual wage shocks used in the pass-through analysis. The residual wage shock for parent i of gender g in survey wave t is

$$\widehat{u}^{w}_{i,g,t} = w_{i,g,t} - \widehat{w}_{i,g,t}, \qquad g \in \{\male, \female\}, \tag{21}$$

where $w_{i,g,t}$ is the log real hourly wage, defined as $\log(\text{real annual labor income}/\text{annual work hours})$, and $\widehat{w}_{i,g,t}$ is the fitted value from the gender-specific wage regression in equation (18). The residual captures the component of a parent's log wage that is not accounted for by age, age squared, years of education, and gender-specific survey-wave fixed effects.

Table A6 reports the wage-process estimates in Panel A and the distribution of the resulting residual wage shocks in Panel B. Returns to age and education are similar for mothers and fathers, though mothers' residuals have a larger standard deviation (0.628 versus 0.518), consistent with greater dispersion in maternal wages. The cross-spouse correlation of residual wage shocks is 0.102, indicating a modest positive association in unobserved wage components within couples.

Table A6. Wage-Process Regressions and Residual-Shock Summary

Panel A. Wage-process regressions			*Panel B. Residual wage shocks*		
	Father wage	Mother wage	Statistic	Father shock	Mother shock
Age	0.0997***	0.0986***	N	8,759	6,489
	(0.0088)	(0.0142)	Mean	0.0000	-0.0000
Age^2	-0.00098***	-0.00105***	SD	0.5177	0.6275
	(0.00011)	(0.00019)	p25	-0.2515	-0.3188
Years of education	0.0761***	0.0814***	p50	0.0327	0.0529
	(0.0020)	(0.0031)	p75	0.2942	0.3723
Period FE	Yes	Yes	Corr$(u^{\male}, u^{\female})$	0.1015	
Observations	8,759	6,489	Cov$(u^{\male}, u^{\female})$	0.0324	
R^2	0.248	0.178	Overlap N	6,212	
Root MSE	0.518	0.628			

Notes: The dependent variable is log real hourly wage, defined as log(real annual labor income divided by annual work hours). Wage shocks are regression residuals from the gender-specific wage-process regressions. Standard errors are reported in parentheses. $^{***}p < 0.01$.

A.8 Robustness to including non-parental childcare

The main analysis measures childcare using only parental reports. This subsection broadens the measure to include formal and informal non-parental care reported in the SOEP child questionnaires. Table A7 describes the resulting sample. Total care averages 13.52 hours per day, of which 9.72 hours are provided by parents and 3.81 hours by non-parental sources.

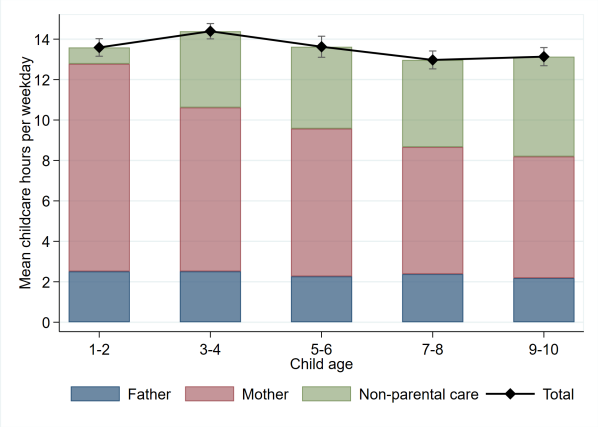
Table A7. Descriptive Statistics of Childcare Decomposition

Childcare measure	Obs.	Mean	Std. Dev.	Min	Max
Total care	2,298	13.524	4.937	0.286	37.800
Parental care	2,298	9.715	4.613	0	31
Non-parental care	2,298	3.808	3.113	0	30.800

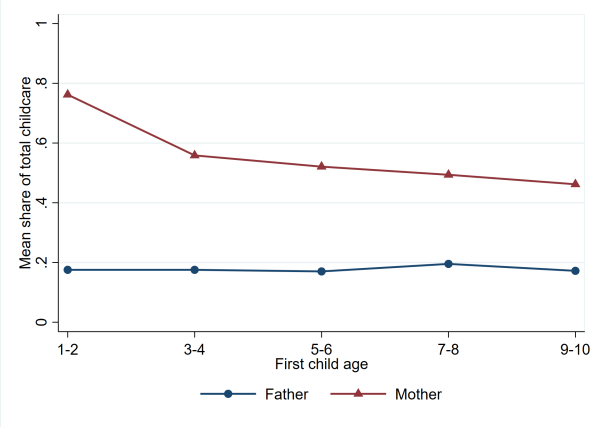
Notes: The sample is constructed by merging SOEP child-level questionnaire data with adult-level information. It covers children aged 1–10 and survey years from 2003 to 2018. The sample is restricted to households with available non-parental care information. Observations are dropped if either parent reports 20 or more hours of childcare.

Figure A13 shows that mothers remain the largest individual source of care across child ages, even after accounting for non-parental providers. Figures A14 and A15 repeat the persistence and residual-dispersion analyses within this subsample. Parental childcare continues to exhibit incomplete persistence and substantial residual variation, confirming that the patterns documented in the main text are not driven by the exclusion of non-parental care.

