Kalenkoski, Charlene Marie; Wulff Pabilonia, Sabrina

Working Paper

Impacts of COVID-19 on the Self-employed

GLO Discussion Paper, No. 843

Provided in Cooperation with:
Global Labor Organization (GLO)

This Version is available at:
http://hdl.handle.net/10419/233997

Impacts of COVID-19 on the Self-employed

Charlene Marie Kalenkoski, Ph.D., CFP®
Texas Tech University and IZA

Sabrina Wulff Pabilonia
U.S. Bureau of Labor Statistics and GLO

May 14, 2021

Abstract:
This study estimates random effects and difference-in-difference-in-differences models to examine the initial impacts of COVID-19 on the employment and hours of unincorporated self-employed workers using monthly panel data from the Current Population Survey. For these workers, effects were visible in March as voluntary social distancing began, largest in April as complete shutdowns occurred, and slightly smaller in May as some restrictions were eased. We find differential effects by gender that favor men, by marital status and gender that favor married men over married women, and by gender, marital, and parental status that favor married fathers over married mothers. The evidence suggests that self-employed married mothers were forced out of the labor force to care for children as prescribed by gender norms and the division and specialization of labor within households. Remote work and working in an essential industry mitigated some of the negative effects on employment and hours.

Keywords: COVID-19, hours worked, self-employment, entrepreneurship, gender, remote work

JEL codes: D1, D13, J1, J16, J2, J23

Contact Information: Charlene Marie Kalenkoski, School of Financial Planning, Texas Tech University, 1301 Akron Avenue, Box 41210, Lubbock, TX 79409-1210 (email: charlene.kalenkoski@ttu.edu); Sabrina Wulff Pabilonia, U.S. Bureau of Labor Statistics, 2 Massachusetts Ave. NE, Rm. 2180, Washington, DC 20212 (e-mail: Pabilonia.Sabrina@bls.gov).

Acknowledgements: Charlene Marie Kalenkoski acknowledges research grant funding from the IZA Emergency Research Thrust for this project. We thank Daniel Hamermesh, Peter Meyer, James Spletzer, and Jay Stewart for helpful suggestions. We thank Thomas Korankye and Nana Twum Owusu-Peprah for research assistance. This paper previously circulated under the title "Initial Impact of the COVID-19 Pandemic on the Employment and Hours of Self-employed Coupled and Single Workers by Gender and Parental Status." All views expressed in this paper are those of the authors and do not necessarily reflect the views or policies of the U.S. Bureau of Labor Statistics.

1.   Introduction

The COVID-19 pandemic has led to serious disruptions in work, schooling, and family life in the United States and around the world, though not all have been affected equally. Initially, in late February and early March 2020, individuals in the U.S. voluntarily started restricting activities to avoid exposure as news of the SARS-CoV-2 virus spread and some counties closed their schools (Goolsbee and Svyerson 2020; Heggeness 2020). Then, in the second half of March 2020, many state and local governments began to impose stay-at-home orders and online schooling and mandate closures of "nonessential" businesses, resulting in further restrictions of movement by individuals. Other states imposed partial business closures. The most restrictions and school closures were in effect in April of 2020. In May, some governments began easing restrictions, but most schools remained closed until the end of the school year.

This paper focuses primarily on the early effects of the pandemic on the unincorporated self-employed.[1] Self-employed workers are those who run businesses that organize factors of production to sell goods or services or those who sell their labor services as independent contractors, day laborers, or gig workers (Abraham, Haltiwanger, Hou, Sandusky, and Spletzer 2020). They create jobs for themselves and often others, making up about ten percent of all employment in the economy (Hipple and Hammond 2016). Some of these businesses are incorporated but the majority are unincorporated. Official U.S. estimates of self-employment are based upon the unincorporated self-employed because the incorporated self-employed are classified as employees of their own businesses.

---

[1] For a comprehensive review of all the labor market effects of the pandemic, see Handwerker, Meyer, Piacentini, Schultz, and Sveikauskas (2020).

Levine and Rubinstein (2017) note that incorporating a business allows the business owners to benefit from limited liability and a separate legal identity that protects those seeking to undertake risky investments, but at a cost, including the costs of incorporation, annual fees, and preparing financial statements. Using data from the U.S Department of Labor's Dictionary of Occupational Titles, the Current Population Survey (CPS), and the National Longitudinal Survey of Youth 1979, they also show that incorporated and unincorporated self-employed workers perform much different activities. On average, the incorporated perform activities requiring relatively stronger nonroutine cognitive skills, while the unincorporated perform activities requiring relatively lower levels of cognitive skills and relatively stronger manual skills. Overall, the incorporated self-employed are also more growth-oriented, committed, and entrepreneurial than the unincorporated self-employed (Fairlie and Miranda 2017; Fairlie, Miranda, and Zolas 2019). The unincorporated self-employed also are more likely to be nonemployers. Analyzing data from the Kauffman Firm Surveys for the Small Business Administration, Cole (2011) found that the self-employed choose a complex form of legalization when they employ more people or have more assets, when they use a business credit card for financing, and when the primary owner is more educated. There is substantial evidence that, once established, businesses rarely change their legal form of organization (Cole 2011; Levine and Rubinstein 2017; Fairlie and Miranda 2017). Fossen (2020) and Fairlie (2020) have shown that it is important to distinguish between the incorporated and unincorporated self-employed when examining variation in self-employment over the business cycle.

For several reasons, the unincorporated self-employed may have experienced the early months of this pandemic recession differently from the incorporated self-employed and other wage and salary workers, especially the female unincorporated self-employed. First, the

pandemic had a larger effect on the service sector than the goods sector, because face-to-face interaction is more prevalent in the service sector (Alon, Doepke, Olmstead-Rumsey, and Tertilt 2020a, 2020b). Among female workers in February 2020, 91 percent of the unincorporated self-employed worked in the service sector, while 86 percent of wage and salary workers worked in the service sector. On the other hand, among male workers, only 60 percent of the unincorporated self-employed worked in the service sector, while 67 percent of wage and salary workers worked in the service sector.[2]

Second, the unincorporated self-employed traditionally have not been eligible for social insurance programs such as unemployment insurance. Incorporated self-employed workers who own a corporation or an "S" corporation and pay themselves a W-2 wage are eligible for traditional UI benefits. Unincorporated self-employed workers are not. However, while the CARES Act, enacted on March 27th, 2020, allocated federal funds to states to use for the self-employed under a program called the Pandemic Unemployment Assistance (PUA) program, it was unclear which self-employed workers were eligible, and many did not apply. In addition, states varied in their ability to orchestrate this new program in a timely manner. Some states started to pay out in late April 2020. However, as of May 12th, only 37 of the 50 states had started to make payments, and many eligible workers were still waiting for checks (Bahler 2020). Another pandemic assistance program was the Paycheck Protection Program (PPP) that on April 3rd started allocating to small businesses with a payroll loans that could be forgiven under certain conditions. However, demand for loans was high, and the initial PPP program funds were depleted by April 16th. Congress then appropriated funds for additional loans through the PPP Act, and banks started to issue additional PPP loans on April 27th. Doniger and Kay (2021) find

---

[2] Authors' calculations based on the Current Population Survey.

that this ten-day delay in financing led to significant job losses in May, especially among the self-employed. Although these loans were targeted for small businesses through the Small Business Administration, the largest of the small businesses were more likely to receive PPP loans in the early stages of the program rather than the unincorporated self-employed, as they tend to have smaller businesses and are more likely to be nonemployers, especially among the female self-employed (Balyuk, Prabhala, and Puri 2020; Cole 2011; Doniger and Kay 2021; Fairlie and Miranda 2017; Humphries, Neilson, and Ulyssea 2020). Thus, differences in the social safety net may have affected the unincorporated self-employed and the incorporated self-employed differently.

Third, the ability of many Americans to work from home has dampened the resulting economic crisis (Barrero, Bloom, and Davis 2020; Bick, Blandin, and Mertens 2021; Brynjolfsson, Horton, Ozimek, Rock, Sharma, and Ye 2020; Montenovo, Jiang, Rojoas, Schmutte, Simon, Weinberg, and Wing 2020). According to the 2018 American Time Use Survey (ATUS), which showed time use one to two years pre-pandemic, 51 percent of unincorporated self-employed workers in the United States did some work from home on their primary job on an average day, while only 21 percent of wage and salary workers did so (Bureau of Labor Statistics 2019). Thus, the unincorporated self-employed also may have been more likely to do some of their work from home during the pandemic than wage and salary workers.

Finally, self-employed workers who were able to work from home were at the same time affected by school and day-care shutdowns, with children now being thrust into their work environment. These shutdowns may have affected female self-employed parents more than male self-employed parents because of gender norms within the home that result in women doing much of the child care (Burda, Hamermesh, and Weil 2008; Sent and van Staveren 2019; Sevilla

and Smith 2020). However, women are more likely than men to become self-employed to better balance work and family demands (Budig 2006; Gimenez-Nadal, Molina, and Ortega 2012; Lim 2019), and so may have been able to weather the shutdowns better. Given these issues, there may have been differential impacts on the self-employed by gender, marital status, and parental status.

We examine the early impacts of the response to the COVID-19 pandemic on the employment and hours of work of unincorporated self-employed workers. On the supply side, some workers left employment or reduced their hours of work because of their own or their customers' fear of contracting the novel coronavirus or because they needed to take care of and educate their children at home. On the demand side, government shutdowns of businesses and the implementation of other restrictions related to "essential" business designations reduced the demand for workers and worker hours. Our analysis examines the effects of COVID-19, controlling for factors such as the presence of children, marital status, remote job, and essential-worker status, but cannot completely disentangle these supply and demand effects. We use monthly panel data from the CPS for those who were self-employed and at work in February 2020 to trace the effects from February through May of 2020, and both random-effects (RE) and difference-in-difference-in differences (DDD) models. Data from February and April 2019 also are used for the DDD models to create the control group. We also compare the effects of COVID-19 on employees and incorporated self-employed workers to show that those workers classified as unincorporated self-employed in February 2020 on their primary job were disproportionately affected by COVID-19.[3]

---

[3] Employees include those classified in the CPS as government workers, private sector workers, and nonprofit workers. Together, employees and incorporated self-employed workers are considered wage and salary workers.

In the analyses, February 2020 is considered a normal month, and March, April, and May of 2020 are months affected by COVID-19. Social-distancing policies and shutdowns of schools and businesses began in March, were widespread by April, and began being relaxed in some locations in May. The school closures for primary and secondary students occurred for the most part after the March CPS reference week. All states had adopted some form of social-distancing measures by March 23rd (Adolph, Amano, Bang-Jensen, Fullman, and Wilkerson 2020). Given the sequence of events, the negative effects of the shutdowns should be larger in April than in March and smaller in May than in April.

We find that the pandemic decreased employment and hours for all groups of workers, with the unincorporated self-employed being hit the hardest. Reductions in employment and hours were larger for April than for March compared to February, and the loosening of restrictions in May did not yet have much of a moderating effect. Among the unincorporated self-employed workers, we find differential effects of COVID-19 by gender that favor men, by marital status and gender that favor married men over married women, and by gender, marital status, and parental status that favor married fathers over married mothers.[4] Females fared worse than males in terms of reductions in employment and hours of work, perhaps because of supply shocks as more risk-averse women left employment than men or because demand shocks were higher in female-dominated jobs. Married women were especially worse off compared to married men, and married mothers especially worse off compared to married fathers. Thus, in addition to these demand and supply shocks, the evidence suggests that married mothers have been forced out of the labor force to care for children as prescribed by gender norms and the division and specialization of labor within households. Having a plausibly remote job and

---

[4] Parental status is defined as there being a child under age 18 in the household.

working in an essential industry mitigated some of these effects. Thus, COVID-19 has erased much of self-employed women's hard-earned gains in the labor market.

2. Related Literature

2.1 Self-employment Literature

The unincorporated self-employed have unique characteristics. Compared to the incorporated self-employed, they tend to engage in work activities that demand relatively low levels of cognitive skills and high levels of manual coordination (Levine and Rubinstein 2017). Although many of the unincorporated self-employed may do some work from home, a significant portion work in construction, including small, home-construction activities whose services were in lower demand during the early stages of the pandemic while households were social distancing (Hipple and Hammond 2016). Some choose self-employment, even as a primary job, to work part-time or on an intermittent basis as an independent contractor or consultant to better balance work and life activities (Abraham and Houseman 2019). Because they can control their work hours to a greater extent than wage and salary workers, self-employed parents may have more flexibility to work reduced hours rather than stopping work altogether to provide child care.

Prior research on the effects of macroeconomic conditions on the unincorporated self-employed in the U.S. finds that their total hours are procyclical (Carrington, McCue, and Pierce 1996; Pabilonia 2014); however, higher unemployment rates are associated with an increase in entry rates into self-employment, often due to a lack of alternatives (Fairlie 2013; Fairlie and Fossen 2020), even at potentially reduced hours. Fairlie (2020) uses the CPS microdata to examine the early effects of COVID-19 on U.S. business owners (many of whom are classified

7

as unincorporated self-employed workers). He finds that the number of actively working unincorporated business owners dropped by 28 percent between February and April of 2020, while the number of incorporated business owners dropped by only 14 percent. In addition, African-American, immigrant, and female business owners were especially hard hit by the shutdown of nonessential activities. Using simulations, he finds that part of this decline in female-owned businesses is because of differences in the industry distribution of businesses owned by gender. In May and June of 2020, he shows that small businesses sustained continued losses but also experienced a partial rebound as restrictions were eased. Over the same period, but for Canadian self-employed workers, Beland, Fakorede, and Mikola (2020) find smaller decreases between February and May in the number of unincorporated businesses compared to the number of incorporated businesses (10 percent versus 15 percent). They also find a substantial disproportionate decrease in ownership and aggregate hours for women, immigrants, and less-educated people. These reductions in female-owned businesses may lead to additional problems beyond the owner's loss of work, however. Studying the Great Recession, Matsa and Miller (2014) found that female business owners were less likely to lay-off their employees than male business owners, while Deller, Conroy, and Watson (2017) found that regions of the U.S. with a greater share of female-owned businesses had greater regional employment-related stability.

2.2 Gender and Intra-household Allocation Literature

In married households, members of a couple jointly decide how much time to devote to market work, household production, and child care and, according to standard household economic theories, time spent in these different activities depends on relative income, social

8

norms, productivity differences in time inputs, and bargaining power (Becker 1965, 1974; Manser and Brown 1980; McElroy and Horney 1981; Lundberg and Pollak 1994; Schoonbroodt 2018). As a result of the closures of schools and child-care facilities in response to the pandemic, there was an increased demand for within-household child care. In a married family, this increased responsibility could be shared. In a single-parent family, the burden likely fell completely on the single parent unless there was an extra adult in the household, such as an unmarried partner, grandparent, aunt, or college student (informal care coming from outside the household was discouraged due to calls for social distancing).

