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DISCUSSION PAPER SERIES

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ABSTRACT

Social Substitution? Time Use Responses to Increased Workplace Isolation

This paper examines how people adjust their time use when they experience an increase in time spent alone, which is a growing share of adults' lives. We utilize the dramatic rise in remote work following the onset of the pandemic, which is associated with a large decline in time spent in the physical presence of non-household members during the workday, to observe the extent to which individuals substitute toward more in-person interactions in non-work settings. We first document that on days that individuals work from home, they spend 3.5 additional hours in activities spent entirely alone and over 5 fewer hours in activities that include any non-household members. We then use a difference-in-difference strategy to ask what happens to time allocations when workers are induced toward remote work by analyzing changes over time in how workers in teleworkable occupations—who experienced the lion's share of the post-COVID increase in remote work—spend their time relative to workers in non-teleworkable occupations. Averaging over all days of the week, we see a relative increase in time spent in activities spent entirely alone by 32 minutes and a decrease in activities that include any non-household members by 38 minutes for workers in teleworkable jobs. Normalizing by the increase in average daily remote work time (46 minutes), these estimates are of a similar magnitude to what we observe in our descriptive analysis. When individuals are induced to work from home, they exhibit almost no substitution toward spending more time with others who are not in their household to make up for the loss of time with others at work.

JEL Classification: J22, J24, I31

Keywords: work from home, social isolation, time use

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1. Introduction

American adults spend more and more time alone and at home and less time with individuals from other households (Kannan and Veazie, 2023; Atalay, 2024; Sharkey, 2024). Because social isolation and loneliness have been linked to poor health and other adverse outcomes (Leigh-Hunt et al. 2017; Holt-Lunstad, Smith, and Layton, 2010), there is growing public concern regarding these trends, which have prompted the U.S. Surgeon General's office to declare an epidemic of loneliness and isolation (Surgeon General 2023).

The objective of this paper is to examine how individuals re-allocate their time use when faced with an increase in time spent alone. In particular, when individuals work remotely, their in-person interactions with non-household members on those days falls dramatically. Given the rapid and sustained rise in remote-work arrangements following the COVID-19 pandemic, our question is how individuals who now work from home have compensated for this loss in in-person interactions.

As our outcomes, we examine time alone, time in the presence of household members, and time in the presence of non-household members both overall and outside of work hours. We first compare the time allocations of those who are working from home on a particular day—defined as spending at least half of one's work hours at home that day—relative to those who are not working at home,[1] controlling for demographic and occupational characteristics. We find those working remotely are alone for 3.5 additional hours and are in the presence of individuals from outside of their household for over 5 fewer hours while being with members of their own household for an additional 1.5 hours.[2] Outside of work time on remote-work days, time alone

[1] This is typically working in a traditional workplace, but it also includes working at other locations.
[2] Technically, what we estimate is an increase in time spent in activities in which the individual is entirely alone by 3.5 hours and a decrease (increase) in time spent in activities in which non-household (household) members are

and with non-household members changes little and reinforces what happens during work hours, though time with own household members outside of work is greater by a little over 1 hour.

These estimates should not be treated as causal for several reasons. First, individuals may may allocate time differently on days they work from home relative to days they work in a traditional workplace (for workers with a hybrid schedule) or relative to non-workdays, such as weekends. This implies that differences in time allocations between remote *workdays* and other days does not reflect differences between remote *workers* and others averaged over all days. Second, our ability to control for all factors that differentiate workers based on where they are working is imperfect. For example, individuals who value more solitude may be inclined toward remote work and would also make different choices concerning how and with whom they spend their non-work time even if they didn't work remotely.

To get a better idea of how individuals respond when they are induced to work remotely (and thus see a large reduction in in-person interactions during work hours), we utilize the fact that individuals in some occupations saw much larger increases in remote-work rates following the pandemic than did others. This is because it is inherently difficult or impossible to perform job tasks in some occupations remotely (Dingel and Neiman, 2020). We thus compare trends in time use from before to after the pandemic for workers in "teleworkable" occupations versus those in "non-teleworkable" ones. Under standard "no anticipation" and "parallel trends" assumptions, this will isolate the causal effect of the "remote-work revolution" on our outcomes of interest: time spent in the presence of others in work and non-work settings.

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noted as present by 5 hours (1.5 hours). As we discuss later, our measure of time spent with household members and time spent with non-household members suffers from measurement error because survey respondents are asked to report the people who were present during a given activity spell, which means that if others were present for only part of that spell, they would be coded as being present for all of it (or none of it, depending on how the respondent chooses to answer, but we believe this is possibility is less likely given the framing of the question). Thus, these variables likely contain upper bounds on time spent with others, and the alone variable likely contains a lower bound on time spent alone. We discuss how this issue affects the interpretation of our results in the data section.

We find that relative to workers in non-teleworkable jobs, workers in teleworkable jobs see an increase in time spent alone by 32 minutes and a decrease in time spent with non-household members by 38 minutes in post-pandemic compared to pre-pandemic years (time spent with household members is unaffected). Normalizing by the increase in average daily remote-work time (46 minutes), these estimates are of a similar magnitude to what we see descriptively on days when individuals work from home (as discussed above). These effects are largely present across gender, age, presence of others in the household, and presence of children at home, though they vary in intensity. Generally speaking, when individuals are induced to work from home, they exhibit almost no substitution toward spending more time with non-household others outside of work to make up for the loss of time with others at work.

