Remote Work as Childcare: Implications for Parental Earnings*

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PRELIMINARY AND INCOMPLETE. DO NOT CITE OR CIRCULATE

Abstract

Remote work breaks the physical tie between workers and workplaces, allowing parents to combine childcare and work time. Using newly available administrative tax data on childcare arrangements in the United States, we document that parental use of paid childcare has fallen by roughly 10 percent since remote work arrangements became prevalent. The decline is broad-based across child ages, largest for higher-income households, and closely matches survey-based measures. A decomposition shows that mothers' access to remote work accounts for more than half of this decline, outweighing other observed factors such as fathers' characteristics, universal pre-k expansions, grandparental caregiving, platform work, and childcare-sector supply conditions. While remote work eases some constraints for mothers—mothers' labor force participation has never been higher than in the mid 2020s—watching children while working may reduce earnings. To understand the net effect of the opportunity to work remotely on parental earnings, we link firm remote-work policies to administrative tax records, and show that parents exposed to remote-work firms are less likely to use paid childcare than comparable parents exposed to in-person firms. We find that access to remote work does not improve mothers' earnings relative to non-mothers. Together, the results suggest that remote work has reduced paid childcare use by allowing parents to substitute toward caring for children while working, but that this substitution offsets potential career gains for mothers.

Keywords: Work from home, Gender Pay Gap, Childcare

JEL Codes: J13; J22; J24; J31

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1 Introduction

Despite substantial growth in female employment and wages in the last half of the twentieth century, women's progress in the labor market has stalled since the mid-1990s (England et al., 2020). A large body of evidence links the remaining gap to the arrival of children. Women's earnings, hours, and advancement fall persistently after childbirth, while men's outcomes change little (Kleven et al., 2019). These patterns point to childcare and the difficulty of combining demanding jobs with family responsibilities as central constraints on women's careers (Goldin, 2014). The Covid-19 pandemic introduced a potentially important change to these constraints. Remote and flexible work arrangements expanded rapidly and remain far more common than before the pandemic. By allowing workers to perform their jobs from home, remote work may ease the tension between careers and family responsibilities and reshape the tradeoffs that have historically slowed women's progress in the labor market.

When parents perform paid work from home, they can simultaneously work and care for children. Consistent with reduced conflict between job and home demands, maternal employment hit an all time high in recent years. This change seems related to remote work: Harrington and Kahn (2024) find that the so-called "motherhood penalty" in employment has fallen in remote work-suitable occupations. However, when parents can perform paid work from home, they have less incentive to purchase childcare services in the market. Watching children while working may reduce the wage-benefits of remote work.

Consistent with this incentive to combine work and childcare, we document a new stylized fact: relative to the pre-COVID period, the use of paid childcare has declined by roughly 10 percent. Analyzing IRS tax data on childcare subsidies not previously available to researchers, we show declines in use of paid childcare across all child ages, with the largest declines among higher-income households. We validate our tax-data-based measures of childcare with survey-based measures, finding that the tax data yields very similar trends on the probability of spending on childcare over time. The robustness of the decline in use of paid childcare to to alternative measures of childcare spending suggests that our finding is not driven by a reporting phenomenon in the tax data. A decomposition suggests that the most important determinant—accounting for more than half of the decline in the use of paid childcare—is whether a mother's occupation is amenable to remote work, based on the pre-2020 O*NET task mix measure from Dingel and Neiman (2020). Factors attributed to fathers play only a secondary role, with more of the decline coming from fathers attributable to occupations with non-teleworkable tasks. We are able to rule out a large role for other explanations, including expansions in Universal Pre-Kindergarten (UPK), expanded gig work, and pandemic-induced early retirements by grandparents. A high-level examination of supply-side factors reveals that profits and employment remain higher throughout the industry, suggesting that Covid-related supply pressures are unlikely to explain the observed decline in paid childcare usage. In summary, our decomposition implies that the ability to work remotely for women is the most important factor for explaining the decline in use of paid childcare. The remainder of the paper examines more direct causal evidence on the impact of remote work on paid childcare use and the consequences for parental earnings.

To understand the net effect of remote work access on parents' careers, we link information on the remote work policies of firms with administrative tax data to (a) show that remote work access affects use of paid childcare, and (b) that remote work has no net effect on the earnings of mothers relative to non-mothers or fathers relative to non-fathers. We link data from the Flex Index database, which records remote-work arrangements as of 2024, to administrative tax data. We identify workers employed at these firms in 2019 and follow those individuals from 2017 to 2025, regardless of where they work before or after 2019. Our empirical design therefore assigns workers to treatment based on whether their 2019 employer still allows remote work in 2024, which provides an intent-to-treat measure of exposure to remote-work policies.

We find that parents who are assigned to firms that allow remote work are less likely to report using paid childcare than parents working in in-person firms. For mothers, we estimate a 5.4 percent reduction in the propensity to use paid childcare in 2024 among those who in 2019 worked in a firm which would allow remote work by 2024, relative to those working in firms which had a return to office requirement by 2024. Between 2019 and 2024, individuals can change firms. We estimate that the fraction of women actually working in a remote-allowing firm in 2024 is approximately forty percentage points higher among those assigned a remote work firm in 2019. Scaling the effect on use of paid childcare by the inverse of the relative propensity to be in a remote work firm implies a 13 percent reduction in the use of paid childcare associated with remote work among mothers of children 0-13 years old with teleworkable jobs in 2019 in our sample. The decline in use of paid childcare is largest for mothers of 0-year-old children and mothers of children 5-11 years old. Estimates for men are approximately half the size of the estimates for mothers.

Turning to non-childcare outcomes, we find evidence of an increase in fertility among mothers assigned to remote firms with teleworkable jobs in 2024 and 2025. These results are consistent with positive fertility effects of remote work inferred from occupation-level variation in Davis et al. (2026). If fertility is related to a firms' remote work policy, then the reduction in paid childcare associated with remote work may be driven by changes in the composition of parents across firms. However, we show that our results are robust to considering the subset of parents who already had children by 2019 as well as the subset of mothers who were 45 or older by 2019 and thus could not respond to the availability of remote work by having additional children. We find no effects on employment of parents and less job switching among parents assigned to remote firms in 2019 (though no less switching than non-parents in these firms). This is consistent with higher retention rates in remote firms relative to firms with a return to office requirement documented with other data (Van Dijcke et al., 2026) and in other settings (Bloom et al., 2024).

While remote work arrangements may affect firms in many ways, the shift in childcare responsibilities associated with remote work affects only parents at these firms. To study the effect of remote work arrangements on earnings, we compare the earnings trajectories of parents assigned to firms that allow remote work to non-parents at those firms, separately for male and female employees. We find that earnings of workers assigned to firms which allow remote work fell relative to earnings of workers assigned to firms that have returned to office, but there is no differential effect of parenthood: parents assigned to these firms do just as well as non-parents. Pooling the year-by-year estimates into a single post-COVID indicator interacted with parenthood, we can rule out effects of 2019 assignment to a remote-work firm on parental earnings, relative to non-parental earnings, larger than 1.5% or smaller than -1.5%. While remote work may expand the hours individuals are able to work, it also induces some workers into combining time spent at work with time spent on childcare. Given the magnitude of the earnings impact of motherhood—estimated in Kleven (forthcoming) to be as large as 31% in the US—we conclude that access to remote work will not meaningfully reduce the gender gap associated with parenthood.

Taken together, our results suggest that remote work changes the tradeoff between caring for children and working in a way that does not translate to a reduction in the gender pay gap. The expansion of remote work reduced reliance on paid childcare, particularly among households where mothers hold teleworkable jobs. At the same time, the evidence indicates that working from home often coincides with parents providing childcare: in the ATUS parents are spending about 20% more time in childcare relative to past years and grand-parental help, UPK expansions, and other market factors do not explain the decline in use of paid childcare. The substitution of parental care for paid childcare appears to offset potential career benefits of remote work for women. Access to remote-work at the firm-level does not improve the earnings trajectories of mothers relative to non-mothers. These patterns suggest that remote work relaxes the need to purchase childcare but does not eliminate the underlying tension between childcare responsibilities and career advancement. As a result, the widespread adoption of remote work alone is unlikely to close the remaining gender gaps in pay and career progression.

Our paper contributes to several literatures. First, our study adds to the extensive literature studying the responsiveness of women's careers to childcare-related constraints. Boneva et al. (2026) document that women's labor supply intentions are responsive to beliefs about childcare availability and quality, Wiswall and Zafar (2018) find that even in college, female students value flexibility in jobs and that these values correlate with later choices, and Price and Wasserman (forthcoming) document a fall in maternal employment in the summer due to public school closures.[1] Gelbach (2002) provides a seminal study of maternal labor supply

[1] See also Duchini and Van Effenterre (2024) and Graves (2013) for the importance of school schedules for maternal labor

in the 1980 census using child's quarter of birth to examine eligibility, and Cascio (2009) finds substantial response of earlier cohorts of mothers to their children's school eligibility. Fitzpatrick (2010) uses restricted data from the 2000 Census to estimate the impact of being eligible for UPK in Georgia and Oklahoma, and finds no impact on female labor supply, however, Wikle and Wilson (2025) study the effect of kindergarten entry using a similar design in more recent years, finding a small and temporary employment effect of having a child go to school one year earlier.[2] Recent literature has focused on the length of the school day as an important factor determining the responsiveness of female labor supply to public school access.[3] Our paper differs both in the focus on already working mothers, and in the mechanism of interest: substitution away from paid childcare.

Our paper contributes to an evolving literature on the impact of remote work on productivity, hours, and earnings. Aksoy et al. (2025), Gibbs et al. (2023), Fenizia and Kirchmaier (2025), and Emanuel et al. (2026b) study the impact of shifts to remote work in individual firms, finding positive, negative, positive, and negative effects, respectively. Compared to these firm-level analyses, our data lack direct measures of productivity, but allow us to identify parents, their childcare arrangements, and to study individuals working in different pre-covid firms and the evolutions of their careers as the remote work policies of their firms shift. Directly studying the relationship between motherhood and remote work, Harrington and Kahn (2024) find decline in employment upon motherhood—the motherhood employment penalty—is mitigated in careers where women can work from home. Basso et al. (2026) and Gulek and Langer (2026) find similar reductions in the post-Covid motherhood penalty among new mothers in Europe and the US. Our paper makes use of panel data and identification of specific firm policies to connect the ability to work from home with wage growth and career progression. On the one hand, work-from-home policies allow women to remain employed rather than leave the labor force when they become mothers. On the other hand, if work from home induces women to substitute away from care arrangements which take place out of the home and towards care arrangements which take place inside the home, there may be substantial productivity costs and career consequences associated with the shift towards working from home post-Covid (Adams-Prassl et al., 2023; Gallen, 2023).

force participation, and Goldin (2022), Alon et al. (2022), Alon et al. (2020), and Heggeness (2020) for discussions of the impact of Covid on school closures and maternal employment.

[2] Jackson et al. (2025) study the impact of UPK on female labor supply and find that maternal employment rose by about one percent in regions with UPK expansions in the past decades.

[3] Wikle and Wilson (2025) find that their effects are driven by longer day programs, and two recent papers—Gibbs et al. (2024) and Humphries et al. (2024)—document a substantial female employment and hours response to full day public childcare.

2 Data

2.1 IRS Tax Data

We combine tax records on paid childcare usage with tax records on labor supply. We also further examine the filings of firms where individuals work, and examine the location of grandparents in the tax data based on multi-generation mother-child SSA links. We describe each of these data elements in turn. Many labor market and childcare variables of interest are available from 2000. We draw on these data to show trends over time, but the focus of this paper is the effect of the remote work revolution on parental choices and outcomes. Thus, our main empirical analysis will be conducted on a panel from 2017 to 2025, the latest data currently available.[4] In some aggregated analysis, we will study the factors affecting the use of paid childcare pre-Covid, focusing on 2018-2019, relative to post-Covid, focusing on 2023-2024.

2.1.1 Birth Records

We begin with a spine based on birth records, where both the mother and child have been issued a Social Security Number (SSN). When someone files for a SSN—often at birth in the United States—the SSA also collects the SSNs of mothers and, when available, of fathers.[5] These data are shared with the IRS by the SSA. The coverage of these data begin with births in 1983. In earlier years, these data may be supplemented based on tax filing information.

2.1.2 Paid Childcare in Tax Data

U.S. tax data provide a unique link between a household, their dependent children and care providers. To our knowledge, we are the first to analyze the tax data recording childcare usage. These data are collected when tax units with children claim the Child and Dependent Care Tax Credit (CDCC) or a Dependent Care Flexible Spending Account (DCFSA).

The United States has had a federal CDCC since 1976. From 2003-2025, a tax unit could receive up to $2,100 from the CDCC. Under the One Big Beautiful Bill Act (OBBBA), the maximum CDCC was expanded to $3,000. The American Rescue Plan Act (ARPA) temporarily but substantially increased the generosity for tax year 2021 only. In this temporary expansion, the credit was made fully refundable, the maximum spending threshold rose to $16,000, and subsidy generosity increased to as much as 50 cents per dollar spent for households with adjusted gross income less than $125,000. In addition, many states offer top ups to the

[4] Paid childcare use is available through 2024.

[5] Mother SSNs are rarely missing, but may be missing if the mother has not been issued an SSN, such as when a foreigner gives birth in the U.S. Father's SSNs can be missing in the case the father is not known or similarly has not been issued a SSN.

federal credit. The most generous are in Minnesota, Pennsylvania, and New York, which double the value of the federal credit.

Qualifying tax units are those with any childcare or dependent care expenses that allow the filer (or spouse) to work, look for work, or go to school. Qualifying children must be under 13 years old.[6] The credit amount is a percentage of the first $3,000 of qualifying expenses, or $6,000 for two or more qualifying children. The federal credit is nonrefundable, and is therefore only relevant for tax units with tax liability. We will return to this point when we compare counts from the tax data with other sources of data on paid childcare usage. Another related tax benefit is the DCFSA, which has been available since 1982. Through 2025, filers could contribute up to $2,500 into DCFSAs, per filer, pre-tax ($5,000 for a married couple).[7] Taxfilers with a DCFSA may also claim the CDCC, but the DCFSA amount is deducted from the cap on qualifying CDCC expenses.

The CDCC is claimed by filing a tax form known as Form 2441, and tax units receiving a DCFSA also file this form. The important elements of this form are shown in Appendix Figure A.1. Tax units list each care provider, the SSN or EIN of the care provider, and amount paid. They also list the expenses for each of their eligible children.

2.1.3 Construction of Panel of Mothers

We begin with all mothers with children under 13 at any point since 2000. In some of our analyses, we rely on a 10 percent random sample for computational purposes. We collapse the data to the mother level, tracking the total number of children under 13 for each mother, and their ages. We also link to fathers based on SSA records.[8] If a mother has multiple children under 13 with different fathers, we attach father's characteristics for the mother's youngest child.

We also look one generation further back, linking the mothers and fathers to their parents (thus identifying the grandparents of the children). Given that we see links beginning in 1983, the oldest a mother can be in a mother-child pair with a grandparental link by the beginning of our 2018 panel would be 35. For older mothers, we further supplement the SSA links based on dependent claiming in 1996 1040 filings.[9] Thus, for the subset of a mothers in our panel who were claimed as dependents in 1996, we can identify their children's grandparents as well. This allows us to construct a grandparental link for mothers as old as 40 as of 2018 (who would have been 18 in 1996).

[6] While our focus is on mothers with young children, qualifying dependents can be any age if they cannot provide care for themselves.

[7] This was expanded to $7,500 under OBBBA.

[8] Another alternative is to assign a father based on tax filing information using the 1040, but this requires the household to file and to file as married filing jointly. For this reason, we prefer the SSA links.

[9] These data are not available prior to 1996.

Our main measure of labor supply comes from receiving a W2 for wage and salary income. We also consider self-employment income, as indicated by the filing or Form Schedule SE, or the receipt of a 1099 from a gig economy payer (Garin et al., 2022). We also extract self-reported occupation on the 1040, when available. Around half of 1040s have a self-reported occupation that is mappable to a six digit O*NET occupation code. We use this occupation to classify jobs based on whether they can be done remotely, using a methodology discussed in more detail below. Geographic location (zipcode and state) is determined based on the 1040 address. Finally, we add mortality, geographic location, labor supply and retirement status of the grandparents. First, we link to death dates, as recorded by the SSA (if applicable). We note whether the grandparents work as employees based on receipt of W2, or are retired, based on receipt of Social Security income (1099-SA) or pension/retirement account withdrawals (1099-R). We identify the location of grandparents based on 1040 filings or information returns received in a tax year.

2.2 Identifying Telework

We are interested in the relationship between remote work and paid childcare. Unfortunately, there is no flag in the tax data for remote work. However, remote work is likely more prevalent in occupations like software engineering relative to occupations like building inspection and auto repair. We use the teleworkability index created in Dingel and Neiman (2020), which classifies occupations based on their feasibility for remote work using O*NET survey data on job characteristics. We can apply this index to occupations self-reported on 1040s.[10]

2.3 Comparisons to Public-Use Data

2.3.1 CPS ASEC

We complement our tax data analysis with public use data from the CPS ASEC for a similar period, from 2000 to the present.[11] In particular, we use the CPS to validate our measure of paid childcare over time.[12] We validate cross-sectional statistics when possible in both the CPS and tax data. There are a number of potentially desirable properties of the CPS data for this purpose. Households can report using paid childcare in the CPS whether or not they are tax filers. In addition, there is no incentive in the CPS to conceal "under

[10] Occupations are translated from raw records (whatever an individual records as their occupation) to O*NET codes within the tax data.

[11] One possible concern during the immediate Covid period is that response rates declined dramatically. However, we are looking at a longer period through the latest data available.

[12] Between 2001 and 2006, the CPS asked: Did (you/anyone in this household) pay for the care of (your/their) (child/ children) while they worked in [year]? [include preschool and nursery school; do not include kindergarten or grade/elementary school]. From 2007 onwards, the question became: Did (you/ anyone in this household) pay for the care of (your/their) (child/children) while (you/they) worked in [year] [include: all child care expenses including preschool and nursery school expenses before and after school care, and summer care. Do not include: cost of kindergarten or grade/elementary school.]

the table" childcare. There are also no tax credit-induced incentives to over-report spending. Unlike the tax data, however, there is no further information about the childcare purchased. Beyond the small sample relative to the tax data, another potential drawback is that individuals may not accurately recall the cost of childcare when asked by an enumerator, compared to when filling out their taxes under the potential risk of audit.

2.3.2 Survey of Income and Program Participation (SIPP)

The survey asks reference parents who reported using childcare during the fall of the reference year, "Did reference parent or reference parent's family pay for child care arrangements during a typical week in the fall of the reference year?" Parents reporting positive costs are then asked how much they paid for childcare during that week. We estimate the number of households using paid childcare by aggregating responses to the household level and applying survey weights. Because childcare information is recorded at the person level, we retain the December observation for each household and use the household head's survey weight. We calculate weighted average weekly costs among households with positive costs and multiply this estimate by 52 to obtain average annual childcare costs.

2.3.3 National Survey of Early Care and Education (NSECE)

An additional source on the childcare arrangements of households is the National Survey of Early Care and Education (NSECE). We construct a complementary measure of paid childcare use in the United States using publicly available data from the 2012, 2019, and 2024 waves of the NSECE. The NSECE is a nationally representative survey funded by the Office of Planning, Research, and Evaluation in the Administration for Children and Families of the U.S. Department of Health and Human Services and conducted in partnership with NORC. It offers a comprehensive look at the U.S. childcare landscape, collecting information from households with a child under age 13, childcare providers, and members of the childcare workforce. We use the household data, which report the types of care used by families and their out-of-pocket childcare costs in the week prior to the survey (this time-frame presumably minimizes recall error), to estimate the number of households with a child under age 13 that pay for childcare and average weekly spending among households with positive costs. Because the CPS and tax data only observe annual childcare spending, we annualize weekly NSECE costs by multiplying them by 52. Since families may not rely on paid childcare throughout the whole year, we interpret this measure as a plausible upper bound on annual childcare expenditures.

2.3.4 Consumer Expenditure Survey (CEX)

We use the CEX Interview Survey monthly expenditure files and identify childcare spending as expenditures on babysitting, child care, day care centers, nurseries, and preschools (UCCs 340210-340212, 670310, and 670320). We restrict the sample to consumer units whose youngest member is under age 13. The number of consumer units paying for childcare in each year is the survey-weighted count of consumer units reporting positive childcare expenditures in an interview quarter, averaged across the four quarters of the year. Average annual spending is computed among consumer units observed in all four interviews of the panel: monthly expenditures are summed over the panel year, each consumer unit is assigned to the median calendar year of its interview months, and the reported estimate is the weighted mean of annual spending among consumer units with positive spending.