Table A8 re-estimates the shock pass-through regressions using total care that includes non-



(a) Total childcare hours by child age bin



(b) Parental shares by child age and parent gender

Figure A13. Total Childcare with Non-parental Care

Notes: Panel (a) reports the mean contribution of each source by child age; the line shows their sum, with vertical bars giving 95 percent confidence intervals. Panel (b) reports the mean mother and father shares of expanded total care.

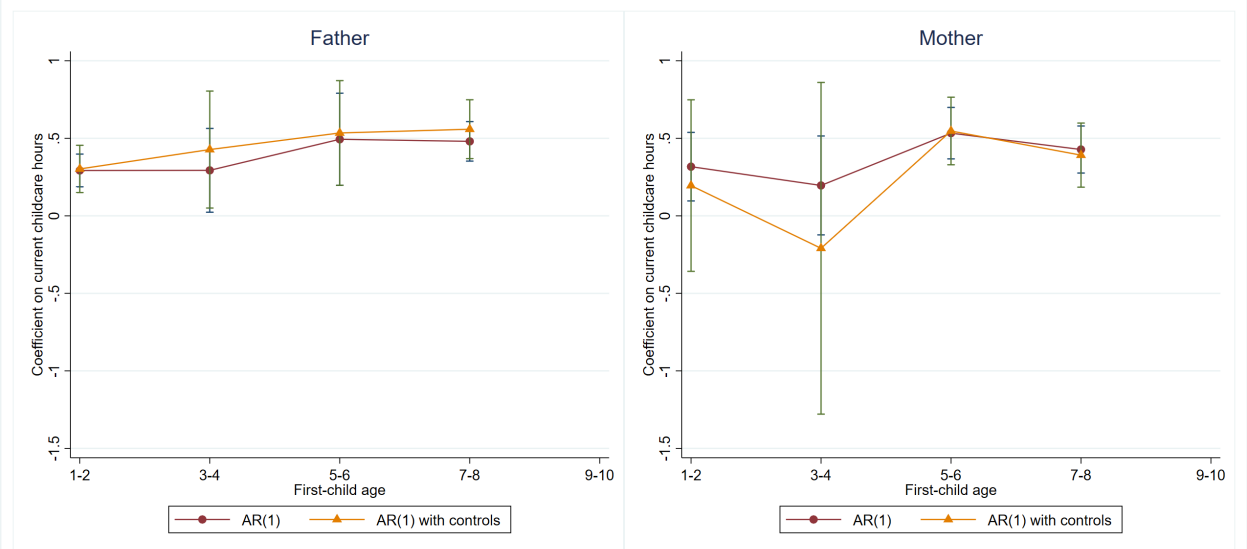


Figure A14. Persistence of Parental Childcare in the Non-parental-care Subsample

Notes: The figure repeats the specifications used in Figure A8 on the subsample with available non-parental-care information.

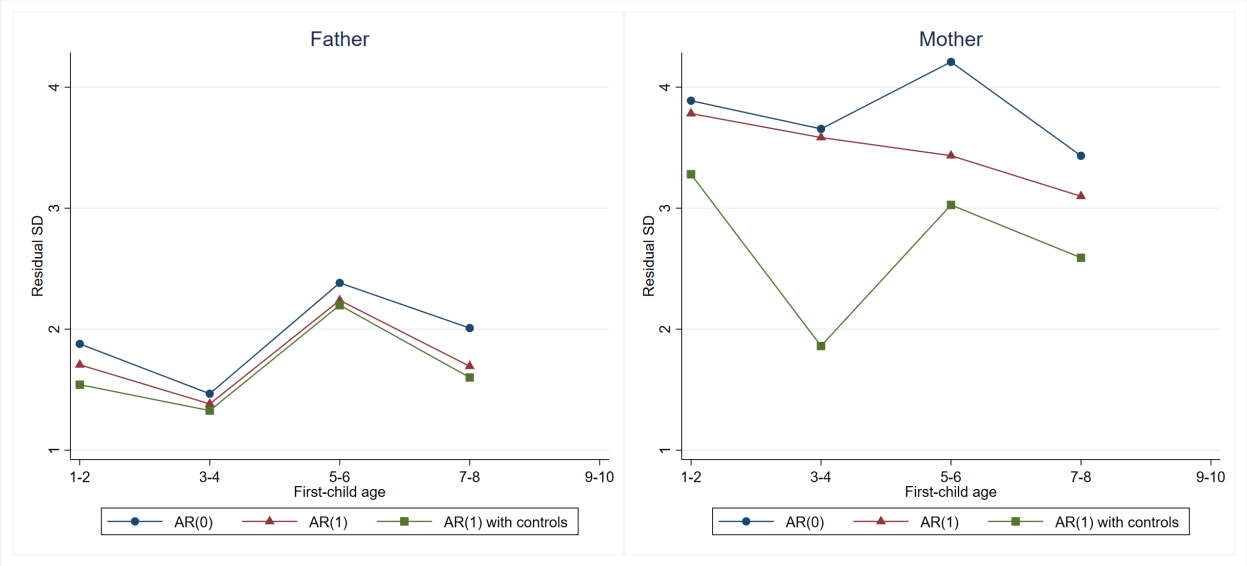


Figure A15. Residual Dispersion of Parental Childcare in the Non-parental-care Subsample

Notes: The figure repeats the specifications used in Figure A9 on the subsample with available non-parental-care information.

parental sources. Mothers continue to absorb the largest share of care innovations. The maternal work-hour response to a one-hour total-care innovation is -0.624, smaller in absolute value than the -1.081 in the parental-only sample, partly because non-parental care absorbs some of the innovation (0.371 hours). The concentration of labor-market adjustment among mothers persists when non-parental care is included.

