Telework, Childcare, and Mothers' Labor Supply

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Abstract

We use a pandemic-driven natural experiment to study the effect of unreliable childcare on the labor supply of prime-age custodial mothers. We explicitly examine whether the telework-compatibility of mothers' jobs mitigates the effect of increased childcare responsibilities. Using difference-in-differences and triple-differences designs, we find persistent declines in mothers' labor force participation by 0.1 to 1.5 percentage points relative to women without children and 0.3 to 2.0 percentage points compared to custodial fathers. Conditional on employment, mothers are 0.7 to 0.8 percentage points more likely to take up leave. These patterns are especially prominent among custodial mothers with a college degree or higher in telework-compatible jobs.

JEL: D10, J16, J22 Keywords: labor supply, gender, telework, difference-in-differences, triple-differences

1 Introduction

A lot has changed in the past century in terms of social norms and women's engagement in paid labor (Goldin (2021b)). Today, there are more female doctors (and more male nurses); there are more female managers (and more male teachers). These changes come alongside changes in social norms around family configuration, partnering, couple-hood, and breadwinner status within families (Stevenson and Wolfers (2007)), with women earning more than men in one-in-four of today's dual-earner different-sex couples (Winkler et al. (2005); Murray-Close and Heggeness (2018)). Even among different-sex couples where a woman earns less than a man, her income is often critical for the family's budget and survival. This is equally true for middle and upper-middle-income families today as it is for lower-income families (Boushey (2016)). These shifts in societal norms require us to rethink the role of women and paid labor, especially in a world where

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women have increasing levels of education and advancing careers.

In the U.S., improvements to the gender-wage gap have slowed over recent decades (Blau and Kahn (2017); Shrider et al. (2021)). Yet by 2019, women had surpassed the number of college-educated men in the workforce (29.5 million women compared to 29.3 million men), and by December of 2019, women made up more than half of non-farm payrolls for the first time in recorded history (Fry (2019); Horsely (2020); Rampell (2010)). These statistics are due, at least partially, to younger generations of women attaching themselves persistently and, perhaps stubbornly, to formal labor markets more than any other time in history (Goldin (2021b)). But inequality within the household and a disproportionate burden of care allocated to women still exist today. These facts, in combination with the negative impact of the pandemic on households and unanticipated collapse of in-person schooling, provide an opportunity to examine what happens to women's labor supply in a market where women are more persistently attached when childcare becomes unreliable. It also allows us to examine more clearly the role of remote work on mother's labor supply when childcare is not available.

We study the intersection of childcare responsibilities and women's labor supply by comparing custodial mothers' response to an exogenous shock of increased childcare demands due to the COVID-19 pandemic - relative to those women without dependent children and custodial fathers. Prior research has more generally examined the pandemic's role on women and paid work (Alon et al. (2020a); Alon et al. (2020b); Heggeness (2020); Landivar et al. (2020); Stevenson (2020); Albanesi and Kim (2021); Deryugina et al. (2021); Lofton et al. (2021); Stevenson (2021); Zamarro and Prados (2021)). Our analysis is different. Using monthly data from the Current Population Survey (CPS) (Flood et al. (2021)), we look more broadly at how telework, or remote work options, and increased childcare responsibilities (induced by the pandemic) interact with mothers' labor supply. We focus on four employment outcomes: labor force participation, conditional on being in the labor force active work status, unemployment, and leave take-up conditional on being employed. With a difference-in-difference framework, we estimate changes in these outcomes attributable to an increased need for childcare of custodial mothers relative to women without dependent children. Using a triple-differences framework, we compare the differences in outcomes of custodial mothers and fathers relative to those without dependent children.

We highlight the continued burden of increased childcare demands on mothers' labor supply as schools struggled returning to normalcy. We expose a counterintuitive relationship between gender and remote work when outside options for childcare are unavailable, and we document a growing disparity between mothers and fathers in their ability to work for pay as the pandemic and its related childcare crisis drug on. Labor force participation of mothers is intractably lower than father's and lower, but relatively close, to women without children. However, non-summer trends in increases

and decreases in employment month-to-month were parallel in the months prior to March 2020.[1] We find that a pandemic shock in decreased childcare availability reduced labor force participation and increased leave from work for mothers with a college degree or higher in telework-compatible occupations. Nine-months into the pandemic, there was a growing gender disparity in labor force participation due to childcare. By September 2020, custodial mothers of school-age children were 1.5 percentage points (ppts) more likely to exit because of childcare needs. By September 2021, that disparity grew to 2.0 ppts - a 33% increase. As the economy stumbled attempting a return to some sort of normalcy, fathers returned to work. Mothers were left dispropotionately managing home quarantines from COVID-19 exposures at school and related care needs of their children. After the 2020-2021 academic school year, mothers working in education and those in white-collar office jobs had disproportionately left the workforce. These two groups of women bore the brunt of the pandemic childcare crisis, and the disproportionate impact on their careers may be permanent.

2 Background

Over the past year and a half, media articles have described the overwhelming and harrowing situation faced by working mothers as they tried to balance paid jobs and unpaid work both outside and within their homes (Aviv (2021); Carmel (2021); Kindelan (2020)). Less effort has been given to describing the situation of fathers, although that too has been covered (Hsu (2020)). While these news articles are shocking and informative, they tell only pieces of the pandemic labor supply story of working parents, and, in many cases, the situation of working mothers is generalized through the lens of labor force statistics for all women (Heggeness (2021)). But labor supply decisions of mothers are diverse and complex. They include whether and how much to actively participate in paid labor given the higher level of effort required in unpaid labor within the home and subsequent reductions in leisure time. Decisions made during the pandemic included whether to take leave or unemployment for childcare responsibilities or exit the labor force entirely. And other factors, such as the number of hours one could work and the accessibility to one's job under increased public health risks, drove shifts in parental labor supply as well. Custodial parents faced unique constraints that bound their paid labor decisions - in particular, what to do with their now unsupervised children while they worked for pay.

The case for focusing on working mothers of school-age children is of unique interest for those who study the economics of the household. The choice set for these parents shifted exogenous of preferences once the pandemic-driven stay-at-home orders and school closures hit. One day

[1] In 2019, one year before the pandemic consumed us all, women aged 25 to 54 participated in the workforce at a rate of 76.3% compared to men aged 25 to 54 whose labor force participation rate was 89.2% (authors' calculations using the Current Population Survey, not shown). In the same year, custodial mothers of school-age children aged 25 to 54 had a labor force participation rate at about 74.1%. For women living without any own children under age 18, it was around 79.1%, and for custodial fathers of school age children it was 94.2%.

they had freely available public schools for the care and educational development of their children, and the next day they did not. For this analysis, our preferred unit of analysis is custodial parents of school-age children to disentangle the differential impact of an exogenous shift of childcare demands on work for parents where all parents had access to free developmentally appropriate care via public schools and then did not.[2] The basic economic interpretation of childcare consumption "choices" for parents of younger children (ages 0 to 4) is different because the cost of childcare can drive mothers (and fathers) out of the labor market.[3]

2.1 A Pandemic-Driven Motherhood Penalty

In normal times, a motherhood penalty in the labor market occurs when pregnant women and mothers of small children disproportionately pull back from the workforce for pregnancy and childcare responsibilities relative to fathers and other women. A wealth of research has shown how labor market exits reduce current and future expected earnings, sending many women on an entirely different lifetime earnings trajectory (Miller (2011); Angelov et al. (2016); Lundberg et al. (2016); Blau and Kahn (2017); Hotchkiss et al. (2017); Chung et al. (2017)).

This additional penalty is worth exploration during a pandemic where school closures and virtual schooling increased the need for parent-driven childcare during regular work hours. There are only 24 hours in a day and childcare activities are relatively intense and extremely inflexible. A parent cannot, for example, easily shift childcare effort from the morning to evening unless someone else is available to cover the morning care duties because no matter what, a child needs care and at least some level of generalized supervision.

While mothers and fathers may have faced similar constraints in terms of childcare needs, preliminary evidence has shown that mothers carried a heavier burden of childcare responsibilities and domestic chores during the pandemic (Del Boca et al. (2020); Heggeness (2020); Sevilla and Smith (2020); Bauer et al. (2021a); Collins et al. (2021); Zamarro and Prados (2021)). To the extent mothers disproportionately disengage with the labor market for childcare responsibilities, they may experience a pandemic motherhood penalty affecting them not only today but well into their future.

[2]Other research focuses on parents of children 12 and under with an assumption that these children require more overt attention and observation for safety throughout the day and because state-level laws around child neglect and abuse require adult supervision for children under the age of 12 (Furman et al. (2021)). However, this assumption ignores two key pandemic-related facts. First, many children including those age 13 to 17 required adult support in figuring out how to engage with virtual school from home and to keep them engaged and on tract. Second, the pandemic exponentially increased the mental health needs of all children, especially teenagers, whose age-specific social needs were no longer being met by regular interaction with classmates and friends at in-person school. Many parents had to manage the mental health struggles and emotional needs of their teenage children as well throughout the workday.

[3]We have calculated the estimated impact of daycare closures on parents including those of children younger than five (results not shown). As we expected, the results are similar but smaller in magnitude because more mothers of children under five were out of the labor force before the pandemic.

In addition to a comparison with fathers, a within-gender comparison of a pandemic-induced motherhood penalty is relevant. While labor market expectations may be similar within gender, the unexpected exogenous increase in childcare needs for one group of women while not the other allows us to disentangle the effect of unanticipated increased care demands during pandemic months holding other work-related gendered expectations constant.

2.2 A Tale of Two Labor Markets

In an economy markets live, breathe, and thrive through exchanges between buyers and sellers. Labor markets are no different. Businesses demand labor through the jobs they offer, and employees supply this labor through the jobs they take. Let's assume that in March 2020, labor markets fractioned employers into two general types of employment – those whose jobs were not amenable to remote work and those who transferred the labor of their employees into remote work environments within the employee's home.

Many employers in the first group were forced to shut their doors and employees lost their jobs. These employers included hair salons, department stores, retail shops, and the like. Some were resilient either because governments deemed them as essential like construction companies, grocery, and liquor stores or because they transformed their business models. For example, some restaurants forced to shut their doors to indoor customers quickly transitioned to food delivery or takeout service. Employees of these employers had two experiences – either they exchanged their labor in the market for hours worked on site when their employer's business model adapted or they lost their jobs. None of these experiences required mixing paid labor with the employee's home and family environment and personal roles as a parent, spouse, and family member.[4]

As for employees who worked for the second group, for the most part they didn't lose their jobs due to reductions in the demand for labor, but most experienced extreme shifts in their work environments. Instead of heading into their employer's office for work every morning, their employer came into their homes via remote telework. Instead of walking to the water cooler to hear the latest office gossip, they walked into their kitchens where they may have been alone or encountered themselves surrounded by other family members. This mass transition to remote work meant their work lives were no longer clearly delineated from the personal but rather comingled. Single employees living alone faced hardship in terms of loneliness and isolation during work hours where they may have been use to socializing with work colleges over lunch in the cafeteria or by taking a short walk down the hall to a colleague's cubicle or office. With schools closed, parents were left simultaneously multitasking the different roles of their lives as both employees and parents

[4]Another equally demanding familial role is that of adult child to elderly parents. This role was also blurred for individuals living with an elder parent in need of care. Around 6.2% of our sample of custodial parents to school-age children also lived with their own parent over the age of 65 during pandemic months.

throughout the workday (Bauer et al. (2021c)).