2.3.5 ATUS

Finally, we complement our analysis in the tax data with time-use data from the American Time Use Survey (ATUS) for the years 2003 to 2024. The ATUS is a nationally representative sample drawn from households that have completed their eighth and final CPS interview. In each household that takes part in the ATUS, one individual is selected as a "designated person" and is invited to complete a time-diary, which is a report of all activities they engaged in specified 24-hour periods.[13] In addition to tracking how the designated person spends their time, the ATUS records where and with whom they were while engaging in each activity. The ATUS also includes rich demographic and economic information linked from the last CPS monthly interview.

We use the ATUS to analyze an alternative measure of the prevalence of remote work among fathers and mothers of children under 14 across the years. Given that the survey asks respondents to specify where they performed each activity, we are able to calculate, for parents that worked on diary day, what share of working hours was done remotely.[14] Specifically, we define remote work in the ATUS as any work time spent in a location other than the designated person's workplace.[15] Additionally, the ATUS also allows us to document how working parents have managed childcare throughout the years. Childcare in the ATUS can be reported in two ways. First, it may be recorded as a primary activity when the designated person is directly engaged with a child, such as helping with homework, playing together, or preparing meals.[16] Childcare may also be recorded as a secondary activity when the designated person reports having supervised a child under 13

[13] Unfortunately, the ATUS does not collect time-use data for household members other than the designated person.

[14] For each activity, respondents also specify where it took place. The ATUS interviewer asks: "Where were you while you were [ACTIVITY]?"

[15] To estimate the amount of work being performed from home, we focus on two specific activities: "Work, main job" and "Work, other job(s)". The activity codes for these activities are 050101 and 050102, respectively

[16] We classify three groups of activities as primary childcare: "Caring for and Helping Household Children", "Activities Related to Household Children's Education", and "Activities Related to Household Children's Health". The activity codes for these groups are 030100, 030200, and 030300, respectively

while engaged in other activities. We use both of these childcare definitions to look at how working parents adjusted their childcare provision in response to the telework-related shifts in work arrangements.

3 Conceptual Framework

To fix ideas, consider a household's decision for how much a mother should work and how much childcare to purchase in two regimes: in a remote-work regime, it is possible to simultaneously do work and provide childcare (which we refer to as "blended time"), the no-remote work regime is the same, except that blending is not possible. For simplicity, assume that the father always works full-time and has no choice variables, but a mother has one unit of time to allocate across market work only (L), direct childcare only (H), and simultaneous work and childcare (B).[17] In the remote work regime, the time constraint is

$$L + H + B = 1.$$

In the no-remote-work regime, blended time is infeasible: $B = 0$, and the constraint reduces to $L + H = 1$. We assume that the wages associated with market work L are w, while the wages associated with blended time are $\phi(B)w$ where $\phi(0) = 1$ and $\phi'(B) < 0$. This captures the possibility that doing childcare while working may have negative effects on training opportunities and promotion, especially when the amount of blended work time is high.

For simplicity, we assume that households have preferences over consumption, C, and time with children, Q, with utility increasing in both arguments. We assume that $Q = H + \delta B$ for $\delta \in (0, 1)$. When parents are not spending time on childcare (either through B or H), childcare must be purchased in a market at price p.

Remote-Work Regime

The mother chooses (H, B) with $H \geq 0$, $B \geq 0$, $H + B \leq 1$, to maximize

$$\max_{H,B} U\left((1 - H - B)(w - p) + \phi(B)wB, H + \delta B\right).$$

[17] One complication to this model is offered by Scott and Sundberg (2025) who focus on the relationship between intrahousehold specialization in market vs. non-market work and how remote work affects this decision. Given our setting—the US where the price of childcare is high—we abstract from household specialization decisions and focus instead on the substitution away from paid childcare and implications for the gender pay gap, but both models emphasize the tradeoffs associated with remote work related to household production.

The first-order conditions are

$$U_C \cdot (w - p) = U_Q, \tag{1}$$

$$U_C \cdot (w - p - (\phi'(B^*)wB^* + \phi(B^*)w)) = \delta U_Q \tag{2}$$

Solving the first order condition for blended hours, (2), we obtain our first prediction:

Prediction 3.1. *Households will blend market and home production, and the level of blending is given by the solution B^* to*

$$(\phi'(B^*)B^* + \phi(B^*)) = (1 - \delta)\frac{(w - p)}{w}$$

The first term in this equation is the effect of a marginal change in B on the wage rate, and the second term is the after childcare-cost wage associated with in-person work as a fraction of the wage rate, scaled by the relative productivity of blended time in producing consumption vs. child quality. This means that a high price of childcare has a similar effect on the optimal level of blending as a reduction in the productivity of blended time in producing child quality.

Prediction 3.2. *Use of paid childcare falls in the remote-work regime compared to the non-remote work regime.*

We can think of the non-remote work regime as being a constrained version of the remote work regime, with B constrained to 0. Intuitively, if work requiring paid childcare *rises* then that means that the fall in hours spent purely on childcare (H) must fall by more than blended time rises when remote work becomes possible. However, this would mean that child quality also falls, since in this model child quality is a linear sum of H and B. But child quality and consumption move in the same direction, by FOC (1), which would imply that utility falls in the unconstrained case relative to the constrained case, which is not possible.[18]

Prediction 3.3. *The effect of access to remote work on a mothers' total earnings is ambiguous.*

Income is higher in the no-remote work regime iff $\phi(B^*)wB^* > (H^* + B^* - H^o)(w - p)$. The effect on total earnings depends on whether the increase in hours worked exceeds the wage penalty associated with blended hours. To show that the effect on earnings is ambiguous, Appendix C solves the model in two cases.

[18] More formally, denote the optimal level of H in the constrained regime by H^o. Use of paid childcare is given by $1 - H - B$. Use of paid childcare falls when the remote-work constraint is lifted as long as the change in hours spent on in direct childcare is not larger than B^*. Paid childcare falls if $1 - H^o - B^o = 1 - H^o > 1 - H^* - B^* \iff B^* > H^o - H^*$ Suppose for contradiction that this is not the case and paid childcare rises in the remote work regime so that $B^* \leq H^o - H^*$. If $B^* \leq H^o - H^*$ then $\delta B^* < H^o - H^*$. This means that $Q^* < Q^o$, so child quality falls when remote work becomes possible. However, in both regimes, (1) holds, implying that if Q is lower then C is also lower (and vice-versa) in the constrained vs. unconstrained regime. Since all of the inputs to utility fall when remote work becomes possible, utility is lower in the remote work regime. However, the remote-work regime is an unconstrained version of the non-remote-work regime, and utility must rise in the unconstrained regime, a contradiction. Thus, $1 - H - B$ (use of paid childcare) falls when remote work becomes possible.

In one case, a high price of childcare induces significant blending, reducing wages enough that total earnings fall even though hours rise.

To empirically assess the effects of remote work, study the effect of remote work using a research design which takes advantage of whether a worker was in a firm in 2019 which would eventually adopt a remote work policy. By comparing wages of parents in these firms relative to firms which require in-person work, we study a) whether use of paid childcare is lower for parents with access to remote work and b) what the net earnings effect of remote work is.

4 Stylized Facts about Paid Childcare and Maternal Labor Supply

4.1 Use of Paid Childcare has Declined Post-2020

Figure 1 examines trends in any paid childcare over time. To benchmark our numbers to an outside source, we compare the tax data to CPS measures of paid childcare usage. While the CPS measure is noisier, trends in the tax data follow the CPS extremely closely. Importantly, both series show the same 10 percent decline in paid childcare usage between 2019 and 2024. Appendix Figure A.2, panel (a), plots the total number of tax units reporting paid childcare in tax data, alongside the comparable measure in the CPS. The tax data on average cover 88 percent of paid childcare usage in the CPS. Panel (b) reports the dollars spent, conditional on having paid childcare, which is available in the CPS since 2009. The tax data capture on average 77 percent of the dollars spent in the CPS. In addition to the CPS comparison, Table A.1 compares trends in paid childcare usage and costs in the tax data to those in the ACS, as well as three additional public data sources: the SIPP, the NSECE, and the CEX. Panel (a) shows that most sources indicate declines in paid childcare usage between 2019 and 2024 that are broadly consistent with the decline in the tax data. The exception is the NSECE, which is approximately stable over this period. Because these sources differ in their reference periods, sampling frames, and definitions of paid childcare, we interpret the comparison as a broad external benchmark rather than an exact reconciliation across datasets. Nonetheless, the fact that most sources point to a decline in paid childcare usage supports the interpretation that the decline observed in the tax data reflects a broader change in childcare use rather than a feature specific to the tax data. Panel (b) shows that all sources indicate increases in average childcare costs among households with positive childcare expenditures, consistent with the tax data.

Figure A.3, Panel (a) examines any paid childcare usage by mother's earnings and child age in the tax data, for 2019. For small earners, paid childcare usage and CDCC filing is low, only around 10 percent. As maternal income rises, the share using paid childcare increases dramatically, reaching around 50 percent for earners of around $50,000, and 70 percent for earners above $100,000. Panel (b) examines this same income gradient to the CPS. The CPS shows more usage of paid childcare for mother's earning less than $25,000. This is perhaps unsurprising given that lower-income households without tax liability will not benefit from filing the CDCC. However, above $25,000 in maternal earnings, the rates of paid childcare are very similar, and are even slightly higher in the tax data, particularly for older children ages 5-12. To summarize, our measure in the tax data appears to follow similar trends as the CPS and cover the majority of paid childcare usage in the United States.

We next examine trends in maternal labor supply in the tax data. Figure A.4, panel (a), plots the share of mothers with any employment over the course of the year, against the share with paid childcare, as measured in the tax data. Employment of mothers was increasing after the great recession through 2019, and the share with paid childcare increased slightly. Any paid childcare dramatically declined in 2020 due to Covid related disruptions. Paid childcare measured in tax data increased in 2021 (some of this increase for 2021 is undoubtedly due to the credit expansion for 2021 only), before declining again in 2022 and 2023. Following a decline in 2020-2021, maternal employment has continued to increase and reached its highest ever level in 2023.[19]

Appendix Figure A.4, panel (b), examines the decline in paid childcare by mothers' earnings. For the lowest earning mothers, paid childcare increases in 2021 (the year of the temporary expansion in generosity from ARPA), before returning to previous levels. For all other earnings levels, paid childcare drops. The largest drops in percentage point terms comes from higher earners, falling over 6 percentage points. We further break out the decline in childcare out by age of the youngest child in Appendix Figure A.4, panel (c). This suggests that the declines in use of paid childcare are largest among school age children, but present for all ages and everywhere larger for mothers with teleworkable occupations relative to mothers with non-teleworkable occupations.

Appendix Figure A.5 examines childcare expenses reported on Form 2441 by number of children, for 2019. Given the structure of the CDCC, there is no incentive to report more than $3,000 in expenses among households who have one eligible child, or $6,000 in expenses among households with two or more eligible children. However, while there is some bunching at these thresholds, more than 40 percent of households report more than these thresholds. This is likely because many households receive a tax form from or end-of-year summary from childcare providers and it is most straightforward to list total annual childcare expenditures summarized in this form.

Appendix Figure A.6 provides additional descriptive evidence on childcare usage in the United States, using data from 2019, examining the role of grandmother distance. Panel (b) examines the share with paid

[19] W2 employment dipped slightly in 2024, but maternal employment is still at a peak if including self-employment income.

childcare, for those with at least $50,000 in earnings, by distance to a grandmother. The share rises from around 55 percent for those in the same zipcode, to 75 percent for grandmothers who are more than 1 hour away. The increase in paid childcare usage appears more or less linear in distance. Panel (a) shows that over 30 percent of mothers live in the same zipcode as their mother. Only 20 percent of mothers live more than 100 miles away. These facts highlight the importance of grandmothers for childcare in the United States.

4.2 Changes in Parental and Grandparental Labor supply

We next discuss trends in parental and grandparental labor supply. First, we examine the ability to do remote work. Appendix Figure A.7, panel (a), examines the share of mothers with teleworkable jobs, according to the Dingel and Neiman (2020) measure. The share rises by around 1 percentage points post Covid for mothers with younger children, suggesting some sorting into occupations that are compatible with teleworking. As shown in Panel (b), there is a similar increase for fathers. Even if the jobs are amenable to teleworking, firm policies vary. Figure A.8 shows that nearly all Fortune 500 firms switched to remote work in the year of the Covid pandemic. Over time, a subset steadily switch back to fulltime in-person policies. By the end of 2024, around twenty percent of Fortune 500 firms have a full-time in office policy.[20]

Platform gig work has been rising dramatically since 2012, and experienced major growth during Covid. As shown in Figure A.7, panel (c), platform gig work rose tripled from fewer than 1 percent of mothers in 2019 to 4 percent by 2024. This was largely driven by growing demand for gig services during Covid, and demand has remained persistently higher since. Panel (d) shows a smaller but still substantial rise for fathers. Outside of platform gig work, other types of self-employment have been largely stable (or even declined) in recent years (Garin et al., Forthcoming, 2023). Given the unique characteristics of platform gig jobs and their dramatic growth, we can test whether paid childcare usage among platform gig workers differs from more traditional forms of self-employment.

Finally, we examine changes in the availability of grandparental care in Panels (e)-(f). There were actually subtantial trends in grandmother distance and the share of grandmothers who were alive and retired prior to the start of Covid. These trends appear to slow after 2020. Nevertheless, as of 2024, grandmothers are further away and more likely to be alive and retired than they were in 2019.

[20] In the figure this is closer to ten percent because this figure focuses on the subset of firms for which we can find return to office date through public announcement or earnings calls. The figure is closer to twenty percent for firms overall. We discuss this in more detail in Section 5.

4.3 Role of Childcare Providers and Other Supply-Side Factors

Explanations for the decline in paid childcare may lie on the supply side, if many centers permanently shut down and never returned. We investigate these trends on the supply side at a high level by examining the firm tax filings of the childcare centers themselves. We proceed in two ways: linking EINs furnished by tax units on Form 2441 and separately studying firm tax filings for NAICS 624410 "Child Day Care Services." More details are provided in Appendix B.

Examining aggregate real profits and payroll, we find that while profits fell during 2020 for all provider types except nonprofits, industry profits (real, $2019) have since rebounded and now surpass 2019 levels. Payrolls, which declined in 2020 and 2021, also recovered across provider types by 2023—with the childcare industry experiencing smaller payroll declines and a more robust recovery than restaurants or hotels, culminating in 2023 payrolls that are 20 percent higher than pre-pandemic levels in real-terms. These positive trends are likely explained by critical government support during the pandemic, as providers benefited from emergency measures such as the Paycheck Protection Program (PPP), Child Care Stabilization Fund block grants, and expanded eligibility for the Employee Retention Credit. Nonprofits in particular received other targeted relief that helped preserve essential community services and likely contributed to their unique profit increases in 2020. These interventions appear to have offset revenue losses, maintained payrolls, and prevented widespread provider exit. While concerns remain about a "Childcare Cliff" as federal relief funds phase out in late 2023, our analysis suggests that supply-side factors, such as provider exit or reduced capacity, are unlikely to explain the observed decline in paid childcare usage, at least through 2023.

We also consider two other supply-side factors: Universal Pre-Kindergarten (UPK) and the low-skill non-native share of the labor force (Cortés, 2008; Cortés and Tessada, 2011). Aggregate trends are shown in Appendix Figure A.9. National UPK enrollment was lower between 2020-2021, but is higher by 2024. The low-skill non-native share declined during 2020-2023, but was also higher by 2024.

4.4 A Decomposition of the Decline in Paid Childcare

To understand the main causes of the decline in paid childcare over time, we next conduct a simple statistical decomposition, as follows:

$$PaidChildcare_{it} = \sum_{z \in Z} \beta_z^{pre} z_{it} + \sum_{z \in Z} \beta_z^{post} z_{it} \times post_t + Controls + \epsilon_{it} \tag{3}$$

This decomposition answers, "What is association between the use of paid childcare and each factor, z," which includes teleworkable occupation (for mother and father), self-employed in platform gig work, an indicator of whether the grandmother is retired, distance to grandmother, UPK availability, and the low-skill non-native share, in year t.[21] The regression is estimated using data from 2018-2019 and 2023-2024 only, where we define *Post* as 2023-2024. Our main estimation sample is all mothers with children under 13. In some specifications we will restrict to non-missing occupation and grandmother link (as discussed above, this requires the mother to be 40 or younger). Since a mother will appear in the data in more than one year, we cluster standard errors at the mother level. We include flexible controls for mother's age, youngest child age, number of children, and, in specifications with grandmother, grandmother's age.

Using the estimates from Equation 3, the share of the decline in paid childcare that can be explained by factor z can be decomposed using a Oaxaca-decomposition into changes in levels and changes in β:

$$zShare = \frac{\Delta \overline{z} \cdot \beta_{z,Pre}}{\Delta \overline{PaidChildcare}} + \frac{\overline{z}_{pre} \cdot \beta_{z,Post}}{\Delta \overline{PaidChildcare}} \tag{4}$$

Where $\overline{X}$ denotes the sample average. As this decomposition shows, there are two main ways (not mutually exclusive) that these factors may contribute to the decline in paid childcare. First, as indicated by term on the left, the share of workers that these factors affect could be increasing over time. Second, the importance of any of these factors could be increasing in the post period (this change will be captured by our post coefficient), as shown by the term on the right.

4.5 Decomposition Result

Table 1 implements specification (3) examining how our factors of interest are related to paid childcare over time. Columns (1)-(4) examine groups of factors separately. Column (5) combines all factors together in one regression. Panel (a) of Table 1 reports the pre-period main effects, while Panel (b) reports the post-period interactions.

We find that prior to 2020, mothers in teleworkable occupations used more childcare than mothers in non-teleworkable occupations. This is likely related to the higher earnings in these jobs, along with substantial in-office norms. The *Post* effect indicates that by 2023-2024, teleworkable jobs among mothers are associated with a 3.1 percentage point decline in paid childcare. There is a smaller decline among fathers, and no additional effect on the interaction (both mother and father are in teleworkable occupations). However, we see a comparable decline among fathers working in a non-teleworkable occupations. Platform gig work by mothers has a large negative main effect. The fact that more workers are engaged in platform gig work in the post period will contribute to a decline in paid childcare. We next turn to factors associated

[21] When we write "grandmother" we refer to and record only the child's maternal grandmother, given the limitations of studying paternal grandmothers discussed above. Distance to grandmother is based on the last available W2 and is interacted with the grandmother being alive. We report the coefficients for the distance among the grandmothers who are alive.

with grandmothers. As we saw in Appendix Figure A.6, grandmother distance is positively associated with childcare. A retired grandmother has a large negative effect on paid childcare usage of -2.3 to -3.4 percentage points. However, this effect nearly halves in the post period. The effect of UPK in Column (5) is positive, suggesting some crowd-in to paid childcare, perhaps for after school activities. The effect of the non-native share on paid childcare is large and negative in Column (5), and this effect gets larger in the post period.[22]

Figure 2 reports the implied share of decline explained by our decomposition results, plugging the regression results and level changes into Equation 4.[23] The most important factor is that the mother's job is teleworkable. Mothers jobs being teleworkable explains 51 percent of the decline in paid childcare overall. Teleworkable jobs among fathers explains another 9 percent, and changes among non-teleworkable jobs for fathers explains an additional 21 percent of the decline. The rise of gig work explains little of the effect.

Changes in alternative care opportunities do not explain the decline in use of paid childcare. The presence of a retired grandmother is substantially less important in the post period and the distance to grandmothers increases. The overall role of grandmothers predicts an increase in use of paid childcare, in contrast to the aggregate decrease we observe. As expected given its limited impact only on 3- and 4-year olds, UPK does not contribute to a substantial reduction in the use of paid childcare. However, the low-skill non-native share does explain a substantial share of the decline–around 30 percent, making it the second most important factor in our decomposition. This comes entirely from changes in the impact of the low-skilled non-native share on the use of paid childcare, however we caveat that this variable my be capturing other changes at the state-year level in local labor markets.

Overall, we can explain 90.2 percent of the decline in paid childcare with the factors discussed above, with 59 percent of the decline attributable to teleworkable jobs among parents. Our decomposition is of course only suggestive, since we do not know if mothers are actually working remotely. We next show additional suggestive evidence based on time-use patterns in the ATUS in how remote work has reshaped the relationship between work and childcare.

4.6 Supporting Evidence From the ATUS

Figure 3, panel (a), shows an increase in the share of work hours engaged in remote work, stratified by whether an occupation is teleworkable according to the same Dingel and Neiman (2020) measure used above. We see that the share of hours engaged in remote work doubles between 2019 and 2020, from around 20 percent to nearly 50 percent, before settling to just under 40 percent by 2024. We also see an increase even for jobs that

[22]However, we caveat that these estimates vary at the share of non-native low-skill workers is estimated at the state by year level, and may capture other trends in, for example, state employment and wage growth. When we simply include state by year fixed effects, our other results are unchanged but we cannot identify the effect of the non-native share low-skill share.

[23]We use the estimates from Column (5), but the calculations are similar using estimates from Columns (1)-(4).

are classified as "non-teleworkable," but this increase is small and may reflect second jobs. The differential increase for teleworkable compared to non-teleworkable is 16 percentage points.