Table A8. Responses to Wage and Childcare Shocks: Non-parental-care Subsample

		Mother wage shock		Father wage shock		Total care shock	
Outcome	N	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Δ Mother work hours	276	0.078	0.110	-0.423	0.154	-0.624	0.178
Δ Father work hours	280	-0.041	0.083	-0.103	0.126	0.141	0.136
Δ Mother care hours	287	-0.021	0.026	0.019	0.038	0.476	0.044
Δ Father care hours	287	0.007	0.018	0.042	0.026	0.153	0.030
Δ Non-parental care hours	287	0.014	0.025	-0.061	0.036	0.371	0.042
Δ Mother care share	287	-0.003	0.002	0.007	0.002	-0.002	0.003
Δ Father care share	287	0.001	0.001	-0.003	0.002	-0.003	0.002
Δ Other care share	287	0.002	0.002	-0.004	0.003	0.006	0.003

Notes: Mother and father wage shocks are scaled by 0.1, so the reported coefficients measure the response to a 0.1 log-point, approximately 10 percent, wage shock. Wage shocks are obtained as residuals from gender-specific wage processes. The childcare innovation is the residual from an AR(1) process for total childcare, combining parental and non-parental care. Each row reports a separate regression specification.

A.9 Work-hour adjustments and inaction

This subsection provides additional evidence on the nonlinear relationship between care changes and work adjustments documented in Fact 6. We examine this relationship using alternative work-hour thresholds, single-hour care bins, signed responses, and work-status transitions.

Probability of large work-hour adjustments

Table A9 compares the probability of changing weekly work hours by more than five or ten hours across broad childcare-change bins. The pattern is clear: relative to small care changes (at most one hour in either direction), large care changes are associated with substantially higher probabilities of large work-hour adjustments. For example, an increase of two to three daily care hours raises the probability of a work-hour change exceeding ten hours by 5.8 percentage points for mothers and 10.8 points for fathers. An increase of at least seven hours raises these probabilities by 31.8 and 33.5 points, respectively.

Table A9. Own-care changes and large work-hour adjustments

	$\lvert\Delta H\rvert > 5$		$\lvert\Delta H\rvert > 10$	
Own-care change (hours/day)	Mothers	Fathers	Mothers	Fathers
-7 or less	0.368^{***}	0.323^{***}	0.379^{***}	0.462^{***}
	(0.034)	(0.071)	(0.031)	(0.056)
-6 to -4	0.214^{***}	0.181^{***}	0.214^{***}	0.220^{***}
	(0.022)	(0.041)	(0.020)	(0.032)
-3 to -2	0.075^{***}	0.095^{***}	0.082^{***}	0.087^{***}
	(0.020)	(0.023)	(0.018)	(0.018)
-1 to 1	Omitted	Omitted	Omitted	Omitted
2 to 3	0.076^{***}	0.072^{***}	0.058^{***}	0.108^{***}
	(0.024)	(0.023)	(0.021)	(0.018)
4 to 6	0.165^{***}	0.207^{***}	0.199^{***}	0.254^{***}
	(0.030)	(0.046)	(0.027)	(0.036)
7 or more	0.316^{***}	0.231^{***}	0.318^{***}	0.335^{***}
	(0.046)	(0.083)	(0.041)	(0.065)
No/small-change mean	0.301^{***}	0.252^{***}	0.177^{***}	0.113^{***}
	(0.011)	(0.008)	(0.010)	(0.006)
Observations	4,472	4,438	4,472	4,438
R^2	0.047	0.018	0.061	0.046

Notes: The dependent variable equals one when the absolute change in weekly work hours exceeds the indicated threshold. Coefficients are relative to the omitted $[-1, 1]$ own-care-change bin; its probability is reported as the no/small-change mean. Standard errors are in parentheses. $^{***}p < 0.01$.

Directional responses by single-hour bins

The broad bins above may conceal important variation near zero. Table A10 splits care changes into single-hour bins and separates work-hour increases from decreases. The results confirm that large care increases are associated with work-hour reductions and large care decreases with work-hour expansions. At a one-hour increase in own care, the additional probability of cutting work by more than five hours is only 1.3 percentage points for mothers and 3.3 points for fathers. At a five-hour increase, the corresponding figures are 27.9 and 28.3 points. The weak response near zero and the sharp escalation at larger care changes are consistent with adjustment costs that make reorganizing work worthwhile only when care changes are large.

Absolute work-hour adjustments

Table A11 reports the coefficients underlying Figure 6 in the main text. The magnitude of the absolute work-hour adjustment rises monotonically with the size of the care change for both parents and in both directions.

Curvature in the signed work-hour response

The signed work-hour response bends rather than following a single straight line through zero. Figure A16 plots the change in weekly work hours separately for decreases and increases in own care. Table A12 reports quadratic fits to the underlying observations and to the plotted bin means. The curvature is especially clear for fathers when own care falls (individual-level squared term of 0.3478, $p < 0.001$) and for mothers when own care rises (-0.1272, $p = 0.024$). These quadratic patterns locate the weak-response region around small care changes within an otherwise substantial hours adjustment, consistent with adjustment frictions that deter reorganization for small shocks (Chetty et al., 2011).