There are some caveats that come with interpreting these estimates as causal. The first is that because we do not have panel data, occupation choices for those we observe in the post-COVID period are not pre-determined. If worker selection into occupational teleworkability changes over time (given newfound opportunities to work remotely in teleworkable occupations, for example), any measured effect of teleworkability on time allocations may be partly due to the changing composition of teleworkable workers. Though we cannot fully rule out this possibility, we show that the likelihood of being in a teleworkable occupation does not appear to change differentially by observable factors we expect to be correlated with preferences for remote work (such as age, gender, marital status, presence of children, and educational attainment) after COVID.

The second caveat is that what we can identify in this analysis is the holistic effect of an inducement toward remote work on time allocations rather than strictly the decline in in-person interactions at work that accompany that shift. This is because remote-work arrangements may

change time allocations for other reasons, such as the time savings workers receive by not having to commute, the ability to more easily blend work with other activities during the workday, and others. Nevertheless, we believe that the full effect of remote work on time allocations—particularly as they pertain to social interactions—is important in and of itself from a policy perspective. Remote work rates in the U.S. are roughly four times higher in 2025 than they were in 2019 (Barrero, Bloom, and Davis, 2021, 2023; Bick, Blandin, and Mertens, 2023). Understanding how this shift affects the social lives of the many workers it touches increasingly appears to be important from a public health perspective.

2. Related Literature

The implications of the "remote-work revolution" stemming from the COVID-19 pandemic are far-reaching. Several recent papers examine how fully remote (and hybrid) work affect productivity on the job (Bloom et al., 2015; Choudhury et al., 2024; Emanuel and Harrington, 2024; Emanuel, Harrington, Pallais, 2023), wages and hours (Bloom, Han, and Liang, 2022; Arntz, Yahmed, and Berlingieri, 2022; Barrero et al., 2022; Pabilonia and Vernon, 2025), race/gender disparities (Harrington and Kahn, 2023; Arnon et al., 2025; Hsu and Tambe, 2024; Song, 2025), and the division of labor within the household (Inoue and Yamaguchi, 2024; Pabilonia and Vernon, 2024; von Gaudecker et al., 2024).[3] Other papers closer to our question of interest examine the association between remote work and time allocations (Aksoy et al., 2023; Cowan, 2024; Massar et al., 2023; Pabilonia and Vernon, 2022, 2023; Restrepo and Zeballos, 2020, 2022).

[3] Another strand of the literature focuses on the health and well-being of workers and their families. These include papers on children's outcomes (Achard, Belot, and Chevalier, 2025), mental health (Song and Gao, 2020; Bertoni et al., 2021; Bilgrami, 2023; Gueguen and Senik, 2023; Senik et al., 2024; Costi et al., 2024; Hennecke and Knabe, 2025; Cowan and Spearing, 2025), job satisfaction (Orešković et al., 2023; Esposito et al., 2024), and physical health (Goux and Maurin, 2025).

We make two major contributions to the body of work on remote work and time use. First, we examine how remote work affects time in the physical presence of others (both household and non-household members), which is new to this literature. As has been documented (and as our data analysis confirms), when individuals work from home, in-person interactions with non-household members drop precipitously. Though virtual interactions with colleagues or clients may partially offset this loss, these appear to be an imperfect substitute for in-person ones in helping people bond with others (Rouxel and Chandola 2024; Thompson 2025). Indeed, during the pandemic when remote work became the norm, communication between Microsoft employees became more "static and siloed," with less synchronous communication and informal collaboration (Yang et al., 2022). In general, teleworkers report a drop in social support from colleagues (Vander Elst et al. 2017), which support appears to be an important determinant of job satisfaction (Surgeon General 2022). 53% of remote workers say that working from home hurts their ability to feel connected to co-workers (Parker 2023).

Our question is how remote workers change their allocation of time, and the company they keep during that time, to compensate for the loss in interactions on days they work from home. If this compensation is robust, such as via an increase in leisure time with non-household adults, it would suggest that remote workers are able to make up the loss of in-person time with work associates. On the other hand, if this loss goes largely uncompensated, it suggests risks to health from isolation and loneliness may become increasingly prevalent in the new world of remote work.

Another way to view our contribution to the literature is that we examine the specific role of the remote-work revolution in the trend toward more time alone and at home, which the pandemic appears to have exacerbated. That is, we examine how remote work affects the trends

highlighted and discussed in Atalay (2023, 2024), Sharkey (2024), Frazis (2024), and Morris, Speroni, and Taylor (2024).

Our second contribution is to estimate the effect of the large increase in remote-work prevalence following the pandemic on time spent with others. Most papers in this literature estimate correlations between remote work and time use (or other outcomes of interest). Few attempt to estimate causal effects of remote work because exogenous variation in remote work is difficult to pin down. For example, workers may switch into or out of remote work as a result of a change in family or career circumstances, which by itself could affect time use and other outcomes. A few papers are able to leverage exogenous changes in firm-level remote-work policies for identification (e.g., Costi et al., 2024; Choudhury et al., 2024; von Gaudecker et al., 2024; Achard, Belot, and Chevalier, 2025). Others exploit changes in remote-work opportunities across occupational or educational characteristics and over time (Harrington and Kahn, 2023; Cowan, 2024; Cowan and Spearing, 2025; Arnon et al., 2025). Given the data at our disposal, we follow the latter strategy, which we detail in Section 4. To our knowledge, we are the first to apply this or any other technique meant to isolate causal effects of the remote-work revolution on the time individuals spend alone versus with others.