As documented in Cubas et al. (2023), parents (especially mothers) perform care work during the workday. This pattern has increased with the rise of remote work. Panel (b) of Figure 3 shows that parents are providing substantially more childcare on work days—around 18 percent more hours for mothers and 20 percent more for fathers (albeit the increase among fathers is from a much lower level)—relative to pre-pandemic years. At the same time, grandmothers (proxied by retired women age 60-75) are providing around 20 percent fewer hours of childcare.

5 Firm Variation in Remote Work Policies

We next directly study the effect of remote-work policies, comparing the evolution of outcomes for workers at firms with different remote work policies by 2024.

5.1 Remote Work Firm Policy Data and Research Design

We obtain information of the remote work policies of firms from the Flex Index database, an online platform documenting work-from-home policies for over 10,000 companies. These data record the policy of firms as of fall, 2024. The database includes details about the type of policy adopted (fully flexible, hybrid, or full-time in-office), as well as additional details for hybrid policies, including the minimum number of required in-office days per week, and whether specific days are mandated for attendance (e.g., Monday through Wednesday or other weekday combinations). These data are based on employee reports, announcements, and verification by HR representatives of the companies. A drawback of this dataset is that we are unable to trace firm polices over time.

To link firm policies with employee outcomes, we match firms in the Flex Index database to employer records in the tax data. Specifically, we search the universe of large W-2 payers in the 2019 tax year for firms listed in the Flex Index, using employer names to identify their Employer Identification Numbers (EINs). We then identify workers employed by those firms and follow these individuals in the tax records from 2017 to 2025, regardless of which firm employs them in later years.[24] We match firms in the Flex Index database to employer records in tax data using approximate string matches for the employer's name. Both the Flex Index records and the administrative tax records reflect the company name, although each source may format the names differently. We begin by cleaning the name strings in each source: cleaned names are converted

[24]While W2 information including annual earnings and employer is available through 2025, dependent care tax credit filing is currently available through 2024.

to upper case and purged of punctuation. Common suffixes, such as “LLC” or “INC,” are then removed. We then find exact matches between the cleaned strings in each of the two databases. This process will produce a one-to-many match between the Flex Index data and the administrative records, respectively. This is because employers found in the administrative data may use several different EINs to issue W-2s to their employees. Through this exact-matching process, we are able to match 3,282 companies from the Flex Index database. As a subsequent matching step, we look for cleaned names in the administrative data which contain candidate matches to the cleaned names from the Flex Index. We identify the best of these candidate matches by measuring the string distance between the cleaned names from each data source. We choose the best candidate match as the one with the minimum string distance, as measured by the Jaro-Winkler distance metric. We then hand-check the output, removing false positives. This yields an additional 1,643 matches in the Flex Index database, bringing our overall match rate to 35.6% of listed employers from Flex Index, a total of 4,925 firms.

As a supplement to these data, we use publicly available information from news articles, management statements, and earnings calls available on Factiva to understand the timing of a return to in-person work following Covid among firms that implemented these policies. For Fortune 500 firms, for each year between 2020 and 2025, we code whether the firm allowed full-time remote work, allowed hybrid work, or required workers to be full-time person. Many firms do not have such announcements—in the Fortune 500 we are able to identify the time-series of policies for 227 companies. We use these data to understand the timing of return to office mandates, Appendix Figure A.8 plots the share firms which are fully in person by 2024 by whether they are in person in that year in this subset of 227 companies. We see that the rate of return to office has been fairly smooth over the years 2021-2024 among these firms with many firms first announcing a return to office in 2021. While these firms are not necessarily representative of the broader set of firms we study of firms overall, this timeseries suggests that a return to office was discussed throughout the period we study. We emphasize that when studying differences over time by the *eventual* remote-work policy of employers, it is possible that some differences emerge before a return to office was implemented due to differences in management attitudes concerning remote work among hybrid employers, or due to anticipation of a future return to office policy.

We study how the remote-work policy of a firm affects use of paid childcare and, ultimately, parental earnings. We compare the characteristics of firms which allow remote work in 2024 to full time in-office firms. To avoid capturing the effect of remote work itself on productivity, we make this comparison in a year when all of these firms had in-person workplace policies, 2019. Figure 4 compares the characteristics of Flex Index firms that still allowed remote work in 2024 with those that required employees to work in person full time. We present the difference in means by workplace policy for financial characteristics and CEO characteristics.

On many important dimensions, such as revenue, number of employees, and assets, firms which allow remote work are similar to those which do not.[25] However, public firms, and conditional on being public, firms with higher market value, firms with a female CEO and firms with a younger CEO are more likely to be remote. Overall, these characteristics do not suggest that firm size based on revenue or number of employees predict the adoption of remote work, but neither is remote work adoption completely random. To make causal claims about the effect of remote work access on employee outcomes, we rely on demonstrations of parallel trends across firms with different policies before remote work became prevalent and, in addition, we make comparisons to other workers in the same firm who are not affected by remote work in the same way as parents juggling childcare and work: parents with non-teleworkable jobs and non-parents with similar occupations and age.

First, we leverage an intent-to-treat style assignment of women to firms in 2019, before firms formulated remote-work policies, to study the impact of workplace policy on outcomes. We estimate coefficients from the regression:

$$y_{it} = \sum_{k \neq 2019} \beta_k \mathbf{1}\{\text{Remote}(j)\}\mathbf{1}\{t = k\} + \gamma_i + \gamma_{ind(j)\times t} + \gamma_{state(i,t)\times t} + \gamma_{occ(i,2019)\times t} + \epsilon_{it} \tag{5}$$

where y_{it} is the outcome (using paid childcare, earnings, or having a child) of individual i in year t, $Remote(j)$ indicates whether i's firm in 2019 allows remote work, γ_i are individual fixed effects, and $\gamma_{ind(j)\times t}$, $\gamma_{state(i,t)\times t}$, and $\gamma_{occ(i,2019)\times t}$ are 2019 firm-industry by year, state by year, and 2019 occupation by year fixed effects, respectively.[26] The coefficients of interest are β_k, which trace out effect of working at a firm in 2019 which allows some remote work by 2024, relative to a firm which is in-person in 2024, controlling for time-varying occupation, industry, and state characteristics. We cluster standard errors at the firm level.

When studying the evolution of earnings for parents with access to remote work based on their 2019 firm, we can further compare parents to others in the firm and use a triple differences in differences event study design, estimating the following model:

$$y_{it} = \sum_{k \neq 2019} \delta_k \mathbf{1}\{\text{Remote}(j)\}\mathbf{1}\{t = k\}\mathbf{1}\{Parent_{it}\} + \sum_{k \neq 2019} \alpha_k \mathbf{1}\{\text{Remote}(j)\}\mathbf{1}\{t = k\} + \gamma_i \tag{6}$$

$$+\rho_1 age_{it} + \rho_2 age_{it}^2 + \gamma_{ind(j)\times t\times p} + \gamma_{state(i,t)\times t\times p} + \gamma_{occ(i,2019)\times t\times p} + e_{it} \tag{7}$$

[25]While financial variables and CEO characteristics are only available for publicly listed firms, number of employees and an indicator of whether a firm is public is available for all firms because Flex Index collects this information along with remote work policy. All other characteristics are collected using Compustat for the subset of public firms.

[26]Occupation is a detailed O*NET occupation and industry is the industry categorization of Flex Index.

Where $\mathbf{1}\{Parent_{it}\}$ indicates whether an individual is the parent of a 0-13 year old and $ind(j) \times t \times p$, $state(i,t) \times t \times p$, and $occ(i, 2019) \times t \times p$ are the indicators in regression (5) above interacted with an indicator for whether an individual is the parent of a 0-13 year old. Because the age of parents and non-parents may differ substantially, and because we may expect different earnings paths over time by age, we also include a quadratic for age in this specification.[27]

Table 2 presents characteristics of the employees of firms in Flex Index that we are able to match to the tax data. We see that these employees are on average 39 years old in 2019, a slight majority are female, and they are relatively high earning: earnings are on average nearly fifty-nine thousand dollars annually but are higher for men than women and highest for fathers. Importantly, we see that 39% of workers are at the same firm in 2024 as in 2019 when they are "assigned" to remote firm treatment. When discussing the impacts of remote work policy based on 2019 firm assignment, it is important to keep in mind that only about half of workers are still in their 2019 firm by the end of our period. Unfortunately we do not observe the remote work arrangements of all firms and so we do not know the actual remote work arrangements workers are exposed to, unless they remain in their 2019 firm. However, we observe the remote work policies if a worker moves to a firm in our Flex Index sample. If extrapolate the rate of remote work among those movers who move to firms in Flex Index to the movers who move to firms outside of our Flex Index sample, we arrive at the relative probability of working in a remote firm by year as presented in Figure 5. We estimate that workers employed at a firm in 2019 that Flex Index records as allowing remote work are more than forty percentage points more likely to be working at a firm that allows remote work in 2025. If we used 2019 firm assignment as an instrument for whether a worker's current firm allows remote work, this figure gives the inverse compliance rate for scaling to obtain the Wald estimate of the effect of working in a remote-work firm on outcomes.[28]

5.2 The Effect of Remote Work Policies

Consistent with the aggregate trend that we highlight—workers who juggle both childcare and workplace responsibilities drive the decline in use of paid childcare, mothers employed in firms in 2019 that continued to allow remote work in the post-Covid years reduced their use of paid childcare these years relative to mothers employed in firms that mandated a return to office. Figure 6, panels (a) and (b) present the effect of 2019 assignment to a firm which allows remote work on use of paid childcare among mothers and fathers, respectively, with teleworkable occupations and children 0-13 years old. Mothers who worked in remote-

[27] The age control also reduces standard errors. We present results without the age control and separately by parenthood in the appendix.

[28] In the remainder of the paper, we primarily focus on reduced form estimates of the effect of a worker's 2019 firm on outcomes, regardless of whether they work at that form, or a firm with access to remote work in general, but it is useful to know these scale factors when interpreting estimate magnitudes and assessing their plausibility.

work firms in 2019 used 1-2.5 percentage points less paid childcare in the post-COVID years than mothers whose 2019 firms later required full-time in-person work. Scaling this effect by the propensity to work in a remote-work firm based on the policy of a mother's 2019 employer, we estimate a reduction in the use of approximately 13% associated with remote work.[29] There is no trend in the use of paid childcare across these firm types in the years before Covid.

The effect on use of paid childcare is larger in subgroups of women more exposed to remote work policy changes, broadly robust to additional controls, sub-samples, and alternative specifications. Appendix Figure A.10 presents results for mothers who worked in non-teleworkable occupations in 2019. The effects on paid childcare in this group are less than half the size of the effects for women in teleworkable occupations. As shown in Appendix Figure A.11, comparing firms within the same industry has a large effect on the effect of the remote work policy of a mother's 2019 firm, but this is especially true in 2021 when there was an expansion in the ability to claim the CDCC. Beyond controlling for industry by year effects, there is little impact of additional controls on the estimates, including controls for dependent age. The effects are also robust to restricting the sample to women who do not enter the sample (become parents) endogenously—when we restrict to mothers who were already parents in 2019 and mothers who are over 45 in 2019, we see similar patterns to our main results on use of paid childcare. Turning to men, we see similar, though more muted patterns for fathers in panel (b) of Figure 6 and qualitatively similar results when studying the difference for fathers by occupation, sample sensitivity, and alternative specifications in Appendix Figures A.10 and A.11. Finally, Appendix Figure A.12 presents differences by remote work within publicly traded/not publicly traded firms, where there is still an association between remote work and use of paid childcare for both mothers and fathers.

Does remote work affect selection into our parent sample, either through an effect on employment or fertility? Appendix Figure A.13, panels (a) and (b) suggest that the probability of having a child born is somewhat higher in the year 2024 and 2025 for women in remote work firms who had teleworkable occupations in 2019, but not in earlier years. Comparing the 2025 point estimate of 0.002 to the mean rate of childbirth in 2024 of about 0.03 and scaling by the relative probability of working in a remote-work firm by the remote-work policy of the 2019 firm, this corresponds to an increase in the birth rate of about 16 percent. We find no increase in fertility among men, and no increase among women who worked in non-teleworkable occupations in these firms in 2019. Given these fertility effects, and given the well documented effect of children on maternal earnings, when studying the effect of remote work on earnings, we check robustness to restricting

[29] $\frac{\hat{\delta}_{2024}}{\hat{\Delta}_{2024}} \frac{1}{\overline{PaidChildcare}} = \frac{-.014}{.407} \frac{1}{.26} = .13$ where $\hat{\Delta}_{2024}$ is our estimate of the relative probability of working in a remote firm by 2019-firm assignment as discussed above. We note that this effect is similar if we use a year in 2021-2023 because both $\hat{\delta}$ and $\hat{\Delta}$ are higher in earlier post-Covid years.

to the subsample of mothers who are over 45 in 2019 and presumably cannot have additional children. If remote work is preferred by employees, as suggested by Cullen et al. (2025), Chen et al. (2023), and others, then we would expect that retention rates of 2019 employees are higher for remote-work firms. Panels (c) and (d) of Appendix Figure A.13 shows that indeed these firms have higher retention rates, though the rates are similarly high for parents as non-parents at these firms.[30] We find no effects of remote work on employment of mothers or fathers in panels (e) and (f).

To understand the effect of the ability to work remotely on parents' careers, we next track log annual earnings for mothers and fathers with teleworkable jobs who work at eventually remote relative to eventually non-remote firms as of 2019. Figure 7, panels (a) and (b) plot these estimates. We find that earnings of parents are insignificantly lower in remote firms. Although Figure 4 shows firms adopting remote work policies have similar size in terms of revenue and employee count relative to firms requiring full-time in-person work, there are some observable differences between these firms, many factors remain unobserved, and policy choices may reflect worker demand. As a result, the wage path of parents employed at in-person firms may be a poor counterfactual for the wage path of parents employed at firms that allow remote work. To address this concern, we compare parents and non-parents within the same firms. Firm-wide factors such as how remote work affects office costs, productivity, or profits should influence similar workers within a firm in similar ways. However, if remote work allows parents to substitute between childcare and market work, then parents earnings may respond differently than non-parents. When we compare the relative log earnings paths of individuals who have teleworkable jobs but who are not parents of 0-13 year old children, we find that non-parents have for men similar, and for women, more favorable, paths. The overall effects for mothers and fathers are larger when we control for public-by-year fixed effects (Appendix Figure A.12) and are broadly robust to various alternative specifications (Appendix Figure A.14 panels (c) and (d)). Given the fertility effects for women at remote-work firms, panels (e) and (f) of Appendix Figure A.14 restrict to individuals who are at least 45 by 2019 and find similar log earnings effects of remote work firms for parents and non-parents.

We compare parents and non-parents across firms with different remote work policies in order to isolate the role of childcare demands in wage responses to remote work. To do this, more formally, we estimate equation (5.1) interacting the time-varying indicators for remote work policy with whether an employee has children age 13 and under. The results are presented in Figure 7, panels (c) and (d), where we additionally control for a quadratic in worker age (which substantially reduces standard errors). We find no evidence that

[30] This is consistent with Chen et al. (2023) who find no statistically significant difference in valuations of remote work by parenthood. Though we do not model benefits of remote work beyond the ability to combine childcare and work, additional benefits of remote work are possible and include a reduction in commute time. As pointed out in Emanuel et al. (2026a), there may also be costs of working remotely associated with mental health among individuals who live alone which individuals with children are shielded from.

earnings of mothers are affected by remote work policies relative to non-mothers, and no significant effects for fathers though point estimates are small (around 1% differences in earnings) but positive. Pooling the years 2021-2025 into a single post-indicator and comparing to 2017-2019, the relative impact of access to remote work for mothers compared to other women controlling for age, industry, occupation, and location is 0.04 percentage point lower wages, with confidence intervals that allow us to reject effects larger than 1.5 percentage points or smaller than -1.5 percentage points.[31] For men, the analogous estimate is a .8 percentage point improvement for fathers relative to non-fathers which is insignificantly different from zero.

To better understand the relationship between the availability of remote work, use of paid childcare, and the earnings trajectory of parents, we present estimates of the average difference in 2021 onward relative to 2017-2019 by a parent's 2019 firm policy by youngest child age for both use of paid childcare and log annual earnings. For parents of newborns, we do see a decline in use of paid childcare associated with access to a remote work firm, but the declines are generally smaller for parents of toddlers. Based on the personal experiences of some coauthors, we posit this may be because caring for toddlers and working simultaneously is particularly challenging. As children grow older, use of paid childcare shifts to afterschool care and summertime care and we see reductions in use of paid childcare for parents of children in these age groups associated with access to remote work. We see again smaller effects for children aged 12 and older, which mirrors the aggregate pattern in Appendix Figure A.4 and is consistent with children of this age not needing supervision. We see no significant effects by child age for fathers, and broadly similar patterns in the point estimates. When we turn to the log earnings effect by child age, we see that though mothers in remote work jobs use less paid childcare for newborns relative to mothers in non-remote jobs, their earnings are not negatively affected. Negative earnings effects are concentrated among parents with children of school age. Teenagers—who we would expect not to need as much active parental care—provide a useful placebo. We see no effects of remote work on the wages of mothers of teenagers. Among fathers, we see neither any consistent pattern in the earnings effects of remote work nor any significant effect at any youngest child age.

Finally, we investigate whether parents with more inflexible jobs—who both may be most constrained in balancing parenthood and workplace demands—benefit relatively more from remote work. To classify an individuals' 2019 occupation as flexible vs. inflexible, we follow the methodology described in Goldin (2014). In particular, we normalize raw O*NET scores across occupations and average them to construct an index of occupation-level inflexibility for the following five characteristics: time pressure, contact with others, maintaining interpersonal relationships, structured vs. unstructured work, and the freedom to make decisions.[32] For each of these job characteristics, a higher score is associated with jobs requiring workers to

[31] We omit 2020 because it is a year in which all firms were remote for a substantial period of time, and childcare was severely restricted for much of the year and for most parents.

[32] The details of these categories is as follows:

be more available and flexible for their employer, making their hours *inflexible*.[33] We normalize each score across occupations and take the average of these normalized scores. We classify jobs with positive average normalized scores as "inflexible" and jobs with negative average normalized scores as "flexible."[34] Appendix Figure A.15 presents the relationship between the measures of inflexibility and the average decline between 2019 and 2023 in use of paid childcare among parents of 0-13 year old children, across occupations. First, we note that the use of paid childcare fell quite dramatically in some of these occupation groups, and by five to fifteen percentage points in virtually all of the inflexible occupations. Next, Appendix Figure A.16 plots the relationship between log annual earnings for parents in teleworkable vs non-teleworkable jobs in 2019 and access to remote work. In the Covid period, women in non-teleworkable jobs experienced dramatic earnings decreases in firms that would eventually be remote firms in particular. This may reflect differences in the perception that work would return to normal post-pandemic across firms and job changes for these workers in particular. Across groups, the differences between teleworkable and non-teleworkable parents (classified based on their 2019 occupation) is fairly constant between 2021 and 2025. The only exception is a slight convergence for mothers in remote work firms with inflexible occupations. This is suggestive of longer-term career frictions for women in "greedy jobs" associated with substitution towards remote work, but estimates are unfortunately too noisy for this conclusion to be made with confidence.

6 Conclusions

This paper documents a shift in the ability of households to combine work and childcare that has resulted in a decline in use of paid childcare by ten percent in aggregate since the Covid pandemic. We find no evidence that this remarkable shift in the technology of production has closed the "last chapter" of the gender pay

1. Time Pressure: How often does your current job require you to meet strict deadlines? 1 - Never; 2 - Once a year or more but not every month; 3 - Once a month or more but not every week; 4 - Once a week or more but not every day; 5 - Every day
2. Contact With Others: How much contact with others (by telephone, face-to-face, or otherwise) is required to perform your current job? 1 - No contact with others; 2 - Occasional contact with others; 3 - Contact with others about half the time; 4 - Contact with others most of the time; 5 - Constant contact with others
3. Establishing and Maintaining Interpersonal Relationships: How important is establishing and maintaining interpersonal relationships to the performance of your current job? 1 - Not important; 2 - Somewhat important; 3 - Important; 4 - Very important, 5 - Extremely important
4. Structured versus Unstructured Work: How much freedom do you have to determine the tasks, priorities, or goals of your current job? 1 - No freedom; 2 - Very little freedom; 3 - Limited freedom; 4 - Some freedom; 5 - A lot of freedom
5. Freedom to Make Decisions: In your current job, how much freedom do you have to make decisions without supervision? 1 - No freedom; 2 - Very little freedom; 3 - Limited freedom; 4 - Some freedom; 5 - A lot of freedom

[33] Goldin (2021) refers to jobs which are client facing, have long hours, are and inflexible (demanding that workers be available when clients are) as "greedy" jobs, arguing that women in these types of jobs face the greatest career challenges associated with motherhood.