Work-status transitions

The nonlinearity in hours arises partly because large care changes trigger discrete transitions between employment states. Table A13 groups SOEP observations by the absolute change in own care and tracks moves between no work, part-time work, and full-time work. Mothers' transition rate rises from 22.44 percent when care is unchanged to 59.23 percent when care changes by at least seven hours; the corresponding rates for fathers are 4.94 and 50.72 percent. Status switchers change weekly work hours by 20.31 hours on average among mothers and 35.55 hours among fathers, compared with 2.42 and 3.77 hours among parents who retain their status. The large difference in hours adjustments between switchers and stayers motivates the model's separation

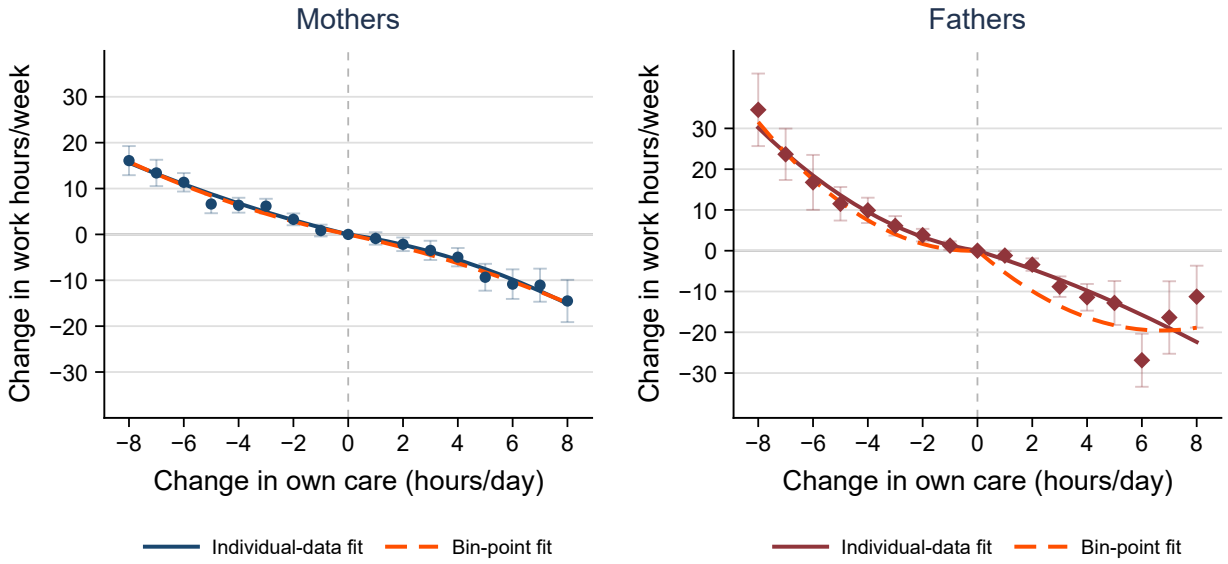


Figure A16. Signed work-hour responses to changes in own childcare

Notes: The panels show changes in weekly work hours by changes in own daily care hours. Solid curves are quadratic fits to individual observations; dashed curves fit the bin means. Both fits are estimated separately on each side of zero.

of continuous hour choice within each employment status from a fixed cost of crossing status boundaries.

B Numerical Implementation of Care-Weight Heterogeneity

The model allows the maternal care weight to vary across households. We implement this heterogeneity using five equally likely discrete types. Because mothers provide the majority of childcare in the data, we restrict all type weights to the interval $(0.5, 1)$, so that maternal time always has the larger weight in the care production technology.

Let $\Lambda(z) = (1 + e^{-z})^{-1}$ denote the logistic function. For each candidate reference weight $\bar{\alpha}^L \in (0.5, 1)$, type j has weight

$$\alpha_j^L = \frac{1}{2} + \frac{1}{2}\Lambda\left[\text{logit}(2\bar{\alpha}^L - 1) + \delta_j\right], \tag{22}$$

where $(\delta_1, \ldots, \delta_5) = (-4, -2, 0, 2, 4)$ and each type has probability $1/5$. The logistic transformation ensures that all weights remain in the unit interval, with $\alpha_3^L = \bar{\alpha}^L$ at the center. The offsets and type probabilities are fixed throughout calibration. Before its first fertility decision, household n draws a type J_n and observes $\eta_n = \alpha_{J_n}^L - \bar{\alpha}^L$. The type remains fixed throughout the life cycle. The dispersion generated by the five types is calibrated to match the cross-household variation in

mothers' care shares observed in the SOEP.

C Estimation Implementation

The 16 structural parameters in Table 3 are estimated by minimizing the distance between simulated and empirical moments. Let m_j^{SOEP} denote target j in Table 4 and $m_j(\theta)$ its simulated counterpart. The formal criterion is

$$\widehat{\theta} = \arg\min_{\theta \in \Theta} \sum_{j=1}^{16} \left(\frac{m_j(\theta) - m_j^{\text{SOEP}}}{m_j^{\text{SOEP}}} \right)^2 . \tag{23}$$

For each candidate parameter vector, we solve the household problem on a discretized state space using five persistent and five transitory wage nodes per spouse, eleven childcare-need nodes, 30 asset nodes, and 15 childcare-share nodes, and then simulate 10,000 households.