However, even among full-time dual-earner couples, women spend more time caring for children than do men (Alon, Doepke, Olmstead-Rumsey, and Tertilt 2020a). Perhaps this is because the man is expected to be the breadwinner in the family (Allred 2018; Betrand, Kamenica, and Pan 2015). However, there is prior evidence from time-use surveys that a reduction in work-related activities during the Great Recession, when male-dominated sectors such as manufacturing and construction were especially hard-hit, led to men shifting relatively more daily hours toward their children, while mothers' time with children was invariant to macroeconomic conditions (Aguiar, Hurst, and Karabarbounis 2013; Bauer and Sonchak 2017). More recently, Pabilonia and Vernon (2020) find that, when working remotely, fathers shift some of the reduction in their commute time to primary child care, while there is no change in primary child-care time for mothers. Some of that increase in fathers' time is during typical working hours.

Concurrent research on the early effects of the pandemic on the labor market finds that women, particularly those with children, are more affected than men on average (Montenovo, Jiang, Rojoas, Schmutte, Simon, Weinberg, and Wing 2020; Zamarro and Prados 2021). This is

partly due to women's employment being concentrated in service-oriented sectors of the economy classified as "nonessential" (Alon, Doepke, Olmstead-Rumsey, and Tertilt 2020a). However, it also is due to the increase in child-care responsibilities as schools and child-care facilities closed, affecting parents' ability to work outside (and sometimes inside) the home. Sevilla and Smith (2020), however, found a drop in the gender child-care gap in the U.K., as furloughed men picked up some of the increase in household-provided child care. Using the CPS and focusing on parents of school-age children, Heggeness (2020) compares labor market effects in U.S. states with early and late school closures. She finds that mothers in early closure states were 68.8 percent more likely than mothers in late closure states to be employed but absent from work because of the shutdowns. Of those remaining active at their job, mothers had higher work hours relative to fathers, as fathers reduced their work hours to share in the increased child-care responsibilities resulting from the closures. Descriptive analyses based on the Understanding Coronavirus in America Tracking Survey indicate that 33 percent of working mothers in two-parent households provided all the care for children while schools were closed in early April, while only 11 percent of working fathers provided all the care (Zamarro and Prados 2021).

2.3 Our Contribution

Gimenez-Nadal, Molina, and Ortega (2012) and Lim (2019) link both the self-employment and intrahousehold allocation literatures, finding that Spanish and American mothers, respectively, choose self-employment to gain work location and schedule flexibility. However, these are pre-COVID-19 papers and do not examine how a shock such as COVID-19 may affect the employment and hours of work of these mothers. Our paper examines the effects

of COVID-19 on the employment and hours of work of all unincorporated self-employed

workers and then breaks them down by gender, marital status, and parental status. Fairlie (2020)

examines the effects of COVID-19 on the number of active business owners by gender and

race/ethnicity. However, he does not focus on the unincorporated self-employed nor does he do

breakdowns by marital and parental status for this worker type as we do. In addition, we

estimate panel data models while he compares weighted aggregates across demographic groups.

Our results provide evidence that, although married mothers may have chosen self-employment

to gain flexibility, they still were harder hit in terms of employment and hours worked than

married fathers. Thus, married mothers' gains in the labor market were partially erased because

COVID-19 induced a return to gender roles and household specialization.

3.   Data

The objective of this paper is to examine changes in the employment and work hours of

the unincorporated self-employed, using matched individual-level data from the CPS basic

monthly files for February through May of 2020 for those initially self-employed and at work in

February 2020.[5] February 2020 is considered a normal month, and March, April, and May of

2020 were months affected by the COVID-19 shutdowns. School closures for primary and

secondary students occurred for the most part after the March CPS reference week. The CPS

reference week typically includes the 12th of the month and ended in March on the 14th.[6] The

World Health Organization (WHO) did not announce the pandemic until March 11th, although

---

[5] Full replication files including the data and STATA code are available here:
https://doi.org/10.5281/zenodo.4757153 (Kalenkoski and Pabilonia 2021).
[6] The March CPS reference week was March 8th through 14th. The April CPS reference week
was April 12th through 18th. The May CPS reference week was May 10th through 16th.

media coverage of the novel coronavirus picked up in early March after several cases were identified in Washington State at the end of February and people had already started to change their behavior in response to the news reports. Nine states announced state-wide emergencies prior to the CPS March reference week, but state-wide business closures were not mandated until late March.[7] Therefore, the effects are expected to be smaller in March than in April. If the re-openings were effective, the effects might be smaller in May than in April, as well.

The CPS interviews a panel of households to collect economic, education, and demographic data about the household members for four months, then does not interview them for eight months, then re-interviews them again for four months. Each month there are eight rotation groups of households. Those households which are in their first or fifth month in the sample plausibly can be followed each month from February to May, while those in their second and sixth month in the sample can be followed from February to April, and so forth. Thus, each subsequent month, the sample of potential continuers falls (approximately 75 percent in the second month of the panel, 50 percent in the third month, and 25 percent in the fourth month). However, in any given month, a household may also choose not to respond. For example, there may be a response in February and in April, but not in March and May, for an individual interviewed for the first time in February.[8]

---

[7] These included Washington, California, Hawaii, Maryland, Indiana, Kentucky, Pennsylvania, Utah, and New York (Fullman 2020). In a sensitivity analysis, we drop these states from our analyses. Our main results are similar, suggesting that early declarations did not affect our March results (see Appendix Table A1).

[8] To observe whether our estimates are subject to composition bias due to nonresponse in some months, we compare employment rates for the unincorporated self-employed in each month for those who were in month-in-sample 1 and 5 in February 2020 by how many subsequent months they were observed in the sample (4 possible months). None of the differences are statistically significant. We repeated this analysis for those in month-in-sample 2 and 6 in February and compared March and April employment rates.

In our analyses, we examine the effects of the pandemic on non-institutionalized civilian adults aged 18 and older.[9] Worker type is determined by class of worker status on their primary job in February, and those with jobs are required to be at work during the reference week in February (rather than employed but absent). We begin by including all workers interviewed in February through May 2020 who were employed and at work in February (for the RE models). This sample includes an unbalanced panel of 48,570, 31,592, 20,690, and 10,076 employees; 2,276, 1,521, 1,045, and 530 incorporated self-employed workers; and 3,400, 2,299, 1,513, and 776 unincorporated self-employed workers, in February, March, April, and May, respectively. After showing that unincorporated self-employed workers are a particularly vulnerable group of workers, we then focus on this group only, to examine differences by gender, marital status, parental status, feasibility of a remote job, and essential industry designation.

After examining the full results from the RE models, we also examine more parsimonious DDD models that interact the treatment with gender or class of worker. For these, we use a balanced panel of individuals who were employed and at work in February 2019 or 2020 and subsequently interviewed in April of 2019 or 2020 (excluding March).[10] Comparing the same months across 2019 and 2020 controls for seasonal differences. In 2019, our sample includes 22,090 individuals who were employees, 1,001 individuals who were incorporated self-employed, and 1,509 individuals who were unincorporated self-employed. In 2020, our sample includes 20,684 individuals who were employees, 1,045 individuals who were incorporated self-employed, and 1,513 individuals who were unincorporated self-employed.

---

[9] We drop a small number of workers who can be matched on CPS identifying variables (HHRID HHRID2 PULINENO) but do not match on age and sex.
[10] May is not included in the DDD models, because there was a different treatment in May as the country began reopening.

A general concern about the CPS data collected during the first few months of the pandemic has been a spike in those reporting employed but absent for "other reasons." Respondents who reported not working due to efforts to contain the spread of COVID-19 should have been classified as unemployed on temporary layoff, but many were misclassified as employed but absent (Bureau of Labor Statistics 2020a, 2020b, and 2020c). For this reason, this analysis focuses on changes in employed and at work status for those who were self-employed and at work in February, i.e. those with positive hours. However, we do not require them to still be classified as self-employed workers in subsequent months to be counted as employed and at work for our main analyses.[11]

Additional information included in the analysis concerns the plausibility that an individual's job (or their spouse's job, if applicable) can be done entirely remotely. This is referred to in the analysis as a remote job. The remote-job variable is based on Dingel and Neiman (2020), who measured the feasibility of an occupation being done entirely at home based on job tasks reported in the Occupational Information Network (O*NET) surveys, with some additional tweaks to match the change from the 2010 Census codes to the 2018 Census codes in the 2020 CPS.[12] In most cases, the remote-job variable takes a value of 0 for not being able to be done remotely, and 1 for being able to be done entirely remotely. However, in several cases,

---

[11] Although our analyses examine whether unincorporated self-employed workers are doing any work in subsequent months compared to February, some of the unincorporated self-employed reported that they had transitioned into wage-and-salary jobs. Of those actively working in March, 5 percent of men and women switched to a wage-and-salary job. In April, 5 percent of men and 8 percent of women switched to a wage-and-salary job. By May, 11 percent of men and 18 percent of women switched to a wage-and-salary job. The last finding is statistically significantly different from zero at the 8 percent level.

[12] Bick, Blandin, and Mertens (2021), using the Real-Time Population Survey (a CPS-like questionnaire), show that changes in the share of remote workers between February and May 2020 is strongly positively correlated with who could plausibly work at home as defined by Dingel and Neiman (2020).

only part of an occupation in the CPS could be classified as being able to be done remotely, and

so the value reflects the share employed in the occupation who can work remotely.

In addition, information about whether an individual (or spouse) worked in an essential

industry is used. The essential industry variable is based upon Delaware's nonessential closed

business criteria, which is reported at the 4-digit NAICS level and thus can be matched to the

CPS data at the detailed industry level (Delaware Division of Public Health, Coronavirus

Response 2020). For three detailed CPS industries (Charter Bus Industry, Cable and Other

Subscription Programming, and Real Estate), the September 2019 Quarterly Census of

Employment and Wages (QCEW) is used to record the nonessential employment share.

4.   Descriptive Statistics: Labor Market Differences by Worker Type, Gender, Marital Status, and Parental Status

Figure 1 shows the decline in employment by worker type (employee, incorporated self-

employed, and unincorporated self-employed) from February through May for those who were

working in February 2020.[13] In March, as voluntary social distancing began, employment was

lower for all groups than in February, with 93 percent of employees and the incorporated self-

employed working. The unincorporated self-employed were hit the hardest, with only 87 percent

working in March. In April, as closures were fully realized, employment was even lower for all

three groups. Again, the unincorporated self-employed fared the worst, with only 62 percent

working compared to 77 percent of the incorporated self-employed and 76 percent of employees.

In May, as employment began to increase again in response to the relaxation of some COVID-19

restrictions, all three groups had improved employment, with employees and the incorporated

---

[13] CPS final weights are used in the descriptive analyses.

self-employed at about 80 percent of February employment but the unincorporated self-employed still far behind at 68 percent of February employment (the rebound in employment from April to May was not statistically significant for the incorporated self-employed).

Figure 2 shows the decline in average weekly hours worked by worker type. In February, the unincorporated self-employed worked fewer hours than the incorporated self-employed and employees (35 hours per week on average versus 41 hours and 38 hours, respectively). Again, we see that the unincorporated self-employed were hardest hit, with significant reductions in hours of work. In March, hours of work declined to 30 hours per week for the unincorporated self-employed, 38 hours per week for the incorporated self-employed, and 35 hours per week for employees. In April, hours per week fell even farther, to 20 hours for the unincorporated self-employed, 28 hours for the incorporated self-employed and 29 hours for employees. In May, hours of work started to bounce back slightly for all workers (a 2–3 hour increase on average).

Focusing on the hardest hit group (the unincorporated self-employed), Figure 3 shows the decline in employment by gender. In March, there is no difference by gender. However, in April, only 65 percent of the men and 58 percent of the women remained at work. Thus, while both men and women among the unincorporated self-employed suffered reduced employment in April, the shutdown had a statistically significant larger effect on women.[14] In May, given the partial re-openings, 74 percent of unincorporated self-employed men and 61 percent of unincorporated self-employed women were working. For women, the difference between April and May was not statistically significantly different. Thus, men appear to be bouncing back while women do not. This may be due to gender roles, where the man is expected to be the

---

[14] T-tests for all the employment and hours differences by gender, marital status, and parental status reported in this descriptive section are statistically significant at the 5 percent level unless otherwise stated.

16

breadwinner in the family (Allred 2018; Betrand, Kamenica, and Pan 2015) and the fact that schools and many child-care facilities had not yet re-opened as of May.

Figure 4 shows the decline in average weekly hours worked by gender for the unincorporated self-employed. In February, self-employed men worked about 37 hours per week and women worked about 30 hours per week. Many women may have been more likely to be secondary earners, already working part-time to take care of children. However, hours of work decreased for both because of COVID-19. In March, hours of work declined to 32 hours per week for men, on average, and to 26 hours per week for women. In April, hours of work fell even farther, to 23 hours per week for men and 16 hours for women. In May, hours started to bounce back for men (back to 28 hours per week), but there was little change for women.

Figure 5 shows how gender and parental status are related to employment for unincorporated self-employed workers who were married. Married individuals can trade off housework and child-care tasks with their spouses, and so individuals in these households have greater flexibility than those in single-parent households, all else equal. Again, we see a decline in employment for everyone between February and April and an increase from April to May. However, the declines are much larger for married women than for married men in April, especially those with children, and the rebound in May is smaller for married women with children than for those without. Having children reduces the rebound in May for married men, as well.

Figure 6 shows how gender and parental status are related to employment for unincorporated self-employed who were single. Single individuals do not necessarily have a

partner to help with household tasks such as caring for children.[15] Comparing Figure 6 to Figure 5, single men had larger declines in employment from February through April than married men. There is an especially large drop for single fathers with household children in April. However, single fathers experienced a large increase in employment in May, getting them almost to the same employment level as single men without children. Single women also experienced a drop in employment in March and April, with a slightly larger drop for single mothers than for non-mothers in April (though the results were not statistically significant at conventional levels). However, single women, with or without children, did not experience the rebound in employment in May that married individuals or single men did.

Figure 7 shows how gender and parental status are related to average weekly hours of work unincorporated self-employed workers who were married. In February, married men without children worked approximately 37 hours, while married men with children worked about 41 hours. However, in April, married men worked only 25 hours, regardless of parental status. Women worked substantially less than men in all months, and women with children worked fewer hours than women without children, although the latter differences were only statistically significantly different from zero in February.

Figure 8 shows how single self-employed workers' average weekly hours were affected, by parental status and gender. Theirs is a similar story to that for married workers, but there is a huge drop in hours for single fathers in April compared to married fathers. Single fathers in April have an even lower number of work hours, on average, than single mothers, though the difference is not statistically significant. However, single fathers rebound in May, while single

---

[15] However, approximately 17 percent of single individuals in our sample are living with an unmarried partner.

mothers do not. Appendix Table A2 provides greater detail about the descriptive statistics of the unincorporated self-employed sample, including a breakdown by the presence and age of children, given the different amounts of supervision and help with online schooling that were necessary during the school closures.