[34] Examples of inflexible, non-teleworkable occupations include first line supervisors of helpers, laborers, and material movers; examples of inflexible, teleworkable occupations include advertising sales agents, and credit authorizers; examples of flexible, non-teleworkable occupations include gas plant operators and stokers; finally, examples of flexible, teleworkable occupations include web developers and financial examiners.

gap (Goldin, 2014). We estimate two distinct margins though which remote work affects households. First, we estimate the effect of being at a firm that allows remote work. Next, we estimate the effect of caring for children at home with access to remote work. Linking the remote work policies of nearly five thousand firms with their employees in 2019—the year before remote work became ubiquitous, and following these workers over time, we are able to study how diverging firm attitudes towards remote work impact otherwise similar employees. We find that workers with access to more remote work use less paid childcare relative to other workers. In addition, the earnings of mothers exposed to more remote work based on their 2019 firm's eventual adoption of remote or hybrid work policies are similar over time to the earnings on non-mothers at these firms. We can reject earnings differences from 2021-2025, on average larger than 1.5 percent in either the positive or negative direction.

These findings speak to broader questions about how technological change reshapes the division of labor within households. Remote work removes the link between paid work and a need for childcare, but it does not eliminate the underlying time and attention constraints associated with caring for children. Instead, remote work changes how these constraints manifest, shifting some childcare from formal markets into the home, but simultaneously reducing parents'—in particular, mothers'—market work, relative to a counterfactual where children are not at home.

Although remote work may not reduce the wage gap, the ability to combine work and childcare saves households thousands of dollars per year. In addition, Chen et al. (2023) documents that individuals value these arrangements, especially post-Covid. Further study of the welfare effects of remote work, especially among households struggling to combine childcare and work, could clarify how much these arrangements improve household well-being.

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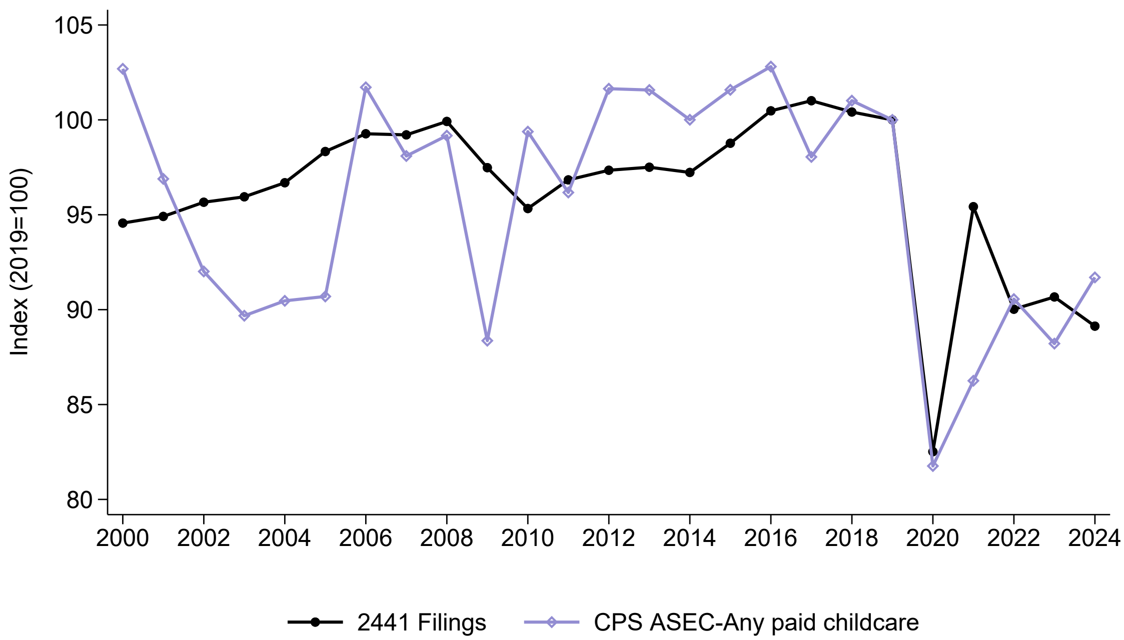
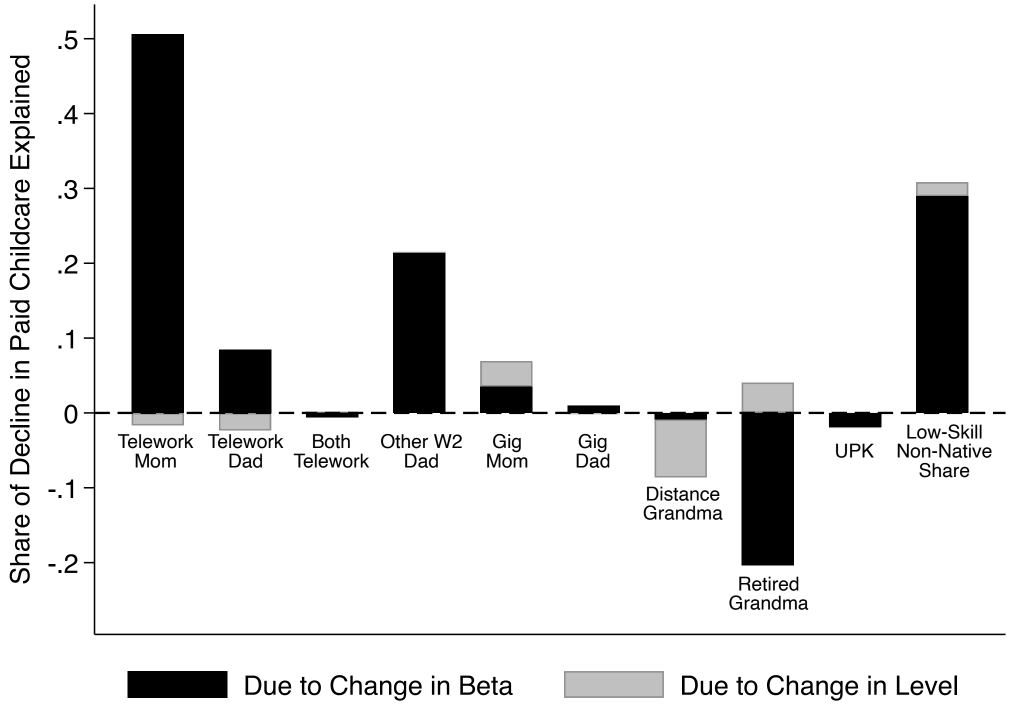
Figures

Figure 1: Decline in Paid Childcare



Notes: The CPS question asks, "Did (you/ anyone in this household) PAY for the care of (your/their) (child/children) while (you/they) worked in [YEAR] [INCLUDE: ALL CHILD CARE EXPENSES INCLUDING PRESCHOOL AND NURSERY SCHOOL EXPENSES, BEFORE AND AFTER SCHOOL CARE, AND SUMMER CARE. DO NOT INCLUDE: COST OF KINDERGARTEN OR GRADE/ELEMENTARY SCHOOL.]"

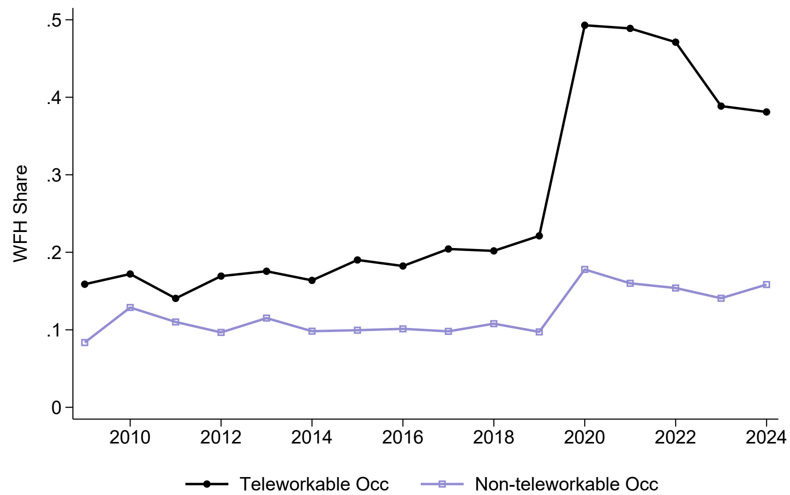
Figure 2: Decomposition of Decline in Paid Childcare, 2023-2024 v 2018-2019



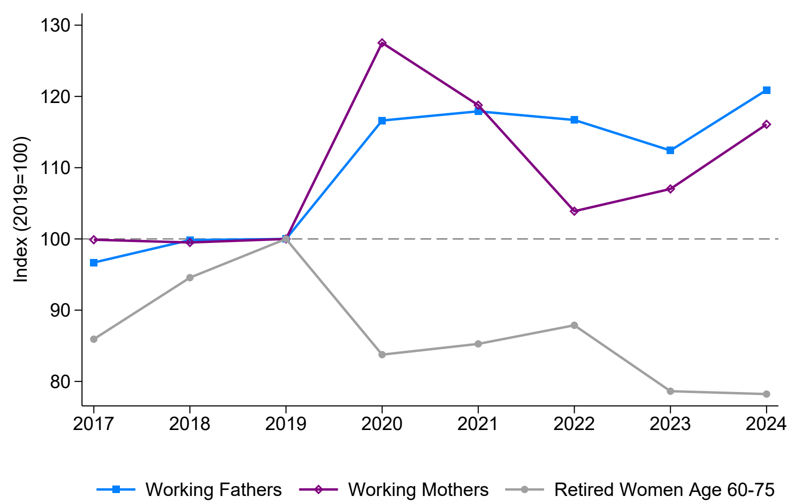
Notes: This figure shows the contribution from each listed factor to the decline in paid childcare, following equation (4) in the text.

Figure 3: Supporting Evidence from the ATUS

(a) Remote Work Hours

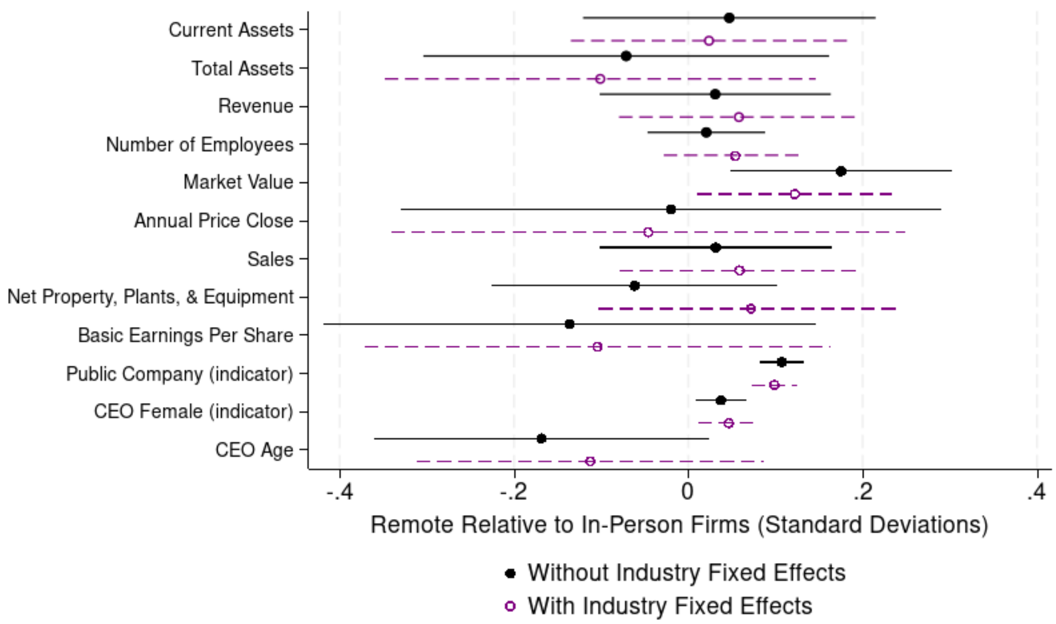


(b) Hours of Childcare



Notes: This figure presents descriptive statistics constructed from the ATUS. In panel (a), we show the average share of regular work hours (8 a.m. to 5 p.m.) worked from home on non-holiday weekdays for all adults who were employed and reported positive work hours on the diary day. We split the sample by work-from-home feasibility using the index in Dingel and Neiman (2020). Work hours are defined as time spent in the following activities: "Work, main job" and "Work, other job(s)". In panel (b), we report total childcare hours relative to 2019 separately for working fathers, working mothers, and women ages 60 to 75 who reported being out of the labor force. For the working fathers and working mothers series, the sample is restricted to parents with a child under age 14 in the household who worked a positive number of hours on the diary day. For the series on women ages 60 to 75, the sample includes all women in this age range who reported being out of the labor force. Total childcare hours include both primary and secondary childcare. Primary childcare includes the following activity groups: "Caring for and Helping Household Children", "Activities Related to Household Children's Education", and "Activities Related to Household Children's Health". Secondary childcare refers to time spent supervising a child under age 13 while performing the following activities: "Work, main job" and "Work, other job(s)". All estimates are weighted using the ATUS sampling weights.

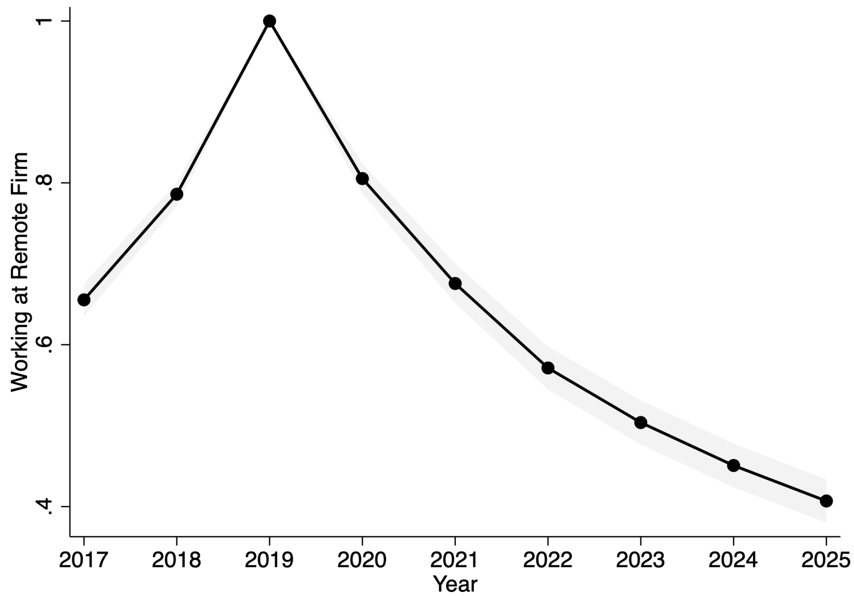
Figure 4: Firm Balance By Remote Work



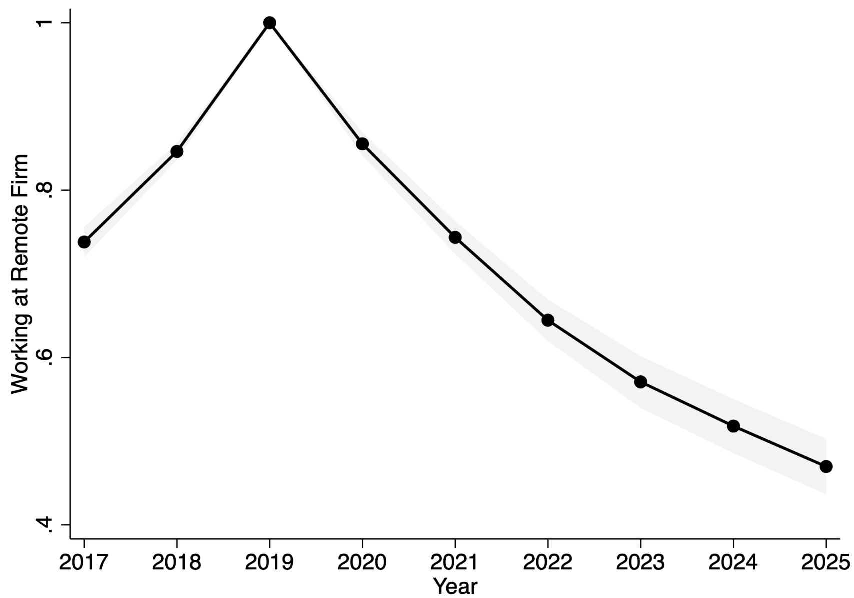
Notes: This figure presents coefficients from a regression of firm characteristics on an indicator of whether the firm allows remote work (as of 2024), in solid lines. The dashed lines plot the same coefficient, but controlling also for industry fixed effects. Public indicates whether the firm can be found in Compustat in 2019. For public firms, firm financial information is based on Compustat records in 2019. Firm CEO age and gender are based on WRDS Execucomp records in 2019.

Figure 5: Probability of Working in Remote Firm (Imputed When Missing)

(a) Mothers (0-13), Pr(Remote Firm)



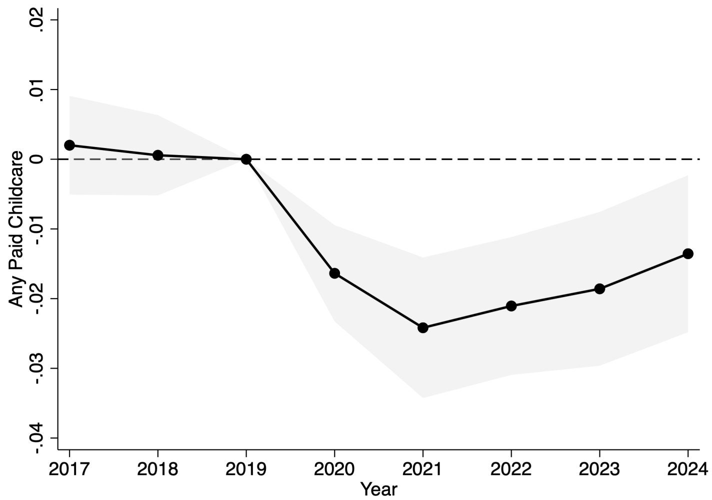
(b) Fathers (0-13), Pr(Remote Firm)



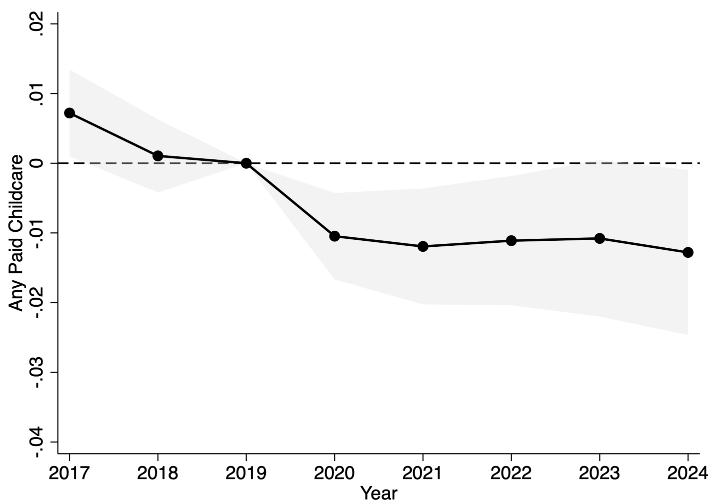
Notes: This figure presents estimates of the difference by year in the probability of working in a firm which allows remote work among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panel (a) reports the results of the regression restricted to mothers of children 0-13 years old, panel (b) reports the results for fathers of children 0-13 years old in teleworkable jobs. Teleworkability is measured in 2019. When workers move to firms whose remote-work policy we do not observe, we impute their policy based on the ratio of remote vs. non-remote firms among firms employing workers who move but whose remote work policy we do observe. Standard errors are clustered at the firm level.