Several features of the implementation deserve note. The wage process is estimated outside the structural calibration from SOEP wage histories of employed parents, using age profiles, gender-specific persistent and transitory components, and cross-spouse covariances. Because childcare need is latent in the model, the care-process targets use observed parental care hours as auxiliary statistics rather than direct observations of the underlying requirement. The unchanged-share target is computed from adjacent observations, worker-hour targets pool employed adults in the broader adult-age sample, and the two work-switching targets use the model's structural employment states. The care-division wage-gap target compares means across relative-wage quartiles rather than using a regression slope.

D Additional Validation Results

Care absorption and the existing division of care. The validation in Section 4 shows that mothers absorb about three quarters of unexpected care on average. This subsection examines whether the model also reproduces how this response varies with the existing division of care.

Figure A17 reports the group-specific maternal absorption coefficients from equation (12), estimated separately within five groups defined by the mother's previous care share. From the lowest to the highest previous-share group, mothers' responses rise from 0.61 to 0.84 hours in SOEP and from 0.52 to 0.89 hours in the model. Additional care needs draw most heavily on mothers who already provide the largest share of care. The model reproduces this gradient, confirming that the CES production technology and household-specific care weights generate the appropriate heterogeneity in care absorption.

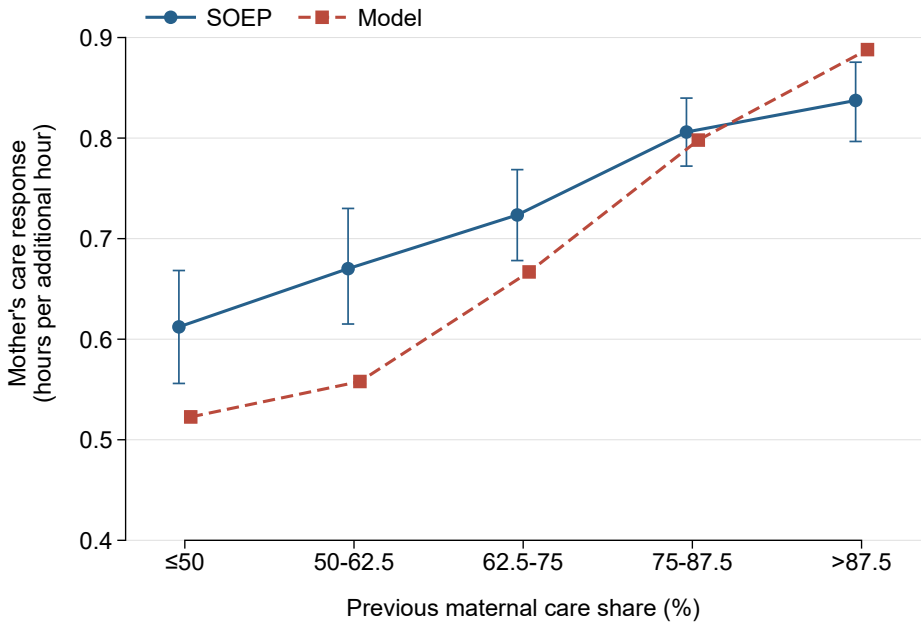


Figure A17. Maternal care responses by previous care share

Notes: Points report the coefficients β_g^{φ} in equation (12). Groups are defined by the mother's share of total care in the previous observation. Error bars show pointwise 95% percentile confidence intervals from bootstrap replications.

E Additional Counterfactual Results

E.1 How risk removal changes the calibrated moments

The counterfactual experiments in Section 5 remove either childcare or wage risk. Table A14 reports how each risk removal changes all 16 calibrated moments, providing a comprehensive view of the mechanisms through which the two risks affect household behavior.

Removing care risk eliminates most of the stochastic variation in the care process: the initial care standard deviation falls by 2.05 hours, and the innovation standard deviation falls by 3.34 hours. Mothers' structural work-status switching drops by 8.18 percentage points, confirming that care uncertainty is a major driver of maternal employment transitions. Fathers' switching falls by only 1.78 points, consistent with the asymmetric adjustment documented in the main text.

Removing wage risk has a different pattern of effects. The most notable change is a 55.85 percentage-point increase in care-share inaction, reflecting the fact that without wage fluctuations, relative wages are stable and there is little reason to revise the division of care. Fathers' structural switching falls by 6.97 points, indicating that wage risk is a more important driver of paternal work adjustments than care risk. Mean first-birth age falls by 1.78 years, consistent with the precautionary motive for delay discussed in Section 5.4. The two risks therefore enter the household through

different adjustment margins: care risk primarily disrupts maternal employment, while wage risk affects both parents' work and strongly influences fertility timing.

E.2 Childcare uncertainty and inequality

Table A15 reports inequality measures with and without care risk. Removing care risk lowers the household earnings Gini from 0.380 to 0.370, a reduction of 2.51%. The effect is concentrated in the lower half of the earnings distribution: the 50–10 household earnings ratio falls from 2.55 to 2.40, while the 90–50 ratio falls only from 2.45 to 2.41. Care risk therefore disproportionately widens earnings disparities between low- and middle-income households. The household consumption Gini declines by only 0.48%, from 0.238 to 0.236, reflecting intertemporal self-insurance through saving. The asset Gini rises slightly, from 0.384 to 0.387, as households with high care draws accumulate less while those with low draws save more.