One might instinctively consider parents with paid jobs convertible to telework the "lucky ones" since they held onto their incomes by transitioning their formal paid labor into their homes. While this may by true in terms of income generation, it is unclear if this is the case entirely as these individuals may have encountered unique challenges in balancing work with the demands of family as roles blurred. In this paper we dig deep into these topics by posing three questions related to job flexibility and childcare: (1) What would generally happen to labor supply if childcare didn't exist? (2) Can telework mitigate the effect of a childcare shock on labor supply? In other words, did this massive shift of paid labor into home environments benefit workers equally? Were parents able to stay attached at similar levels to their counterparts while simultaneously caring for their children and families? Was the experience different compared to parents in onsite occupations?[5] (3) Were the effects of this childcare shock on labor supply immediate, long-term, or both?

2.3 Workplace Flexibility

There is a general belief that more flexible jobs can increase female labor supply, especially for mothers, and there is evidence that this may be true for jobs that allow flexibility in choice of hours worked – both when and how much (Goldin (2014); Goldin (2021b)). However, during the pandemic even with extensive amounts of flexibility, telework may not have saved us all equally. Even with the type of flexibility that would allow custodial parents to stay engaged in work at odd hours, they may not have been able to avoid intense and frequent interruptions from family members.

The pandemic had a pervasive effected on all workers, yet some may have been disproportionately impacted due to a joint exogenous shock of changes to paid work life intermingled with childcare. During pandemic times, telework-compatible jobs did not relieve parents of the additional effort required to care for their children during school hours. This care included (but was not limited to), supporting virtual schooling needs, finding backup care, preparing food, serving meals and snacks, organizing down time, monitoring screen time, and meeting all the emotional needs of their children. Parents ended up substantially increasing the amount of time they spent on unpaid non-market labor. Even mothers who maintained paid labor gained the equivalent of a second fulltime job of unpaid childcare and domestic chores within their homes (Bauer et al. (2021c)). While government programs provided support to families and individuals during the pandemic and businesses expanded flexible work options, those with childcare responsibilities may have still disproportionately experienced the brunt of the pandemic's economic cruelty.

[5] Onsite occupations are defined as jobs that need to be done at the employer's location due to safety, physicality, or other reasons.

3 Methods and Data

Using the Current Population Survey from January 2018 to September 2021 (Flood et al. (2021)), we cut the data into two pooled cross-sections– observations of individuals in the months before the pandemic compared to observations of individuals in the months after and including March 2020. We use difference-in-difference (DID) methods to test whether custodial mothers of school-age children experienced disproportionate shifts in labor supply associated with increased caregiving responsibilities.

We start with a basic difference-in-difference (DID) framework for women aged 25 to 54 in sample nine months before March 2020 and nine after (and including) March 2020 shown in Equation (1),

$$\begin{aligned} Y_{icst} = \beta_0 + \beta_1 * \text{Kids}_{icst} + \beta_2 * \text{Post}_{icst} + \beta_3 * \text{Adult}_{icst} \\ + \delta * \text{Kids}_{icst} * \text{Post}_{icst} + \zeta_c + \phi_s + \nu_t + \varepsilon_{icst} \end{aligned} \tag{1}$$

Y_{icst} is a dichotomous variable of four different labor market indicators for individual i in county c and state s at time t. Kids_{icst} is an indicator for individuals with kids that are of school-age (5-17 years old) living in the same household. Post_{icst} is an indicator variable for the period March 2020 or later. Adult_{icst} is a dummy variable indicating the presence of more than one prime-age (25 to 54) adult in the household.[6] ζ_c, ϕ_s, and ν_t denote county, state and year fixed effects, respectively.[7] We cluster our standard errors at the state, year and month levels to account for correlations in outcomes due to policy and labor market shocks at these levels that are not accounted for by the observed variables in the specification. δ is the main coefficient of interest representing the average difference in Y_{icst} before and after the pandemic for custodial mothers with school-age children relative to women without dependent children, conditional on differences in Y_{icst} due to the presence of adults in the household and county, state, and year-specific shocks.

While everyone was exposed to the pandemic and its generic effect on one's ability to work conditional on the type of job one had and shifts in labor demand, parents of school-age children were additionally exposed to a childcare shock because the six to eight hours of the day when their school-age children were normally outside the home vanished from one day to the other. Many parents of school-age children acquired between 42 to 56 additional hours per week of unpaid childcare effort in March 2020, which lingered for well over a year and, in some cases, is still an issue today as schools send children who have been in close contact with another student or teacher who tested positive for COVID-19 home to quarantine. This increased childcare shock may have

[6] Our results are robust to the inclusion of race and education. In the results section, we examine the heterogeneity in effects by education and type of occupation separately.

[7] In specifications below, we incorporate occupation and industry.

had an additional differential effect on parental labor supply since childcare is labor intensive and inflexible.

The four labor market indicators we analyze in this paper are: labor force participation, active work status (conditional on being in the labor force), unemployment (conditional on being in the labor force) and being on leave (conditional on having a job).[8] Labor force participation is defined as whether one has a paying job or is actively looking for one. Active work status is determined as, conditional on being in the labor force, having a job and actively performing the tasks of that job (not on leave). Unemployed is defined as those who do not have a paid job but are actively looking for one. While the distinction between being on leave and actively working has historically been ignored, it became glaringly relevant during the pandemic when most parents taking leave were doing so not to rest and recover but rather to handle care responsibilities of young children and other loved ones (Heggeness (2020); Goldin (2021a)). Because of this, the fourth outcome variable is an indicator identifying whether, conditional on having a paid job, the individual was on leave from work.

To identify the impact on custodial mothers relative to custodial fathers, we estimate a triple-difference (DDD) equation in which we include all adults aged 25 to 54 without children under age five (Equation (2)). Women are identified using the dummy variable Female_{icst}. Here, the coefficient of interest, θ, captures the differential effect of the childcare shock on prime-age custodial mothers of school-age children relative to prime-age custodial fathers of school-age children compared to their counterparts without dependent children.

$$\begin{aligned} Y_{icst} = {} & \beta_0 + \beta_1 * \text{Kids}_{icst} + \beta_2 * \text{Post}_{icst} + \beta_3 * \text{Adult}_{icst} + \beta_4 * \text{Female}_{icst} \\ & + \delta * \text{Kids}_{icst} * \text{Post}_{icst} + \theta * \text{Kids}_{icst} * \text{Post}_{icst} * \text{Female}_{icst} + \zeta_c + \phi_s + \nu_t + \varepsilon_{icst} \end{aligned} \tag{2}$$

A factor influencing the ability to multitask work with crisis care during the pandemic was the extent to which one's job was easily convertible to telework or remote work. As mentioned, brick-and-mortar operations (e.g., retail stores and restaurants) were forced to shut down. Even though some moved to online and delivery services, many employees temporarily or permanently lost their jobs. The biggest shift in the work environment arguably took place in jobs located in offices that used cloud platforms, laptops, and other technologies to convert office work from the employer's location to home offices across the country. These businesses found a way to survive by converting and redistributing the core of their productivity to employee's home offices, dining rooms, and

[8] Our main specification and analysis of labor force participation includes all prime-age custodial mothers. However, in our analysis of labor force participation for those mothers in telework-compatible or onsite occupations, we are limited to only prime-age custodial mothers who have had a job 12 months prior to observation. Mothers who have never worked and those who have worked but have been out of the labor force for more than one year are excluded because we cannot determine an occupation for those mothers and, therefore, whether the occupation is telework-compatible or not.

shared living spaces. This flexible transition saved millions of jobs, paychecks, and businesses.

In normal times, telework or flexible work options have the potential to expand formal paid work options for parents, especially mothers, on the margin balancing personal life and care responsibilities simultaneously with paid labor (Goldin (2014); Goldin (2021b)). A simple measure of the potential for telework is whether an individual is working in an occupation that is telework-compatible, meaning the job has the potential to be virtual and viable from home. This is especially relevant during a public health crisis when employers are forced to creatively figure out remote work options for employees due to public health concerns or risk losing the productivity of their employees (and profit).

We divide occupations into telework-compatible and onsite occupation types using the Census Bureau's 2010 occupation classification scheme and telework occupation definitions as defined in Dingel and Neiman (2020). Dingel and Neiman use responses to two surveys administered by O*Net to assign a value $\in$ [0,1] indicating the telework ability of an occupation.[9] Their methodology identifies occupations that cannot be performed at home due to the nature of the work or due to certain activities typically performed on the job.[10] All other occupations are classified as telework-compatible. Their classification for most 5-digit standard occupational classification (SOC) codes is publicly available. We use a crosswalk between SOC codes and Census 2010 occupation codes to merge their classification with occupation codes in the CPS data.[11] We then construct a binary telework variable using their score.[12] We manually assign telework status to 47 occupations that remain unmatched after this process.

We do not have detailed information regarding who worked from home, and some categories in this classification could be confounded in that the category is mostly telework-compatible with some non-telework jobs mixed in (or vice versa). One benefit of categorizing telework status in this way is that we can capture individuals who were not currently working but had an occupation within the last year, which is particularly relevant during the pandemic. Our analysis, therefore, does not censor those who exited the labor force or lost a job within the past twelve months from the time of data collection.

Starting in May 2020, the Current Population Survey began including COVID-related questions, one of which was whether the individual worked from home due to COVID-19. We pool the data from May 2020 to September 2021 and compare our classification of telework-compatible jobs to those who said they teleworked due to COVID-19. We have little expectation that these

[9] These surveys are the Work Context Questionnaire and the Generalized Work Activities Questionnaire.

[10] For example, an occupation is classified as not telework-compatible if the average respondent reports that their majority of time is spent walking or running, or if the job requires wearing protective equipment most of the time.

[11] Note that some of their SOC codes correspond to 2018 Census codes, while some correspond to 2010 codes. For completeness, we first match their data with 2018 Census codes, and then with Census 2010 codes.

[12] Occupations with scores 0.5 and above are coded as telework-compatible.

comparisons will align exactly since most employers have a range of staff who can telework and others for whom the job is not feasible for telework and our classification is focused on identifying the general or major trend in each occupation. In addition, the telework question inserted into the CPS is COVID-19 specific and, as such, does not provide information on individuals who may have been teleworking for other reasons.

Around 78% of individuals who said they were teleworking due to COVID-19 were captured as working in telework-compatible occupations (authors' calculations, results not shown). For those who said they were not teleworking due to COVID-19, the match was lower as we would expect. Around 67% of those who said they were not teleworking due to COVID-19 were identified in onsite occupations, the other 33% fell into telework-compatible (authors' calculations, results not shown). Of those, a portion of them may be teleworking but not specifically due to COVID-19. The fact that we generally capture individuals from the COVID-19 remote work question into the relevant telework-compatible categories provides confidence that, on average, we are capturing overall trends correctly.

The style of work available to an individual, onsite or remote, can depend on one's level of education. Higher levels are correlated with more white-collar office work. A worthy exercise to account for this is to isolate the effect of telework flexibility on the impact of a childcare shock for those in onsite jobs and, separately, those in telework-compatible occupations by educational attainment. We run our basic DID framework (see Equation (1)) for four separate subsamples of women age 25 to 54. They are: onsite with less than a college degree, onsite with a college degree or higher, telework-compatible with less than a college degree, and telework-compatible with a college degree or higher.