3. Data

3.1 Description of the American Time Use Survey and time-use measures

Our main source of data is the American Time Use Survey (ATUS). We consider the years between 2014 and 2024, with some analyses focusing on a subset of these years.[4] Individuals from subset of households that complete the Current Population Survey (CPS) are randomly sampled to complete the ATUS, and do so two to five months (typically three months)

[4] Days in 2020 from March 18 to May 9 were not collected due to the Covid-19 pandemic.

after their final CPS interview.[5] The ATUS is a 24-hour time diary covering the hours from 4am of the day in question to 4am of the following day. Respondents record when each activity took place, the type of activity (selecting from hundreds of options), the location of the activity, and who was present during the activity. The response rate has fallen in our sample time frame from 51% in 2014 to 32.4% in 2024, a point we return to below.

We define our measures of time working, time working from home, and an indicator for remote work as follows: first, work (the "Work" variable) is the minutes across all activities in the diary day coded as "working," "work-related activities," "other income-generating activities," and "work and work-related activities, not otherwise classified."[6] We exclude "job search and interviewing" and transportation to and from work. Second, work at home (the "Work_athome" variable) is the minutes of work where the location is "respondent's home or yard," meaning that work that occurred at any other location is not included. Finally, we define the indicator for remote work (the "Remote" variable) only for respondents with at least one minute of work during the day. This variable takes value 1 if at least half of the work time is at home, and 0 otherwise.

Next, we create variables based on who was present during the activity. Because this information is not collected for sleeping, grooming, and personal activities, we exclude these activities.[7] For each activity spell, respondents are asked the question, "Who was with you?/ Who accompanied you?" We define time alone (the "Alone" variable) to be all activities without another person present. Time with household (HH) members (the "HH" variable) is all activities

[5] We draw on information from the 2003-2024 ATUS User's Guide in this section. See https://www.bls.gov/tus/atususersguide.pdf for more information.
[6] The categories are 050101 to 050389 and 059999.
[7] We also exclude the cases where this variable is not recorded, including the individual did not remember, refused to respond, or had a gap in their time diary.

for which a HH member was present, and time with non-HH members (the "NonHH" variable) is all activities for which a non-HH member was present.[8] [9] We also create versions of these three variables that are limited to non-work activities (i.e., time outside of work). "Alone_xwork" is the number of minutes in the day the respondent is alone, excluding alone time at work. "HH_xwork," and "NonHH_xwork" are analogously defined.

We note two important characteristics of these "time spent with others" variables. First, the amount of time spent with HH members and the amount of time spent with non-HH members are likely to be overestimates because if the respondent includes individuals who were present during only part of an activity spell as being present during that activity, they are coded as being present during the entire activity spell. For example, if a four-hour work spell included a one-hour meeting with a colleague, with the rest of the time alone working in the office, then we may observe four hours spent with non-HH members (the alternative is that the respondent says that no one was present during the four-hour work spell, but we believe this is less likely given the framing of the question). We imagine that the longer the time spell, the larger the issue with overestimation of time spent with others. Measured alone time is likely an underestimate of true time alone for the same reason presented above.

The most important question for us is how these possible discrepancies between true and measured time with others affect our estimates of the effects of a shift in remote work on these variables. A simple example illustrates what we believe is a plausible scenario. We compare how

[8] The "HH" variable includes: Spouse, Unmarried partner, Own household child, Grandchild, Parent, Brother/sister, Other related person, Foster child, Housemate/roommate, Roomer/boarder, and Other nonrelative. The "non-HH" variable includes: Own non-household child < 18, Parents (not living in household), Other non-household family members < 18, Other non-household family members 18 and older (including parents-in-law), Friends, Co-workers/colleagues/clients, Neighbors/acquaintances, Other non-household children < 18, Other non-household adults 18 and older, Boss or manager, People whom I supervise, Co-workers, and Customers.

[9] In one type of sub-analysis, we further split time with non-HH members into time spent with non-HH members who are work-related, and time spent with non-HH members who are not work-related.

time spent with non-household others at work affects workers in teleworkable occupations versus non-teleworkable occupations, before and after the pandemic. For simplicity, suppose that workers always have a work spell of 8 hours, that non-teleworkable workers do not work from home in either period, and that teleworkable workers go from working away from home in the pre-period to working from home in the post-period. Furthermore, assume that when people work from home, they are in the presence of non-household others for zero hours.

In this simple example, the difference-in-differences (DD) estimate of how remote work affects time with non-household others depends on how individuals answer the question of who was present during their work activity spell outside of the home. If during those spells individuals report that others (colleagues, clients, etc.) were present, even if they were only present for part but not all of the activity spell, then the time spent with others during that activity would be coded as 8 hours. The DD estimate of remote work on time spent with others would be (0-8)-(8-8)=-8, or a reduction in time with others of 8 hours. However, the real reduction in time spent with others due to remote work would be less than 8 hours, with the discrepancy depending on how much of the time at work was actually spent in others' presence (something we cannot measure with our data).[10]

It is more difficult to tell how our estimates would be affected by the overestimation of time with others outside of work hours. We present estimates throughout the paper as if measured changes in time with others/alone are true changes, though all estimates are subject to the caveat described above.