Figure 6: Use of Paid Childcare Among Parents by Remote Work Policy

(a) Mothers (0-13), Use of Paid Childcare



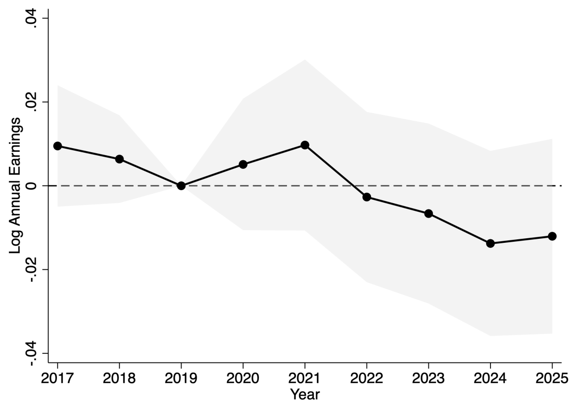
(b) Fathers (0-13), Use of Paid Childcare



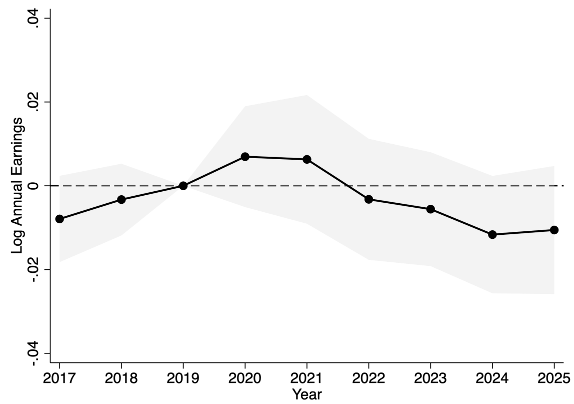
Notes: This figure presents estimates of β_k from equation (5) where the outcome is an indicator of reporting any paid childcare expenses. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panel (a) reports the results of the regression restricted to mothers of children 0-13 years old in teleworkable jobs in 2019, panel (b) reports the results for fathers of children 0-13 years old in teleworkable jobs in 2019. Teleworkability is measured in 2019. Baseline controls include individual fixed effects, and 2019-firm industry by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Figure 7: Log Annual Earnings by Remote Work Policy and Parenthood

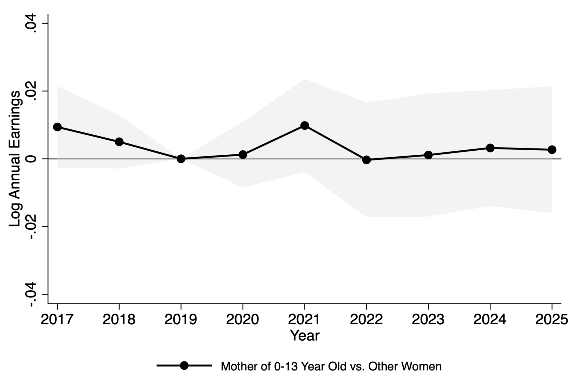
(a) Mothers (0-13), Difference-in-Differences



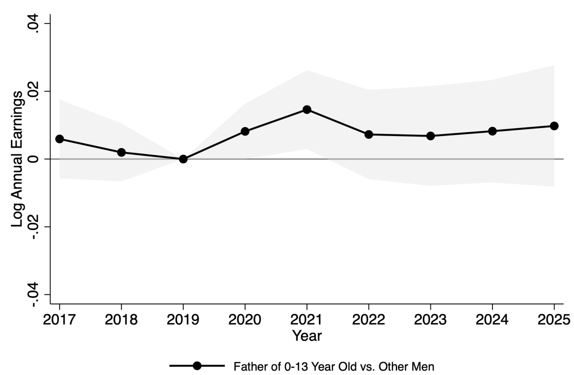
(b) Fathers (0-13), Difference-in-Differences



(c) Mothers vs. Other Women, Triple Difference-in-Differences



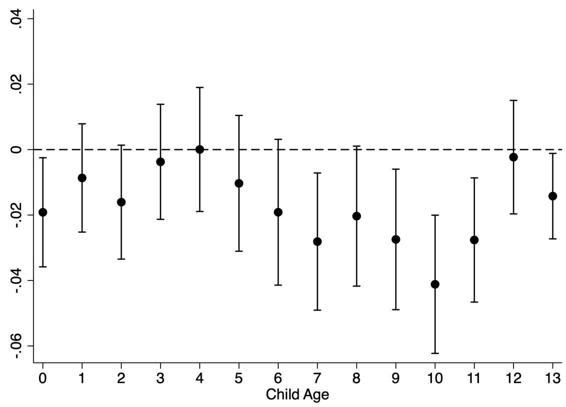
(d) Fathers vs. Other Men, Triple Difference-in-Differences



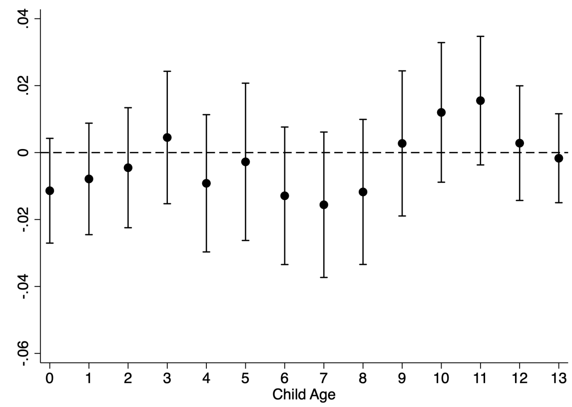
Notes: This figure presents estimates of β_k from equation (5) where the outcome is log earnings. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panel (a) reports the results of the regression restricted to mothers of children 0-13 years old in teleworkable jobs, and panel (b) reports the results for fathers of children 0-13 years old in teleworkable jobs. Panels (c) and (d) report the results of triple difference in differences regressions which estimate the effects of access to remote work on log wages for parents compared to other employees in the firm—controlling additionally for a quadratic in age—in the sample of all employees with teleworkable jobs as measured in 2019. Controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Figure 8: Heterogeneity in Remote Work Policy Effects by Child Age

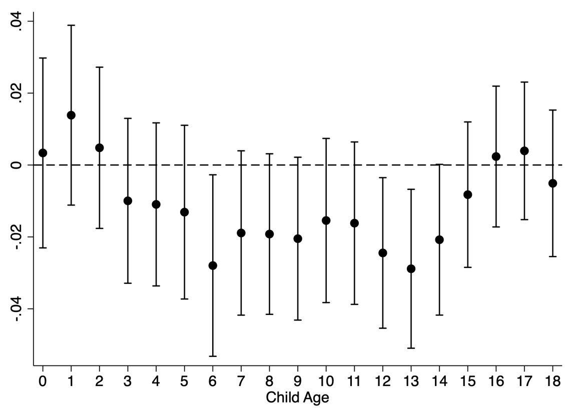
(a) Mothers, Use of Paid Childcare



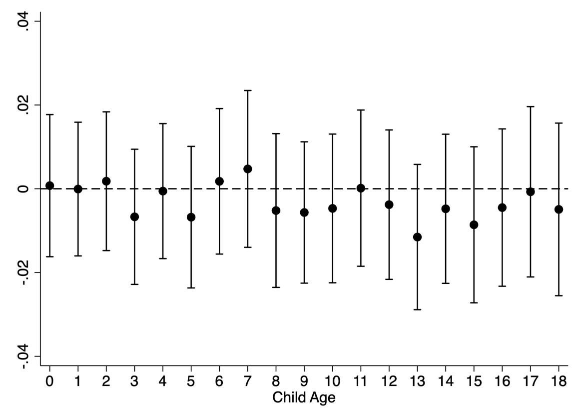
(b) Fathers, Use of Paid Childcare



(c) Mothers, Log Annual Earnings



(d) Fathers, Long Annual Earnings



Notes: This figure presents estimates of a difference in differences regression comparing the post-2021 years with 2017-2019 among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024, estimated separately by age of the youngest child. Panels (a) and (b) report the effects on use of paid childcare for mothers and fathers, respectively, which panels (c) and (d) report the effects on log annual earnings for mothers and fathers, respectively. The sampel is restricted to workers with teleworkable jobs in 2019. Controls include 2019 firm fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Tables

Table 1: Factors Contributing to Change in Any Paid Childcare Among Working Mothers, 2022-2023 v. 2018-2019

(a) 2018-2019 Estimates

	(1)	(2)	(3)	(4)	(5)
Main Effects:					
Mother Teleworkable	0.106	0.082			0.079
	(0.001)	(0.001)			(0.002)
Father Teleworkable		0.097			0.079
		(0.002)			(0.003)
Mother and Father Teleworkable		0.001			-0.000
		(0.003)			(0.005)
Father Other W2		0.107			0.087
		(0.001)			(0.002)
Mother Platform Gig Work		-0.058			-0.030
		(0.005)			(0.009)
Father Platform Gig Work		-0.015			0.000
		(0.005)			(0.009)
Grandma Distance * 10			0.011		0.011
			(0.000)		(0.000)
Grandma Retired			-0.023		-0.034
			(0.002)		(0.002)
State UPK Enrollment				-0.004	0.014
				(0.003)	(0.008)
State Low-Skill Non-Native Share				0.015	-0.170
				(0.007)	(0.019)
Pre-Mean	0.315	0.333	0.298	0.302	0.342

Notes: Table shows estimates for 2018-2019 from running Specification 3 in the text. "Pre-mean" refers to 2018-2019. Teleworkable refers to a job being classified as teleworkable according to the Dingel and Neiman (2020) measure. Platform gig work refers to receiving a 1099-NEC or 1099-K from a platform-gig company. Grandmother distance is the Haversine distance in miles between zipcode centroids of the mother and grandmother. Grandmother retired refers to a grandmother who is alive and either not working or receiving Social Security, pension or IRA withdrawals. A mother can appear in the data for multiple years so long as the youngest child's age is between 1-12. Regressions include controls for mother's age, age of youngest child, number of children earnings and grandmother age. Standard errors clustered on mother.

(b) Interacted Post Coefficients, Identifying Change in Coefficients in Post Period (2023-2024) Compared to pre-period (2018-2019)

	(1)	(2)	(3)	(4)	(5)
Post Effects:					
1{Post}	-0.015	0.002	-0.048	-0.018	-0.021
	(0.000)	(0.001)	(0.001)	(0.001)	(0.003)
×Mother Teleworkable	-0.031	-0.027			-0.032
	(0.001)	(0.001)			(0.002)
×Father Teleworkable		-0.016			-0.011
		(0.002)			(0.004)
×Mother and Father Teleworkable		0.001			0.001
		(0.003)			(0.005)
×Father Other W2		-0.017			-0.007
		(0.001)			(0.002)
×Mother Platform Gig Work		0.003			-0.002
		(0.006)			(0.009)
×Father Platform Gig Work		-0.030			-0.024
		(0.004)			(0.009)
×Grandma Distance * 10			-0.000		-0.001
			(0.000)		(0.000)
×Grandma Retired			0.014		0.014
			(0.001)		(0.002)
×State UPK Enrollment				-0.022	0.013
				(0.003)	(0.008)
×State Low-Skill Non-Native Share				-0.116	-0.095
				(0.008)	(0.023)
Observations	4,151,980	2,356,985	3,546,759	7,439,230	964,978

Notes: Table shows the coefficients interacted with post (i.e. the change in the estimates between 2023-2024 and 2018-2019) from running Specification 3 in the text. 2020-2022 are omitted from the regression due to Covid-related disruptions in these years. Teleworkable refers to a job being classified as teleworkable according to the (Dingel and Neiman, 2020) measure. Platform gig work refers to receiving a 1099-NEC or 1099-K from a platform-gig company. Grandmother distance is the Haversine distance in miles between zipcode centroids of the mother and grandmother. Grandmother retired refers to a grandmother who is alive and either not working or receiving Social Security, pension or IRA withdrawals. A mother can appear in the data for multiple years so long as the youngest child's age is between 1-12. Regressions include controls for mother's age, age of youngest child, number of children earnings and grandmother age. Standard errors clustered on mother.

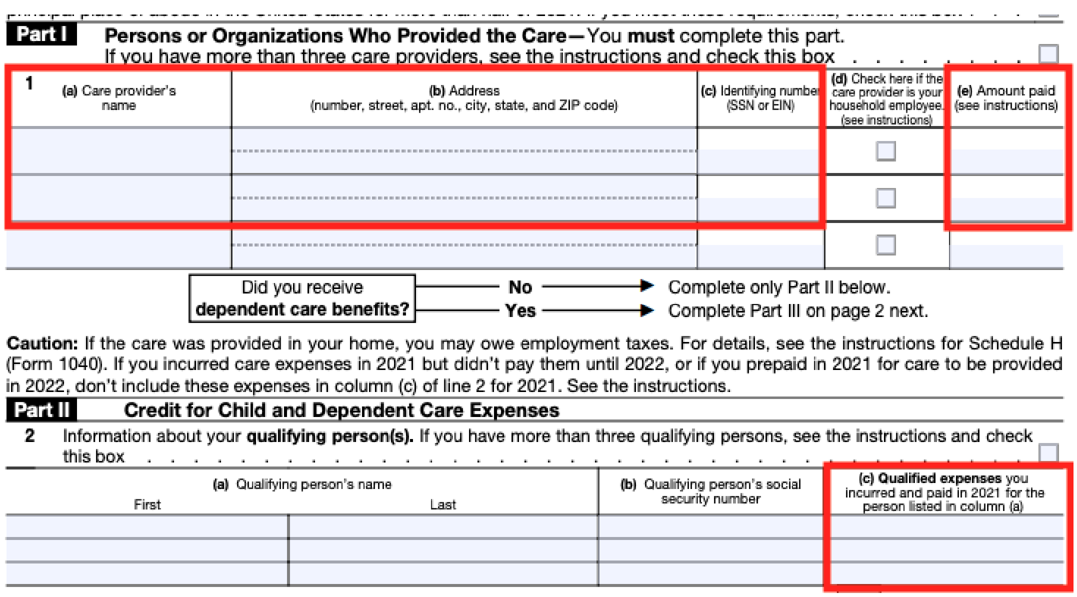
Table 2: Summary Statistics for Flex Index Sample

	All	Women	Men	Mothers (0-13)	Fathers (0-13)
			2019		
Female	0.512				
	(0.500)				
Age	39.8	39.6	40.0	35.0	38.3
	(13.7)	(13.9)	(13.6)	(7.6)	(8.1)
In person by 2024	0.373	0.375	0.371	0.379	0.353
	(0.484)	(0.484)	(0.483)	(0.485)	(0.478)
Annual Earnings	59,942	47,026	73,498	47,280	88,560
	(70,978)	(54,939)	(82,455)	(59,891)	(90,886)
Age of youngest child	13.1	13.7	12.3	5.5	5.3
	(10.1)	(10.3)	(9.9)	(4.1)	(4.1)
Has a 0-year old child	0.036	0.034	0.037	0.114	0.124
	(0.185)	(0.182)	(0.188)	(0.318)	(0.330)
Any paid childcare reported	0.085	0.088	0.082	0.291	0.276
	(0.279)	(0.283)	(0.274)	(0.454)	(0.447)
Parent of 0-13 year old	0.298	0.301	0.295		
	(0.457)	(0.459)	(0.456)		
			2024		
Same firm as 2019 firm	0.389	0.365	0.413	0.315	0.422
	(0.487)	(0.482)	(0.492)	(0.464)	(0.494)
Annual Earnings	63,092	50,229	76,594	52,807	94,521
	(82,366)	(64,966)	(95,493)	(71,861)	(105,609)
Age of youngest child	15.4	16.0	14.8	5.4	5.6
	(11.5)	(11.7)	(11.1)	(4.1)	(4.0)
Has a 0-year old child	0.032	0.034	0.031	0.112	0.104
	(0.176)	(0.180)	(0.172)	(0.315)	(0.305)
Any paid childcare reported	0.076	0.079	0.073	0.260	0.249
	(0.265)	(0.269)	(0.261)	(0.439)	(0.433)
Parent of 0-13 year old	0.297	0.301	0.294		
	(0.457)	(0.459)	(0.455)		
N	14,959,503	7,660,358	7,298,952	2,305,908	2,154,283

Notes: This table reports summary statistics for the Flex Index remote work policy analysis sample. Means and standard errors (in parentheses) are displayed in 2019 and 2024. In person by 2024 indicates whether the worker was employed at a firm in 2019 that had required a return to office as of 2024. Paid childcare indicates whether the household reports any paid childcare expenditures. Annual Earnings are inflation adjusted and reported in 2019 dollars. The sample in both years is the same, since the study sample is employees of firms in the Flex Index data in 2019, followed over time no matter where they work. Thus fraction female and "In person by 2024" is assigned and unchanged across years and age in 2024 is mechanically 5 years older than in 2019 (these are not reported twice).

A Appendix Figures and Tables

Figure A.1: Form 2441 Child and Dependent Care Expenses



Part I **Persons or Organizations Who Provided the Care—**You **must** complete this part.
If you have more than three care providers, see the instructions and check this box

1 (a) Care provider's name	(b) Address (number, street, apt. no., city, state, and ZIP code)	(c) Identifying number (SSN or EIN)	(d) Check here if the care provider is your household employee. (see instructions)	(e) Amount paid (see instructions)
			☐	
			☐	
			☐	

Did you receive **dependent care benefits?** — **No** → Complete only Part II below.
— **Yes** → Complete Part III on page 2 next.

Caution: If the care was provided in your home, you may owe employment taxes. For details, see the instructions for Schedule H (Form 1040). If you incurred care expenses in 2021 but didn't pay them until 2022, or if you prepaid in 2021 for care to be provided in 2022, don't include these expenses in column (c) of line 2 for 2021. See the instructions.

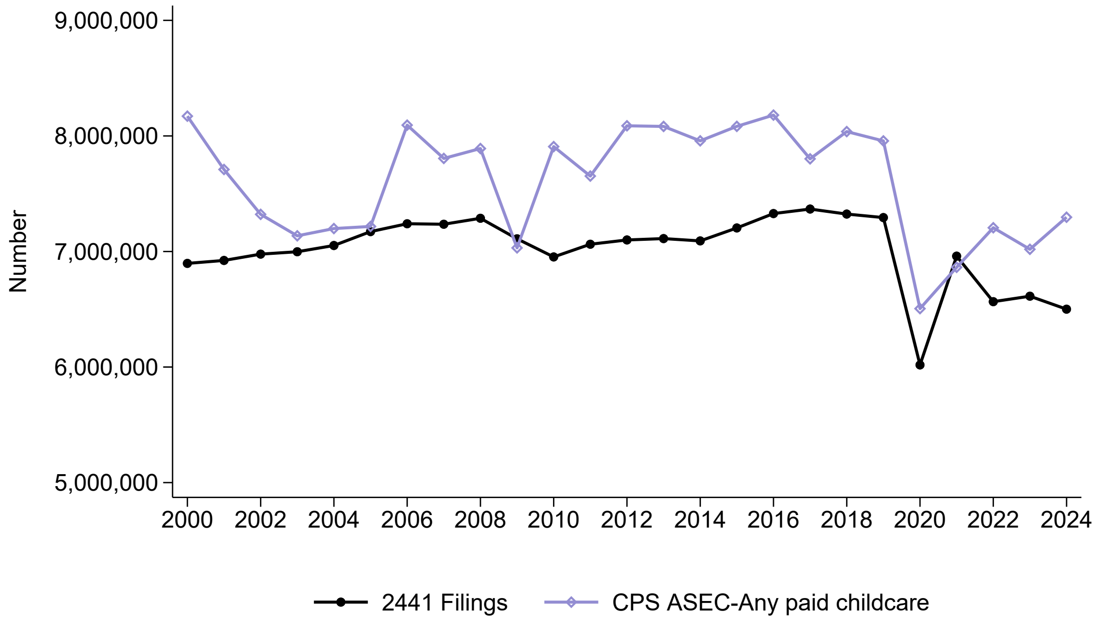
Part II **Credit for Child and Dependent Care Expenses**

2 Information about your **qualifying person(s).** If you have more than three qualifying persons, see the instructions and check this box

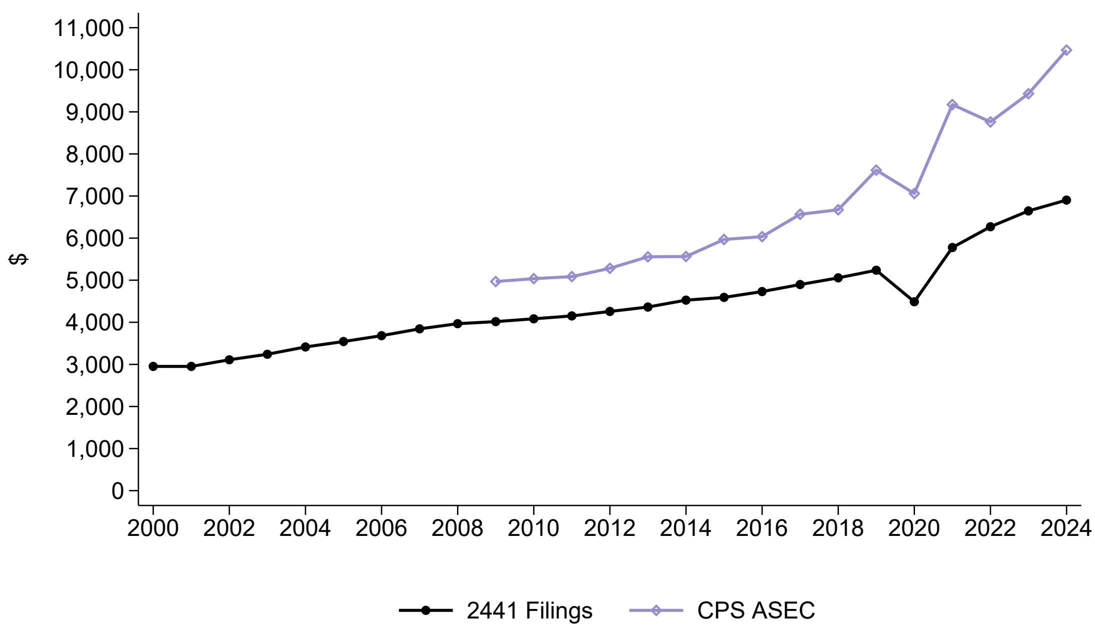
(a) Qualifying person's name First	Last	(b) Qualifying person's social security number	(c) **Qualified expenses** you incurred and paid in 2021 for the person listed in column (a)

Figure A.2: Use of Paid Childcare: IRS data v Current Population Survey

(a) Counts



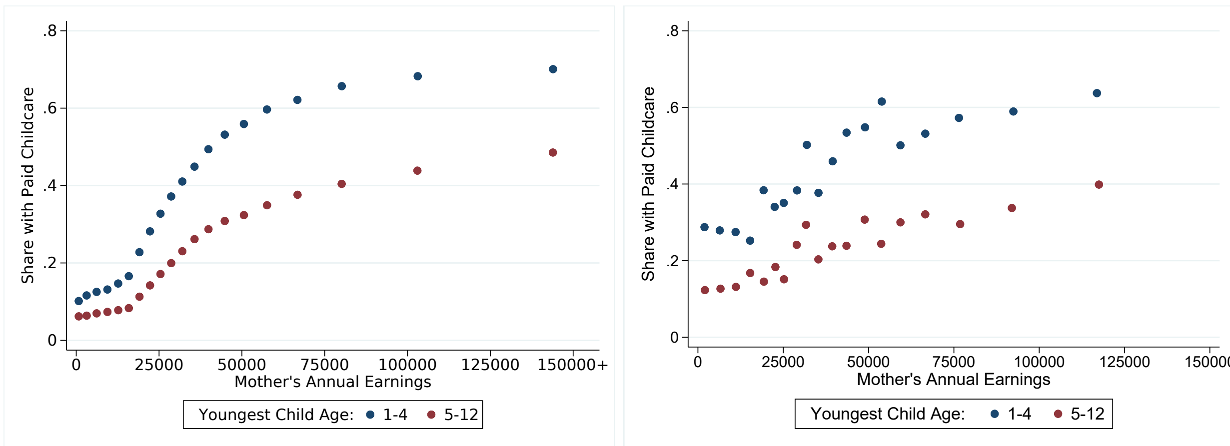
(b) Dollars



Notes: This figure presents number of 2441 filings vs. CPS counts for the number of households reporting any use of paid childcare, as described in Figure 1 in panel (a), and inflation adjusted (to 2019 dollars) average claims of paid childcare spending on form 2441 vs. CPS respondents' claims of annual amount spent on childcare, conditional on spending, in panel (b).