5.   Models Used to Show Initial COVID-19 Impacts

Two types of models are estimated to examine the initial differential impacts of the COVID-19 pandemic on the employment and hours of the unincorporated self-employed. These impacts included both demand-side and supply-side impacts. On the demand side, unincorporated self-employed workers reduced or eliminated their work hours due to government restrictions on the types of goods and services that could be sold. In addition, due to stay-at-home orders and/or the fear of contracting COVID-19, consumers reduced their face-to-face consumption of goods and services. On the supply side, self-employed workers may not have wanted to work because of fears regarding COVID-19 or had to stop working to care for and/or to educate their children due to school closures. Our models are reduced-form models which cannot disentangle these demand- and supply-side effects. Our primary specifications are RE models. These exploit the richness of the data to examine how employment and hours of work changed as social distancing and shutdowns began to occur in March, were more widespread and more often mandatory in April, and partial re-openings began in May. Month dummy variables capture these effects, and are interacted with gender, marital status, age of children, occupation type (remote work plausible or not), and industry type (essential or not), to determine whether the effects differ for the different groups. Further, the RE models also are estimated separately for subgroups defined by marital and parental status.

The second type of models, DDD models, do not examine the evolution of employment changes as social distancing and shutdowns began, became complete, and then began being rescinded. Instead, they consider the change from February to April as a single "treatment" and examine the effect of this treatment on employment and hours of work. While these models do not allow multiple interactions with the treatment as the RE models do (we interact the treatment with gender only and examine demographic sub-samples), they do net out time-invariant unobserved heterogeneity that the RE models do not. However, we do not expect this to be an issue for the RE model estimates, given our extensive set of controls.

5.1   RE Models

We estimate several RE models by ordinary least squares (OLS) as follows:

(1) $E_{it} = \beta_0 + \beta_1 W_i + \beta_2 M_t + \beta_3 W_i * M_t + \beta_4 X_i + \mu_i + \varepsilon_{it}$

where E_{it} is an indicator for whether individual i in month t is employed and at work during the reference week and 0 otherwise.[16] W_i is a vector of key regressors measured in February 2020 (to avoid changes potentially caused by the treatment/shutdowns) that we interact with month. When we examine unincorporated workers, these include dummies for gender, marital status, age of children (any household child age <6, any household child age 6–17), respondent's job is a plausibly remote job, and respondent's job is in an essential industry.[17] M_t is a vector of month dummy variables for March, April, and May of 2020. $W_i * M_t$ are the interactions between the key regressors included in W_i and month. The matrix X_i includes additional control variables

---

[16] Logit or probit random-effects models would be appropriate due to the dichotomous nature of the dependent variable. However, the models would not converge.
[17] When we examine all workers, these include dummies for class of worker (employee or incorporated self-employed).

measured as of February 2020. These include age and age squared, the number of extra adults in the household (besides a spouse or cohabiter), and indicators for older than age 65, education (high school degree, some college, bachelor's degree, advanced degree), race (African-American, other race), Hispanic ethnicity, cohabitation status, immigrant status, living in a metropolitan area, state of residence, own major industry, own major occupation, spouse's major industry, and indicators for whether a respondent's spouse is employed, in a remote job, and in an essential industry. μ_i is the unobserved, person-specific effect, assumed to be uncorrelated with the other included regressors, and ε_{it} is the error term. The coefficient β_0 and the vectors of coefficients β_1, β_2, β_3, and β_4, are to be estimated. The key coefficient vectors are β_2 and β_3, as these give the levels and interaction effects of the treatment (i.e., the shutdowns). The models control for clustering by household, because in some cases both the respondent and his or her spouse are unincorporated self-employed workers and thus both are in the sample.

To examine the impact of COVID-19 on hours worked last week, we estimate tobit RE models via maximum likelihood as follows:

(2) $H_{it}* = \gamma_0 + \gamma_1 W_i + \gamma_2 M_t + \gamma_3 W_i * M_t + \gamma_3 X_i + a_i + v_{it}$,

$H_{it} = H_{it}*$ if $H_{it}*>0$,

$H_{it} = 0$ otherwise,

where $H_{it}*$ is a latent variable for desired hours behind the observed hours variable H_{it}, and the other variables are defined above. a_i is the unobserved, person-specific effect, assumed to be uncorrelated with the other included regressors. The coefficient γ_0 and the coefficient vectors, γ_1, γ_2, γ_3, and γ_4, are to be estimated, and the error term, v_{it}, is normally distributed with a mean of 0 and variance σ^2.

5.2 DDD Models

We also estimate DDD models for which there is assumed to be one "treatment" that occurred in April 2020. The control group includes those sampled in both February and April 2019 and the treated group includes those sampled in both February and April 2020. We examine the initial differential effects of social distancing and the widespread shutdowns on employment and hours in April 2020 by estimating linear models of the following form:

(3) $Y_{it} = \alpha_0 + \alpha_1 h_i + \alpha_2 COVID + \alpha_3 h_i * COVID + \alpha_4 April_t + \alpha_5 Year2020_t + \alpha_6 April_t * h_i +$

$\alpha_7 Year2020_t * h_i + \alpha_8 X_{it} + \omega_{it}$

where Y_{it} is an indicator for whether individual i was employed in month t or hours worked last week for individual i in month t.[18] h_i is an indicator variable for female.[19] COVID equals 1 in April 2020 when the COVID-19 shutdowns were widespread and 0 otherwise. The effect of COVID for males, i.e., the difference-in-differences estimator, is α_2. The differential effect for females, i.e., the triple-difference estimator, is α_3. These models explore only the gender differential effect but are estimated for several demographic sub-samples (married, married parents, etc.). The $April_t$ dummy is included to control for seasonal differences. $Year2020_t$ equals 1 if the individual is in the treated group (interviewed in 2020) and 0 otherwise. The model also allows for differential seasonal factors by gender ($April_t * h_i$) and a gender-specific time trend ($Year2020_t * h_i$). The matrix X_{it} includes the individual, spatial, and job characteristics controls specified earlier, which improves the model precision and potentially controls for any

---

[18] We estimate linear DDD models for hours rather than tobit models because it is not straightforward to estimate nonlinear DDD models (e.g. Puhani 2012). Results from these linear models suggest findings similar to those from the tobit RE models.
[19] When we examine all workers as a sensitivity analysis, h_i is a vector including dummies for class of worker (employee or incorporated self-employed).

compositional differences, and ω_{it} is the error term.[20] We estimate these models by OLS and cluster standard errors at the household level.

6.   Differential Initial Impacts of COVID-19

6.1   Effects of COVID-19 by Type of Worker

We begin by showing the initial impacts of COVID-19 on employment and hours by type of worker. Because the coefficients from the RE models in equations (1) and (2) are difficult to interpret directly when numerous interaction terms included and we want to compare all three worker types, we instead show differences by type of worker across time in the predicted probabilities of being employed and at work and the predicted hours of work.[21] The first three columns of Table 1 show the differences in predicted probabilities of being employed and at work. Examining across time, the probability of employment was lower for all groups of workers in March, April, and May compared to February. The greatest losses occurred in April, when all restrictions were in place, and there was some improvement in May, when restrictions began to be lifted. The unincorporated self-employed suffered a 14-percentage-point loss in employment in March compared to February, a 35-percentage-point loss in April compared to February, and a 30-percentage-point loss in May compared to February. Employees were slightly better off than the unincorporated self-employed, with a reduction in employment of only 7 percentage points in March compared to February, 22 percentage points in April compared to February, and 19 percentage points in May compared to February. The differences in effects across these worker types are statistically significant. Although the incorporated self-

---

[20] Adding individual fixed effects would not change the coefficient estimates but would provide slightly smaller standard errors.
[21] Predictions are provided in Appendix Table A3.

employed suffered losses in employment, they lost only 7 percentage points in employment in March compared to February, 21 percentage points in April compared to February, and 18 percentage points in May compared to February. These are statistically significantly different from the unincorporated self-employed; however, they are not statistically significantly different from employees. Thus, we see that the unincorporated self-employed are a particularly vulnerable group.

Columns 4–6 of Table 1 show the differences in predicted hours worked last week.[22] The unincorporated self-employed saw over 5 fewer hours of work in March than in February, almost 15 fewer hours in April than in February, and over 12 fewer hours in May than in February. The incorporated self-employed fared somewhat better, losing only about 3 hours in March compared to February, about 13 hours in April compared to February, and about 10 hours in May compared to February. Employees lost about 3 hours in March, about 10 in April, and about 8 hours in May, all compared to February. Thus, the incorporated self-employed took a harder hit to hours of work than both the incorporated self-employed and employees in April relative to February. Again, as we did with employment, we can conclude that the unincorporated self-employed were the most vulnerable worker type in terms of hours reductions due to the pandemic.[23] Therefore, in the rest of our analyses, we focus on differential effects among the unincorporated self-employed.

6.2   Key Results for the Unincorporated Self-employed

---

[22] Predicted hours from the RE tobit model are for observed hours.
[23] Results using DDD models are provided in the Appendix Table A4. The differences among the types of workers are qualitatively similar but slightly smaller in magnitude.

Table 2 focuses on the unincorporated self-employed and shows the differences in the predicted probabilities of being employed and at work (Columns 1-3) and the predicted hours of work (Columns 4-6) across time and between groups defined by gender and marital status.[24] Again, the underlying predictions are from the RE models. Regarding the employment effects, we observe that females fared worse than males in April (by 7 percentage points) and May (by 10 percentage points) compared to February. This makes sense if the demand shocks from COVID-19 were higher in female-dominated jobs (Alon, Doepke, Olmstead-Rumsey, and Tertilt 2020b). However, because our analyses control for major occupation and industry, these shocks would refer to occupations at a finer level. Another possibility is that women were more wary of contracting COVID-19 than men (as they are more risk-averse on average, see Borghans, Golsteyn, Heckman, and Meijers 2009), and thus were more likely to leave employment. Yet still another possibility is that the closing of schools and day cares may have caused women to be more likely to leave employment than men if they took on the role of caring for children at home due to proscribed gender roles and the division and specialization of labor within households. Indeed, we find that married women were much worse off in terms of employment reductions compared to February than married men (being 4 percentage points less likely to be employed and at work than married men in March, 14 percentage points less likely in April, and 13

---

[24] Appendix Tables A5 and A6 show the predicted probabilities and predicted hours, respectively, while Table A7 presents the summary statistics. Across months in 2020, demographics are similar, suggesting that the results should not suffer from nonresponse bias due to any differential reduction in nonresponse. We also estimated a specification where we used a binary indicator for unincorporated self-employed and at work as the outcome using the sample who were initially unincorporated self-employed and at work in February. Thus, in this specification, workers who transitioned to wage and salary employment are no longer counted as employed and at work. The differences presented in Appendix Table A8 show the differential impacts of leaving self-employment. The magnitude of the differences between groups in Table 2 increases by only about one-percentage-point.

percentage points less likely in May), and that married men were more likely to be employed than single men (5 percentage points more likely in March and 13 percentage points more likely in April), providing suggestive evidence of this latter possibility. More evidence for this possibility is found in Table 3 where we examine the effects of COVID-19 on employment using the sub-sample of married individuals.[25] Columns 1–3 of Table 3 show that married mothers of young children were less likely to be employed than fathers of young children, 16 percentage points less likely in April compared to February, and 25 percentage points less likely in May compared to February. Married mothers of school-age children also were less likely to be employed than married fathers of school-aged children, 7 percentage points less likely in March, 18 percentage points less likely in April, and 14 percentage points less likely in May, all compared to February. Even married women without children were less likely to be employed than married men without children in April compared to February, but only 11 percentage points less likely, a smaller reduction than for married women with children. This suggests that specialization within the household did not happen solely because of children. Thus, there may be some support for the demand-side shock and risk-aversion explanations.

Going back to the results in Table 2, Columns 4–6 show the differences in predicted hours worked between groups across time. In terms of hours, females were worse off than males in May compared to February (about 3.5 hours worse off), especially among married individuals (5 hours worse off). Again, these effects could be the result of the COVID-19 demand shocks differentially affecting employment and hours within an occupation and industry and/or a

---

[25] This specification includes additional interactions between month, female, and age of child. We did a similar analysis for single individuals (see Appendix Table A9). We find no gender differences in the impacts of COVID on employment, but do find that single mothers of school-aged children fared better than single fathers of school-aged children in April.

reduction in supply due to the greater risk aversion of women. They also could be due to specialization and gender norms. Support for this last explanation can be seen when we compare predicted hours for married individuals by parental status in Table 3. In Columns 4-6 of Table 3, we see that the hours of mothers with young children fell more than the hours of fathers with young children in March and May compared to February (by 5 hours more in March and by over 8 hours more in May). However, specialization is not solely the result of child care needs, as childless married women worked 5 fewer hours than childless married men in May compared to February, suggesting that demand-side shocks and/or risk-aversion may be playing a role in the intensity of women's labor market participation.

6.3   Additional Analyses: DDD Models

In Table 4, we show the differential initial effects of COVID-19 on the employment and hours of work of the married unincorporated self-employed using estimates from the DDD models. We specify the COVID-19 treatment as occurring in April of 2020 only and allow only one interaction with the treatment (a female dummy). Therefore, they are not directly comparable to the estimates from the RE models. Each panel presents results for a separate regression.[26] Panel A shows the overall effects of COVID-19 on married, unincorporated self-employed workers. Such individuals were 23 percentage points less likely to be employed and at work and worked over 11 fewer hours per week because of COVID-19. In Panel B, we use the same sample and examine whether there were differential effects by gender. Among married individuals, women were less likely to be employed and at work due to COVID-19 than men, but the estimate is imprecise. When examining all married parents in panel C, we see that mothers

---

[26] Summary statistics for these DDD models are presented in Appendix Table A10.

were 11 percentage points less likely to be employed due to COVID-19 than fathers. This is consistent with the idea that COVID-19 sent mothers back into the home to care for children as per gender norms. However, further breakdowns by age of children (Panels D and E) do not reveal any statistically significant female effects, likely due to the smaller sample sizes. Married women without children (Panel F) were not more greatly affected by COVID-19 in April 2020 than married men without children.

6.4   Additional Analyses: Remote Job and Essential Industry Status

In Table 5, we again use the RE models to present differences in the predicted probabilities of employment and predicted hours worked across time and groups defined on two job characteristics—plausible remote job status and essential industry status—to see whether these mitigated the effects of COVID-19. Overall, in Panel A, we find that unincorporated self-employed workers with a plausibly remote job were 9 percentage points more likely to be employed and at work in April relative to February than those who did not have a remote job. Those working in an essential industry were more likely to be employed in both April and May relative to February than those who did not work in an essential industry (a 23-percentage-point difference and 16-percentage-point difference, respectively). Both the remote-job and essential-industry effects make sense if being able to work remotely and working in an essential industry reduced or eliminated the demand or supply shocks for these workers.

In terms of hours, unincorporated self-employed workers with a plausibly remote job had over 2 more hours of work per week in April relative to February than those who did not have a remote job. Those working in an essential industry had almost 11 more hours of work in April and over 7 in May relative to February than those who did not work in an essential industry.

Again, working in a remote job and/or an essential industry appears to have reduced demand or supply shocks to the hours of these workers.