The second thing to note about these variables is that time spent with HH members and time spent with non-HH members are not mutually exclusive. If an activity includes, for

[10] In this example, the real increase in time spent alone while working would also be an upper bound on the true effect.

example, one's spouse, child, and neighbor, we classify that activity both as time with HH members (as at least one person present was a HH member) and time with non-HH members (as at least one person present was a non-HH member).

3.2 Assigning occupations a "teleworkability" index score

We now turn our attention to how place workers in "teleworkable" versus "non-teleworkable" occupations. We rely on Dingel and Neiman's (2020) paper that uses pre-COVID job characteristics to determine whether jobs could feasibly be performed from home. Dingel and Neiman (2020) assign a value of "1" to detailed occupational categories for which the task content (as measured by O*NET surveys) does not preclude working remotely (and "0" otherwise). The authors provide a crosswalk to aggregated Standard Occupational Classification (SOC) codes in which a "teleworkability" index score between 0 and 1 is assigned to each occupation.[11] This index has been used extensively in the literature and cross-validated by employee self-reports on remote work feasibility in their job (Alipour, Falck, and Schüller, 2023).

Following Cowan (2024), to assign a teleworkability score to occupations in the ATUS, we use a crosswalk from SOC codes to BLS occupation codes.[12] We classify a person's occupation as "teleworkable" if the index score for that occupation is greater than or equal to 0.5. We note that occupation codes are only elicited from individuals are currently employed, which means we generally restrict attention to such individuals in our analysis. In a robustness check

[11] https://github.com/jdingel/DingelNeiman-workathome/blob/master/onet_to_BLS_crosswalk/output/onet_teleworkable_blscodes.csv

[12] This is available at https://www.bls.gov/emp/documentation/crosswalks.htm. Because ATUS occupation codes were based on the 2010 Census Occupation Classification System up until 2020 and the 2018 system after that, we also use a 2010 to 2018 crosswalk provided at https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html. There is not a 1-to-1 match between some SOC codes provided by Dingel and Neiman (2020) and ATUS occupation codes, which requires us to hand match some occupations based on our best judgment. Our code for doing so is available upon request.

described below, we also include individuals who are not currently employed/have missing occupation codes.

4. Empirical Strategy

We begin by examining time in the presence of others for individuals between the ages of 25 and 55 years old who work from home relative to those who work outside the home on a given day. The sample in this analysis is restricted to individuals who work at least one minute on their diary day in the 2022-2024 period, which years are affected by the sweeping changes to remote-work opportunities (the "remote-work revolution") without being directly affected by pandemic policy. We estimate models of the following type:

$$y_{it} = \beta_0 + \beta_1 remote_{it} + X_{it}\lambda + \epsilon_{it}. \quad (1)$$

In this equation, y_{it} represents the amount of time that individual i observed at time t spends alone, in the presence of household members, or in the presence of non-household members. $remote_{it}$ is an indicator that the individual works at least half of their work hours from home, and X_{it} is a set of observable characteristics, including year, calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry and occupation dummies (4-digit Census codes). We cluster at the occupation level. We probability weight using the multi-year ATUS final weight.[13] It is important to note that we do not control for hours worked on the day of observation as that variable is likely endogenous with respect to the remote-work

[13] This weight variable does not contain values for 2020 due to the pandemic. For 2020, we use the ATUS final weight built specifically for this year.

decision. Summary statistics broken out by whether the individual worked remotely or in-person on their diary day are provided in Appendix Table A.1. Relative to those working in-person, those who work remotely are more likely to live in a metropolitan area, be married (with a spouse present), be female, be non-white, be Asian, be non-Hispanic, and be born in the U.S., have higher completed education levels, and to work on a weekend day.

Estimation of Equation (1) is helpful for observing time-use patterns between observationally similar individuals who are working from home versus the workplace on a given day. However, any differences between these groups are likely also partly due to 1) remote workers and traditional workers differing in terms of unobserved factors (such as preferences over leisure or household production) and 2) the *same* workers choosing to spend days in which they telework differently than days they spend at the office. Hybrid work arrangements—in which workers typically work some days of the week at home and other days in the workplace—are more common than fully remote ones, and hybrid workers indeed adjust their work, household, and other routines around their work location on a given day (Bloom, Han, and Liang, 2022). Because we only observe exactly one 24-hour period for each individual in ATUS, we do not know individuals' typical remote-work schedules and thus cannot differentiate on that variable.

To better assess how a shift in the prevalence of remote work affects time in the presence of others, we turn to an alternative strategy that differentiates individuals by whether their occupation is conducive to telework. We utilize an event-study model that includes fixed effects for occupation and time and examines how the time-use outcome evolves for 25-55 year-old individuals in teleworkable occupations relative to those in non-teleworkable occupations:

$$y_{iot} = \sum_{t \neq 2019} (tele_{it} \cdot D_t)\beta_t + \gamma_o + \delta_t + X_{it}\lambda + \epsilon_{it}\,. \qquad (2)$$

In this case, y_{iot} is the outcome for individual i in year t with occupation o. D_t is an indicator that takes a value of "1" for each year t in our sample frame (2014-2024, with 2019 as the excluded base year), γ_o is an occupation fixed effect, and δ_t is a year fixed effect. We also include the additional controls in X_{it} as outlined for Equation (1).