E.3 Risk intensity and economic scale

The main counterfactual removes care risk entirely. To assess whether the labor-supply effects scale with the intensity of care uncertainty, Figure A18 traces maternal employment outcomes as the amplitude of care-demand shocks is gradually reduced from the baseline to zero. The responses are approximately monotone. At half the baseline shock amplitude, maternal overall weekly hours fall from 18.80 to 18.01 and structural switching falls from 32.01% to 26.00%. The corresponding welfare gain is 0.473% of parents' consumption. The smooth response rules out the possibility that the main results are driven by a threshold effect at complete risk removal.

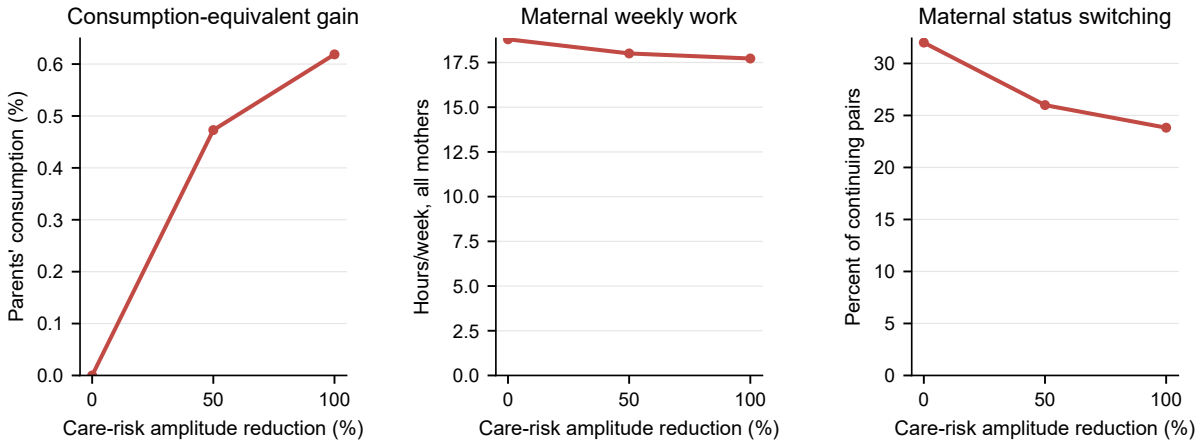


Figure A18. Maternal labor and welfare as childcare-demand risk is reduced

Table A16 places the welfare cost of childcare uncertainty alongside the per-event costs of the model's adjustment frictions. Panel A reports that removing care risk yields a welfare gain of

0.619% of parents' consumption, compared with 1.670% for wage risk. Panel B converts each adjustment cost into a consumption-equivalent per event, following the approach in Graves (2025). A maternal work-status change costs 0.094% of consumption, compared with 0.013% for a care-share change and 1.698% for a paternal work-status change. The large per-event cost for fathers explains why their work adjustments are rare despite the substantial care risk that both parents share.

Table A10. Work-hour responses to changes in own childcare

A. Mothers Observations: 4,472

Change in own care	Work-hour increases			Work-hour reductions		
(hours/day)	>3 hours	>5 hours	>10 hours	>3 hours	>5 hours	>10 hours
-7 or less	0.433^{***}	0.458^{***}	0.442^{***}	-0.110^{***}	-0.080^{***}	-0.046^{**}
	(0.034)	(0.032)	(0.028)	(0.026)	(0.023)	(0.019)
-6	0.366^{***}	0.411^{***}	0.385^{***}	-0.100^{***}	-0.070^{***}	-0.036^{*}
	(0.038)	(0.036)	(0.032)	(0.030)	(0.026)	(0.022)
-5	0.216^{***}	0.236^{***}	0.223^{***}	-0.088^{***}	-0.058^{**}	-0.042^{**}
	(0.038)	(0.036)	(0.031)	(0.030)	(0.026)	(0.022)
-4	0.230^{***}	0.247^{***}	0.225^{***}	-0.087^{***}	-0.064^{***}	-0.033^{*}
	(0.031)	(0.029)	(0.025)	(0.024)	(0.021)	(0.017)
-3	0.213^{***}	0.201^{***}	0.172^{***}	-0.092^{***}	-0.076^{***}	-0.044^{**}
	(0.030)	(0.029)	(0.025)	(0.024)	(0.021)	(0.017)
-2	0.136^{***}	0.112^{***}	0.099^{***}	-0.058^{***}	-0.048^{***}	-0.016
	(0.024)	(0.023)	(0.020)	(0.019)	(0.017)	(0.014)
-1	0.035	0.043^{*}	0.048^{**}	-0.009	-0.006	-0.001
	(0.024)	(0.023)	(0.020)	(0.019)	(0.017)	(0.014)
$+1$	-0.012	-0.017	-0.005	0.025	0.013	0.018
	(0.026)	(0.024)	(0.021)	(0.020)	(0.018)	(0.015)
$+2$	0.002	-0.017	-0.011	0.063^{***}	0.086^{***}	0.065^{***}
	(0.028)	(0.026)	(0.023)	(0.022)	(0.019)	(0.016)
$+3$	-0.039	-0.002	0.002	0.115^{***}	0.129^{***}	0.121^{***}
	(0.040)	(0.037)	(0.033)	(0.031)	(0.028)	(0.023)
$+4$	-0.072^{*}	-0.045	-0.027	0.142^{***}	0.166^{***}	0.176^{***}
	(0.038)	(0.036)	(0.031)	(0.030)	(0.026)	(0.022)
$+5$	-0.127^{**}	-0.085	-0.020	0.302^{***}	0.279^{***}	0.288^{***}
	(0.056)	(0.052)	(0.046)	(0.044)	(0.038)	(0.032)
$+6$	-0.119^{*}	-0.079	-0.036	0.336^{***}	0.384^{***}	0.384^{***}
	(0.061)	(0.058)	(0.051)	(0.048)	(0.042)	(0.035)
$+7$ or more	-0.068	-0.045	-0.036	0.349^{***}	0.371^{***}	0.371^{***}
	(0.044)	(0.042)	(0.037)	(0.035)	(0.031)	(0.025)
No-change mean	0.241^{***}	0.185^{***}	0.106^{***}	0.155^{***}	0.107^{***}	0.055^{***}
	(0.015)	(0.014)	(0.012)	(0.012)	(0.010)	(0.009)