In the remaining panels of Table 5 (B-F), we further examine whether there were differential effects of job characteristics for all married individuals and for married individuals by parental status. In Panel B, we find that married workers with a plausibly remote job were 8 percentage points more likely to be employed in April relative to February than those who did not have a remote job. Among married mothers, having a remote job mitigated the negative hours effects of COVID-19 in April relative to February by 5 hours (Panel C). Among married fathers (Panel D), having a remote job mitigated the employment effects of COVID-19 in April relative to February (Panel D) by 15 percentage points. Among both parents and non-parents in the married sample, we find that working in an essential industry mitigated the employment effects of COVID-19 in April by 18–27 percentage points, depending on subsample. Regarding the effects of COVID-19 on hours, these were mitigated for all married persons in essential industries in April. In May, the effects were mitigated for married mothers in essential industries.

7.   Conclusion

In this paper, we study the initial impact of COVID-19 on workers by class of worker and find that the unincorporated self-employed experienced the largest reductions in employment and hours of all worker types, highlighting how relatively vulnerable the unincorporated self-employed were. Perhaps this is because they were without a sufficient social safety net (such as PPP) in place at the beginning of the pandemic. The negative effects were largest in April 2020, with a small rebound in May 2020. These results suggest significant revenue losses for many

small businesses in the early months of the pandemic, which likely resulted in permanent closures for many, as surveys show that few had sufficient cash on hand to cover their expenses in even a short downturn (Bartik, 2020; Buffington, Dennis, Dinlersoz, Foster, and Klimek 2020). They also suggest that it is important for researchers to distinguish between self-employed workers by incorporation status.

Focusing just on the unincorporated self-employed, we find differential effects of COVID-19 by gender that favor men, by marital status and gender that favor married men over married women, and by gender, marital, and parental status that favor married fathers over married mothers. Consistent with the literature on gendered employment effects of COVID-19 on all workers (e.g., Alon, Doepke, Olmstead-Rumsey, and Tertilt 2020b; Heggeness 2020), we find that self-employed females fared worse than self-employed males in terms of reductions in employment and hours, perhaps because demand shocks from COVID-19 were higher in female-dominated jobs or from supply shocks as more risk-averse women left employment than men. Married women were especially worse off compared to married men, and married mothers especially worse off compared to married fathers. Thus, in addition to the above-mentioned demand and supply shocks, married mothers have been forced out of the labor force to care for children as prescribed by gender norms and the division and specialization of labor within households. Having a plausibly remote job and working in an essential industry have mitigated some of these effects. Thus, COVID-19 appears to have set unincorporated self-employed women back in terms of their labor market presence, relegating many of them to the home and reinforcing traditional gender norms. Our finding of gendered employment effects of COVID-19 among the self-employed also has broader implications for the overall employment-to-population

ratio in the long run, as female self-employed workers tend to be less likely to lay off their employees (Matsa and Miller 2014).

A limitation of this paper is that while we estimate the total effect of COVID-19 on employment and hours of work, we are unable to fully disentangle the supply and demand effects. Future research could estimate a more structural model with different data. Another limitation is that although we do examine the effects of COVID-19 on hours, we do not break down our results by full-time versus part-time employment status. Indeed, many self-employed workers may be part-time, as they are using it as a bridge to retirement or as supplementary income to that of the primary earner in the household. This is an avenue worth pursuing in future research. Another limitation is that we cannot examine earnings, because information on earnings is not collected every month in the CPS and so it is not available for all our observations. Future research could use different data to examine the effects of COVID-19 on earnings. Finally, our analyses stop in May, but loosening of restrictions across states over time has occurred since then and not in tandem. Future analyses could exploit this variation across states over time to see how different state responses to the pandemic affected hours and employment.

References

Abraham, K.G., Haltiwanger, J.C., Hou, C., Sandusky, K. & Spletzer, J.R. (2020). Reconciling survey and administrative measures of self-employment. *Journal of Labor Economics*, forthcoming. https://doi.org/10.1086/712187.

Abraham, K.G., & Houseman, S.N. (2019). Making ends meet: The role of informal work in supplementing Americans' income. *Russell Sage Foundation Journal of the Social Sciences*, 5(5), 110–131. https://doi.org/10.7758/RSF.2019.5.5.06.

Adolph, C., Amano, K., Bang-Jensen, B., Fullman, N., & Wilkerson, J. (2020). Pandemic politics: Timing state-level social distancing responses to Covid-19. *MedRXiv*, March 31. https://www.medrxiv.org/content/10.1101/2020.03.30.20046326v1.full.pdf.

Aguiar, M., Hurst, E., & Karabarbounis, L. (2013). Time use during the great recession. *American Economic Review*, 103(5), 1664–96. https://doi.org/10.1257/aer.103.5.1664.

Allred, C.A. (2018). Attitudes on women's roles in the home: 1986–2016. National Center for Marriage & Family Research, FP-18-10.

Alon, T.M., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020a). The impact of COVID-19 on gender equality. *Covid Economics: Vetted and Real-Time Papers*, 4, 62–85. https://cepr.org/sites/default/files/news/CovidEconomics4.pdf.

Alon, T.M., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020b). This time it's different: The role of women's employment in a pandemic recession. Conference paper, Allied Social Sciences Associations Annual Meeting, January 4, 2021. https://www.aeaweb.org/conference/2021/preliminary/1313.

Balyuk, T., Prabhala, N.R., & Puri, M. (2020). Indirect costs of government aid and intermediary supply effects: Lessons from the paycheck protection program. NBER Working Paper No. 28114.

Barrero, J.M., Bloom, N., & Davis, S.J. (2020). COVID-19 is also a reallocation shock. *Brookings Papers on Economic Activity*. https://www.brookings.edu/bpea-articles/covid-19-is-also-a-reallocation-shock/.

Bahler, K. (2020). A state-by-state guide to getting pandemic unemployment assistance benefits. *Money* (June 17, 2020). https://money.com/pandemic-unemployment-assistance-state-by-state/.

Bartik, A.W., Bertrand, M., Cullen, Z., Glaesar, E.L., Luca, M. & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the National Academy of Sciences*, 117(30), 17656–17666. https://doi.org/10.1073/pnas.2006991117.

Bauer, P. & Sonchak, L. (2017). The effect of macroeconomic conditions on parental time with children: Evidence from the American time use survey. *Review of*

Economics of the Household, 15, 905–924. https://doi.org/10.1007/s11150-017-9368-y.

Becker, G.S. (1965). A theory of the allocation of time. *The Economic Journal*, 75(299), 493–517. https://doi.org/10.2307/2228949.

Becker, G.S. (1973). A theory of marriage: Part I. *Journal of Political Economy*, 81(4), 813–846. https://doi.org/10.1086/260084.

Becker, G.S. (1974). A theory of social interactions. *Journal of Political Economy*, 82(6), 1063–1093. https:// doi/10.1086/260265.

Beland, L., Fakorede, O., & Mikola, D. (2020). Short-term effect of COVID-19 on self-employed workers in Canada. *Canadian Public Policy*, 46(S1), S66–S81. https://doi.org/10.3138/cpp.2020-076.

Bertrand, M., Kamenica, E., & Pan, J. (2015). Gender identity and relative income within households. *Quarterly Journal of Economics*, 130(2), 571–614. https://doi.org/10.1093/qje/qjv001.

Bick, A., Blandin, A., & Mertens, K. (2021). Work from home before and after the COVID-19 outbreak. Federal Reserve Bank of Dallas Research Department Working Paper No. 2017. https://doi.org/10.24149/wp2017r2.

Borghans, L., Golsteyn, B.H.H., Heckman, J.J., & Meijers H. (2009). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association*, 7(2/3), 649–658. https://doi.org/10.1162/JEEA.2009.7.2-3.649.

Brynjolfsson, E., Horton, J., Ozimek, A., Rock, D., Sharma, G., & Tu Ye, H.Y. (2020). COVID-19 and remote work: An early look at US data. NBER Working Paper No. w27344.

Budig, M. (2006). Intersections on the road to self-employment: Gender, family and occupational class. *Social Forces*, 84, 2223–2239. https://doi.org/10.1353/sof.2006.0082.

Buffington, C., Dennis, C., Dinlersoz, E., Foster, L., & Klimek, S. (2020). Measuring the effect of COVID-19 on U.S. small businesses: The small business pulse survey. Center for Economic Studies Working Paper No. 20-16. https://www2.census.gov/ces/wp/2020/CES-WP-20-16.pdf.

Burda, M.C., Hamermesh, D.S., & Weil, P. (2008). Total work, gender and social norms in EU and US time use. In Boeri, T., Burda, M., & Kramarz, F. (Eds.) *Working Hours and Job Sharing in the EU and USA: Are Europeans Lazy? Or Americans Crazy?* (pp. 11–91) Oxford University Press. ⟨hal-00972821⟩

Bureau of Labor Statistics, U.S. Department of Labor. (2019). American Time Use Survey — 2018 Results. https://www.bls.gov/news.release/pdf/atus.pdf.

Bureau of Labor Statistics, U.S. Department of Labor, and the Census Bureau, U.S. Department of Commerce. (2019–2020). Current Population Survey. https://www.census.gov/data/datasets/time-series/demo/cps/cps-basic.html. Accessed June 14, 2020.

Bureau of Labor Statistics, U.S. Department of Labor. (2020a). The employment situation — April 2020. https://www.bls.gov/news.release/archives/empsit_05082020.pdf.

Bureau of Labor Statistics, U.S. Department of Labor. (2020b). Frequently asked questions: The impact of the coronavirus (COVID-19) pandemic on the employment situation for April 2020. https://www.bls.gov/cps/employment-situation-covid19-faq-april-2020.pdf.

Bureau of Labor Statistics, U.S. Department of Labor. (2020c). Update on the misclassification that affected the unemployment rate. Commissioner's Corner (blog), June 29, 2020. https://blogs.bls.gov/blog/2020/06/29/update-on-the-misclassification-that-affected-the-unemployment-rate/.

Carrington, W.J., McCue, K., & Pierce, B. (1996). The role of employer/employee interactions in labor market cycles: Evidence from the self-employed. *Journal of Labor Economics*, 14(4), 571–602. https://doi.org/10.1086/209823.

Cole, R.A. (2011). How do firms choose legal form of organization? Small Business Administration, Office of Advocacy Report. https://www.sba.gov/sites/default/files/files/rs383tot.pdf.

Deller, S.C., Conroy, T. & Watson, P. (2017). Women business owners: A source of stability during the great recession? *Applied Economics*, 49(56), 5686–5697. https://doi.org/10.1080/00036846.2017.1332745.

Dingel, J., & Neiman, B. (2020). How many jobs can be done at home? *Journal of Public Economics*, 189. https://doi.org/10.1016/j.jpubeco.2020.104235.

Doniger, C.L. & Kay, B. (2021). Ten days late and billions of dollars short: The employment effects of delays in paycheck protection program financing. Finance and Economics Discussion Series 2021-003. Washington: Board of Governors of the Federal Reserve System. https://doi.org/10.17016/FEDS.2021.003.

Delaware Division of Public Health, Coronavirus Response. (2020). Essential and non-essential business categories during coronavirus closure. https://coronavirus.delaware.gov/business-categories-search/?business_to_remain_open=Closed. Accessed May 27, 2020.

Fairlie, R.W. (2013). Entrepreneurship, economic conditions, and the great recession. *Journal of Economics & Management Strategy*, 22(2), 207–231. https://doi.org/10.1111/jems.12017.

Fairlie, R.W. (2020). The impact of COVID-19 on small business owners: Evidence from the first three months after widespread social-distancing restrictions. *Journal of Economics & Management Strategy*, 29(4), 727–740. https://doi.org/10.1111/jems.12400.

Fairlie, R.W., & Fossen, F.M. (2020). Defining opportunity versus necessity entrepreneurship: Two components of business creation. Polachek, S.W. & Tatsiramos, K. (Ed.) *Change at Home, in the Labor Market, and On the Job* (*Research in Labor Economics)*, 48, 253–289. https://doi.org/10.1108/S0147-912120200000048008.

Fairlie, R.W., Miranda, J., & Zolas, N. (2019). Measuring job creation, growth, and survival among the universe of start-ups in the United States using a combined start-up panel data set. *ILR Review*, 72(5). https://doi.org/10.1177/0019793919862764.

Fairlie, R.W. & Miranda, J. (2017) Taking the leap: The determinants of entrepreneurs hiring their first employee. *Journal of Economics & Management Strategy*, 26(1), 3–34. https://doi.org/10.1111/jems.12176.

Fossen, F.M. (2020). Self-employment over the business cycle in the USA: A decomposition. *Small Business Economics*. https://doi.org/10/1007/s11187-010-00375-3.

Fullman, N., Bang-Jense, B., Reinke, G., Magistro, B., Amano, K., Adolph, C., & Wilkerson, J. (2020). State-level social distancing policies in response to COVID-19 in the US. http://www.covid19statepolicy.org. Accessed December 23, 2020.

Gimenez-Nadal, J.I., Molina, J.A., & Ortega, R. (2012). Self-employed mothers and the work-family conflict. *Applied Economics*, 44(17), 1–15. https://doi.org/10.1080/00036846.2011.558486.

Goolsbee, A., & Svyerson, C. (2020). Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of Public Economics*, 193. https://doi.org/10.1016/j.jpubeco.2020.104311.

Handwerker, E.W., Meyer, P.B., Piacentini, J., Schultz, M., & Sveikauskas, L. (2020). Employment recovery in the wake of the COVID-19 pandemic. *Monthly Labor Review*, December 2020. https://www.bls.gov/opub/mlr/2020/article/pdf/employment-recovery.pdf.

Heggeness, M.L. (2020). Estimating the immediate impact of the COVID-19 shock on parental attachment to the labor market and the double bind of mothers. *Review of Economics of the Household*, 18, 1053–1078. https://doi.org/10.1007/s11150-020-09514-x.

Hipple, S.F., & Hammond, L.A. (2016). Self-employment in the United States. *BLS Spotlight on Statistics*. https://www.bls.gov/spotlight/2016/self-employment-in-the-united-states/home.htm.

Humphries, J.E., Neilson, C., & Ulyssea, G. (2020). Information Frictions and Access to the Paycheck Protection Program. *Journal of Public Economics*, 190. https://doi.org/10.1016/j.jpubeco.2020.104244.

Kalenkoski, C.M., & Pabilonia, S.W. (2021). Replication archive for Impacts of COVID-19 on the self-employed. [Data set]. *Zenodo*. https://doi.org/10.5281/zenodo.4757153.

Levine, R., & Rubinstein, Y. (2017). Smart and illicit: Who becomes an entrepreneur and do they earn more? *Quarterly Journal of Economics*, 132(2), 963–1018. https://doi.org/10.1093/qje/qjw044.

Lim, K. (2019). Do American mothers use self-employment as a flexible work alternative? *Review of Economics of the Household*, 17, 805–842. https://doi.org/10.1007/s11150-018-9426-0.

Lundberg, S. & Pollak, R. (1994). Noncooperative bargaining models of marriage. *American Economic Review*, 84, 132–37.