The pandemic rocked businesses to their core. Some adapted, but jobs and industries were differentially devastated – losing all line staff or all employees when they were forced to shutter their doors. Because the experience was vastly different by occupation and industry, we examine the impact of a childcare shock in two ways. First, we include occupation and industry-level fixed effects in our analysis to account for across occupation and industry differences. We then examine a subset of industries that were uniquely hit and for whom employee composition is disproportionately female. The subset of industries we examine are (1) hospitals and nursing homes, (2) teaching, schools, and daycares, (3) retail and personal services, and (4) professional or white-collar industries. Together, they make up almost 72% of women in our sample who participate in the labor force. Again, we will use our basic DID framework as in Equation (1) and (2) on these industry-specific subsamples.

After studying the overall marginal effect of a childcare shock during the first nine months of the pandemic, we examine the extent to which the effect persists today. Was the impact mostly centered

around an initial reaction or did it linger? Was there a differential longer-term effect for mothers compared to fathers? We expand the timeframe of our analysis to 12, 15, and 18 months pre/post-March 2020 and again include fixed effects for more than one prime-age adult in the household, educational attainment, occupation, industry, state, county, and year. We cluster standard errors by state, year, and month. These tables are presented in the appendix and results are discussed below. Here the question of interest is whether the impact of a childcare shock dissipated overtime or still lingers today.

4 Results

We begin by demonstrating that prime-age custodial mothers of school-age children have, for the most part, stayed attached to the labor market. Using 2018 and 2019 data as a reference to non-pandemic times, at least a portion of the monthly swings we have seen in labor force participation, leave, and work during the pandemic were common even before COVID-19 (Figure 1, Panel A). Women and men living without dependent children and custodial fathers also experienced an increase in leave over summer months, but these shifts were not as sharp as for custodial mothers (Figure 1, Panels B, C, and D). Figure 1 shows that, at least descriptively, the largest change to mothers' engagement in paid labor during the pandemic was not leaving the labor market but rather in their ability to actively work. Increases in leave from work and unemployment were initially greater than increases in formal exits from the labor market.

Figure 2 shows trends in our four outcome variables for custodial mothers of school-age children by telework status and educational attainment. Everyone's labor force participation decreased at the pandemic's onset, but the largest drop in labor force participation occurred among mothers with less than a college degree in onsite occupations. This makes sense as many retail and personal service businesses like hair and nail salons were forced to shut their doors in March 2020 and a larger proportion of those mothers had no choice but to leave the labor market as childcare issues arose. Due to increased family responsibilities many could not take the time needed to search for new work, but some did. These mothers also had steeper increases in unemployment and decreases in active work status. Their leave take-up patterns look similar to their counterparts in telework-compatible occupations. Mothers with a college degree or higher in telework-compatible jobs descriptively had the smallest drop in labor force participation, a delayed drop in active work status tied to the start of school in the fall of 2020, lower unemployment, and lower rates of leave (excluding summer months).

A question remains as to how much of these descriptive differences were due to labor demand issues (businesses shuttering their doors and all employees losing work) and how much were due to shifting labor supply (employees making individual decisions to stop working because

of public health concerns or childcare issues). This is what we tackle in the rest of this paper. Specifically, we identify the marginal effect of a childcare shock on the labor supply of employees most disproportionately likely to be bound by informal care challenges – working mothers.

4.1 Validation Checks

Table 1 presents descriptive statistics for each treatment and control group during the two nine month periods before and after March 2020 for individuals aged 25 to 54 by gender and parental status. As one would expect, we see no major differences in general demographics, family variables of interest, or educational attainment before and during the pandemic, but there are observed differences in labor force participation and related outcome variables for all groups.

A critical assumption of DID methodology is parallel pretrends. Under this assumption, level sets between treatment and control groups do not have to be equal, but the trends overtime before exposure to the treatment should be parallel. Figure 3 shows trends in the gap between custodial mothers of school-age children and women living without dependent children in the four major outcome variables used in this analysis. It shows that, for the most part, the four major outcome variables are parallel for prime-age custodial mothers of school-age children compared to prime-age women living without their own dependent children.

The one exception is summer months. Relative to women without children, custodial mothers experienced steeper episodes of leave take up and, conversely, larger increases in non-active work status in summer months prior to the pandemic. This is especially true for mothers with a college degree in telework-compatible occupations (see Figure 2). To avoid violating the parallel trends assumption, we exclude the months of June, July, and August from the pooled difference-in-difference analysis results. The main purpose of doing this is to allow the parallel trends assumption to hold, validating our results, by excluding normative unparallel temporal changes due to shifts in children's schooling and childcare needs in normal times from shifts due to a pandemic-related childcare shock.[13]

It is still possible the methods presented here produce results driven by factors other than the childcare shock particularly if there are unobservable characteristics of the treatment and control groups that changes overtime in an unparallel fashion. We test whether other unobserved factors may drive our results by constructing a 19-month pseudo sample of prime-age women and men exactly one year prior to the actual event (June 2018 to December 2019). We create a pseudo

[13] In our analysis, we find that this correction matters. Including the summer months leads to a downward bias on our coefficients of interest and changes in significance. For example, the labor force participation gap for the entire sample including summer months is -1.1 percentage points (ppts) and statistically insignificant. With the correction, labor force participation decreased 1.5 ppts and is statistically significant at $p<0.10$, implying that mother's labor force participation did disproportionately decrease relative to women living without dependent children.

pandemic event in March 2019 and test whether the labor market outcomes of interest demonstrate significant difference between pre- and post-March 2019. Significant differences could happen either by chance or signal that other relevant factors are being picked up not tied to the increased childcare risk associated with the pandemic.

Table 2 reports the results of this pseudo check of the data. We find no significant difference between custodial mothers of school-age children and women living without dependent children (Table 2, Columns 1-4), nor do we find any significant difference between custodial mothers relative to custodial fathers compared to their childless counterparts (Table 2, Columns 5-8). This check provides additional evidence that the results presented here are not due to shifting changes in unobserved characteristics or other factors but rather isolated to the effect on an increased childcare shock imposed by the pandemic.

4.2 Analysis of Nine-Month Outcomes

Who Exited?– Custodial mothers did exit the labor force during the pandemic, but they did not leave in droves as suggested by popular media (Adely (2020); Ebbert (2020) Mohan (2021)). Between January 2019 and February 2020, on average around 74.2% of custodial mothers of school-age children were participating in the formal labor market (results not shown). By May 2020, that percent decreased by 2.5 percentage points to 71.7% (Figure 1). The immediate shock of the pandemic and school closures bled into summer break for kids and a historically normative decrease in labor force participation for mothers. The biggest cautionary tale is that the change we saw was almost certainly partially driven by normal detachment from the labor market by mothers as summer months began and children exited school (even virtual). By September 2021, 72.9% of custodial mothers of school-age children were in the labor market, an additional 1.3 percentage points more were still out compared to their average of 74.2% pre-pandemic. While custodial mothers left at the onset, about 1/2 of those who left have returned and, perhaps surprisingly, most custodial mothers remained attached to the labor force throughout.

Moving to a more robust difference-in-difference analysis, Table 3 shows the results from Equations 1 and 2. Custodial mothers of school-age children did, in fact, leave the labor force at some point during the first nine months of the pandemic at higher rates relative to women living without dependent children and custodial fathers of school-age children. Their labor force participation dropped 1.5 percentage points due to a childcare shock compared to women living without dependent children (Table 3 , Column 1) and 1.7 percentage points relative to custodial fathers living with school-age children (Table 3, Column 5).

Was the decrease in labor force participation the same for all mothers? We run Equation (1) separately for onsite (Table 4) and telework-compatible (Table 5) occupations by educational at-

tainment (less than a college degree compared to those with a college-degree or higher).[14] Custodial mothers in onsite occupations were no more or less likely to differentially exit the labor force due to a childcare shock, regardless of educational attainment. The labor supply of these mothers, at least during the first nine months of the pandemic, appears driven primarily by demand-side issues than supply-side constraints related to shifting daycare availability.

Table 5 shows that the effect of a childcare shock on labor force participation is driven by mothers with a college degree or higher in telework-compatible occupations, whose participation decreased by 0.2 percentage points attributable to the childcare shock.[15] These effects persisted over time (Appendix Table A5). These women were more likely to have access to economic and financial resources giving them an opportunity to leave the workforce to focus on care for their school-age children. Those with a college degree or higher made up 40.5% of all custodial mothers of school-age children in the sample (authors' calculations, results not shown). Almost half (45.5%) of all custodial mothers who actively worked had a college degree or higher, and almost 1/3 (30.1%) of all mothers had a college degree or higher and actively worked in a telework-compatible occupation (authors' calculations, results not shown).

Who Stayed?– Conditional on being in the labor force, custodial mothers were no more or less likely to actively work compared to women without children and custodial fathers (Table 3, Columns 2 and 6). This is a cautionary tale, however, because the p-value on the coefficient for active work status of mothers with a college degree or higher nine months out was 0.115 (Table 5). By 12 months out the coefficient of -0.0075 (or 0.75 percentage points) had a p-value = 0.083 (Appendix Table A5). While the effect was not statistically significant during the first 9-months of the pandemic, there is evidence that highly educated mothers experienced a temporary disproportionate decrease in active work status during the fall of 2020 when most children began to fully engaged in virtual schooling.

At least initially, the mothers who stayed in the labor force were just as equally engaged in work as their counterparts. One reason may be because of a more egalitarian distribution of domestic tasks and childcare within households than in the past, however research has shown that women carried more burden in increased domestic work during the pandemic than men (Sevilla and Smith (2020)). Another reason might be because many families today rely on two incomes. While a mother's income may not be the highest income in her family, it is necessary to pay bills, put food on the table, and a roof over the family's head. A third reason is that a mother's career today is more intertwined with her identity than in the past and, as such, she is even more willing to take on the pandemic double duty of childcare and paid work if she can rather than give up her career.

[14] Parallel pretrend figures are available in Appendix Figure A1 to Figure A4.

[15] Most of the drop in labor force participation goes away once we control for occupation and industry implying that most of the differential shift to workforce exits for mothers was due to disproportionately working in occupations and industries that struggled to remain open when the pandemic hit.

Whatever the reason(s), mothers initially stayed attached to the labor market as best they could, just like everyone else.

Who Took Up Unemployment and Leave from Work? - Mothers were less likely to be unemployed. Custodial mothers of school-age children were 0.7 percentage points less likely to be unemployed compared to women living without dependent children (Table 3, Column 3). Unemployment benefits are low, require time for the application process, and generally come with work search constraints. All or some of these factors may have made this option unviable for working mothers with childcare needs. This effect goes away when separating mothers by the telework-compatible status of their job and educational attainment (Tables 4 and 5). Occupation and industry account for a large portion of the differential increase in leaving the labor force between mothers and women without children (Horrigan et al. (2022)), and it is likely that this sorting into occupation and industry is partially captured in the raw difference in unemployment observed in Table 3.

Unemployment was not disproporationately used as a support, but leave was. Custodial mothers of school-age children were more likely to leave from paid work during the pandemic's onset. They were 0.7 percentage points more likely to take leave than women living without dependent children (Table 3, Column 4). Comparing mothers by educational attainment and telework-status, custodial mothers in onsite jobs and with less than a college degree were 0.8 percentage points more likely to be on leave compared to their childless counterparts (Table 4, Column 4).[16] Mothers with a college degree or higher and in telework-compatible occupations were also 0.8 percentage points more likely to be on leave (Table 5, Column 8) and these effects persisted over time (Appendix Table A5). There were no differences for mothers with higher levels of education in onsite occupations nor for mothers with lower education levels in telework-compatible occupations (see Table 4, Column 8 and Table 5, Columns 4 respectively).