B. Fathers Observations: 4,438

Change in own care	Work-hour increases			Work-hour reductions		
(hours/day)	>3 hours	>5 hours	>10 hours	>3 hours	>5 hours	>10 hours
-7 or less	0.414^{***}	0.453^{***}	0.526^{***}	-0.188^{***}	-0.127^{**}	-0.048
	(0.066)	(0.055)	(0.041)	(0.065)	(0.055)	(0.040)
-6	0.289^{***}	0.378^{***}	0.379^{***}	-0.070	-0.055	-0.048
	(0.111)	(0.092)	(0.069)	(0.110)	(0.092)	(0.067)
-5	0.237^{***}	0.272^{***}	0.266^{***}	-0.108	-0.074	-0.022
	(0.068)	(0.056)	(0.042)	(0.067)	(0.056)	(0.041)
-4	0.201^{***}	0.201^{***}	0.230^{***}	-0.110^{**}	-0.053	-0.019
	(0.051)	(0.042)	(0.032)	(0.051)	(0.042)	(0.031)
-3	0.162^{***}	0.157^{***}	0.162^{***}	-0.052	0.009	0.003
	(0.039)	(0.033)	(0.025)	(0.039)	(0.033)	(0.024)
-2	0.111^{***}	0.108^{***}	0.096^{***}	-0.043^{*}	-0.035^{*}	-0.017
	(0.025)	(0.021)	(0.016)	(0.025)	(0.021)	(0.015)
-1	0.024	0.024	0.032^{***}	-0.042^{**}	-0.028^{**}	-0.004
	(0.017)	(0.014)	(0.011)	(0.017)	(0.014)	(0.011)
$+1$	-0.018	-0.015	-0.004	0.037^{**}	0.033^{**}	0.041^{***}
	(0.018)	(0.015)	(0.011)	(0.018)	(0.015)	(0.011)
$+2$	-0.059^{**}	-0.039^{*}	0.006	0.065^{***}	0.072^{***}	0.076^{***}
	(0.025)	(0.021)	(0.016)	(0.025)	(0.021)	(0.015)
$+3$	-0.079^{*}	-0.019	-0.002	0.202^{***}	0.223^{***}	0.254^{***}
	(0.041)	(0.034)	(0.026)	(0.041)	(0.034)	(0.025)
$+4$	-0.129^{**}	-0.073	-0.017	0.197^{***}	0.201^{***}	0.214^{***}
	(0.054)	(0.045)	(0.034)	(0.053)	(0.044)	(0.033)
$+5$	-0.029	0.060	-0.004	0.196^{**}	0.283^{***}	0.315^{***}
	(0.088)	(0.073)	(0.055)	(0.088)	(0.073)	(0.054)
$+6$	-0.211^{**}	-0.122	-0.049	0.387^{***}	0.473^{***}	0.552^{***}
	(0.107)	(0.089)	(0.067)	(0.106)	(0.089)	(0.065)
$+7$ or more	-0.107	-0.088	-0.015	0.338^{***}	0.322^{***}	0.366^{***}
	(0.077)	(0.064)	(0.048)	(0.077)	(0.064)	(0.047)
No-change mean	0.211^{***}	0.122^{***}	0.049^{***}	0.213^{***}	0.127^{***}	0.048^{***}
	(0.010)	(0.008)	(0.006)	(0.010)	(0.008)	(0.006)

Notes: Coefficients are probability differences relative to zero change in own care. The no-change mean is the reference-group probability. Work-hour changes are weekly; care changes are daily. Standard errors appear below coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A11. Absolute work-hour adjustment by changes in own childcare

Care-change magnitude	Care decreases		Care increases	
(hours/day)	Mothers	Fathers	Mothers	Fathers
1	1.107^{*}	0.482	0.650	0.775
	(0.584)	(0.474)	(0.617)	(0.494)
2	2.251^{***}	2.160^{***}	1.763^{***}	2.445^{***}
	(0.587)	(0.692)	(0.675)	(0.687)
3	3.913^{***}	5.480^{***}	3.380^{***}	8.649^{***}
	(0.731)	(1.076)	(0.957)	(1.131)
4	4.617^{***}	7.059^{***}	2.621^{***}	8.118^{***}
	(0.741)	(1.397)	(0.914)	(1.472)
5	4.253^{***}	9.363^{***}	8.334^{***}	10.828^{***}
	(0.916)	(1.853)	(1.337)	(2.424)
6	9.082^{***}	14.370^{***}	8.526^{***}	21.425^{***}
	(0.918)	(3.031)	(1.472)	(2.929)
7 or more	13.077^{***}	18.717^{***}	13.290^{***}	13.950^{***}
	(0.810)	(1.807)	(1.068)	(2.115)
	Mothers		Fathers	
No-change mean	5.062^{***}		5.308^{***}	
	(0.363)		(0.277)	
Observations	4,472		4,438	
R-squared	0.102		0.076	