Manser, M. & Brown, M. (1980). Marriage and household decision-making: A bargaining analysis. *International Economic Review*, 21(1), 31–44. https://doi.org/10.2307/2526238.

Matsa, D. A., & Miller, A. R. (2014). Workforce reductions at women-owned businesses in the United States. *Industrial and Labor Relations Review,* 67(2), 422–452. https://doi.org/10.1177/001979391406700206.

McElroy, M. & Horney, M.J. (1981). Nash-bargained household decisions: Toward a generalization of the theory of demand. *International Economic Review*, 22, 333–49. https://doi.org/10.2307/2526280.

Montenovo, L., Jiang, X., Rojoas, F. L., Schmutte, I.M., Simon, K.I., Weinberg, B.A., & Wing, C. (2020). Determinants of disparities in COVID-19 job losses. NBER Working Paper No. 21732.

Pabilonia, S.W. (2014). Measuring hours worked by the unincorporated self-employed using the CPS and ATUS. Conference paper, International Association for Research in Income and Wealth General Conference. http://www.iariw.org/papers/2014/PabiloniaPaper.pdf.

Pabilonia, S.W. & Vernon, V. (2020). Telework, wages, and time use in the United States. Conference Paper, Allied Social Sciences Associations Annual Meeting, January 5, 2021. https://www.aeaweb.org/conference/2021/preliminary/1992.

Puhani, P. A. (2012). The treatment effect, the cross difference, and the interaction term in nonlinear "difference-in-differences" models. *Economics Letters*, 115(1), 85–87. https://doi.org/10.1016/j.econlet.2011.11.025.

Schoonbroodt, A. (2018). Parental child care during and outside of typical work hours. *Review of the Economics of the Household*, 16, 453–476. https://doi.org/10.1007/s11150-016-9336-y.

Sevilla, A., & Smith, S. (2020). Baby steps: The gender division of childcare during the COVID-19 pandemic. *Oxford Review of Economic Policy*, 36(S1), S169–S186. https://doi.org/10.1093/oxrep/graa027.

Zamarro, G. & Prados, M.J. (2021). Gender differences in couples' division of childcare, work and mental health during COVID-19. *Review of Economics of the Household*, 19, 11–40. https://doi.org/10.1007/s11150-020-09534-7.