We interpret these results in the following way. Highly educated moms have more "choice" over labor supply decisions because their households have, on average, more resources. These mothers disproportionately took leave to balance the stress of additional childcare responsibilities during work hours. Other household resources may have given them more flexibility to "opt out" of paid labor to care for their children. Conversely, highly educated mothers working onsite in hospitals or managing construction sites found care for their children in a way that did not disproportionately encourage them to take leave. The care may have taken place from a spouse who either did not work or had a telework-compatible job or, perhaps, an au pair, live-in nanny, or a daycare center providing childcare for essential workers. These mothers were never expected to work while coexisting with other family members. As such, the lines were not blurred and their work was manageable. Lower educated women in telework-compatible jobs kept their jobs at the same rate as their counterparts

[16] Results are not shown here, but the increase in leave take-up for mothers with less than a college degree in onsite occupations persisted over time.

without children. Most likely because their households could not afford to lose their income. These mothers bore the brunt of pandemic stress because they kept working while simultaneously taking care of their children. Conversely, lower educated women who disproportionately took leave from onsite occupations may not have had anyone else to care for their children and did not have the resources to pay for private care. They had no choice but to exit, at least temporarily. For these women their leave was most likely unpaid.

To understand the impact of across occupation and industry differences, we add in fixed effects for occupation and industry in Table 6. Retention in the labor market was influenced heavily by across occupation and industry differences. Our simple DD estimates of the effect of a childcare shock on labor force participation reduce from 1.5 ppts to a 0.1 ppt difference between custodial mothers and women without children and from 1.7 ppts a 0.2 ppt decrease between custodial mothers and fathers. Conditional on remaining in the labor force, across occupation and industry differences have little influence over the other three outcomes.

We then select four industries dominated by female employment and replicate our analysis on these four subsamples separately. Results are shown in Table 7. Teachers and those in retail were disproporationately impacted. Custodial mothers in education were less likely to be in the labor force than women without children and custodial fathers. Those in retail services were less likely to be in the workforce compared to women without children. Custodial mothers in white collar industries were less likely to be in the labor force compared to custodial fathers. We found no differences in healthcare.

Overall, these results paint a picture of a very skewed experience regarding the effect of increased childcare responsibilities, or childcare shock, on mothers working in paid labor. Not all custodial mothers were affected equally. Telework flexibilities of employers appears to have kept most working mothers engaged in paid work even though they experienced increased childcare responsibilities at home. However, due to the blurred lines of work and home, telework did not save all working mothers and society lost out on the potential productivity these highly educated women can provide. In this sense, economic development and growth suffers.

4.3 How Long Did the Impact of the Childcare Shock Last?

The appendix tables include results from Equations (1) and (2) for different subsamples increasing by three-month intervals from six to 18-months out from the onset of the pandemic. We do not include these tables in the body of this paper due to space constraints, but the results are none-the-less interesting. As Heggeness (2020) has previously shown, one immediate impact of the childcare shock right after the pandemic began (see six-month results Appendix Table A1) was on leave take up of custodial mothers relative to women living without dependent children. Once school started

in the fall of 2020, however, labor force participation disproportionately decreased for custodial mothers of school-age children relative to both female counterparts and custodial fathers.

Conditional on staying attached to the labor force, in the short-run (first six months) custodial mothers generally looked like custodial fathers. They were just as likely to be working, unemployed, or on leave (Appendix Table A1). Mothers and fathers appeared to have experienced an equal effect of the increased childcare burden on their labor market experiences. Caution that this does not mean they were engaged in an equal amount of household tasks, just that if one group struggled to be actively working in paid labor, the other did at a similar rate.

As time wore on, however, the seams began to tear. One year into the pandemic, custodial mothers were not only around 1.8 percentage points more likely to exit the labor force than custodial fathers, but they were also 1.1 percentage point less likely to be actively working and 0.7 percentage points more likely to be on leave due to the childcare shock (Appendix Table A2). By 15 and 18 months out, custodial mothers were persistently disproportionately affected in all outcomes analyzed (Appendix Tables A3 and A4). They experienced increasing gaps in the disproportional effect on labor force participation. At 6 months out, they had a 1.5 percentage point decrease in labor force participation that grew to a 2.0 percentage point gap by 18 months. While fathers may have been co-shouldering the brunt of the childcare shock at the onset of the pandemic, mothers who stayed attached to the labor market may have become more disproportionately responsible for carrying the childcare duties as time went on by reducing active work and increasing take up of unemployment or leave from paid work to balance it all.

Results over time are consistent for women in onsite jobs in that those women with less than a college degree disproportionately took leave from work due to the childcare shock. Women in onsite jobs with a college degree or higher were not invincible though, and, by 18-months, we also see them disproportionately taking leave from work for childcare related issues (results not shown). In terms of active work, custodial mothers seemed to have found a new equilibrium among virtual and hybrid schooling, but they have and continue to experience additional scarring since the summer of 2021. While the pooled data showed custodial mothers less likely to take up unemployment, they were more likely to disproportionately receive it in later months (results not shown). Take up of leave from work was cyclical and increased disproportionately during times when kids were not in school.

Figure 4 reports DID coefficients from Equation (1) using the four industry-focused subsamples previously mentioned and increases at three-month intervals. It shows the differential effect of the childcare shock on custodial mothers every three months relative to women living without dependent children for the four outcome variables: labor force participation, active work status, unemployment, and leave take up. We find varying effects by industry. For some (e.g. retail),

a disparity appeared after one year of the pandemic but recovered. Some are still experiencing a disproportionate childcare shock that is holding them back from full engagement in labor force participation compared to women living without dependent children. For example, mothers working as teachers and white-collar office workers disproportionately exited at the end of the 2020-2021 virtual school year and still had not recovered by the beginning of the 2021-2022 school year. These were the mothers most likely to be continuously and intensely multitasking paid work with childcare inside their homes on a daily basis and were likely to have experienced burn out.

5 Conclusion

In this paper, we study the effect of increased childcare duties on custodial mothers. Lockdowns and school closures during the COVID pandemic served as an exogenous shock of increased childcare and household tasks. We estimate the differential impact of this shock on custodial mothers relative to women without childcare duties and custodial fathers. Our results align with what others have shown (Bauer et al. (2021b); Aaronson and Alba (2021); Furman et al. (2021)). Prime-age custodial mothers of school-age children disproportionately exited the workforce compared both to prime-age women without children and custodial fathers, but exits due solely to issues of childcare were relatively small - anywhere from 0.1 to 0.2 percentage points after controlling for across occupation and industry differences. Conditional on remaining in the workforce, mothers of school-age children were less likely to be unemployed and took more leave; they looked similar to fathers - at first. As the pandemic lingered, childcare held mothers back. By March 2021, they were less likely to be actively working, taking unemployment or leave at higher rates than fathers due to childcare related issues. The gender gap among parents participation in the labor force grew 0.5 ppts between September 2020 and September 2021 (Appendix Table A2 and Appendix Table A4).

Remote work did save jobs when the pandemic hit and the option for telework kept many attached to the labor market and working. However, the option for telework did not equally retain custodial mothers of school-age children and more of them left. At first glance our results may appear counterintuitive. We argue they are not. Parents in onsite occupations were not exposed to the same level of intense simultaneous multitasking of childcare with work as parents in telework-compatible occupations.

Mothers in onsite jobs had two paths. Those with low levels of education took leave to handle childcare, most likely because they did not have another adult at home or could not afford (or find) private care for their school-age children while they worked outside their home. Mothers with higher levels of education working as emergency room doctors, veterinarians, and construction site managers did not experience differential career scarring. These women clung to their jobs outside

of the home at similar rates to women living without dependent children, and they experienced no differential leave take up attributable to childcare needs.

Regarding remote work, the results flip. Mothers with low levels of education in telework-compatible occupations do not look any different than their counterparts without children in terms of work engagement. Telework allowed them to stay tethered to a job they probably needed to put food on the table and a roof over their head. They most likely paid a price, however, in terms of exhaustion and burn out. Custodial mothers with high-levels of education in telework-compatible jobs disproportionately left the workforce and took leave. These mothers experienced the same high-intensity level of multitasking childcare with paid labor but most likely had enough resources within their household or savings to make the choice to step back from juggling pandemic care and paid work.

Mothers have shown amazing resiliency regarding their attachment to the labor market. They have not left in droves and show no sign of doing so. Some did, however, struggle to "lean in" when faced with the enormous tasks of childcare and helping their children transition from in-person to virtual learning. The additional evidence in this paper shows that systems of comprehensive and affordable childcare are critical to keep parents engaged in work, especially remote work, and reduce gender inequalities in the workplace. Almost 3-in-4 custodial mothers of school-age children are actively engaged in the labor force (Figure 1). Mothers are breadwinners. Perhaps they do not earn as much (on average) or actively dive into the workforce with such persistence as men, but when they work, it defines them, economically supports their families, and is, in many cases, a critical resource for the household's survival.

The results in this paper point towards a need for policies that bolster and expand comprehensive, affordable childcare. If mothers are to participate at equal rates, we need to acknowledge the silent disproportional weight they carry of providing care to children (and elder parents) in ways that interrupt their ability to be economically active at the same rate as others. Without care policies, full employment and economic growth are stifled, never allowing our nation to reach its full potential and restricting the Federal Reserve's ability to achieve its full employment mandate. This hinders growth and hurts us all.

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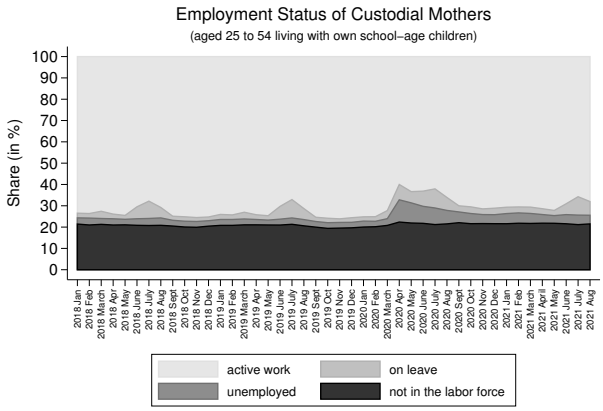
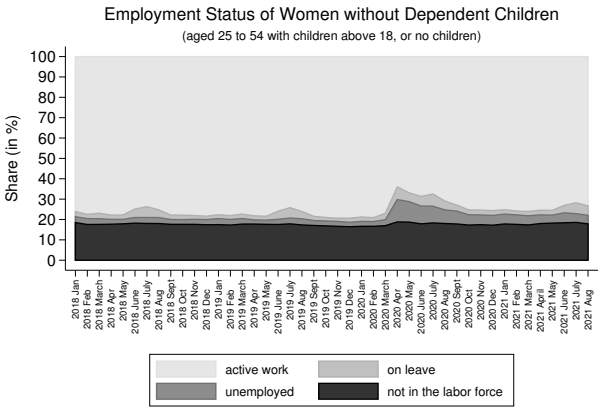
6 Figures and Tables

Panel A



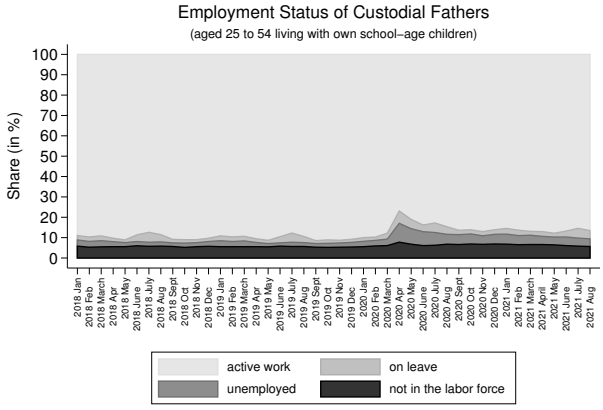
Graph shows the share of custodial mothers in each category.