Figure A.3: Use of Paid Childcare by Mothers' Earnings, Tax Data versus CPS (2019)

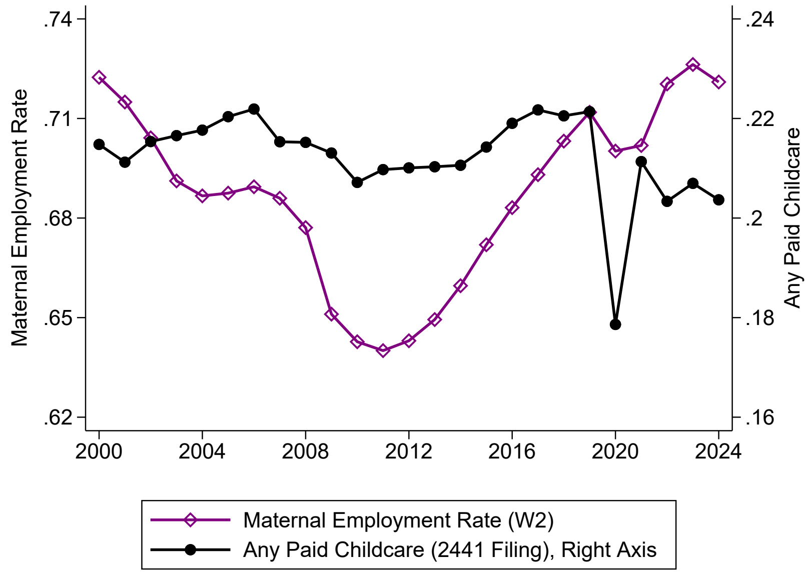
(a) Tax Data (b) CPS



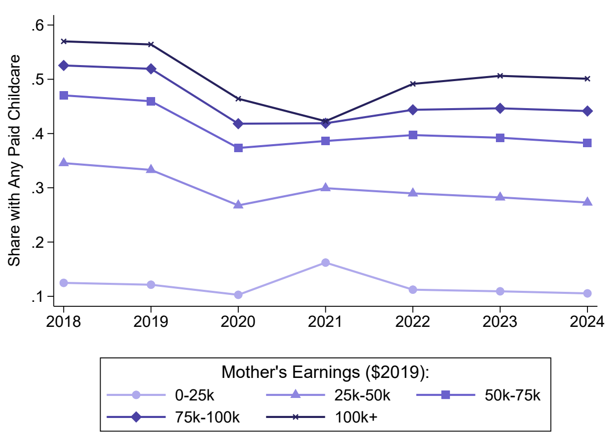
Notes: Panel (a) plots use of paid childcare against mothers' earnings in the tax data. Panel (b) shows the analogous binscatter using 2019 CPS-ASEC data. The CPS sample includes mothers with a child under age 13 who worked during 2019 and had positive earnings. CPS earnings are winsorized at the 95th percentile, and all estimates use CPS sampling weights.

Figure A.4: Employment and Paid Childcare Usage Among Mothers

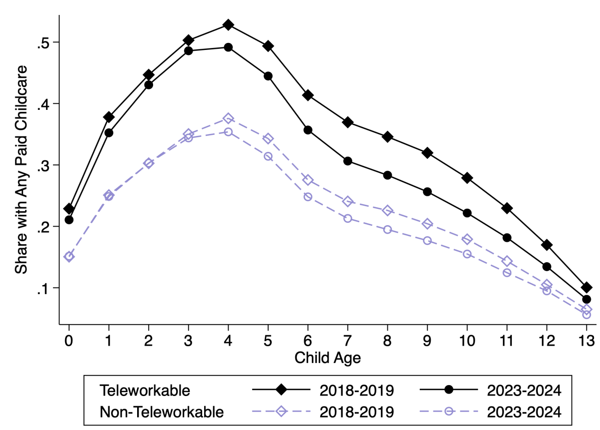
(a) Share of Mothers Working versus Using Paid Childcare 2000-2024



(b) Paid Childcare by Mothers' Earnings



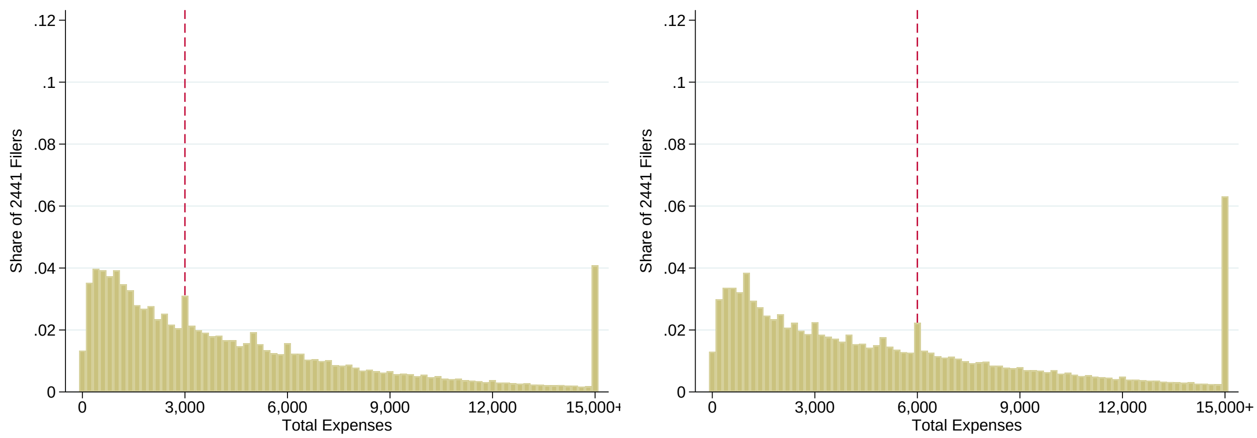
(c) Paid Childcare by Age of Youngest Child



Notes: Mothers with children under 13. Earnings includes wage/salary plus reported self-employment profits. Panel (c) restricted to households eligible for the CDCC.

Figure A.5: Expenses Reported on 2441 (2019)

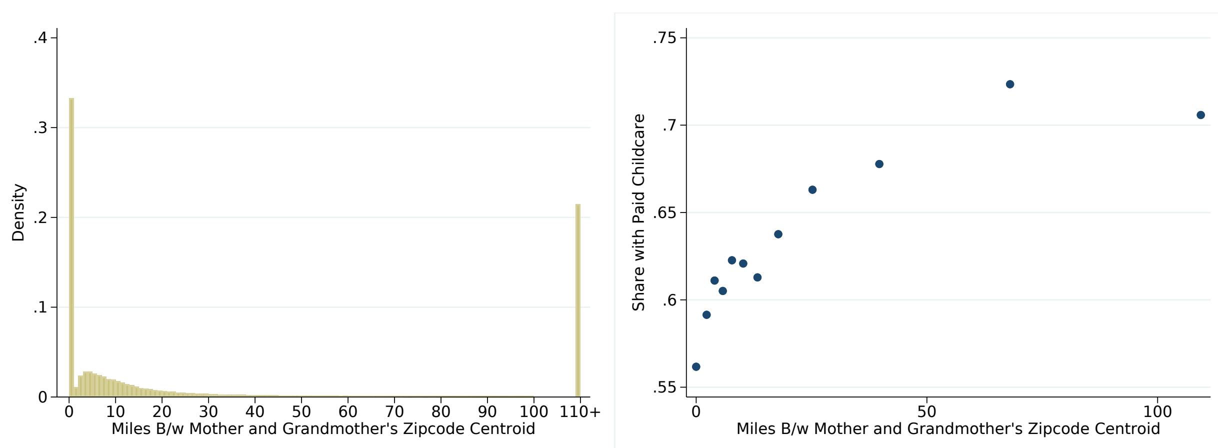
(a) One Child (b) Two or More Children



Notes: The vertical line indicates the maximum expenses eligible for the CDCC.

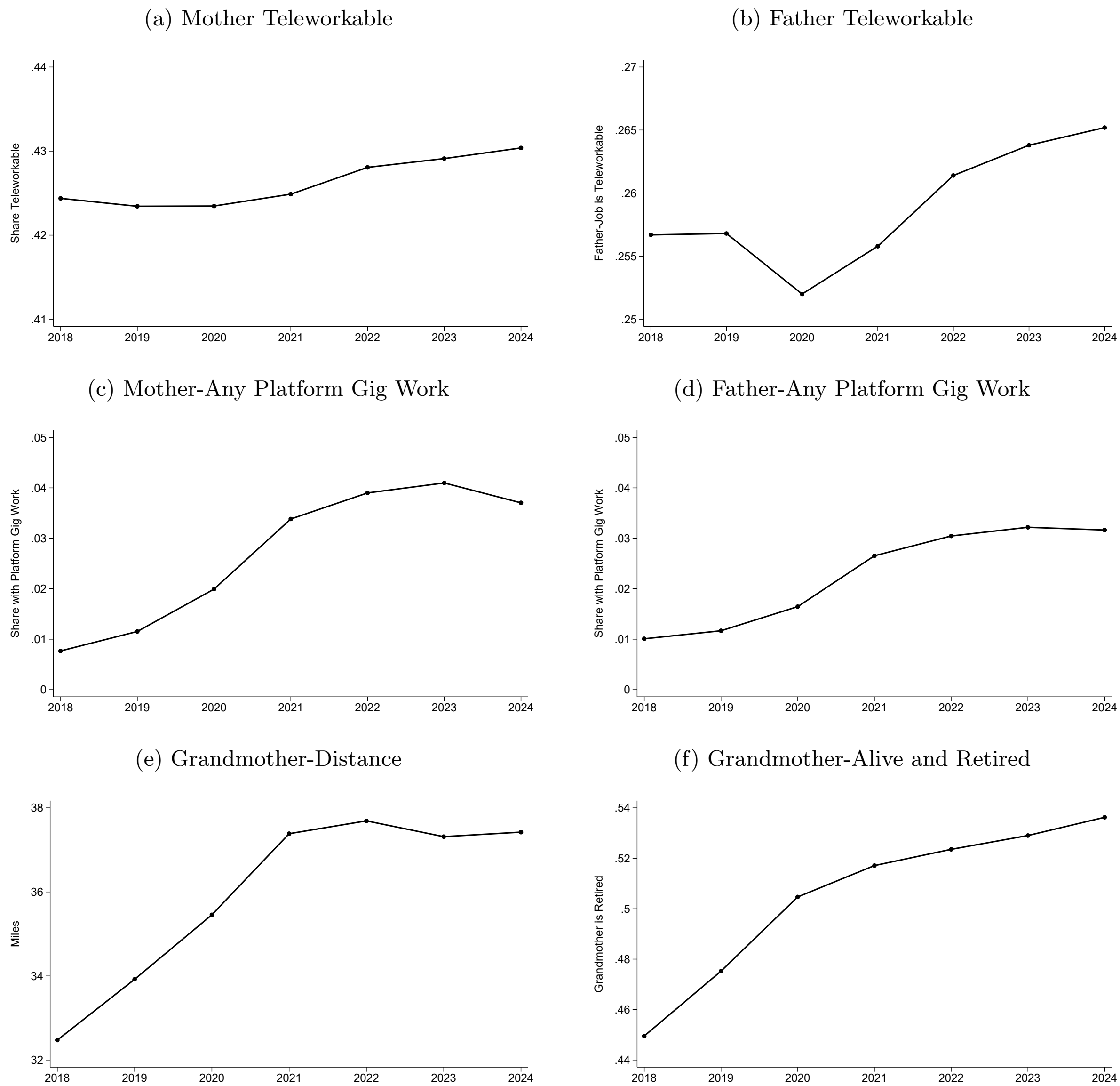
Figure A.6: Childcare Usage and Grandmother Distance, 2019

(a) Distance to Grandmother (b) Usage of paid childcare by grandmother distance



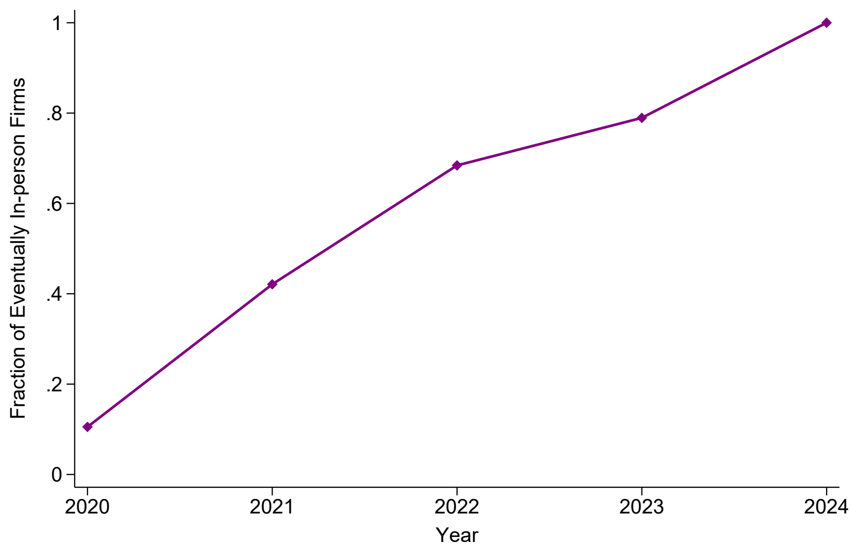
Notes: Panel (a) shows the distribution of mother-grandmother distance in the tax data. Distance is defined as the number of miles between the centroids of the mother's and grandmother's zip codes. Panel (b) plots paid childcare use against distance to grandmother in the tax data for mothers with earnings $\geq$50,000.

Figure A.7: Changes in Parental and Grandparental Labor Supply



Notes: Mothers with children under 13. Teleworkable refers to a job being classified as teleworkable according to the (Dingel and Neiman, 2020) measure. Platform gig work refers to receiving a 1099-NEC or 1099-K from a platform-gig company. Grandmother retired refers to a grandmother who is alive and either not working or receiving Social Security, pension or IRA withdrawals. Panels (e)-(f) are restricted to mothers aged 18-38.

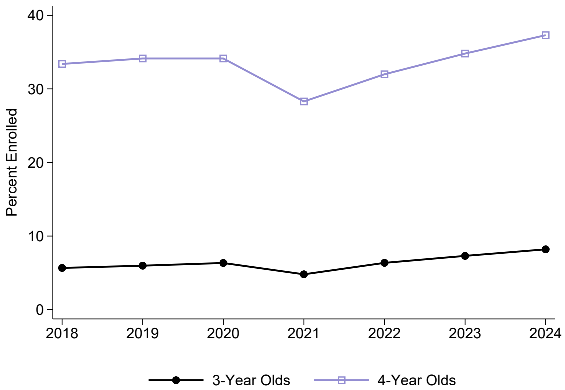
Figure A.8: Fortune 500, Transition to In-Person Work Among Eventually In-Person Firms



Notes: This figure plots, in the sample of Fortune 500 firms which have made public announcements about a return to full-time in-person work, what fraction of those firms are in-person in a given year.

Figure A.9: The Role of Other Supply-Side Factors

(a) Universal Pre-Kindergarten



(b) Low-Skill Non-Native Share

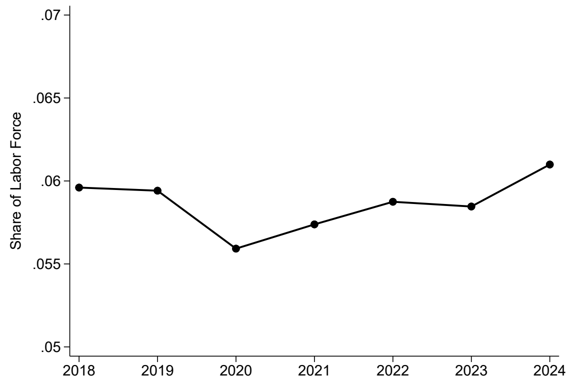
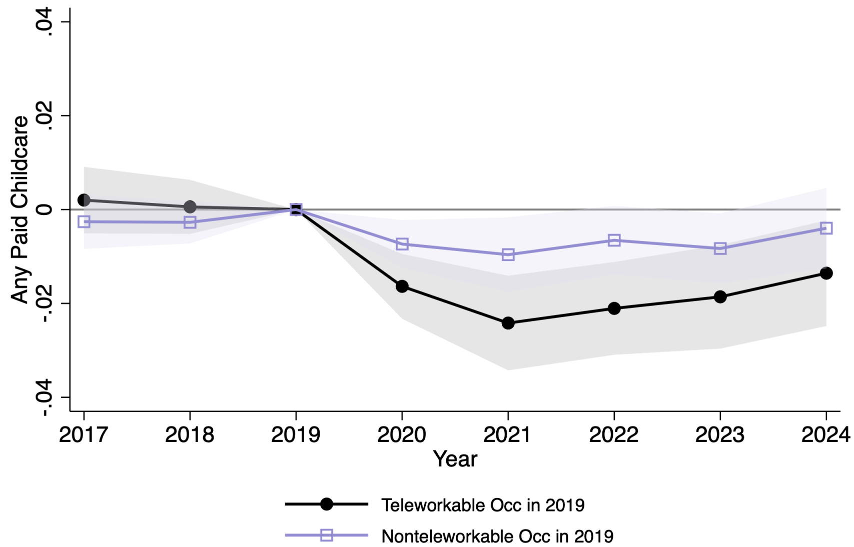
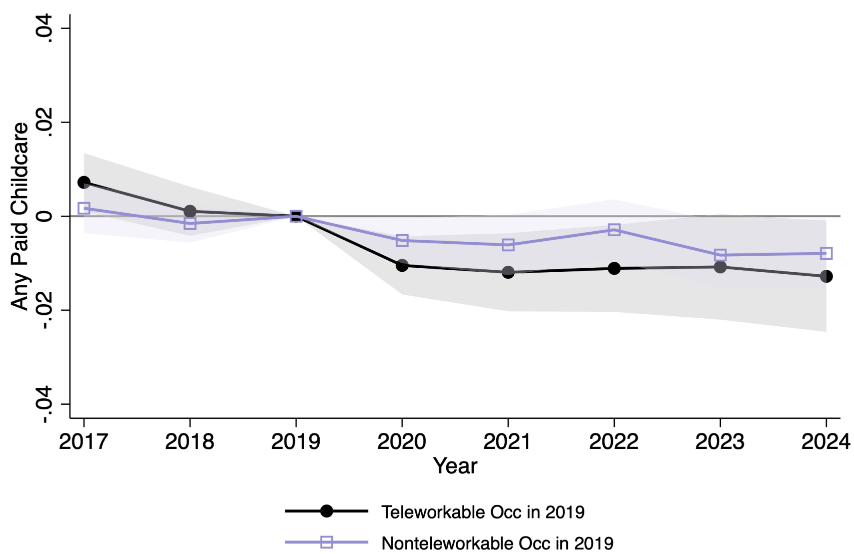


Figure A.10: Use of Paid Childcare Among Parents by Remote Work Policy and Teleworkability