Fig. 1 Employed and at work in 2020 by worker type
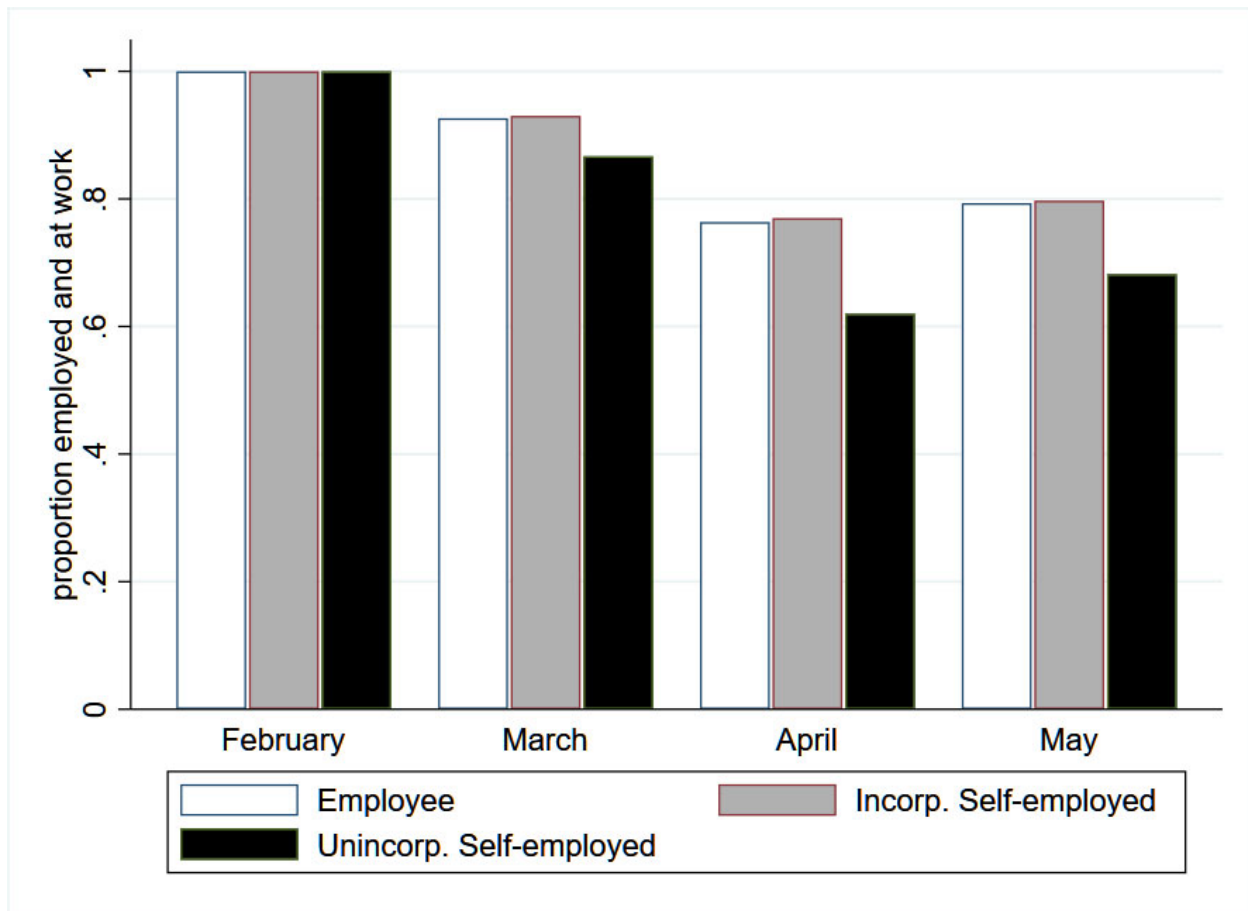
Note: All workers were employed and at work in February 2020. For employees, N = 48,570, 31,592, 20,690 and 10,076 for consecutive months. For incorporated self-employed, N = 2,276, 1,521, 1,045, and 530 for consecutive months. For unincorporated self-employed, N = 3,400, 2,299, 1,513, and 776 for consecutive months.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 2 Average weekly hours worked in 2020 by worker type
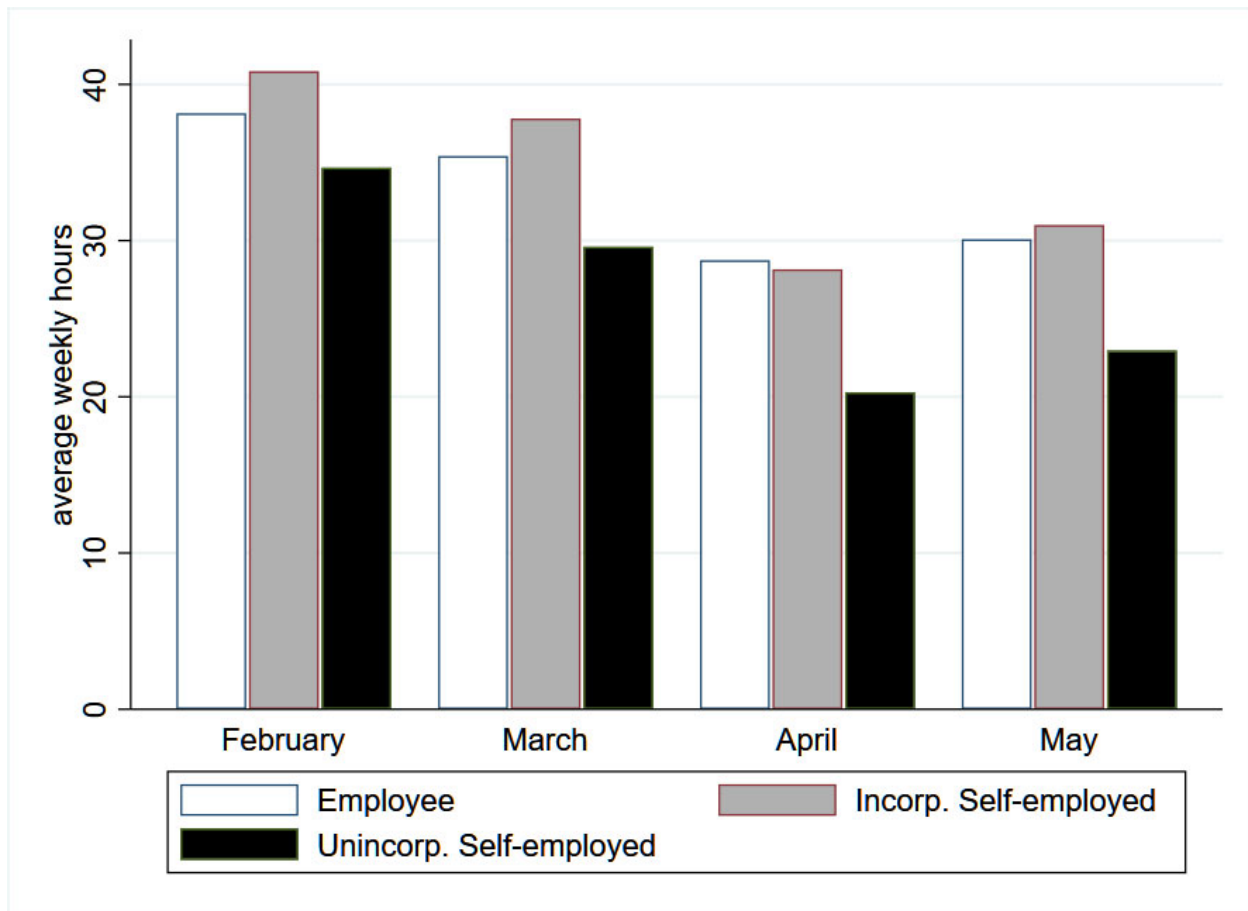
Note: All workers were employed and at work in February 2020. For employees, N = 48,570, 31,592, 20,690 and 10,076 for consecutive months. For incorporated self-employed, N = 2,276, 1,521, 1,045, and 530 for consecutive months. For unincorporated self-employed, N = 3,400, 2,299, 1,513, and 776 for consecutive months.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 3 Unincorporated self-employed who were at work in 2020
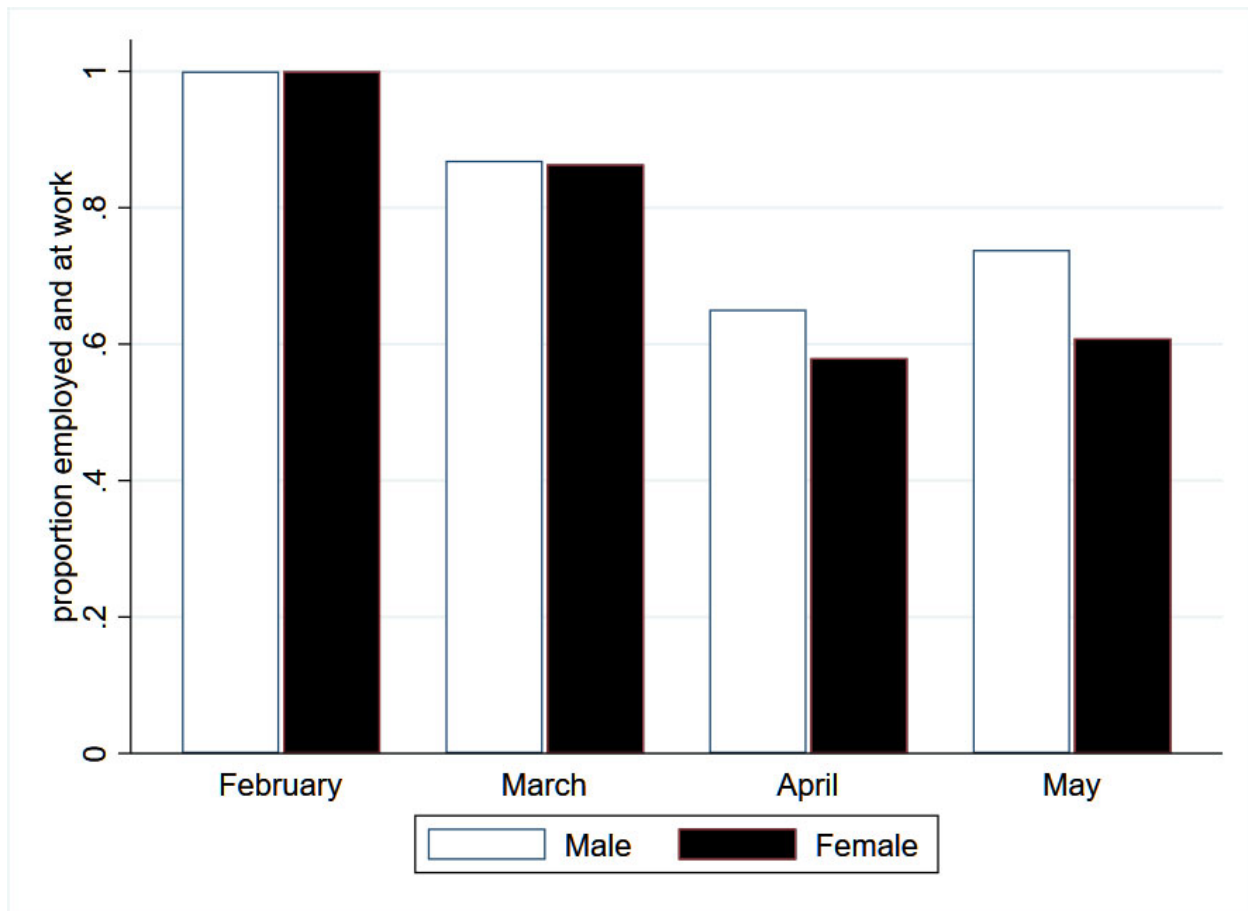
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 2,054, 1,364, 860, and 442 for consecutive months. For females, N = 1,346, 935, 653, and 334 for consecutive months.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 4 Average weekly hours worked by the unincorporated self-employed in 2020
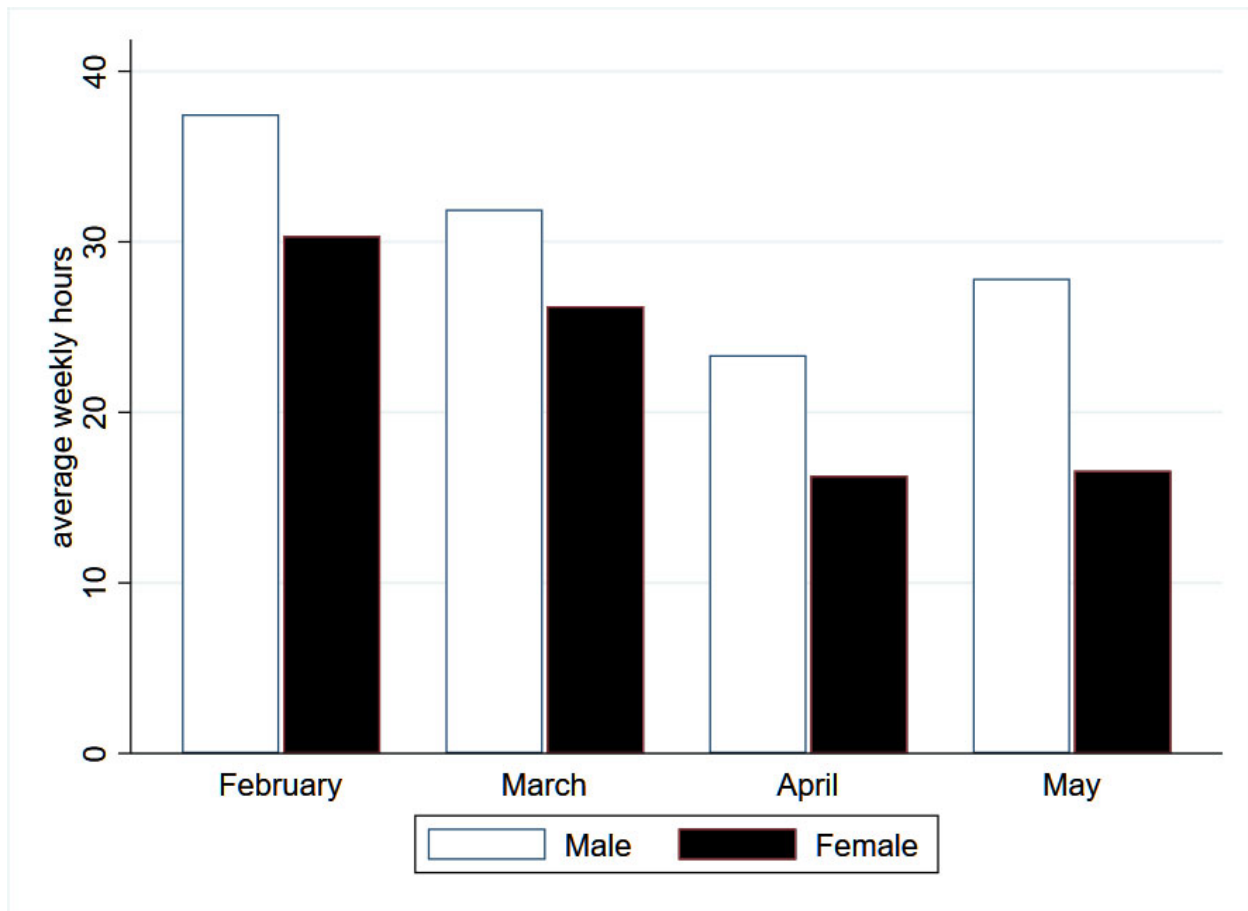
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 2,054, 1,364, 860, and 442 for consecutive months. For females, N = 1,346, 935, 653, and 334 for consecutive months.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 5 Unincorporated self-employed who were at work (married individuals, by gender and parental status)
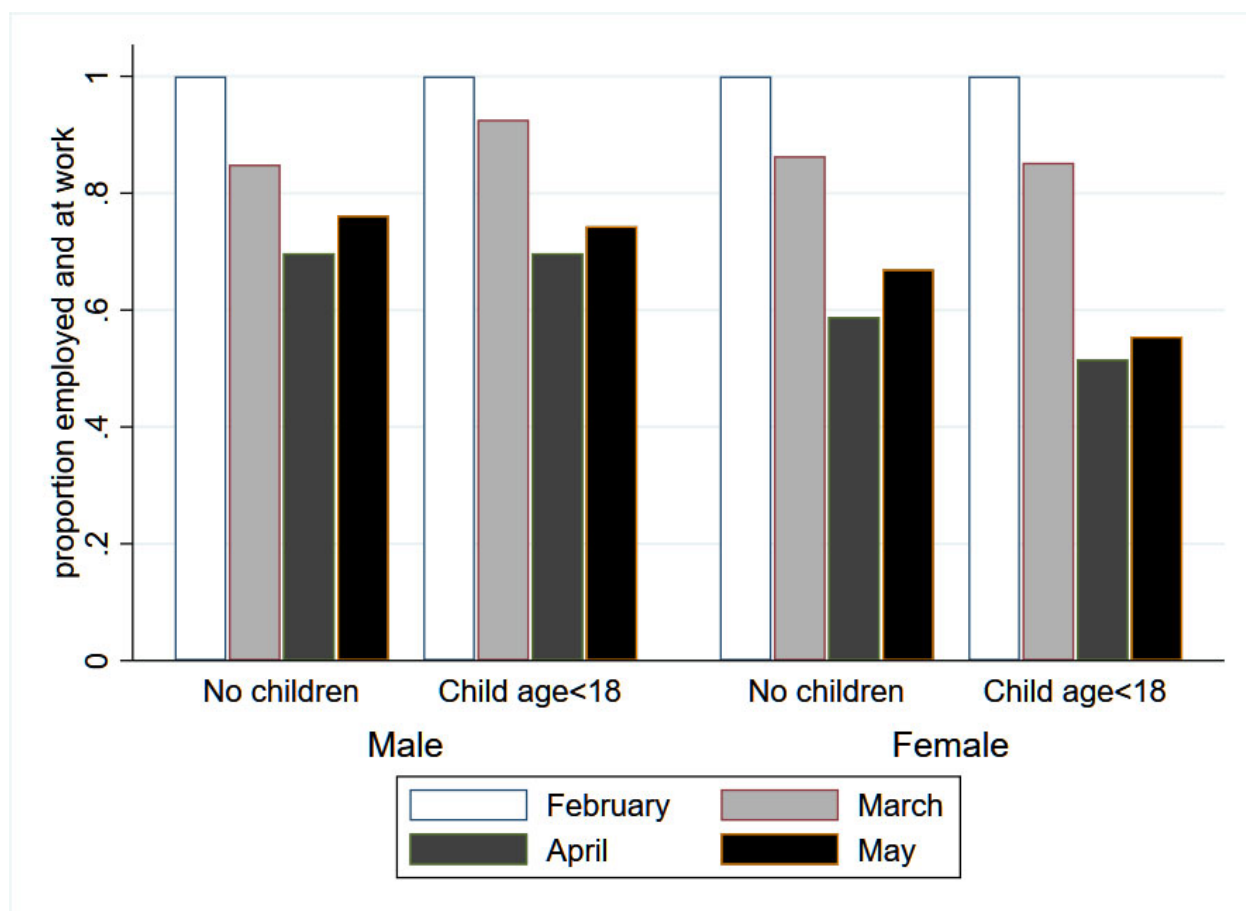
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 1,333, 904, 573, and 287. For females, N = 841, 573, 416, and 214.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 6 Unincorporated self-employed who were at work (single individuals, by gender and parental status)
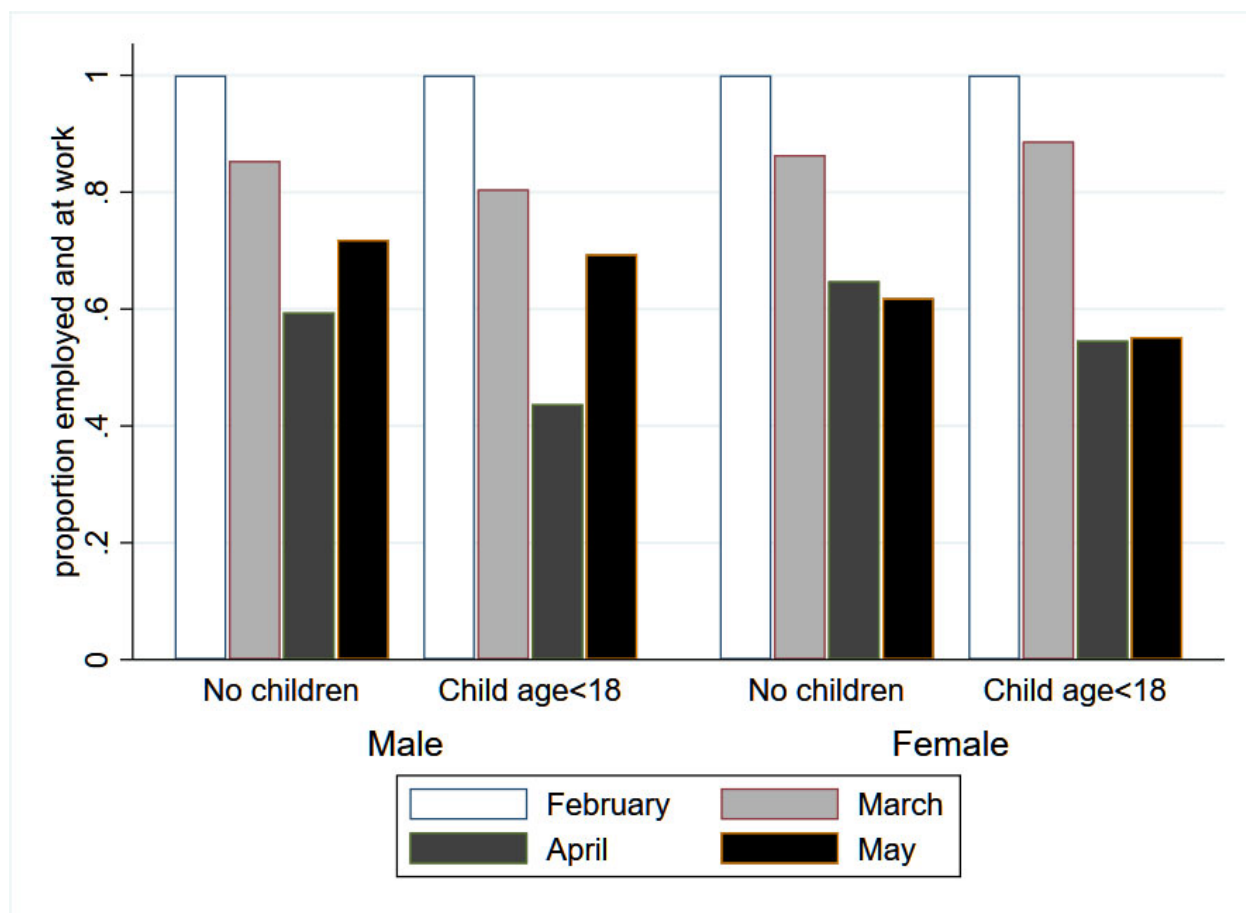
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 721, 460, 287, and 155. For females, N = 505, 362, 237, and 120.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 7 Average weekly hours worked by the unincorporated self-employed (married individuals, by gender and parental status)
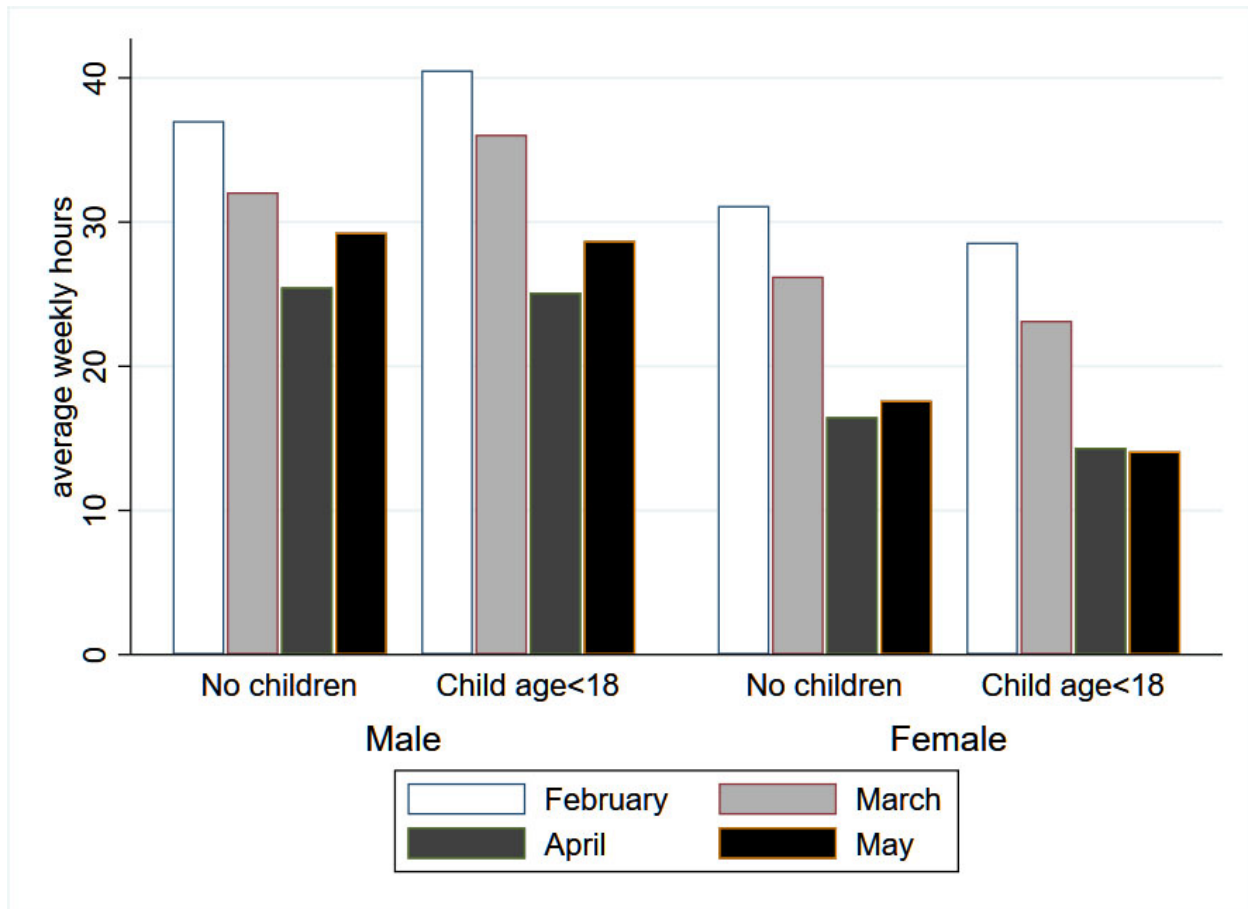
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 1,333, 904, 573, and 287. For females, N = 841, 573, 416, and 214.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Fig. 8 Average weekly hours worked by the unincorporated self-employed (single individuals, by gender and parental status)
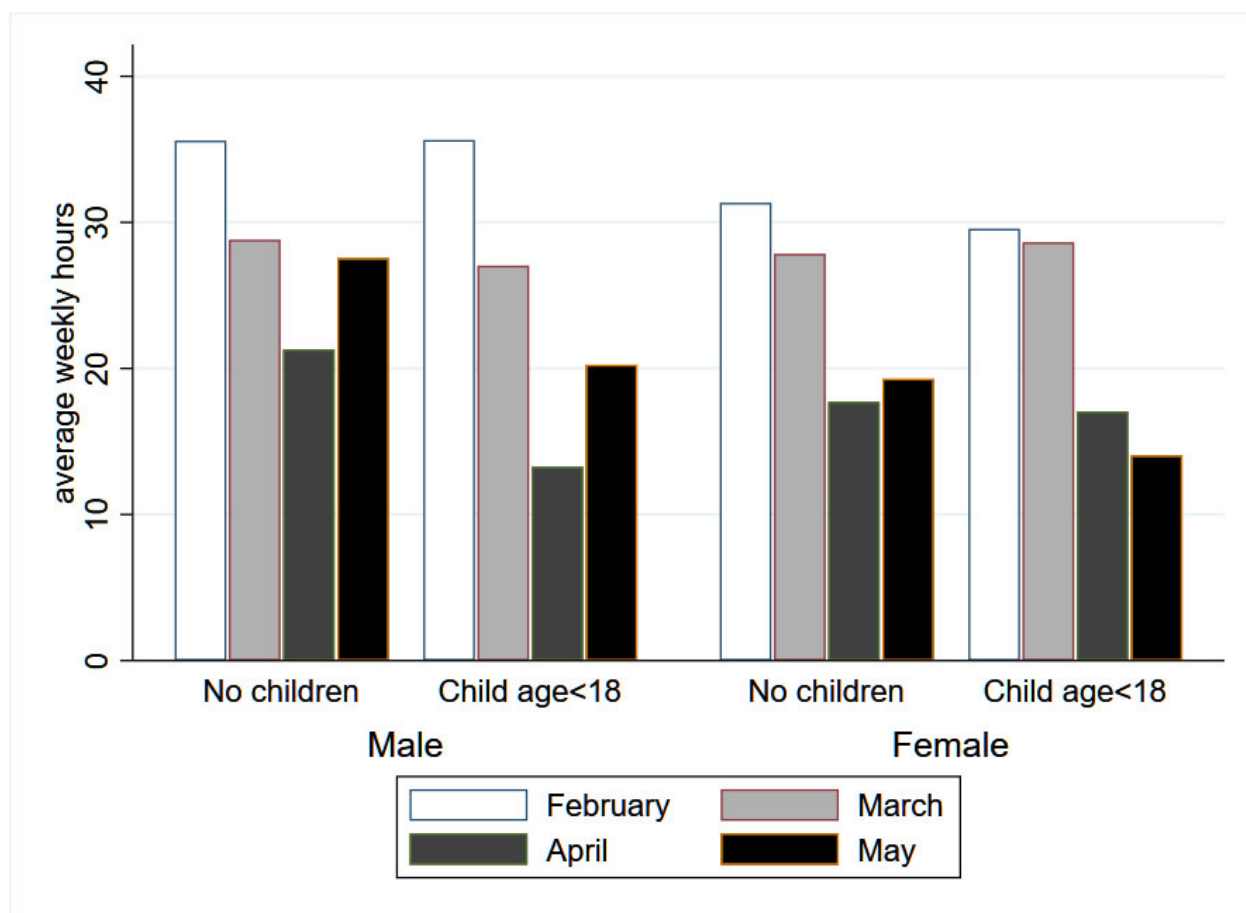
Note: All workers were unincorporated self-employed and at work in February 2020. For males, N = 721, 460, 287, and 155. For females, N = 505, 362, 237, and 120.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table 1. Differences in Predicted Probabilities of Being Employed and At Work and Hours Worked, by Worker Type in February 2020 (RE models)