We are most interested in whether the relationship between holding a teleworkable occupation and time use with others changes starting in 2020, when remote work skyrocketed in the U.S., particularly among those in teleworkable occupations (as we later show). Though 2020 and part of 2021 were affected by COVID lockdowns and social distancing, those factors disappeared in subsequent years, though remote-work rates have remained high. Thus, in 2022-2024, we should be able to see the effects of the large shift to remote work in non-pandemic times. To summarize the post-COVID effect of the remote-work revolution on time allocations for teleworkable relative to non-teleworkable workers, we modify Equation (2) to be a standard difference-in-differences specification:

$$y_{iot} = \beta * (tele_{it} \cdot post\_covid_t) + \gamma_o + \delta_t + X_{it}\lambda + \epsilon_{it}. \quad (3)$$

In this case, the variable $post\_covid_t$ takes a value of one for the years 2022-2024 and a value of zero for the years 2014-2019. We exclude 2020 and 2021 due to their being directly affected by the pandemic. The level effects of occupational teleworkability and time are subsumed by occupational and year fixed effects, respectively.

Summary statistics broken out by whether the individual is in a teleworkable occupation or not are provided in Appendix Table A.2. In some ways, the differences between those in teleworkable and non-teleworkable occupations qualitatively mirror difference between remote and non-remote workers, respectively: teleworkable workers are more likely to live in a metropolitan area, be married (with spouse present), be female, be Asian, be non-Hispanic, and

be born in the U.S., and they have higher completed education levels. In addition, they are slightly older, less likely to have children at home, and less likely to be black.

If the trend in time with others among individuals in non-teleworkable occupations is an accurate counterfactual for individuals in teleworkable occupations (parallel trends), the β_t's in Equation (2) will identify the effect of treatment—teleworkability, strictly speaking—on our outcomes of interest in year t relative to the base year. This raises the question of how teleworkable jobs—or the individuals in them—have changed over time. Though factors other than the large increase in remote-work opportunities might be at play, they are unlikely to have had an immediate, large, and persistent effect starting in 2020 (which is what occurred with the remote-work revolution). Thus, we can use the pattern in our event-study estimates to examine whether it is remote work opportunities that likely explain changes in time use over time by occupational teleworkability status. For example, if we observe divergence in time-use trends for these groups prior to 2020, it would suggest that other factors are at least partially responsible for any post-2020 differences as well.

As discussed in the introduction, because we don't have panel data on individuals, we cannot use respondents' pre-COVID occupations to assign teleworkabity. That means that the choice of whether to pursue a teleworkable occupation is endogenous, and if the composition of teleworkable workers changes in ways that affects time-use patterns, this could contaminate our results. To address this possibility, we examine whether individuals are more likely to hold teleworkable occupations over time in the ATUS data. We also examine whether observable characteristics such as college attainment, gender, marital status, presence of children, and age—which are likely to be correlated with preferences over remote work as well as time-use

decisions—are differentially related to teleworkability in post-COVID years relative to pre-COVID ones.

Lastly, if the parallel trends assumption holds, another question is whether we can use occupational teleworkability (interacted with time) as an instrument for remote work in estimating the effect of the latter on time-use patterns. Though an additional assumption is required—namely, that the only pathway by which the interaction of teleworkability and post-COVID affects time-use allocations is via an increase in an individual's own remote-work decision—we also estimate two-stage least squares (2SLS) models to capture these effects.[14] We note that these coefficients are numerically equivalent to the reduced-form effects on time alone/with others (estimated in Equation 3) divided by the same reduced-form effect on time spent in remote work.

5. Results

5.1 Descriptive evidence on time allocations on days individuals work from home

In Table 1, we show how time spent in various ways differs on days between those who work a positive amount on their diary day with at least half their work time occurring at home ("remote workers") and those who work a positive amount but do not meet this criterion ("non-remote workers").[15] As seen in column 1, those who are working from home typically work less than those who are not (by 86 minutes). Not surprisingly, their work time from home (in column

[14] One way in which the exclusion restriction related to the IV can fail is if co-workers' remote-work decisions also affect the amount of time that an individual spends in the presence of others (e.g., going into the office but not interacting as much with colleagues because many of them are working remotely that day).

[15] In Appendix Table A.3, we include those who do not work at all on their diary in the sample by coding them as not working remotely on that day. Because this introduces many weekend days into the control group, remote work is now associated with more, not fewer, work hours. Remote work is still associated with a large increase in alone time overall and a large decrease in time with non-household others. The additional time spent with household members on remote workdays is significantly reduced compared to Table 1.

2) is far greater (by 371 minutes, or a little over 6 hours), which suggests that most individuals spend their workday either entirely from home or at their workplace.