(a) Mothers (0-13), Use of Paid Childcare



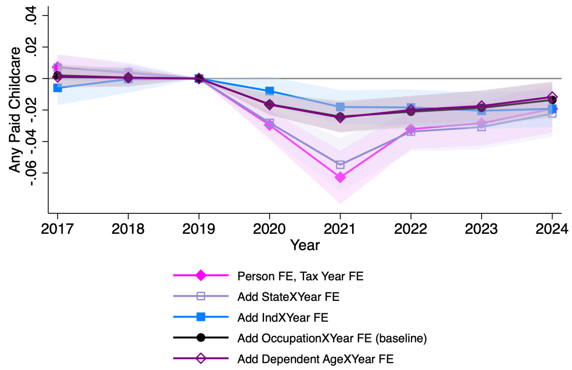
(b) Fathers (0-13), Use of Paid Childcare



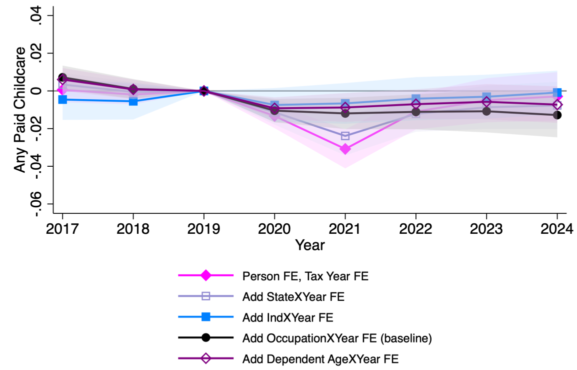
Notes: This figure presents estimates of β_k from equation (5) where the outcome is an indicator of reporting paid childcare expenses. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panel (a) reports the results of the regression restricted to mothers of children 0-13 years old, panel (b) reports the results for fathers of children 0-13 years old. Teleworkability is measured in 2019. Baseline controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Figure A.11: Use of Paid Childcare Among Parents by Remote Work Policy Robustness

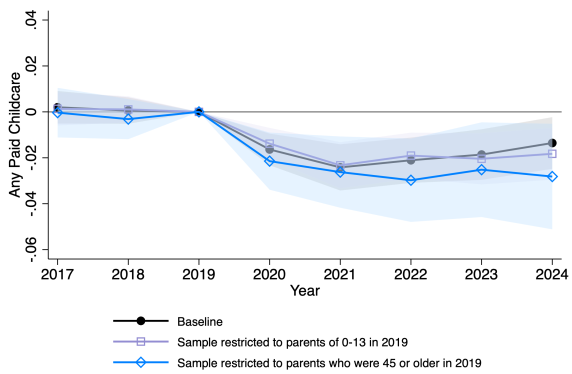
(a) Mothers (0-13), Use of Paid Childcare



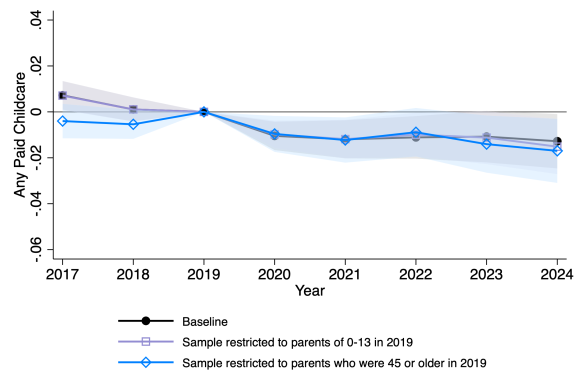
(b) Fathers (0-13), Use of Paid Childcare



(c) Mothers (0-13), Use of Paid Childcare

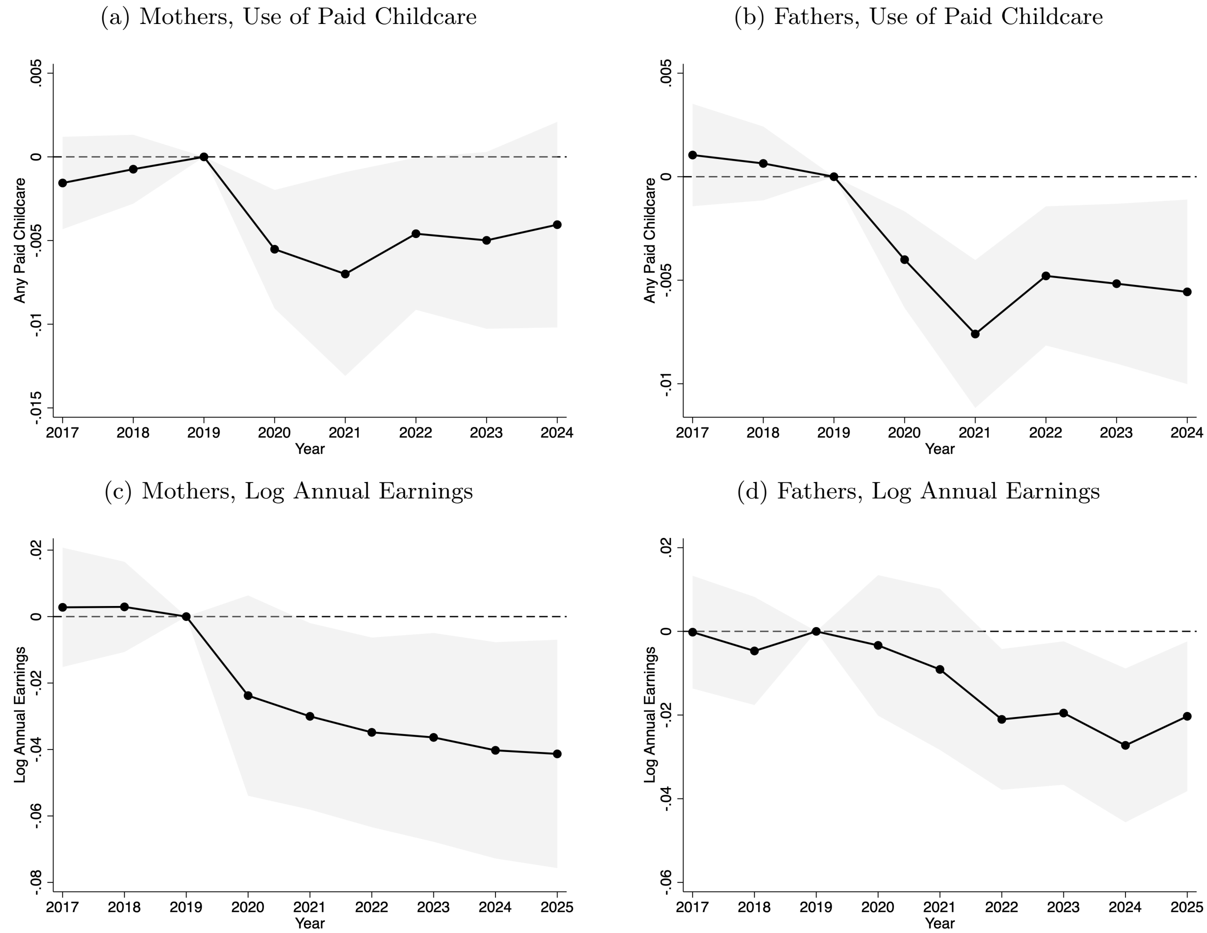


(d) Fathers (0-13), Use of Paid Childcare



Notes: This figure presents estimates of β_k from equation (5) where the outcome is an indicator of reporting paid childcare expenses. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panels (a) and (c) report the results of the regression restricted to mothers of children 0-13 years old, panels (b) and (c) report the results for fathers of children 0-13 years old. These samples include only mothers and fathers with teleworkable jobs. Teleworkability is measured in 2019. Baseline controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Additional controls and sample restrictions are indicated in the figures. Standard errors are clustered at the firm level.

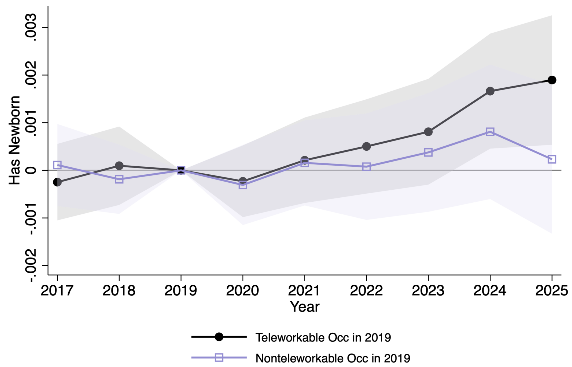
Figure A.12: Controlling for Public x Year Effects by Remote Work Policy



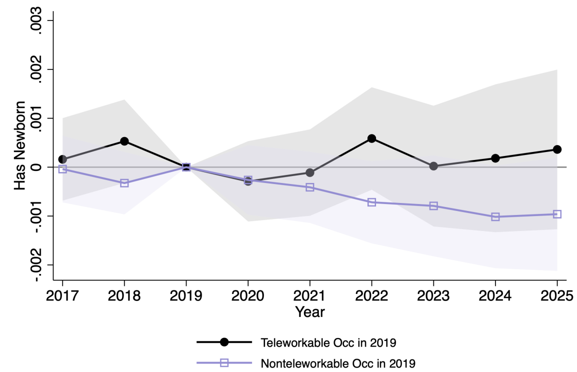
Notes: This figure presents estimates of β_k from equation (5) where the outcome is use of paid childcare in panels (a) and (b) and log annual earnings in panels (c) and (d). β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panels (a) and (c) report the results of the regression restricted to mothers of children 0-13 years old, panels (b) and (d) reports the results for fathers of children 0-13 years old, in the sample of all employees with teleworkable jobs as measured in 2019. Controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects and an indicator of whether a firm is public by year fixed effects. Standard errors are clustered at the firm level.

Figure A.13: Fertility and Job Changes by Remote Work Policy

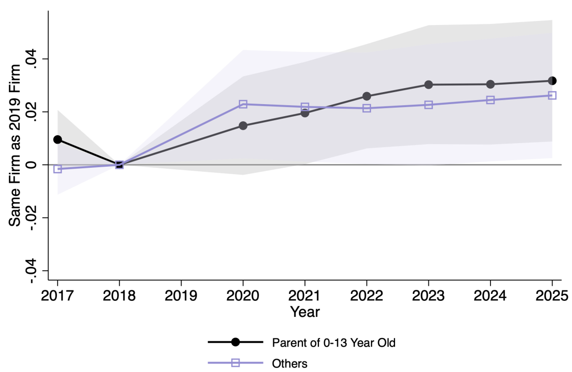
(a) Women, Newborn



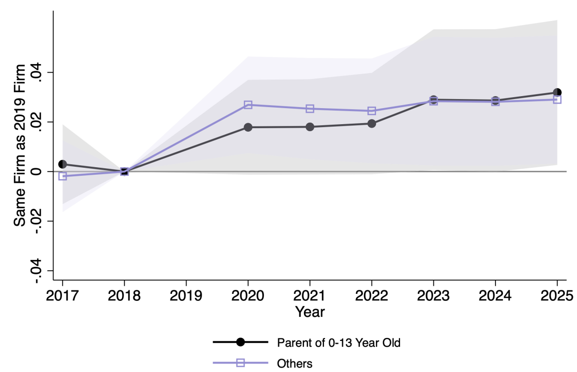
(b) Men, Newborn



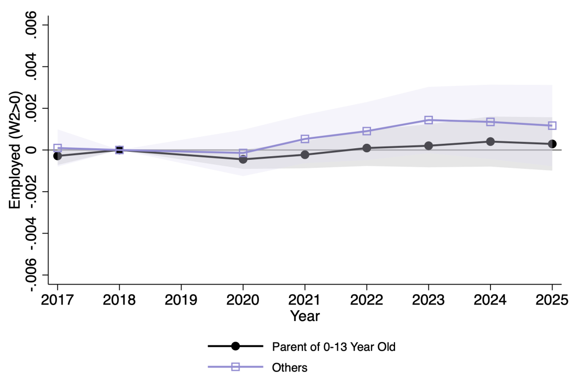
(c) Women, Same Firm as 2019 Firm



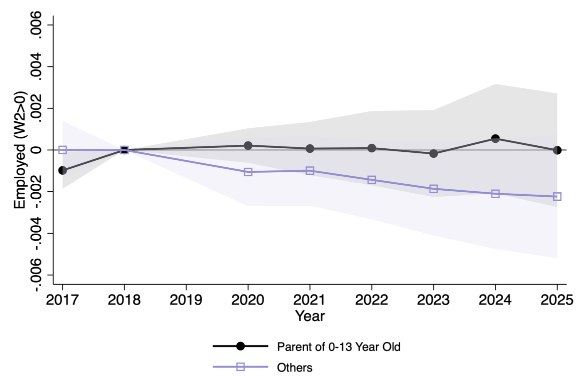
(d) Men, Same Firm as 2019 Firm



(e) Women, Employed



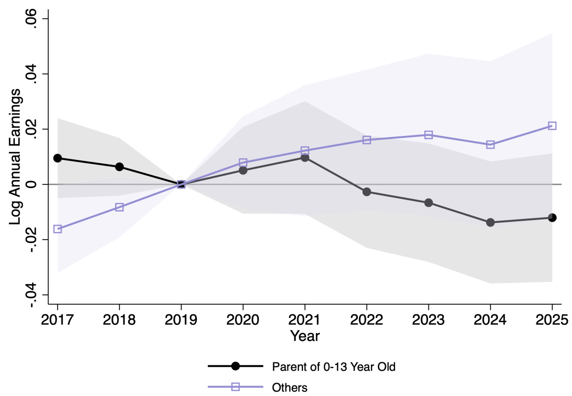
(f) Men, Employed



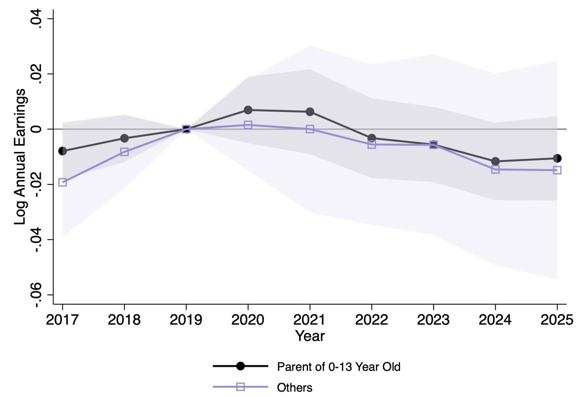
Notes: This figure presents estimates of β_k from equation (5) where the outcome is have a 0 year old child in panels (a) and (b), working in the same firm as the focal 2019 firm in panels (c) and (d), and employment in panels (e) and (f). β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panels (a), (c) and (e) report the results of the regression restricted to mothers of children 0-13 years old, or other women, as indicated, and panels (b), (d), and (f) report the results for fathers of children 0-13 years old, or other men, as indicated. Teleworkability is measured in 2019. Baseline controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Figure A.14: Earnings by Remote Work Policy Robustness

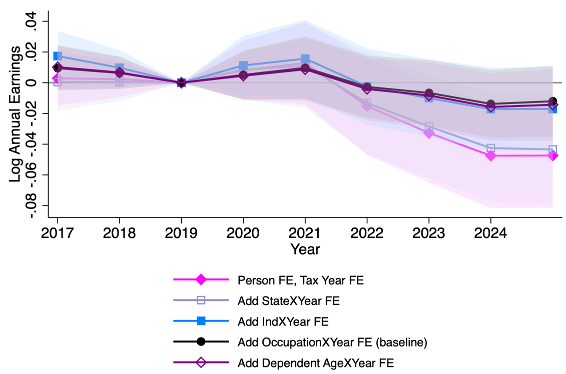
(a) Women, Log Annual Earnings



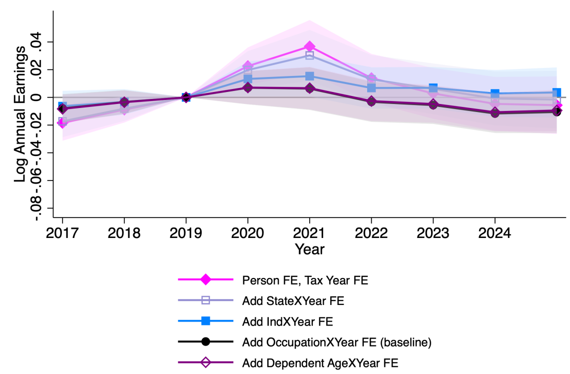
(b) Men, Log Annual Earnings



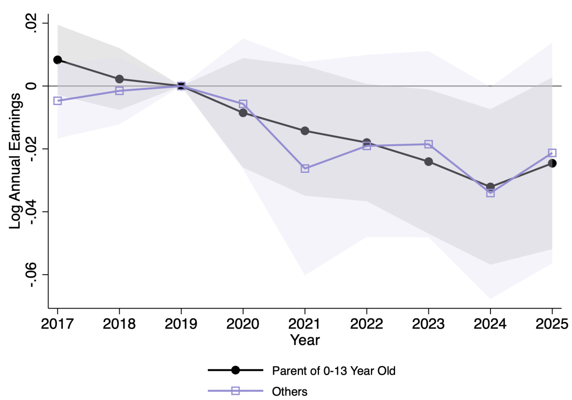
(c) Women, Log Annual Earnings



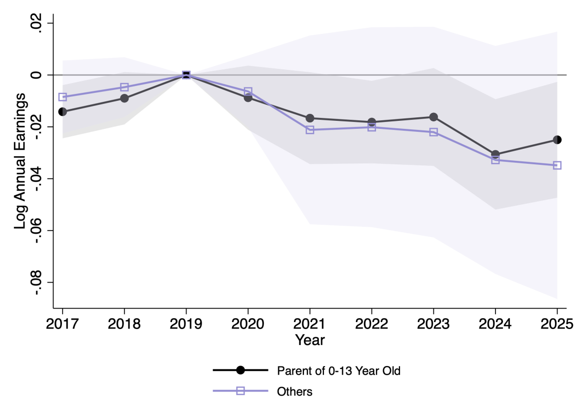
(d) Men, Log Annual Earnings



(e) Women 45 or Older in 2019, Log Annual Earnings



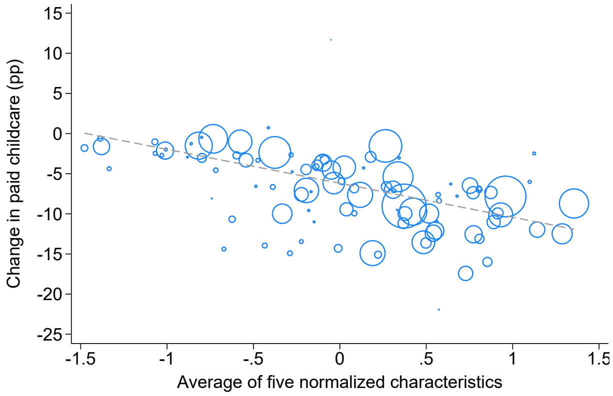
(f) Women 45 or Older in 2019, Log Annual Earnings



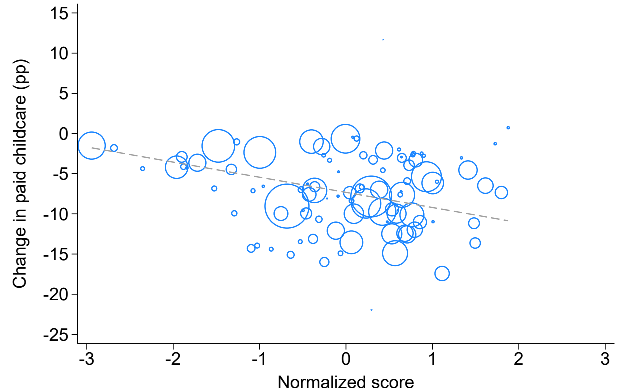
Notes: This figure presents estimates of β_k from equation (5) where the outcome is log earnings. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panels (a), (b), and (c) report the results of the regression for women, panels (b), (d), and (f) report the results for men, and panels (e) and (f) in various subsamples and using alternative controls as indicated. Baseline cntrols include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

Figure A.15: Change in Paid Childcare Usage between 2023 and 2019 and O*Net Characteristics