Worker Types	Employed and At Work			Hours Worked		
	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Unincorporated Self-employed (SE)	-0.14**	-0.35**	-0.30**	-5.44**	-14.63**	-12.30**
	(0.01)	(0.01)	(0.02)	(0.36)	(0.55)	(0.72)
Incorporated SE	-0.07**	-0.21**	-0.18**	-3.40**	-12.81**	-9.84**
	(0.01)	(0.01)	(0.02)	(0.45)	(0.68)	(0.94)
Employee	-0.07**	-0.22**	-0.19**	-2.85**	-9.94**	-8.35**
	(0.00)	(0.00)	(0.00)	(0.08)	(0.14)	(0.17)
Differences between worker types						
Unincorporated SE - Incorporated SE	-0.07**	-0.14**	-0.12**	-2.04**	-1.82*	-2.46*
	(0.01)	(0.02)	(0.02)	(0.58)	(0.87)	(1.18)
Unincorporated SE - Employee	-0.07**	-0.13**	-0.12**	-2.60**	-4.69**	-3.94**
	(0.01)	(0.01)	(0.02)	(0.37)	(0.57)	(0.74)
Employee - Incorporated SE	0.00	-0.01	-0.01	0.55	2.87**	1.48
	(0.01)	(0.01)	(0.02)	(0.46)	(0.69)	(0.95)

Notes: N = 124,288. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. Control variables include a quadratic in age and the number of extra household adults (besides a spouse or cohabiter) and indicators for older than age 65, month (March, April, May), marital status, cohabitation status, gender, education (high school, some college, bachelor's degree, advanced degree), race (African-American, other race), Hispanic ethnicity, any household child age<6, any household child age 6-17, plausible remote job, job in essential industry, immigrant status, spouse employment, spouse has remote job, spouse works in essential industry, lives in metropolitan area, own major industry, own major occupation, spouse major industry, and state fixed effects. * $p < 0.05$, ** $p < 0.01$.
Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table 2. Differences between Groups and across Months in Predicted Probabilities of Being Employed and At Work and Hours Worked for the Unincorporated Self-employed (RE models)

Differences between groups	Employed and At Work			Hours Worked		
	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Gender						
Female - Male	-0.01	-0.07**	-0.10**	0.81	-0.17	-3.52**
	(0.01)	(0.02)	(0.03)	(0.65)	(0.92)	(1.26)
Marital Status						
Married - Single	0.02	0.04	0.03	0.60	1.10	0.79
	(0.02)	(0.03)	(0.03)	(0.74)	(1.06)	(1.40)
Marital/Gender Status						
Married women - Married men	-0.04*	-0.14**	-0.13**	-0.97	-1.65	-4.75**
	(0.02)	(0.03)	(0.04)	(0.78)	(1.10)	(1.46)
Single women - Single men	0.03	0.06	-0.04	4.03**	2.90	-1.17
	(0.02)	(0.04)	(0.05)	(1.16)	(1.65)	(2.28)
Married men - Single men	0.05*	0.13**	0.07	2.67**	3.26*	2.58
	(0.02)	(0.03)	(0.04)	(0.97)	(1.45)	(1.92)
Married women - Single women	-0.02	-0.07	-0.02	-2.33*	-1.29	-1.01
	(0.02)	(0.04)	(0.05)	(1.07)	(1.45)	(1.95)

Notes: $N = 7,988$. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table 3. Differences between Groups and across Months in Predicted Probabilities of Being Employed and At Work and Hours Worked for the Unincorporated Self-employed (RE models) (Married Individuals)

Differences between groups	Employed and At Work			Hours Worked		
	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Mothers - Fathers with child age < 6	-0.09	-0.16*	-0.25**	-4.55*	-0.79	-8.45**
	(0.05)	(0.07)	(0.09)	(1.99)	(2.67)	(3.22)
Mothers - Fathers with child age 6–17	-0.07*	-0.18**	-0.14*	-1.84	-0.50	-1.69
	(0.03)	(0.05)	(0.06)	(1.35)	(1.82)	(2.26)
Childless women - Childless men	-0.01	-0.11**	-0.09	0.20	-2.28	-5.32**
	(0.02)	(0.04)	(0.05)	(0.99)	(1.43)	(2.00)

Notes: N = 5,141. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table 4. Differential Effects of COVID-19 in April 2020 on Being Employed and At Work and Hours Worked of Married Unincorporated Self-employed Workers (DDD Models)

Sample	N	Variables	Employed and At Work	Hours Worked
Panel A. All married	3,884	COVID	-0.23**	-11.27**
			(0.02)	(0.87)
Panel B. All married	3,884	COVID	-0.21**	-10.92**
			(0.02)	(1.07)
		COVID x female	-0.06	-0.84
			(0.03)	(1.48)
Panel C. All married parents	1,704	COVID	-0.22**	-11.70**
			(0.03)	(1.69)
		COVID x female	-0.11*	-1.46
			(0.05)	(2.32)
Panel D. Married with any child age<6	692	COVID	-0.25**	-12.48**
			(0.05)	(2.76)
		COVID x female	-0.08	-1.91
			(0.09)	(4.01)
Panel E. Married with any child age 6–17	1,396	COVID	-0.23**	-12.31**
			(0.03)	(1.81)
		COVID x female	-0.08	-0.68
			(0.06)	(2.458)
Panel F. Married no children	2,180	COVID	-0.19**	-10.47**
			(0.03)	(1.42)
		COVID x female	-0.02	-0.21
			(0.05)	(1.97)

Notes: Each panel is a separate regression showing the effect of COVID and/or the differential effect of COVID by gender for different parental and/or marital status samples. Standard errors in parentheses are clustered by household. See Table 1 for control variables. Regressions also include interactions of the subgroup with month and year. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February and April 2019–2020

Table 5. Differences between Groups defined by Job Characteristics and across Months in Predicted Probabilities of Being Employed and At Work and Hours Worked for the Unincorporated Self-employed (RE models)

Differences between groups	Employed and At Work			Hours Worked		
	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Panel A. Unincorporated self-employed (N = 7,988)						
Remote job - not remote job	-0.00	0.09**	0.04	-0.59	2.47*	0.91
	(0.02)	(0.03)	(0.04)	(0.77)	(1.08)	(1.45)
Essential - not essential industry	0.02	0.23**	0.16**	0.73	10.76**	7.41**
	(0.02)	(0.03)	(0.04)	(0.84)	(1.44)	(1.55)
Panel B. All married (N = 5,141)						
Remote job - Not remote job	-0.01	0.08*	0.03	-0.47	2.21	0.21
	(0.02)	(0.03)	(0.04)	(0.94)	(1.32)	(1.76)
Essential industry - Not essential industry	0.03	0.23**	0.09	1.42	11.61**	6.98**
	(0.02)	(0.04)	(0.05)	(1.09)	(1.48)	(1.95)
Panel C. Married mothers (N = 860)						
Remote job - Not remote job	0.00	0.12	0.08	2.39	5.27*	2.21
	(0.05)	(0.07)	(0.09)	(2.00)	(2.57)	(3.11)
Essential industry - Not essential industry	0.00	0.27**	0.16	0.73	11.28**	9.99**
	(0.05)	(0.07)	(0.09)	(2.05)	(2.57)	(3.07)
Panel D. Married fathers (N = 1,262)						
Remote job - Not remote job	-0.02	0.15**	-0.01	-3.25	2.75	-2.92
	(0.03)	(0.06)	(0.08)	(2.03)	(2.83)	(3.95)
Essential industry - Not essential industry	0.08	0.23**	0.18	0.72	8.71*	8.63
	(0.05)	(0.09)	(0.13)	(3.05)	(4.13)	(6.04)
Panel E. Married women no children (N = 1,184)						
Remote job - Not remote job	-0.07	0.00	0.04	-2.74	-0.04	3.34
	(0.04)	(0.07)	(0.09)	(1.69)	(2.47)	(3.48)
Essential industry - Not essential industry	-0.03	0.22**	0.06	1.77	11.92**	5.42
	(0.04)	(0.07)	(0.09)	(1.62)	(2.34)	(3.36)
Panel F. Married men no children (N = 1,835)						
Remote job - Not remote job	0.02	0.04	-0.05	1.60	1.83	-2.72
	(0.03)	(0.06)	(0.07)	(1.52)	(2.36)	(3.10)
Essential industry - Not essential industry	0.09	0.18*	0.00	1.85	10.51**	4.35
	(0.05)	(0.07)	(0.08)	(1.85)	(2.69)	(3.08)

Notes: Each panel represents differences for separate regressions by sub-sample. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A1. Differences in Predicted Probabilities of Being Employed and At Work and Hours Worked for the Unincorporated Self-employed (RE model) (Sample restricted to states with state-wide emergency declarations after March 8th)

	Employed and At Work			Hours Worked		
Differences between groups	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Gender						
Female - Male	-0.01	-0.06*	-0.08*	1.01	-0.10	-3.21*
	(0.02)	(0.03)	(0.03)	(0.73)	(1.01)	(1.40)
Marital Status						
Married - Single	0.01	0.04	0.02	-0.09	1.19	0.58
	(0.02)	(0.03)	(0.04)	(0.83)	(1.18)	(1.55)
Marital/Gender Status						
Married women - Married men	-0.04*	-0.14**	-0.12**	-0.78	-1.83	-4.86**
	(0.02)	(0.03)	(0.04)	(0.88)	(1.23)	(1.62)
Single women - Single men	0.05	0.08	-0.01	4.32**	3.22	-0.12
	(0.03)	(0.04)	(0.06)	(1.30)	(1.80)	(2.58)
Married men - Single men	0.05*	0.13**	0.07	2.04	3.50*	2.77
	(0.02)	(0.04)	(0.05)	(1.10)	(1.59)	(2.09)
Married women - Single women	-0.04	-0.08*	-0.04	-3.06*	-1.55	-1.97
	(0.03)	(0.04)	(0.06)	(1.19)	(1.61)	(2.23)
Job Characteristics						
Remote job - Not remote job	-0.01	0.09**	0.04	-1.37	2.06	0.62
	(0.02)	(0.03)	(0.04)	(0.87)	(1.21)	(1.65)
Essential - Not essential industry	0.02	0.21**	0.15**	1.11	11.13**	6.98**
	(0.02)	(0.03)	(0.04)	(0.96)	(1.30)	(1.74)

Notes: N = 6,479. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A2. Mean Employment and Hours Worked in 2020 by Marital and Parental Status (Unincorp. Self-employed)

Sample	February	March	April	May
Panel A. Employed and At Work				
Married				
Males	1.00	0.88	0.70	0.75
No children	1.00	0.85	0.70	0.76
Child age<6	1.00	0.91	0.66	0.81
Child age 6–17	1.00	0.92	0.69	0.73
Females	1.00	0.86	0.56	0.61
No children	1.00	0.86	0.59	0.67
Child age<6	1.00	0.76	0.48	0.57
Child age 6–17	1.00	0.87	0.54	0.59
Single				
Males	1.00	0.84	0.56	0.71
No children	1.00	0.86	0.59	0.72
Child age<6	1.00	0.85	0.61	0.94
Child age 6–17	1.00	0.79	0.37	0.67
Females	1.00	0.87	0.62	0.60
No children	1.00	0.85	0.65	0.62
Child age<6	1.00	0.89	0.60	0.55
Child age 6–17	1.00	0.90	0.57	0.64
Panel B. Average Weekly Hours				
Married				
Males	38.57	33.85	25.30	29.00
No children	37.02	32.07	25.48	29.26
Child age<6	39.18	35.57	24.54	31.41
Child age 6–17	40.56	35.97	24.10	27.84
Females	30.04	24.90	15.52	15.93
No children	31.13	26.22	16.48	17.61
Child age<6	25.79	18.01	11.89	13.12
Child age 6–17	29.45	24.67	15.33	15.40
Single				
Males	35.61	28.46	19.60	25.87
No children	35.60	28.81	21.30	27.55
Child age<6	37.82	30.62	18.81	27.75
Child age 6–17	36.00	24.64	11.15	19.17
Females	30.83	28.10	17.54	17.69
No children	31.35	27.85	17.73	19.30
Child age<6	25.57	24.81	20.49	15.30
Child age 6–17	30.60	29.66	17.21	15.67
Observations	3,400	2,299	1,513	776