For those working from home, time alone increases by 212 minutes, or about 3.5 hours (column 3). This is almost fully due to being alone more often while working: the estimate for time alone outside of work hours is not statistically significant and is only slightly higher than that of non-remote workers (by 12 minutes, column 4). On the other hand, remote workers spend more time with people in their own household (by 96 minutes, column 5), and the majority of this is outside of work hours (69 minutes, column 6). Time in the presence of non-household members is lower for individuals working from home by 323 minutes, or just over 5 hours (column 7).[16] Again, this is almost entirely due to the loss in time with non-household members during work hours since the reduction in time spent with such individuals outside of work is modest (9 minutes, column 8). At the same time, there is no evidence that individuals compensate for a loss of time in the presence of work colleagues by increasing time with non-household members during non-work hours on days they work remotely.

As stated in the introduction, though these results tell us about time allocations on remote-work days versus days in the office, they are silent on the question of whether an increase in remote work *causes* a change in how and with whom individuals spent time overall. This is because the same individuals may allocate time differently on remote- versus non-remote work days and because the types of individuals who work remotely may differ on average from those who do. Our empirical strategy outlined in Equations (2) and (3) is designed to overcome these challenges, and we present the results from these analyses in the next subsection.

[16] When we split column 7 (time in the presence of non-household members) by if the non-household member is work-related (like a colleague or boss) or not work-related (like a neighbor or friend), we see that the vast majority of the effect is coming from the former category. These results are contained in Appendix Table A.4.

5.2 Evidence on changes in time allocations due to the remote-work revolution

We now turn attention to analyzing differences in time-use patterns between workers in teleworkable occupations versus those in non-teleworkable occupations, from before to after 2020. Unless otherwise noted, we use all days (weekdays as well as weekends) and all workers who have an occupation code (which means that they are currently employed) in this analysis. Thus, the sample includes individuals who do not report working at all on their diary day. This is to allow for full substitution with whom individuals spend their time across workdays and non-workdays.

Figure 1 displays differences between teleworkable and non-teleworkable workers in terms of 1) minutes worked from home, 2) share of minutes worked from home (conditional on working a positive amount), and 3) total minutes of work. Panels a, c, and e (left side of the figure) show mean weighted averages for each year for both groups. Panel b, d, and f (right side of the figure) show estimates from the event-study specification in Equation (2), which are the relative effects of being in a teleworkable job compared to a non-teleworkable one relative to the base year (2019) controlling for occupation and year fixed effects and individual demographics.

The figure makes clear that while workers in teleworkable occupations have worked more from home (both in minutes and as a share of work time) since 2014, the relative difference changed little before 2020, after which it shot up as a result of the pandemic and the subsequent push toward remote work. Though the difference has come down somewhat since its peak in 2020 and 2021, it is still much larger than it was prior to the pandemic. Workers in teleworkable jobs generally work more than those in non-teleworkable jobs, but this difference has been relatively steady over our entire analysis period (2014-2024) such that differences in the share of work time from home are driven by changes in the numerator.

Event-study estimates on the right-hand side of the figure are consistent with differences in the weighted means: work from home spikes in 2020 for teleworkable workers and remains much higher than it was prior to the pandemic through 2024. Furthermore, there is little visual evidence that the trajectory in remote work prior to 2020 was diverging for teleworkable workers relative to non-teleworkable workers.

In Figure 2, we show event-study coefficients associated with total minutes alone, minutes in the presence of household members, and minutes in the presence of non-household members. Minutes alone (panel a) for teleworkable workers is higher than it is for non-teleworkable workers prior to 2019, possibly owing to pre-COVID differences in remote work or more solitude during work even in the workplace. However, the trend in relative time alone appears to be decreasing just prior to the pandemic. Then, starting in 2020, it jumps up and remains higher through the end of the sample window (though it is somewhat lower in 2024). We note, however, that these estimates are not precise enough to generally reject that post-COVID coefficients are individually statistically distinguishable from pre-COVID ones.

There is no discernible pattern in relative time spent with household members (panel b) other than possibly a small relative bump for teleworkable workers in the early years of pandemic (though these coefficients are not statistically significant). On the other hand, effects on time with non-household members mirror those found for time alone, with a noisy but non-decreasing trend line just prior to the pandemic but a sustained decrease following it. Overall, though the evidence is only suggestive, the lack of clear pre-trends and sudden and lasting changes in time alone/with non-household others starting in 2020 in Figure 2 are consistent with a causal effect of an increase in remote work on these variables. Figure 3 is similar to Figure 2

but is restricted to time spent alone and with others during non-work hours. There are no discernible effects of the remote-work revolution on these variables.

Table 2 shows difference-in-differences estimates of Equation (3) that summarize the relative pre-post difference in outcomes for workers in teleworkable jobs, keeping in mind that 2020 and 2021 are excluded. On an average day, teleworkable workers spend an additional 46 minutes working from home relative to what they did prior to the pandemic, all relative to the same difference for non-teleworkable workers. In conjunction with this, they are alone an additional 32 minutes a day and in the presence of individuals outside of their household for 38 fewer minutes a day.[17] These effects are driven almost entirely by what happens when individuals are working: outside of work, alone time decreases and time with household members increases slightly, though neither change is statistically significant at conventional levels. Time in the presence of non-household members outside of work barely changes.