Panel B



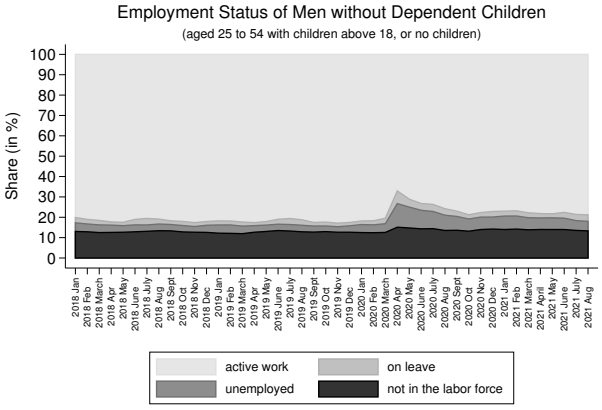
Graph shows the share of women without dependent children in each category.

Panel C



Graph shows the share of custodial fathers in each category.

Panel D



Graph shows the share of men without dependent children in each category.

Figure 1 – Employment by Gender and Parental Status

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

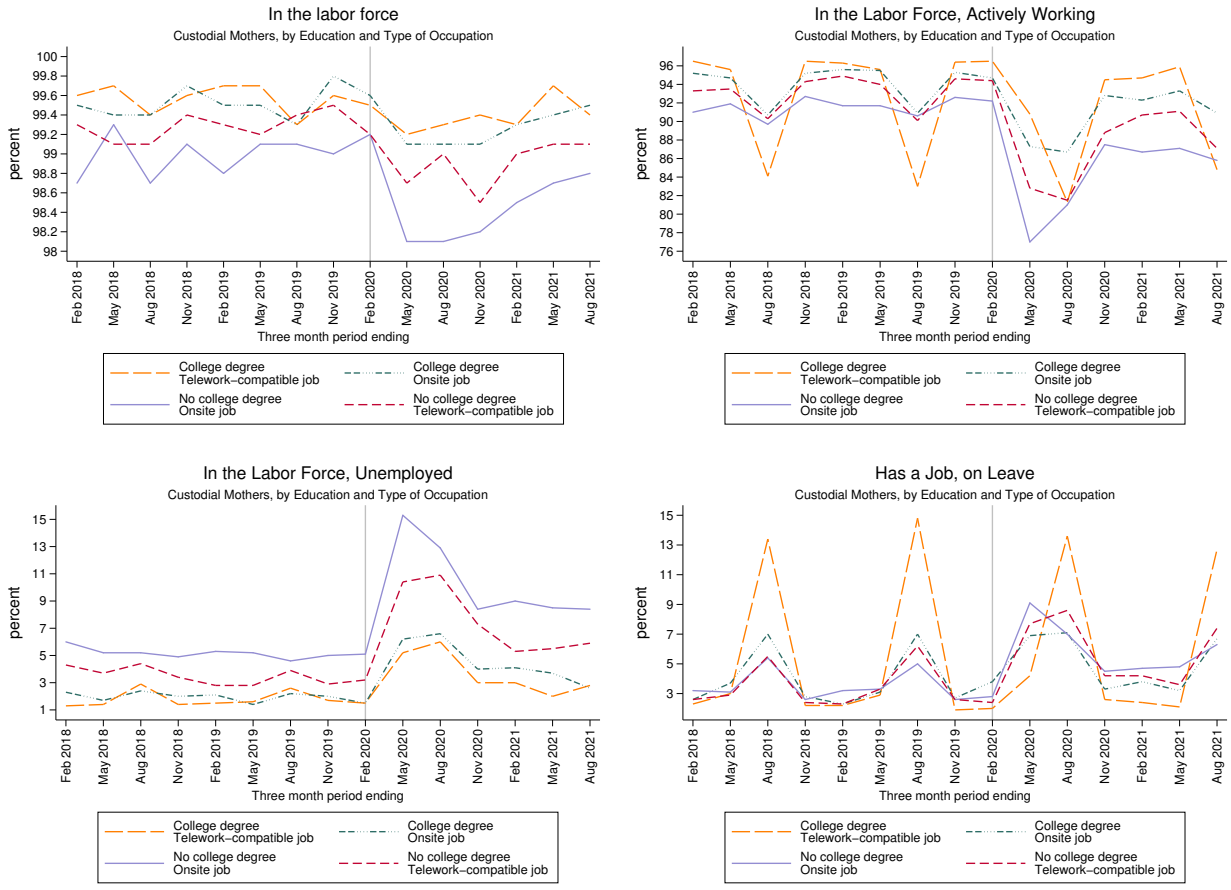


Figure 2 – Employment Trends of Custodial Mothers by Education and Job Type

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

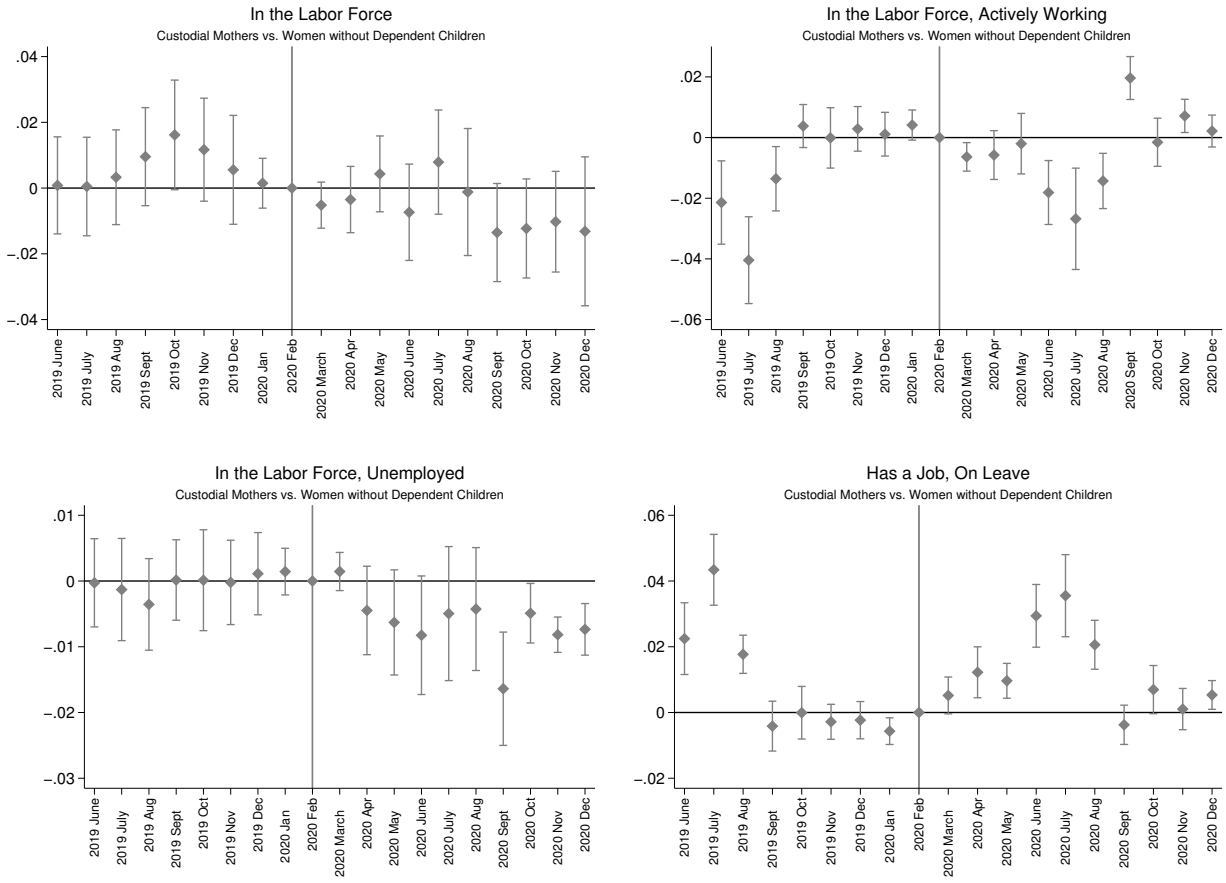


Figure 3 – Pretrends Analysis

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

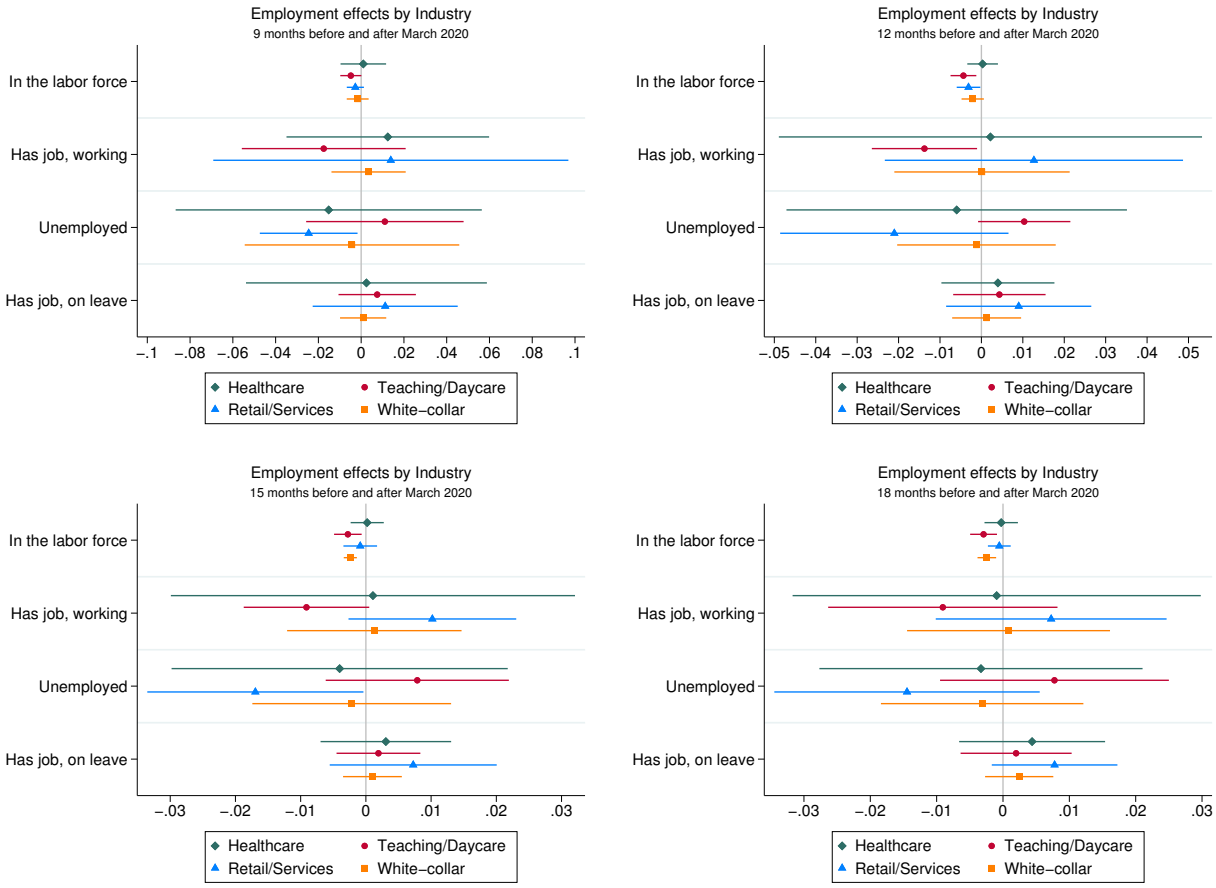


Figure 4 – Effect of a Childcare Shock on Employment Outcomes by Industry

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 1 – Descriptive Statistics (9-Months Pre/Post)