Note: CPS final weights used. Sample restricted to those who were employed and at work in February.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A3. Predicted Probabilities of Being Employed and At Work and Hours Worked, by Worker Type in February 2020 (RE model)

Worker Types	Feb	March	April	May
Probability of Being Employed and At Work				
Unincorporated SE	1.00	0.86	0.65	0.70
	(0.00)	(0.01)	(0.01)	(0.02)
Incorporated SE	1.00	0.93	0.78	0.81
	(0.00)	(0.00)	(0.00)	(0.00)
Employee	1.00	0.93	0.79	0.82
	(0.00)	(0.01)	(0.01)	(0.02)
Hours Worked Last Week				
Unincorporated SE	35.52	29.08	19.89	22.23
	(0.29)	(0.41)	(0.55)	(0.72)
Incorporated SE	40.52	37.12	27.70	30.68
	(0.36)	(0.50)	(0.68)	(0.93)
Employee	38.22	35.38	28.28	29.87
	(0.05)	(0.09)	(0.14)	(0.17)

Notes: N = 124,288. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A4. Differential Effects of COVID in April 2020 on Being Employed and At Work and Hours Worked, by Worker Type in February (DDD model)

Worker Types	All (1)	Restricted Sample (2)
Panel A. Employed and At Work		
COVID (Reference group = Unincorporated SE)	-0.23**	-0.21**
	(0.02)	(0.02)
COVID x Incorporated SE	0.09**	0.05
	(0.02)	(0.03)
COVID x Employee	0.07**	0.05*
	(0.02)	(0.02)
Panel B. Hours Worked		
COVID (Reference group = Unincorporated SE)	-11.01**	-10.78**
	(0.69)	(1.12)
COVID x Incorporated SE	1.80	-0.67
	(1.08)	(1.77)
COVID x Employee	3.72**	3.65**
	(0.70)	(1.14)
Observations	95,684	31,328

Notes: All workers were employed and at work in February. Column 1 includes those who were observed in February and April of at least one year. Column 2 includes those who were observed in all four months in order to further minimize concerns that the parallel trends assumption may be violated because of differences in the sample's composition (note: February means are similar, see Appendix Table A4). Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February and April 2019–2020

Table A5. Predicted Probabilities of Being Employed and At Work for the Unincorporated Self-employed (RE model)

Groups	March	April	May
Female	0.86	0.61	0.64
	(0.01)	(0.02)	(0.03)
Male	0.87	0.68	0.74
	(0.01)	(0.02)	(0.02)
Married	0.87	0.67	0.71
	(0.01)	(0.01)	(0.02)
Single	0.85	0.63	0.68
	(0.01)	(0.02)	(0.03)
Married women	0.85	0.59	0.64
	(0.02)	(0.02)	(0.03)
Married men	0.89	0.73	0.77
	(0.01)	(0.02)	(0.02)
Single women	0.87	0.66	0.66
	(0.02)	(0.03)	(0.04)
Single men	0.84	0.60	0.70
	(0.02)	(0.03)	(0.03)
Not remote job	0.87	0.63	0.69
	(0.01)	(0.02)	(0.02)
Remote job	0.85	0.70	0.71
	(0.01)	(0.02)	(0.03)
Not essential industry	0.87	0.51	0.61
	(0.02)	(0.02)	(0.03)
Essential industry	0.86	0.72	0.75
	(0.01)	(0.02)	(0.02)

Notes: N = 7,988. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A6. Predicted Hours Worked for the Unincorporated Self-employed (RE model)

Groups	Feb	March	April	May
Female	30.90	25.95	16.45	16.72
	(0.42)	(0.57)	(0.67)	(0.91)
Male	37.45	31.69	23.17	26.78
	(0.33)	(0.50)	(0.69)	(0.91)
Married	35.33	30.05	21.11	23.20
	(0.34)	(0.49)	(0.64)	(0.84)
Single	34.00	28.11	18.68	21.08
	(0.44)	(0.64)	(0.84)	(1.11)
Married women	30.16	24.29	15.27	15.65
	(0.52)	(0.69)	(0.81)	(1.09)
Married men	38.60	33.69	25.35	28.84
	(0.41)	(0.61)	(0.86)	(1.12)
Single women	32.13	28.59	18.52	18.63
	(0.69)	(0.97)	(1.19)	(1.58)
Single men	35.32	27.74	18.82	22.98
	(0.56)	(0.86)	(1.18)	(1.56)
Not remote job	34.44	29.16	18.95	21.67
	(0.43)	(0.57)	(0.69)	(0.91)
Remote job	35.54	29.67	22.53	23.68
	(0.60)	(0.75)	(0.90)	(1.14)
Not essential industry	35.69	29.68	13.72	18.22
	(0.68)	(0.86)	(0.88)	(1.28)
Essential industry	34.48	29.21	23.28	24.43
	(0.38)	(0.50)	(0.69)	(0.85)

Notes: N = 7,988. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A7. Means for Random Effects Sample (Unincorporated Self-employed)

Variable	February	March	April	May
Employed and at work	1.00	0.87	0.62	0.68
Hours on the primary job	34.67	29.61	20.29	22.96
Female	0.39	0.40	0.43	0.43
Age	49.45	49.37	49.38	48.91
Age 65 plus	0.16	0.16	0.16	0.16
High school degree	0.27	0.27	0.26	0.27
Some college	0.28	0.28	0.29	0.29
Bachelor's degree	0.23	0.24	0.24	0.24
Advanced degree	0.12	0.12	0.13	0.13
Black	0.08	0.08	0.07	0.07
Other race	0.07	0.07	0.07	0.06
Hispanic	0.18	0.18	0.18	0.2
Any child age<6	0.14	0.14	0.15	0.16
Any child age 6–17	0.30	0.31	0.31	0.32
Married	0.62	0.62	0.64	0.63
Number of extra HH adults	0.53	0.54	0.51	0.52
Cohabiter	0.06	0.06	0.06	0.07
Immigrant	0.22	0.22	0.22	0.21
Remote job	0.38	0.39	0.40	0.42
Essential industry	0.69	0.68	0.67	0.66
Own Industry				
Agriculture and mining	0.07	0.07	0.07	0.06
Construction	0.18	0.17	0.16	0.16
Manufacturing	0.03	0.03	0.03	0.03
Trade, transportation, and utilities	0.14	0.14	0.14	0.13
Information	0.02	0.02	0.02	0.02
Financial activities	0.08	0.08	0.08	0.10
Professional and business services	0.20	0.20	0.20	0.20
Educational and health services	0.11	0.11	0.12	0.12
Leisure and hospitality	0.07	0.07	0.08	0.08
Other services/public administration	0.11	0.11	0.10	0.10
Observations	3,400	2,299	1,513	776

Note: CPS final weights used. All workers were employed and at work in February.

Source: Authors' calculations based on the Current Population Survey, 2020

Table A7. Means for RE Sample (Unincorporated Self-employed) (Continued)

Variable	February	March	April	May
Own Occupation				
Management, business, and financial	0.24	0.24	0.26	0.25
Professional	0.17	0.18	0.18	0.2
Service	0.20	0.20	0.20	0.19
Sales	0.11	0.12	0.12	0.11
Office and administrative support	0.03	0.03	0.03	0.03
Farming, fishing, and forestry	0.01	0.01	0.01	0.00
Construction and extraction	0.13	0.12	0.11	0.1
Installation, maintenance, and repair	0.03	0.03	0.02	0.03
Production	0.03	0.03	0.03	0.03
Transportation and material moving	0.06	0.05	0.05	0.05
Spouse - Employed	0.47	0.46	0.48	0.48
Spouse - Remote job	0.22	0.22	0.24	0.25
Spouse - Essential industry	0.34	0.34	0.35	0.35
Spouse Industry				
Agriculture and mining	0.03	0.03	0.03	0.04
Construction	0.04	0.03	0.03	0.04
Manufacturing	0.04	0.04	0.04	0.04
Trade, transportation, and utilities	0.08	0.08	0.09	0.08
Information	0.01	0.01	0.02	0.01
Financial activities	0.04	0.04	0.04	0.05
Professional and business services	0.06	0.07	0.07	0.08
Educational and health services	0.10	0.10	0.09	0.08
Leisure and hospitality	0.02	0.02	0.02	0.03
Other services/Public administration	0.05	0.05	0.05	0.05
Observations	3,400	2,299	1,513	776

Note: CPS final weights used. All workers were employed and at work in February.

Source: Authors' calculations based on the Current Population Survey, 2020

Table A8. Differences in Predicted Probabilities of Being Unincorporated Self-Employed and At Work across Months and between Groups (RE model)

Differences between groups	March–Feb	April–Feb	May–Feb
Gender			
Female - Male	-0.01	-0.08**	-0.12**
	(0.02)	(0.02)	(0.03)
Marital Status			
Married - Single	0.03	0.04	0.03
	(0.02)	(0.03)	(0.04)
Marital/Gender Status			
Married women - Married men	-0.05*	-0.15**	-0.16**
	(0.02)	(0.03)	(0.04)
Single women - Single men	0.05	0.04	-0.06
	(0.03)	(0.04)	(0.06)
Married men - Single men	0.07**	0.12**	0.07
	(0.02)	(0.03)	(0.05)
Married women - Single women	-0.02	-0.07	-0.02
	(0.03)	(0.04)	(0.05)
Job Characteristics			
Remote job - not remote job	-0.02	0.08**	0.04
	(0.02)	(0.03)	(0.04)
Essential - not essential industry	0.03	0.23**	0.17**
	(0.02)	(0.03)	(0.04)

Notes: N = 7,988. All workers were classified as unincorporated self-employed and at work in February. This specification captures transitions out of being unincorporated self-employment. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A9. Differences between Groups and across Months in Predicted Probabilities of Being Employed and At Work and Hours Worked for the Unincorporated Self-employed (RE models) (Single Individuals)

Differences between groups	Employed and At Work			Hours Worked		
	March–Feb	April–Feb	May–Feb	March–Feb	April–Feb	May–Feb
Mothers - Fathers with child age < 6	0.05	-0.09	-0.23	2.41	0.31	-6.59
	(0.08)	(0.14)	(0.16)	(4.12)	(6.20)	(5.84)
Mothers - Fathers with child age 6–17	0.05	0.18	0.09	4.62	8.20*	2.60
	(0.06)	(0.09)	(0.12)	(2.72)	(3.52)	(5.30)
Childless women - Childless men	0.03	0.05	-0.05	4.14**	2.02	-1.41
	(0.03)	(0.05)	(0.06)	(1.34)	(1.87)	(2.61)

Notes: N = 2,847. All workers were employed and at work in February. Standard errors in parentheses are clustered by household. See Table 1 for control variables. * $p < 0.05$, ** $p < 0.01$.

Source: Authors' calculations based on the Current Population Survey, February–May 2020

Table A10. Means for DDD Sample (Unincorporated Self-employed)

Variable	Feb 2019	April 2019	Feb 2020	April 2020
Employed at work	1.00	0.90	1.00	0.62
Hours on the primary job	34.67	32.99	34.42	20.29
Female	0.42	0.41	0.44	0.43
Age	49.35	49.36	49.74	49.38
Age 65+	0.15	0.15	0.17	0.16
High school degree	0.26	0.26	0.25	0.26
Some college	0.28	0.28	0.29	0.29
Bachelor's degree	0.23	0.23	0.24	0.24
Advanced degree	0.12	0.12	0.13	0.13
Black	0.07	0.06	0.07	0.07
Other race	0.09	0.09	0.07	0.07
Hispanic	0.18	0.17	0.16	0.18
Any child age<6	0.16	0.16	0.15	0.15
Any child age 6–17	0.33	0.33	0.31	0.31
Married	0.61	0.61	0.64	0.64
Number of extra HH adults	0.52	0.52	0.50	0.51
Cohabiter	0.07	0.07	0.06	0.06
Immigrant	0.22	0.22	0.21	0.22
Remote Job	0.41	0.41	0.40	0.40
Essential Industry	0.69	0.69	0.67	0.67
Own Industry				
Agriculture and mining	0.08	0.08	0.07	0.07
Construction	0.16	0.16	0.16	0.16
Manufacturing	0.03	0.03	0.03	0.03
Trade, transportation, and utilities	0.12	0.12	0.14	0.14
Information	0.01	0.01	0.02	0.02
Financial activities	0.07	0.07	0.08	0.08
Professional and business services	0.21	0.21	0.19	0.20
Educational and health services	0.12	0.12	0.12	0.12
Leisure and hospitality	0.06	0.06	0.08	0.08
Other services/public administration	0.13	0.12	0.10	0.10
Observations	1,509	1,509	1,513	1,513

Note: CPS final weights used. Some differences are because of different monthly weights. Restricted to respondents who could be matched between February and April and who were working in February.

Source: Authors' calculations based on the Current Population Survey, 2019–2020

Table A10. Means for DDD Sample (Unincorporated Self-employed) (Continued)

Variable	Feb 2019	April 2019	Feb 2020	April 2020
Own Occupation				
Management, business, and	0.26	0.26	0.26	0.26
Professional	0.17	0.17	0.18	0.18
Service	0.20	0.20	0.20	0.20
Sales	0.12	0.12	0.12	0.12
Office and administrative support	0.03	0.03	0.03	0.03
Farming, fishing, and forestry	0.00	0.00	0.01	0.01
Construction and extraction	0.12	0.12	0.10	0.11
Installation, maintenance, and	0.03	0.03	0.03	0.02
Production	0.02	0.02	0.03	0.03
Transportation and material	0.05	0.05	0.05	0.05
Spouse - Employed	0.47	0.47	0.48	0.48
Spouse - Remote job	0.23	0.23	0.24	0.24
Spouse - Essential industry	0.35	0.35	0.36	0.35
Spouse Industry				
Agriculture and mining	0.04	0.04	0.03	0.03
Construction	0.03	0.03	0.03	0.03
Manufacturing	0.03	0.03	0.04	0.04
Trade, transportation, and utilities	0.07	0.07	0.09	0.09
Information	0.01	0.01	0.02	0.02
Financial activities	0.04	0.04	0.04	0.04
Professional and business services	0.06	0.06	0.07	0.07
Educational and health services	0.11	0.11	0.09	0.09
Leisure and hospitality	0.02	0.02	0.02	0.02
Other services/Public	0.06	0.06	0.05	0.05
Observations	1,509	1,509	1,513	1,513

Note: CPS final weights used. Some differences are because of different monthly weights. Restricted to respondents who could be matched between February and April and who were working in February.

Source: Authors' calculations based on the Current Population Survey, 2019–2020