These findings from analyzing all days at once are underscored by splitting the sample into those whose diary day is a weekday (Table 3, panel a) and those whose day is on the weekend (Table 3, panel b). As seen in the table, weekdays fully drive the increase in remote work and time alone and the decrease in time with individuals outside of one's household. Though effects on these variables are of opposite signs on weekends (consistent with substitution to more social time on weekends when one works remotely during the week), the magnitudes of the effects are very small compared to their weekday counterparts, and none are statistically significant.

5.3 Evaluating identification assumptions

[17] When we split column 7 (time in the presence of non-household members) by if the non-household member is work-related (like a colleague or boss) or not work-related (like a neighbor or friend), we see that the essentially all of the effect is coming from the former category. These results are contained in Appendix Table A.5.

A major challenge with our quasi-experimental approach is that the occupation of individuals is potentially endogenous with respect to the work-from-home revolution. We address this issue a few ways in this subsection. First, we note that the fraction of individuals in teleworkable jobs in the ATUS has risen over time. In Appendix Figure B.1, we show the fraction of workers in teleworkable jobs in the sample of individuals with an occupation/industry code (panel a) as well as all individuals (panel b, in which case those without a code are assigned a teleworkability score of zero). We repeat the exercise for the fraction with a college degree in panels c and d, respectively.

There is a striking increase in individuals in teleworkable jobs coinciding with the onset of the pandemic in 2020. This is mirrored by an increase in the fraction with a college degree at the same time. Survey response rates in the ATUS fell dramatically in the first few months of the pandemic, which may be partially responsible for the sudden increase in teleworkable/college attainment seen in 2020.[18] This would occur if college degree holders (who are much more likely to be in teleworkable occupations; Cowan, 2024) were more likely to respond to the survey during the pandemic (because ATUS survey weights do not explicitly account for educational attainment, weighting the data, as we do in this figure, does not correct this issue).

The issue described above for 2020 is a microcosm of what has happened to survey response rates over the course of our study period. As response rates have fallen, the percentage of those with a college degree in the sample has risen faster than the true percentage of college degree holders in the population (a similar phenomenon has occurred in the Current Population Survey and the American Community Survey).

[18] https://www.bls.gov/osmr/response-rates/household-survey-response-rates.htm.

We begin to address this issue by pointing out that when we do not restrict our sample to those with an occupation/industry code (Appendix Figure B.1, panels b and d for teleworkable occupation and college degree, respectively), the jump in 2020 is more modest and appears to be more in line with the long-term trend. This leads us to re-run our difference-in-differences analysis with all individuals regardless of their employment status (in which we code those without an industry/occupation as not being in a teleworkable job).[19] These results are contained in Appendix Table A.6. The coefficients are very similar to their counterparts in Table 2 and are even somewhat larger in magnitude when it comes to work from home, time alone, and time with non-household members. This provides some evidence that restricting the sample to current workers (who are the ones for whom industry and occupation information is elicited) does not affect our results.

In our second analysis related to the changing likelihood of teleworkability in the ATUS sample over time, we begin by noting that secular changes in the likelihood of working in such occupations should not jeopardize the interpretation of our results. This would be the case, for example, if individuals are generally more likely to work in teleworkable jobs over time due to changes in the economy/labor market, but the choice to do so is not increasingly correlated with underlying characteristics that influence time alone and with others. To examine the latter possibility with observable characteristics (which are likely to be correlated with unobservable characteristics that affect time use), we regress several individual demographics—including presence of children in the home, whether one has a college degree, whether one is married, age, and whether one is female on the same right-hand side variables in Equation (3) (other than the variable that now appears on the left-hand side of the regression). This will tell us whether the

[19] Even though unemployed individuals can "not work" from home, their ability to do so does not change in 2020 as it does for those currently working in teleworkable occupations.

correlation between these characteristics and being in a teleworkable profession changes following the pandemic.

The results of this exercise are contained in Table 4. In fact, the coefficient on the interaction between "teleworkable occupation" and "post COVID" is uniformly small in magnitude and statistically insignificant across columns. This lends support to the notion that differential selection into teleworkable occupations after 2020 is not driving our results.

5.4 Heterogeneity

How does the effect of remote-work revolution on time spent alone and with (non)household members vary by worker characteristics? In Table 5, we divide workers by gender and age. Only women (panel a) experience a statistically significant rise in alone time, which is more than twice as large as the one for men (panel b). This goes along with a larger change in remote-work time (by 15 minutes) for teleworkable women after the pandemic compared to teleworkable men. Men also experience an increase in time in the presence of household members outside of work of 19 minutes (significant at the 10% level) while women do not. These relative shifts are consistent with evidence that the remote-work revolution has narrowed gaps in how men and women spend their time (Arntz, Yahmed, and Berlingieri, 2022; Cowan, 2024; von Gaudecker et al., 2024; Inoue and Yamaguchi, 2024). Lastly, both women and men in teleworkable jobs significantly decrease their time with non-household members after 2020 (all relative to the same difference for those in non-teleworkable jobs). We find no evidence of substitution to time with non-household members outside of work.

Panels c and d of Table 5 divide workers into young (ages 25-39) and old (ages 40-55), respectively. Compared with non-teleworkable workers, teleworkable workers in these groups experience similar increases in remote work time and time alone and a similar decrease in time

with non-household others. We again find no evidence of substitution to time with non-household members outside of work for either age group.