	June 2019-Feb 2020			March-Nov 2020		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Custodial Mothers of school age children:						
Age	87,735	39.65	7.07	83,564	39.88	6.96
Number of own children	87,735	2.25	1.05	83,564	2.26	1.07
More than one prime age adult in HH	87,735	0.84	0.36	83,564	0.85	0.36
Eucation Attainment:						
Less than HS diploma	87,735	0.1	0.3	83,564	0.09	0.29
HS Diploma	87,735	0.23	0.42	83,564	0.23	0.42
Some college	87,735	0.27	0.45	83,564	0.27	0.44
Bachelor's degree or higher	87,735	0.4	0.49	83,564	0.41	0.49
Labor Force Participation:						
In the labor force	87,735	0.75	0.43	83,564	0.72	0.45
Has job, working	65,909	0.92	0.27	61,261	0.86	0.35
Unemployed	65,909	0.03	0.18	61,261	0.08	0.27
Has job, on leave	63,813	0.04	0.21	56,797	0.06	0.24
Telework-compatible Occupation	66,304	0.49	0.5	61,982	0.5	0.5
Control group women:						
Age	101,393	39.86	9.86	97,405	39.62	9.89
Number of own children	101,393	0.26	0.61	97,405	0.25	0.6
More than one prime age adult in HH	101,393	0.77	0.42	97,405	0.78	0.41
Eucation Attainment:						
Less than HS diploma	101,393	0.07	0.25	97,405	0.06	0.23
HS Diploma	101,393	0.24	0.42	97,405	0.23	0.42
Some college	101,393	0.26	0.44	97,405	0.26	0.44
Bachelor's degree or higher	101,393	0.44	0.5	97,405	0.46	0.5
Labor Force Participation:						
In the labor force	101,393	0.79	0.4	97,405	0.78	0.41
Has job, working	80,542	0.94	0.24	76,372	0.87	0.33
Unemployed	80,542	0.03	0.17	76,372	0.08	0.28
Has job, on leave	78,162	0.03	0.18	70,562	0.05	0.21
Telework-compatible Occupation	80,912	0.5	0.5	77,057	0.52	0.5
Custodial Fathers of school age children:						
Age	66,858	41.37	6.92	64,465	41.59	6.83
Number of own children	66,858	2.27	1.04	64,465	2.3	1.06
More than one prime age adult in HH	66,858	0.95	0.21	64,465	0.95	0.21
Eucation Attainment:						
Less than HS diploma	66,858	0.11	0.32	64,465	0.11	0.31
HS Diploma	66,858	0.27	0.44	64,465	0.27	0.44
Some college	66,858	0.24	0.43	64,465	0.24	0.43
Bachelor's degree or higher	66,858	0.37	0.48	64,465	0.38	0.49
Labor Force Participation:						
In the labor force	66,858	0.94	0.24	64,465	0.93	0.26
Has job, working	62,920	0.95	0.21	60,001	0.91	0.29
Unemployed	62,920	0.02	0.15	60,001	0.06	0.24
Has job, on leave	61,579	0.02	0.15	56,701	0.04	0.19
Telework-compatible Occupation	63,062	0.36	0.48	60,275	0.38	0.48
Control group men:						
Age	110,347	38.26	9.55	105,844	38.12	9.49
Number of own children	110,347	0.14	0.48	105,844	0.14	0.47
More than one prime age adult in HH	110,347	0.73	0.44	105,844	0.73	0.44
Eucation Attainment:						
Less than HS diploma	110,347	0.09	0.28	105,844	0.08	0.27
HS Diploma	110,347	0.31	0.46	105,844	0.31	0.46
Some college	110,347	0.26	0.44	105,844	0.26	0.44
Bachelor's degree or higher	110,347	0.34	0.48	105,844	0.36	0.48
Labor Force Participation:						
In the labor force	110,347	0.85	0.35	105,844	0.84	0.37
Has job, working	94,178	0.94	0.24	88,978	0.88	0.33
Unemployed	94,178	0.04	0.19	88,978	0.09	0.28
Has job, on leave	90,774	0.02	0.15	81,714	0.04	0.19
Telework-compatible Occupation	94,518	0.35	0.48	89,715	0.37	0.48

Source: Authors' calculations, Current Population Survey June 2019 – November 2021, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 2 – Pandemic Placebo in March 2019 (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0418	-0.0043	0.0037	0.0008	0.0876**	0.0154**	-0.0131*	-0.0027
	(0.0067)	(0.0014)	(0.0018)	(0.0024)	(0.0045)	(0.0010)	(0.0013)	(0.0025)
School-age kid*Post	-0.0011	-0.0047	0.0013	0.0035	0.0023	-0.0026	0.0021	0.0006
	(0.0013)	(0.0009)	(0.0019)	(0.0022)	(0.0029)	(0.0015)	(0.0011)	(0.0022)
School-age kid*Post*Female					-0.0038	-0.0019	-0.0008	0.0028
					(0.0032)	(0.0015)	(0.0010)	(0.0007)
Observations	302,133	233,100	233,100	226,159	584,115	483,401	483,401	468,759
R^2	0.018	0.006	0.007	0.003	0.042	0.005	0.006	0.003

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 3 – Effect of a Childcare Shock on Custodial Mothers (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0430	-0.0083	0.0063*	0.0023	0.0894**	0.0139	-0.0104	-0.0037
	(0.0089)	(0.0019)	(0.0010)	(0.0006)	(0.0046)	(0.0023)	(0.0019)	(0.0009)
School-age kid*Post	-0.0151*	0.0005	-0.0073*	0.0073*	0.0023	0.0098	-0.0115	0.0009
	(0.0016)	(0.0016)	(0.0009)	(0.0006)	(0.0044)	(0.0022)	(0.0021)	(0.0015)
School-age kid*Post*Female					-0.0174**	-0.0093	0.0042	0.0063
					(0.0009)	(0.0024)	(0.0025)	(0.0016)
Observations	257,120	197,890	197,890	188,083	498,860	410,855	410,855	390,410
R^2	0.020	0.021	0.019	0.008	0.041	0.019	0.017	0.007

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 4 – Onsite Jobs by Educational Attainment (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0012	-0.0108	0.0110	0.0001	0.0005	-0.0063	-0.0007	0.0071
	(0.0013)	(0.0018)	(0.0025)	(0.0007)	(0.0018)	(0.0025)	(0.0044)	(0.0018)
School-age kid*Post	-0.0007	0.0072	-0.0146	0.0080**	-0.0014	0.0254	-0.0256	-0.0009
	(0.0012)	(0.0029)	(0.0044)	(0.0005)	(0.0018)	(0.0056)	(0.0077)	(0.0025)
Observations	65,488	64,648	64,648	59,888	32,166	31,950	31,950	30,740
R^2	0.009	0.041	0.037	0.019	0.014	0.038	0.044	0.021

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers with less than a college degree compared to women with less than a college degree living without dependent children. Columns (5)-(8) are DD estimates of a childcare shock on custodial mothers with a college degree or higher compared to women with a college degree or higher living without dependent children. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 5 – Telework-Compatible Jobs by Educational Attainment (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0012	-0.0146	0.0058	0.0094	-0.0003	0.0025	-0.0010	-0.0016
	(0.0028)	(0.0054)	(0.0054)	(0.0019)	(0.0004)	(0.0025)	(0.0020)	(0.0017)
School-age kid*Post	-0.0026	0.0031	-0.0045	0.0020	-0.0017**	-0.0097	0.0018	0.0083*
	(0.0032)	(0.0020)	(0.0044)	(0.0008)	(0.0001)	(0.0018)	(0.0017)	(0.0008)
Observations	40,066	39,712	39,712	37,720	61,678	61,372	61,372	59,727
R^2	0.014	0.040	0.036	0.023	0.009	0.019	0.019	0.012

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers with less than a college degree compared to women with less than a college degree living without dependent children. Columns (5)-(8) are DD estimates of a childcare shock on custodial mothers with a college degree or higher compared to women with a college degree or higher living without dependent children. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 6 – Influence of Industry and Occupation Fixed-Effects (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0010*	-0.0081	0.0062*	0.0022	0.0015*	0.0077	-0.0049	-0.0028
	(0.0001)	(0.0021)	(0.0006)	(0.0008)	(0.0001)	(0.0023)	(0.0014)	(0.0012)
School-age kid*Post	-0.0014*	0.0004	-0.0071*	0.0070*	0.0014	0.0104	-0.0118	0.0006
	(0.0002)	(0.0016)	(0.0010)	(0.0006)	(0.0003)	(0.0025)	(0.0020)	(0.0017)
School-age kid*Post*Female					-0.0029**	-0.0101	0.0049	0.0065
					(0.0002)	(0.0029)	(0.0026)	(0.0018)
Observations	257,120	197,890	197,890	188,083	498,860	410,855	410,855	390,410
R^2	0.959	0.054	0.058	0.014	0.954	0.051	0.054	0.011