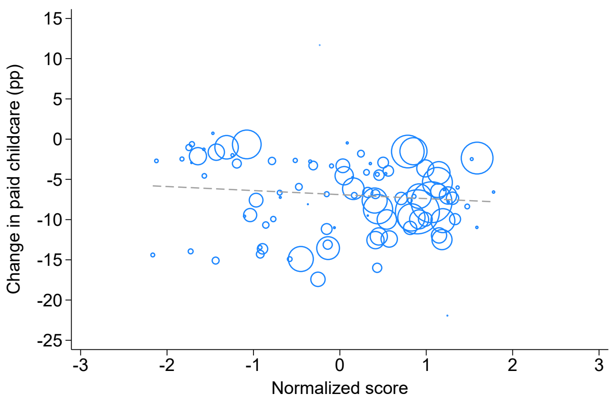
(a) Average of Five Normalized Scores



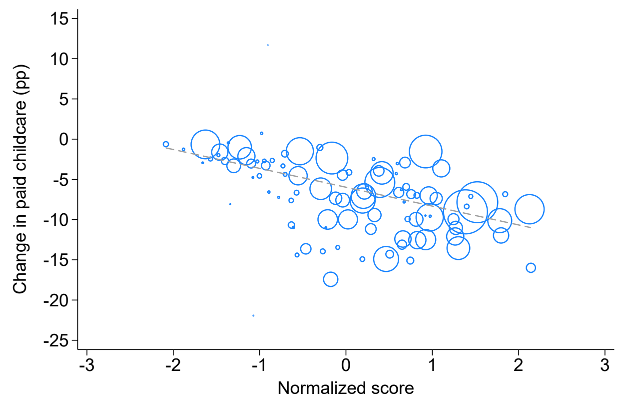
(b) Time Pressure



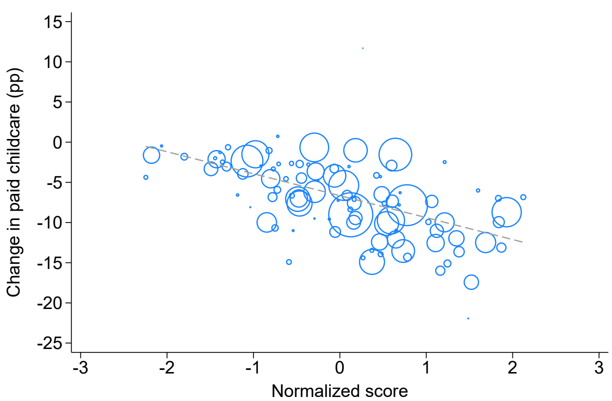
(c) Contact with Others



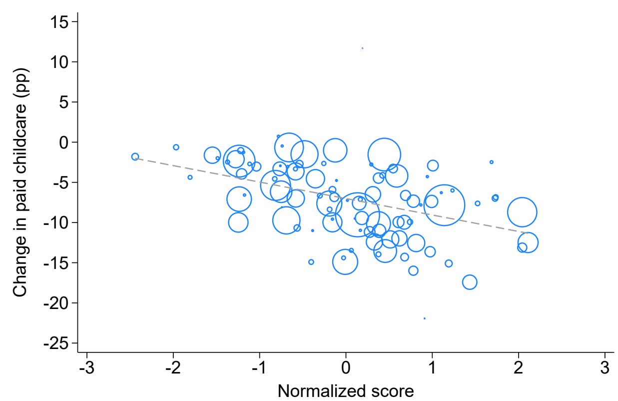
(d) Maintaining Interpersonal Relationships



(e) Structured versus Unstructured Work

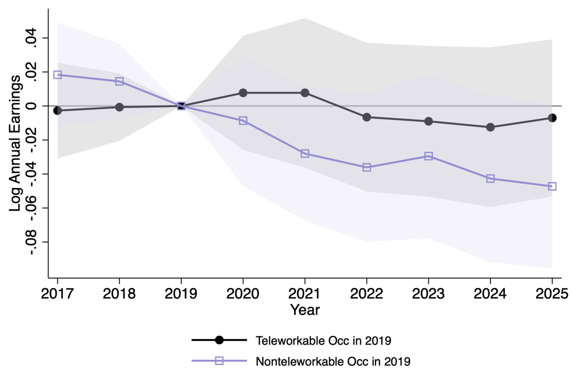


(f) Freedom to Make Decisions

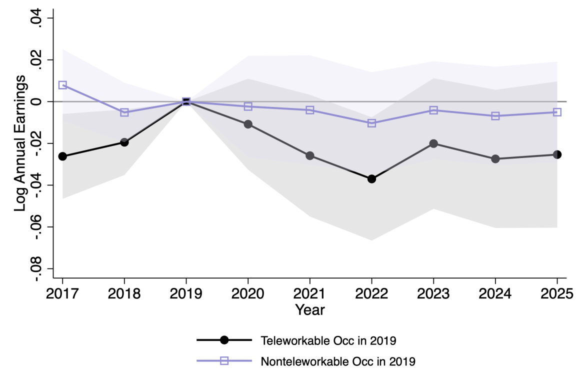


Notes: This figure plots changes in paid childcare usage from 2019 to 2023, measured in the tax data at the 4-digit O*NET occupation level, against the O*NET job characteristics studied in Goldin (2014). Panel (a) uses the average normalized score across five characteristics: time pressure, contact with others, establishing and maintaining interpersonal relationships, structured versus unstructured work, and freedom to make decisions. Panels (b)–(e) use the normalized score for each characteristic separately. The underlying O*NET scores are survey-based measures of the importance or prevalence of each characteristic within an occupation; see Goldin (2014) for details on the definitions, survey questions, and scales. We aggregate raw O*NET scores, which range from 1 to 5, to the 4-digit occupation level and normalize them across occupations. Dot size reflects the number of individuals in each 4-digit O*NET occupation cell in the tax data. Scatter plots and regression lines are weighted by the same occupation-cell counts.

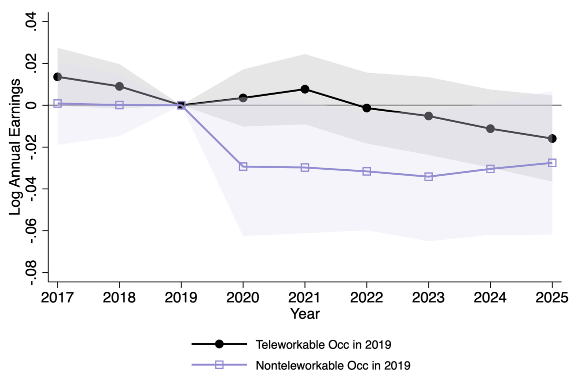
Figure A.16: Heterogeneity in Earnings by Remote Work Policy



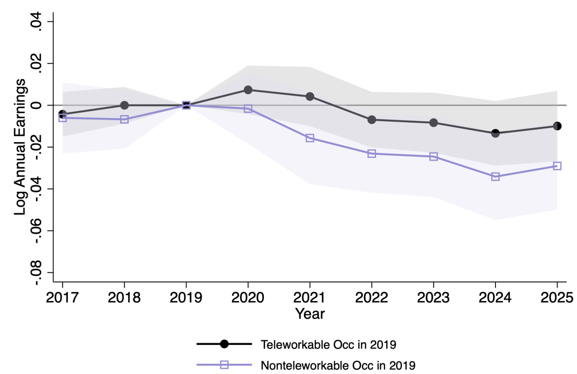
(a) Mothers (0-13), Flexible Occupations



(b) Fathers (0-13), Flexible Occupations



(c) Mothers (0-13), Inflexible Occupations



(d) Fathers (0-13), Inflexible Occupations

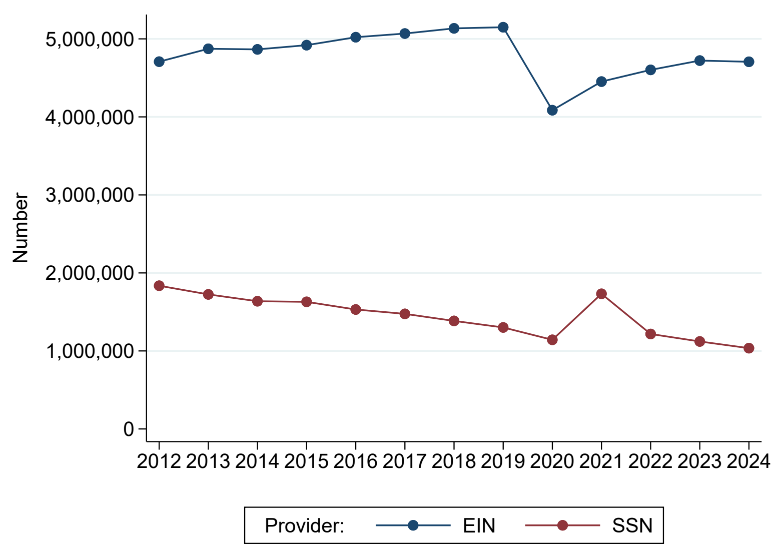
Notes: This figure presents estimates of β_k from equation (5) where the outcome is log earnings. β_k give the difference in outcomes among parents who in 2019 worked in firms allowing remote work (as measured in 2024) compared to parents who in 2019 worked in firms which have returned to full-time in person work by 2024. Panel (a) reports the results of the regression restricted to mothers of children 0-13 years old with flexible occupations in 2019, panel (b) reports the results for fathers of children 0-13 years old with flexible occupations in 2019, and panels (c) and (d) reports the analagous effects for parents with inflexible occupations in 2019. Controls include individual fixed effects, and 2019-firm NAICS by year, 2019-occupation by year, and state of residence by year fixed effects. Standard errors are clustered at the firm level.

B Appendix: Tax Filings of Child Care EIN Providers

We study the supply side using two complementary approaches: (1) matching and following the EINs furnished by tax units on Form 2441, and (2) separately studying the universe of firm tax filings of NAICS 624410 “Child Day Care Services.”

Figure B.1 breaks out 2441 filings by whether they list an EIN or SSN. EIN providers are by far more common, and represent 70 percent of filings. Moreover, there has been a decline over time in SSN providers appear on Form 2441, with a slight increase in EIN providers. Most of the drop we observe since 2020 appears to come from EIN providers.

Figure B.1: 2441 Filings, Numbers of EIN and SSN Providers



Notes: Electronically filed 2441 returns.

We are able to match 67 percent of these EINs to business returns (1065 Partnerships, 1120 Corporate, 990 Non-Profits or Schedule C Sole-Proprietor).

We also separately examine the universe of firm returns with NAICS code 624410. 69 percent of all firm returns with NAICS 624410 appear on a 2441. This rises to 82 percent when excluding Schedule C’s.

Table B.1 examines the distribution of business returns from our two complementary approaches. The most common type of provider is a corporation. Among firms with NAICS 62441, the second most common is a nonprofit. The next most common are Schedule C filers. Partnerships are the least common, representing fewer than 10 percent of providers.

Table A.1: Households paying for childcare and average annual cost, by data source, 2019–2024

	Level					Index (2019=1)				
Year	IRS	CPS ASEC	SIPP	NSECE	CEX	IRS	CPS ASEC	SIPP	NSECE	CEX
Panel A. Households paying for childcare (thousands)										
2019	7,294	7,957	9,830	7,123	7,152	1.00	1.00	1.00	1.00	1.00
2020	6,019	6,506	6,911	–	5,511	0.83	0.82	0.70	–	0.77
2021	6,960	6,863	7,924	–	5,175	0.95	0.86	0.81	–	0.72
2022	6,566	7,206	9,132	–	6,208	0.90	0.91	0.93	–	0.87
2023	6,613	7,019	8,570	–	6,835	0.91	0.88	0.87	–	0.96
2024	6,501	7,297	–	7,104	5,931	0.89	0.92	–	1.00	0.83
Panel B. Average annual cost among paying households										
2019	$5,237	$7,616	$13,034	$9,102	$4,783	1.00	1.00	1.00	1.00	1.00
2020	$4,488	$7,061	$14,264	–	$5,220	0.86	0.93	1.09	–	1.09
2021	$5,778	$9,174	$14,141	–	$4,414	1.10	1.20	1.08	–	0.92
2022	$6,270	$8,761	$15,657	–	$6,414	1.20	1.15	1.20	–	1.34
2023	$6,647	$9,432	$14,018	–	$5,948	1.27	1.24	1.08	–	1.24
2024	$6,905	$10,468	–	$14,498	$6,430	1.32	1.37	–	1.59	1.34

Notes: Panel A reports the estimated number of households paying for childcare (in thousands); Panel B reports average annual childcare expenditures among households that pay for childcare, in nominal dollars. Within each panel, the left block reports levels by data source, and the right block reports values indexed to each source's 2019 level (2019 = 1). Sources are the IRS, CPS ASEC, SIPP, NSECE, and CEX. "–" denotes data not available: SIPP estimates for 2024 have not yet been released, and the NSECE was conducted only in 2019 and 2024. Details on the construction of each source-specific measure are as follows:

(1) **IRS:** The number of households is the annual count of Form 2441 filings, and average childcare costs are calculated from the annual amounts reported on those filings.

(2) **CPS ASEC:** The survey asks, "Did (you/ anyone in this household) PAY for the care of (your/their) (child/children) while (you/they) worked in [YEAR]?" Respondents are instructed to include any childcare expenses incurred during the reference year, including preschool, nursery school, before- and after-school care, and summer care, but to exclude the costs of kindergarten and other schooling. Beginning with the 2010 CPS ASEC, households reporting positive childcare expenditures are also asked to report the total amount paid for childcare during the reference year. We estimate the number of households paying for childcare by summing the ASEC household weights among households reporting positive childcare expenditures. Among these households, we calculate weighted average annual spending using the ASEC household weights.

(3) **SIPP:** The survey asks reference parents who reported using childcare during the fall of the reference year, "Did reference parent or reference parent's family pay for child care arrangements during a typical week in the fall of the reference year?" Parents reporting positive costs are then asked how much they paid for childcare during that week. We estimate the number of households using paid childcare by aggregating responses to the household level and applying survey weights. Because childcare information is recorded at the person level, we retain the December observation for each household and use the household head's survey weight. We calculate weighted average weekly costs among households with positive costs and multiply this estimate by 52 to obtain average annual childcare costs.

(4) **NSECE:** The NSECE collects a roster of regular childcare arrangements for each child in the household and records, for each child-provider arrangement in the reference week, whether the arrangement was paid and the amount paid. We use arrangement-level data from the household survey in each NSECE wave and sum arrangement-level costs to the household level. For arrangements with costs flagged as missing by the NSECE in the relevant care-type categories, we impute weekly costs using the weighted mean cost among children with observed positive costs for the same type of care. The number of households paying for childcare is the survey-weighted count of households with positive total weekly costs, and average annual costs are the survey-weighted mean weekly cost among these households multiplied by 52.

(5) **CEX:** We use the CEX Interview Survey monthly expenditure files and identify childcare spending as expenditures on babysitting, child care, day care centers, nurseries, and preschools (UCCs 340210–340212, 670310, and 670320). We restrict the sample to consumer units whose youngest member is under age 13. The number of consumer units paying for childcare in each year is the survey-weighted count of consumer units reporting positive childcare expenditures in an interview quarter, averaged across the four quarters of the year. Average annual spending is computed among consumer units observed in all four interviews of the panel: monthly expenditures are summed over the panel year, each consumer unit is assigned to the median calendar year of its interview months, and the reported estimate is the weighted mean of annual spending among consumer units with positive spending.

Table B.1: Distribution of Businesses Providing Childcare

	Percent of returns	
	(1) Firms with NAICS 62441	(2) 2441 EINs matched to business returns
Corporation (1120)	47.8	37.1
Nonprofit (990)	28.2	26.3
Sole Proprietor (Schedule C)	15.4	29.7
Partnership (1065)	8.7	7.0

We next examine aggregate profits and payroll in the childcare industry. To do this, we use the second approach, following all firms in NAICS 624110, since this should provide complete coverage, at least for this NAICS code. In Figure B.2, we examine profits and payroll by type of firm filing. In 2020, profits fell for all providers except nonprofits, who saw a dramatic increase in profits. In all other years, profits in the industry have increased relative to 2019. Total payrolls fell in 2020 and continued to be lower in 2021, but since recovered for across types of providers by 2023.

In figure B.3, we compare the experience of the childcare industry to full-service restaurants (NAICS 722511) and hotels and motels (NAICS 721110). Childcare saw less dramatic declines in profits in 2020 compared to restaurants. While restaurants had a higher increase in aggregate profits in 2021, the childcare industry had higher profits in 2022 and 2023. Childcare also had smaller declines in aggregate payroll compared to restaurants and hotels, and by 2023 payroll was 20 percent higher than in 2019, similar to restaurants and well above hotels.

Figure B.2: Childcare Industry, Aggregate Profits and Payroll

(a) Aggregate Profits (b) Aggregate Payroll

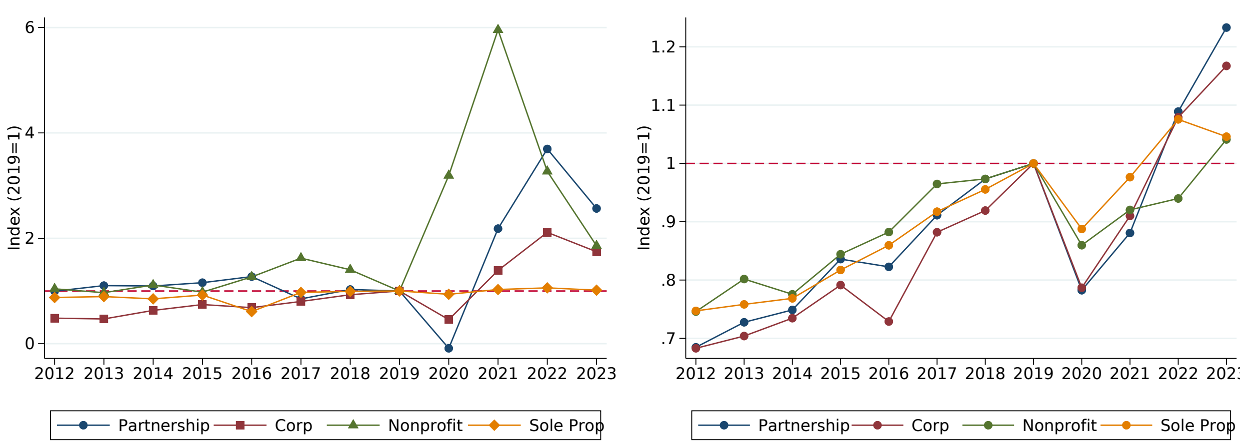
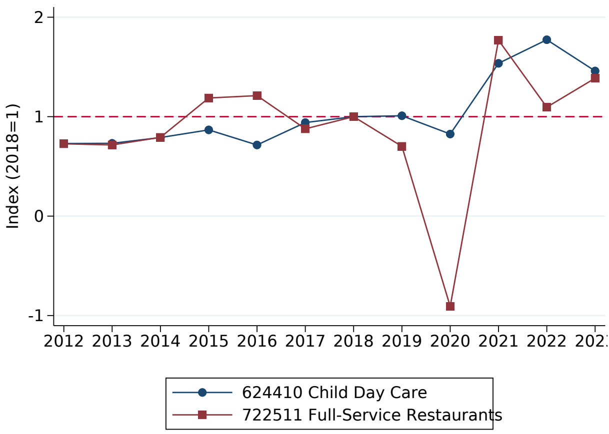


Figure B.3: Comparison to Other Industries

(a) Aggregate Profits



(b) Aggregate Profits

C Appendix: Extensions of conceptual Framework

Consider the following functional form and parametrization:

$$U(C,Q) = \sqrt{CQ},\ \phi(B) = 1 - B, \delta = \frac{1}{2}, w = 1$$

When remote work is not possible $\Rightarrow H^o = \frac{1}{2}$ and earnings $E^o = \frac{1}{2}$, regardless of $p \in [0,1)$.

When remote work is possible, these preferences and a linear wage cost in blending imply that the amount of blending and the associated wage penalty depend on w, p, and δ. We consider two cases:

Case 1: Let $p = 0$. Then the FOCs for H and B imply that $-B^* + 1 - B^* = (1-\delta)\frac{w-p}{w} = \frac{1}{2}$ so $B^* = \frac{1}{4}$. Substituting into the budget constraint, we obtain

$$C^* = (1 - H^* - \frac{1}{4}) \cdot 1 + \frac{3}{4}\frac{1}{4} = \frac{15}{16} - H^*$$

$$Q^* = H^* + \frac{1}{8}$$

Since $w - p = 1$, $C^* = Q^*$ by the FOC for H. $\Rightarrow H^* + \frac{1}{8} = \frac{15}{16} - H^* \Rightarrow H^* = \frac{13}{32}$, $L^* = \frac{11}{32}$, and earnings

$$E^* = \frac{11}{32} \cdot 1 + \frac{3}{4}\frac{1}{4} = \frac{17}{32} > E^o$$

Case 2: Now let $p = \frac{3}{5}$. The possibility of saving on childcare will increase B relative to the previous case. $-B^* + 1 - B^* = (1-\delta)\frac{w-p}{w} = \frac{1}{2}\frac{2}{5} \Rightarrow B^* = \frac{2}{5}$. Substituting into the budget constraint, we obtain

$$C^* = \left(\frac{3}{5} - H^*\right)\frac{2}{5} + \frac{3}{5} \cdot \frac{2}{5} = \frac{12}{25} - \frac{2}{5}H^*$$

$$Q^* = H^* + \frac{1}{5}$$

Using the FOC for H gives $C^* = \frac{2}{5}Q^*$. Solving for H^* then gives $H^* = \frac{1}{2}$. $\Rightarrow L^* = \frac{1}{10}$ and

$$E^* = \frac{1}{10} + \frac{3}{5}\frac{2}{5} = \frac{17}{50} < E^o$$