Notes: The dependent variable is the absolute change in weekly work hours. Rows give the magnitude of the daily care change; columns distinguish decreases from increases. Coefficients are differences from the zero-care-change group. The no-change mean reports that group's mean absolute work-hour change. Standard errors appear below coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A12. Quadratic curvature in work-hour responses to own-care changes

		Mothers			Fathers		
Estimation data	Care-change side	$\hat{\beta}_2$	SE	p-value	$\hat{\beta}_2$	SE	p-value
Individual observations	$\Delta C \leq 0$	0.0652	0.0441	0.139	0.3478	0.0730	< 0.001
Individual observations	$\Delta C \geq 0$	-0.1272	0.0562	0.024	-0.0886	0.0767	0.248
Plotted bin points	$\Delta C \leq 0$	0.0954	0.0615	0.172	0.5194	0.0933	0.001
Plotted bin points	$\Delta C \geq 0$	-0.0743	0.0559	0.232	0.4328	0.3006	0.200

Notes: The dependent variable is the signed change in weekly work hours. Each regression includes the change in own childcare hours, its square, and a constant, and is estimated separately over $[-8, 0]$ and $[0, 8]$. Individual-level regressions use household observations; bin-point regressions use the nine plotted points on each side. $\hat{\beta}_2$ is the coefficient on squared care change.

Table A13. Work-status transitions and work-hour adjustments by changes in own childcare

	Mothers	Fathers
Panel A. Status-switch rate (%) by absolute change in own care		
$\lvert\Delta C\rvert$ (hours/day)		
0	22.44	4.94
1	22.82	7.01
2–3	31.57	16.32
4–6	42.36	33.03
7 or more	59.23	50.72
Overall	32.02	10.00
Panel B. Mean absolute change in weekly work hours		
No status switch	2.42	3.77
Status switch	20.31	35.55

Notes: SOEP opposite-sex couple-period observations with current child ages 3–12 and consecutive observed periods. Own care is measured in weekday hours; work hours are weekly. Status 0 is no work, status 1 is $(0, 30]$ hours per week, and status 2 is more than 30 hours. A switch is any change in status between consecutive observations. Panel A bins the absolute change in own care; Panel B groups the same observations by whether a status switch occurs.

Table A14. Changes in the 16 Target Moments

Target	**Baseline**	**No care risk: change**	**No wage risk: change**
Initial total-care mean, hours/day	10.530	-0.022	-0.033
Initial total-care SD, hours/day	4.089	-2.046	-0.027
Care AR(1) intercept: constant	6.140	-6.146	-0.037
Care AR(1) intercept: age slope	-0.358	$+0.361$	-0.002
Care AR(1) persistence: constant	0.299	$+0.607$	-0.002
Care AR(1) persistence: age slope	0.0238	-0.0235	$+0.0003$
Care innovation SD: constant	3.456	-3.335	-0.004
Care innovation SD: age slope	-0.0351	$+0.0358$	-0.0021
Care-share inaction, %	13.899	-0.480 pp	$+55.854$ pp
Women's worker hours/week	31.940	-1.119	-0.801
Men's worker hours/week	43.156	-0.083	$+2.020$
Mean first-birth age	28.089	-0.025	-1.784
Within-household mother/father care ratio	3.797	$+0.030$	-0.091
Care-division wage-gap elasticity	0.185	$+0.026$	-0.153
Mother's structural switching, %	32.006	-8.184 pp	-12.729 pp
Father's structural switching, %	10.012	-1.775 pp	-6.968 pp

Notes: The baseline column reports the corresponding model moments under the estimated specification. The final two columns report changes relative to the baseline when care risk or wage risk is removed, respectively. Changes in percentage outcomes expressed in "pp" are measured in percentage points.

Table A15. Childcare uncertainty and inequality

	Baseline	No care risk
Intra-household earnings gap	42.68%	42.36%
Maternal earnings Gini	0.640	0.632
Paternal earnings Gini	0.435	0.432
Household earnings Gini	0.380	0.370
50–10 household earnings ratio	2.55	2.40
90–50 household earnings ratio	2.45	2.41
Household consumption Gini	0.238	0.236
Household asset Gini	0.384	0.387

Notes: Both columns report levels. The earnings gap averages father-minus-mother earnings divided by their sum.

Table A16. Welfare Effects and Adjustment Costs

Experiment or adjustment	Consumption equivalent (%)
Panel A. Welfare from removing risk	
Remove childcare risk	+0.619
Remove wage risk	+1.670
Panel B. Mean cost per adjustment event	
Childcare division	0.0125
Mother's work status	0.0944
Father's work status	1.6979

Notes: All values are expressed as percentages of parents' own consumption. Panel A reports CEV from re-solving the model with estimated parameters unchanged; positive values indicate welfare gains. Care-risk removal closes initial care-need differences and later innovations. Wage-risk removal preserves gender- and age-specific mean offered wages. Panel B reports mean consumption-equivalent fixed utility costs per adjustment event at child ages 1–12, following the conversion in Graves (2025). These measures are comparable with Cho et al. (2024); Issler et al. (2008); Heathcote et al. (2008); Wu and Krueger (2021).