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table 7 – Labor Force Participation Outcomes (9-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Healthcare								
School-age kid	-0.0016	-0.0083	0.0089	-0.0005	0.0005	0.0075	-0.0037	-0.0036
	(0.0006)	(0.0049)	(0.0045)	(0.0037)	(0.0008)	(0.0063)	(0.0037)	(0.0069)
School-age kid*Post	0.0010	0.0125	-0.0152	0.0025	0.0013	-0.0041	-0.0052	0.0095
	(0.0008)	(0.0037)	(0.0056)	(0.0044)	(0.0014)	(0.0098)	(0.0027)	(0.0109)
School-age kid*Post*Female					-0.0003	0.0161	-0.0091	-0.0074
					(0.0018)	(0.0087)	(0.0053)	(0.0128)
Observations	30,546	30,386	30,386	29,617	39,478	39,285	39,285	38,346
R^2	0.023	0.030	0.036	0.021	0.016	0.025	0.031	0.017
Teaching/Daycare								
School-age kid	-0.0003	-0.0009	-0.0016	0.0026	0.0029	-0.0064	0.0011	0.0061
	(0.0013)	(0.0063)	(0.0047)	(0.0030)	(0.0007)	(0.0105)	(0.0074)	(0.0063)
School-age kid*Post	-0.0048*	-0.0175	0.0111	0.0075	0.0043	0.0189	-0.0109	-0.0096
	(0.0004)	(0.0030)	(0.0029)	(0.0014)	(0.0008)	(0.0093)	(0.0066)	(0.0064)
School-age kid*Post*Female					-0.0090*	-0.0354	0.0208	0.0171
					(0.0012)	(0.0095)	(0.0074)	(0.0066)
Observations	32,781	32,557	32,557	31,297	44,172	43,875	43,875	42,247
R^2	0.021	0.057	0.056	0.030	0.020	0.051	0.048	0.026
Retail/Services								
School-age kid	0.0017	-0.0110	0.0090	0.0024	0.0016	0.0061	-0.0035	-0.0025
	(0.0011)	(0.0056)	(0.0047)	(0.0015)	(0.0016)	(0.0030)	(0.0033)	(0.0036)
School-age kid*Post	-0.0027*	0.0139	-0.0245**	0.0112	0.0014	0.0184	-0.0244	0.0048
	(0.0003)	(0.0065)	(0.0018)	(0.0027)	(0.0012)	(0.0069)	(0.0042)	(0.0054)
School-age kid*Post*Female					-0.0042	-0.0065	0.0017	0.0067
					(0.0007)	(0.0070)	(0.0027)	(0.0061)
Observations	37,602	37,039	37,039	33,799	69,832	69,014	69,014	63,414
R^2	0.015	0.075	0.072	0.037	0.011	0.067	0.061	0.029
White-collar								
School-age kid	-0.0008	-0.0040	0.0031	0.0010	0.0025	0.0148	-0.0075	-0.0077*
	(0.0008)	(0.0007)	(0.0022)	(0.0012)	(0.0008)	(0.0058)	(0.0052)	(0.0012)
School-age kid*Post	-0.0016	0.0035	-0.0043	0.0009	0.0011	-0.0006	-0.0011	0.0017
	(0.0004)	(0.0014)	(0.0039)	(0.0009)	(0.0005)	(0.0035)	(0.0047)	(0.0010)
School-age kid*Post*Female					-0.0029*	0.0046	-0.0036	-0.0010
					(0.0003)	(0.0055)	(0.0070)	(0.0021)
Observations	53,656	53,346	53,346	51,688	93,540	93,074	93,074	90,427
R^2	0.011	0.029	0.032	0.015	0.006	0.022	0.022	0.010

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

A Appendix Figures and Tables

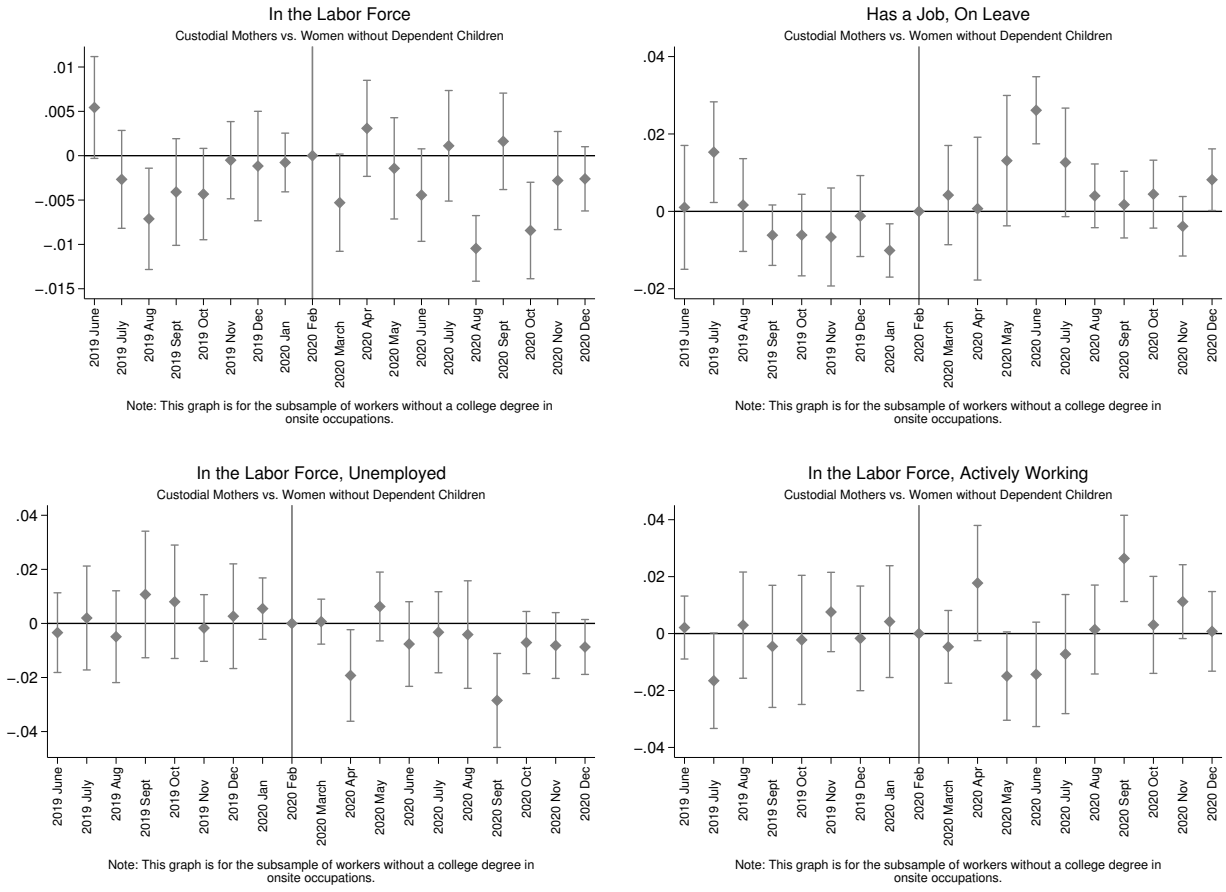


Figure A1 – Pretrends Women without a College Degree in Onsite Occupations

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

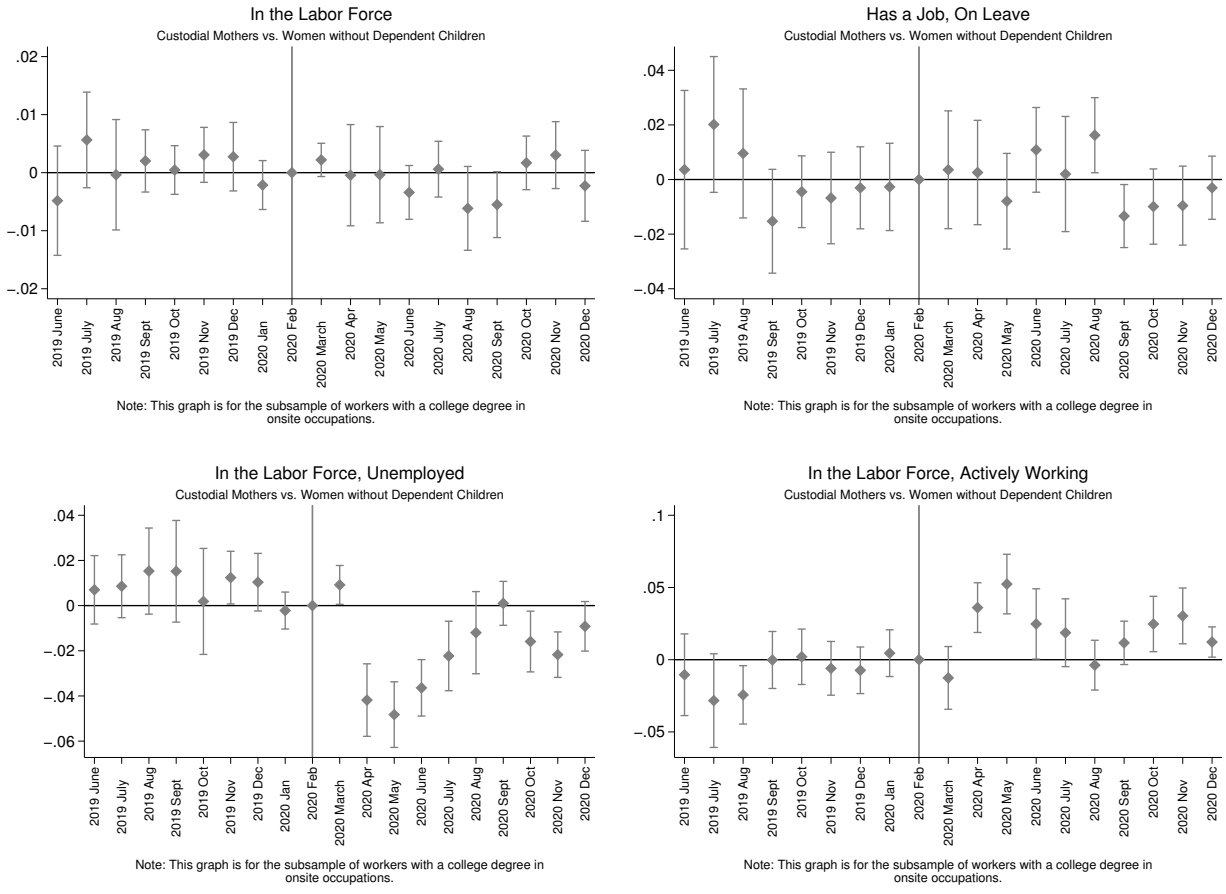


Figure A2 – Pretrends Women with a College Degree in Onsite Occupations

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

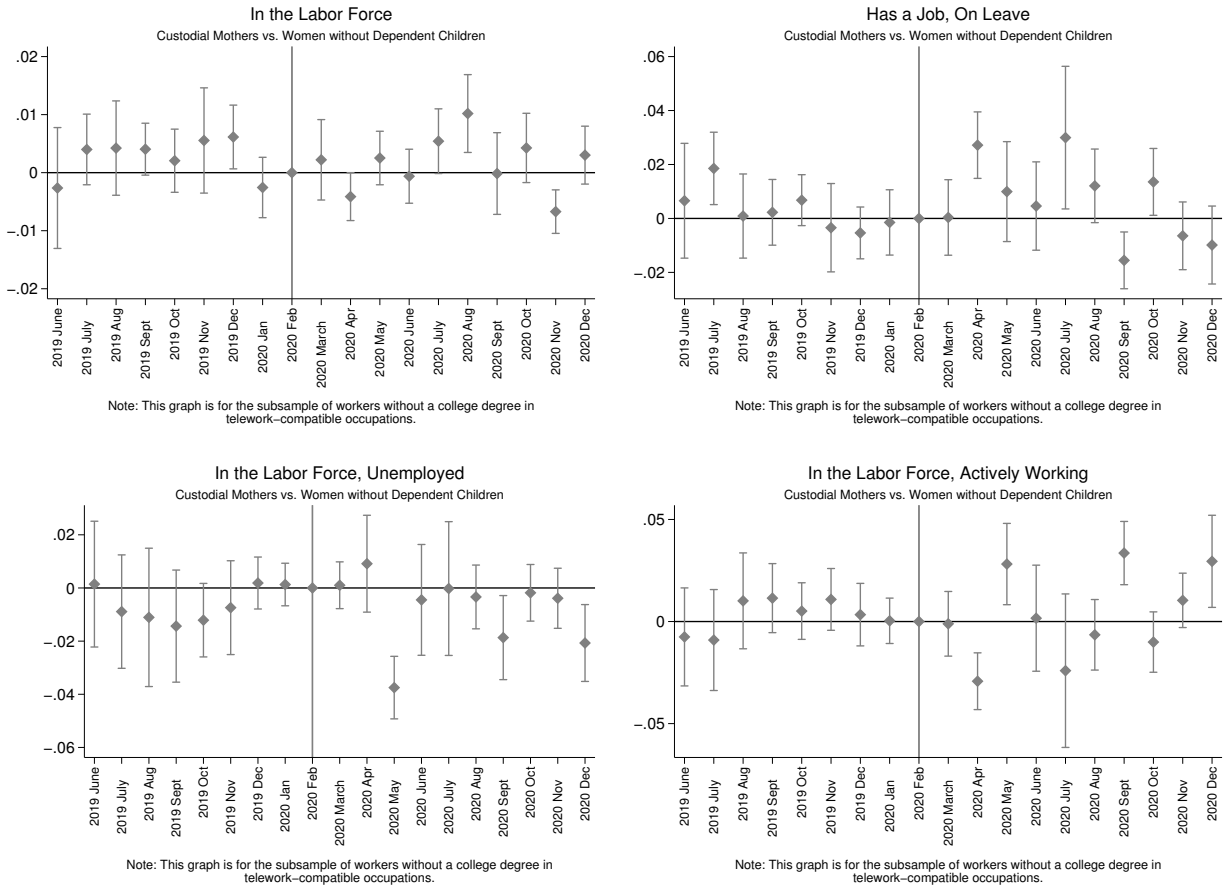


Figure A3 – Pretrends Women without a College Degree in Telework-Compatible Occupations

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

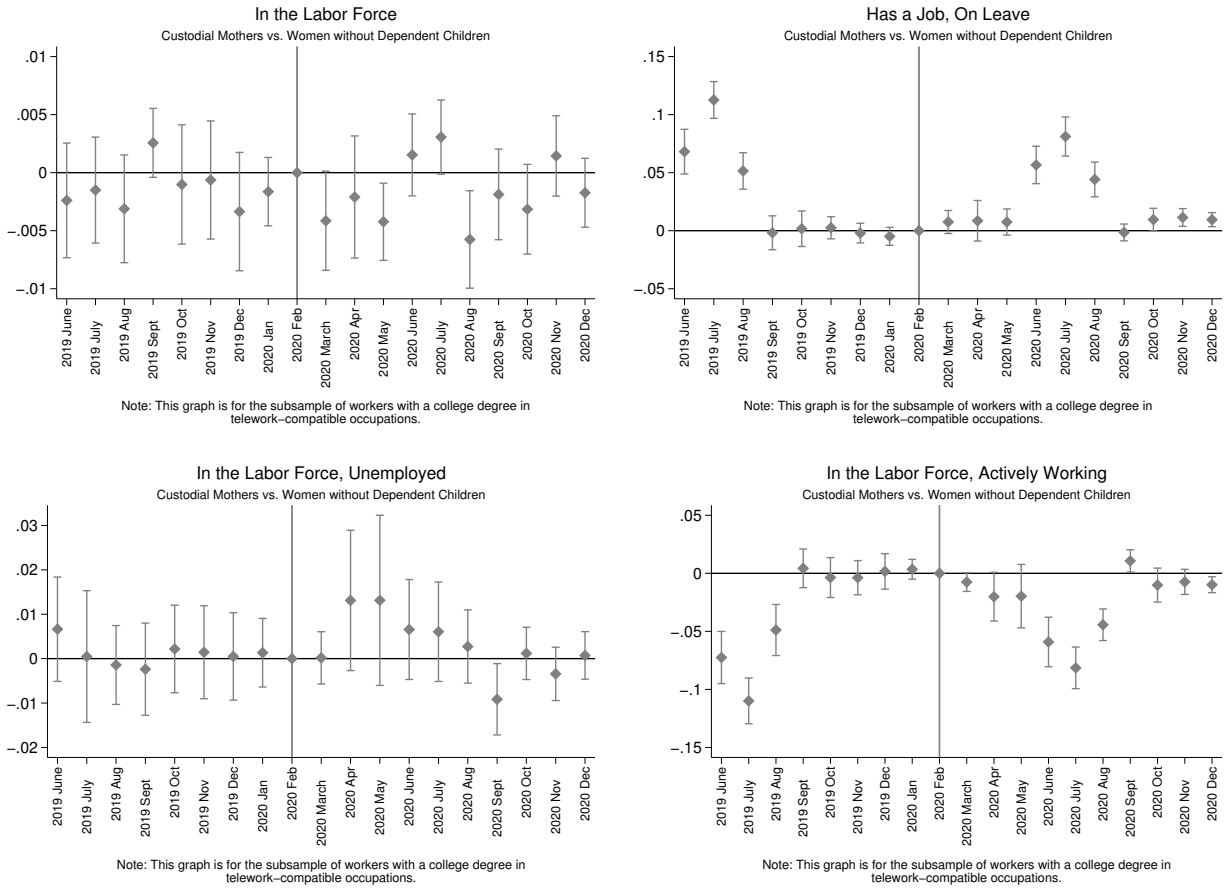


Figure A4 – Pretrends Women with College Degree in Telework-Compatible Occupations

Source: Authors' calculations, Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table A1 – Effect of a Childcare Shock on Custodial Mothers (6-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0428	-0.0079	0.0060*	0.0022	0.0895**	0.0142	-0.0106	-0.0038
	(0.0088)	(0.0015)	(0.0009)	(0.0005)	(0.0046)	(0.0026)	(0.0019)	(0.0009)
School-age kid*Post	-0.0119*	-0.0001	-0.0072*	0.0080*	0.0031	0.0128	-0.0155	0.0017
	(0.0014)	(0.0021)	(0.0009)	(0.0009)	(0.0044)	(0.0032)	(0.0029)	(0.0019)
School-age kid*Post*Female					-0.0148**	-0.0131	0.0083	0.0065
					(0.0010)	(0.0039)	(0.0037)	(0.0012)
Observations	198,536	153,203	153,203	145,787	384,695	317,606	317,606	302,322
R^2	0.021	0.031	0.026	0.012	0.042	0.028	0.023	0.010

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table A2 – Effect of a Childcare Shock on Custodial Mothers (12-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0446**	-0.0096**	0.0062**	0.0036**	0.0885***	0.0128**	-0.0106**	-0.0024
	(0.0063)	(0.0018)	(0.0010)	(0.0008)	(0.0029)	(0.0019)	(0.0019)	(0.0011)
School-age kid*Post	-0.0139**	-0.0011	-0.0050	0.0066***	0.0040	0.0102**	-0.0106**	-0.0003
	(0.0023)	(0.0024)	(0.0030)	(0.0005)	(0.0021)	(0.0012)	(0.0011)	(0.0014)
School-age kid*Post*Female					-0.0180**	-0.0113**	0.0055	0.0069**
					(0.0036)	(0.0022)	(0.0021)	(0.0015)
Observations	378,447	290,490	290,490	276,980	734,664	604,188	604,188	575,564
R^2	0.018	0.018	0.017	0.007	0.040	0.017	0.015	0.005

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table A3 – Effect of a Childcare Shock on Custodial Mothers (15-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0453***	-0.0087***	0.0051***	0.0039***	0.0865***	0.0128***	-0.0113***	-0.0016
	(0.0054)	(0.0009)	(0.0008)	(0.0005)	(0.0025)	(0.0013)	(0.0013)	(0.0011)
School-age kid*Post	-0.0125**	-0.0010	-0.0040	0.0054**	0.0061*	0.0099***	-0.0099***	-0.0006
	(0.0028)	(0.0019)	(0.0024)	(0.0012)	(0.0023)	(0.0014)	(0.0012)	(0.0008)
School-age kid*Post*Female					-0.0188**	-0.0109***	0.0058**	0.0061***
					(0.0043)	(0.0018)	(0.0016)	(0.0006)
Observations	482,110	369,815	369,815	353,338	935,510	769,292	769,292	734,009
R^2	0.017	0.016	0.015	0.006	0.040	0.015	0.014	0.004

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table A4 – Effect of a Childcare Shock on Custodial Mothers (18-Months Pre/Post)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
School-age kid	-0.0433***	-0.0079***	0.0053***	0.0029	0.0878***	0.0131***	-0.0111***	-0.0022
	(0.0058)	(0.0012)	(0.0006)	(0.0014)	(0.0029)	(0.0011)	(0.0015)	(0.0014)
School-age kid*Post	-0.0144***	-0.0019	-0.0039	0.0062**	0.0051	0.0087**	-0.0090**	-0.0003
	(0.0020)	(0.0022)	(0.0023)	(0.0017)	(0.0025)	(0.0016)	(0.0016)	(0.0011)
School-age kid*Post*Female					-0.0197**	-0.0105**	0.0050*	0.0064***
					(0.0038)	(0.0019)	(0.0017)	(0.0008)
Observations	567,336	435,330	435,330	416,746	1100391	905,246	905,246	865,669
R^2	0.017	0.015	0.015	0.005	0.040	0.014	0.013	0.004

Notes: Columns (1)-(4) are DD estimates of a childcare shock on custodial mothers compared to women living without dependent children. Columns (5)-(8) are DDD estimates of a childcare shock on custodial mothers compared to respective fathers. Outcomes of interest are labor force participation (columns (1) & (5)), active work status (columns (2) & (6)), unemployment (columns (3) & (7)), and leave from work (columns (4) & (8)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org

Table A5 – Effect of a Childcare Shock on Custodial Mothers with a College Degree or Higher in Telework-Compatible Jobs (12, 15, and 18-Months Pre/Post)

	12-Months Pre/Post				15-Months Pre/Post				18-Months Pre/Post			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
School-age kid	0.0005	0.0001	-0.0011	0.0010	0.0007	0.0006	-0.0023	0.0017	0.0006	0.0013	-0.0031	0.0017
	(0.0004)	(0.0019)	(0.0014)	(0.0020)	(0.0004)	(0.0013)	(0.0017)	(0.0016)	(0.0003)	(0.0018)	(0.0017)	(0.0016)
School-age kid*Post	-0.0031*	-0.0075*	0.0011	0.0067*	-0.0024***	-0.0040	-0.0006	0.0048*	-0.0022***	-0.0039	-0.0002	0.0043*
	(0.0008)	(0.0023)	(0.0020)	(0.0019)	(0.00001)	(0.0019)	(0.0015)	(0.0017)	(0.0003)	(0.0024)	(0.0015)	(0.0017)
Observations	90,505	90,072	90,072	87,819	115,025	114,503	114,503	111,732	134,744	134,159	134,159	131,048
R^2	0.007	0.014	0.015	0.009	0.005	0.012	0.013	0.007	0.004	0.011	0.012	0.006

Notes: Each column presents DD estimates of a childcare shock on custodial mothers with a college degree or higher compared to women with a college degree or higher living without dependent children. Columns (1)-(4) include the sample of 12 months before and after March 2020. Columns (5)-(8) include the sample of 15 months before and after March 2020. Columns (9)-(12) include the sample of 18 months before and after March 2020. Outcomes of interest are labor force participation (columns (1), (5), & (9)), active work status (columns (2), (6), & (10)), unemployment (columns (3), (7), & (11)), and leave from work (columns (4), (8), & (12)). All regressions include fixed effects for more than one prime-age adult in the household, educational attainment, state, and year. Standard errors are clustered by state, county, and month. Months of June, July, and August are excluded from the sample.
Source: Authors' calculations using monthly Current Population Survey, U.S. Census Bureau & Bureau of Labor Statistics, ipums.org