Panels a and b of Table 6 show results separately for workers based on whether they live in a multi-person household (panel a) or a single-person one (panel b). Notably, effects on remote work, time alone, and time with non-household members are very similar whether or not the respondent lives with anyone else.[20] Among both groups, any substitution toward time with others outside of work is minor.

The results show a somewhat different pattern when it comes to presence of children in the household (Table 6, panels c and d). While the sign on time alone is positive for those with household children (20 minutes), it is not statistically significant at conventional levels and is less than half the magnitude of the effect for those without household children (46 minutes). This curiously appears to be in part because those with children have a smaller reduction in time with non-household members rather than a differential effect on time spent with household members.

Overall, our results in this section indicate that shifting individuals into remote work has the effect of increasing their time alone and decreasing time with people outside their household, though effects vary by presence of children and gender. The proximate reason for these changes is that the mechanical decrease in time spent in the physical presence of colleagues, customers, and other work associates when one works from home is not offset by time spent with non-household others outside of work hours.

5.5 IV estimates of remote work on time alone and with (non)household members

In this section, we compute instrumental variables (IV) estimates of the effects of remote work on our various time outcomes. In doing so, we make the additional assumption that the

[20] The effect on time alone is of a similar magnitude across the two groups, but it is not significant for those in single-person households, for which the sample size is much smaller.

only pathway by which the interaction of teleworkability and a post-COVID indicator affects time-use allocations is via an increase in an individual's own remote-work decision. Of principal interest is to compare the descriptive (OLS) results from Table 1 on the association of remote work and time allocations to IV estimates that make use of the identification strategy outlined in Section 4.

We conduct the IV analysis two ways. First, we use as our remote-work variable the same one we used in Equation (1): an indicator that the individual works at least one minute with half of their work hours from home (this variable takes a value of zero if the individual does not work on the day in question). These results are contained in Table 7. In Appendix Table A.7, we simply use the number of minutes the individual reported working remotely on their diary day (including zero minutes). The results are similar regardless of how we define the remote-work variable.

Table 7 shows that when using variation in remote work that arises because workers in teleworkable jobs are more likely to work from home following the pandemic, the effects on total time spent alone, with household members, and with non-household others are quite similar to what we see in Table 1. On the other hand, effects on some outcomes, including work time and time alone outside of work are quite different between the two tables. This indicates that that individuals do generally structure their time use differently on remote-work days and/or there is selection into who chooses to work from home. For example, the descriptive results indicate individuals work less and spend slightly more time alone even outside of work on days they work remotely. However, when individuals are *induced* to work from home more, their work

hours are roughly the same (16 minutes higher, though not significant) and they do spend less time alone outside of work hours (112 minutes, significant at the 10% level), on average.[21]

What is strikingly clear from Table 7 is 1) the reduction in alone time outside of work does not come close to offsetting the overall increase in alone time (the overall increase is over 3 times larger than the decrease outside of work), and 2) the reduction in alone time outside of work is fully filled by interactions with household, rather than non-household, members. The very large reduction in time spent with non-household others that accompanies remote work (of 416 minutes, or almost 7 hours) is not offset at all by an increase outside of work hours.

6. Conclusion

We investigate the consequences of the remote-work revolution for the way workers spend their time overall and outside of work hours. While other studies have shown activity differences that are associated with an increase in remote-work prevalence (e.g., a reduction in commuting time), our study examines a different set of questions: 1) Who are remote workers with throughout their days? 2) If they spend less time with work associates during work hours, do they make up for this loss by increasing time spent with non-household members outside of work?

We use a difference-in-differences strategy in which we compare workers in teleworkable jobs (those that lend themselves to remote work) and workers in non-teleworkable jobs, before and after the pandemic. Starting shortly after the onset of COVID-19 in 2020, opportunities to work from home at least part of the time increased rapidly and have not returned

[21] When comparing Table 1 and Table 7, note that Table 1 restricts the sample to those who work during the diary day, while Table 7 does not. Recall that Appendix Table A.3 is similar to Table 1 but includes those who do not work in the control (non-remote work) group. Comparing the IV estimates in Table 7, which also includes those who do not work during the diary day in the control group, to Appendix Table A.3, we see that effects on time alone (total and outside of work) and time in the presence of non-household members are qualitatively similar, though the IV estimates are larger in absolute value. Other estimates differ, sometimes considerably, though none of the remaining IV coefficients are significantly different from zero at conventional levels.

to pre-COVID levels. These opportunities have largely been confined to certain occupations in which in-person or onsite work is not necessary.

We find that along with the relative increase in remote-work rates among workers in teleworkable jobs after COVID, there has been a significant increase in time spent alone and a significant decrease in time spent with non-household members. These changes are driven by what happens on weekdays, consistent with the idea that remote workers spend much less in-person time around colleagues. Outside of work hours, there is very little to no substitution toward spending more time with non-household members to offset the loss during work hours.

These changes have potentially large social consequences. Over a quarter of paid workdays in the U.S. in July 2025 were from home.[22] At the same time, many indicators suggest that individuals are more socially isolated than they have been at any time in the last several decades (Surgeon General, 2023). Interacting with individuals in one's social network, even those for whom the connection is peripheral, appears to improve wellbeing (Sandstrom and Dunn, 2014), which may explain why fully remote and hybrid workers report higher levels of loneliness than do on-site workers in a 2024 Gallup poll (Pendell, 2024). Social isolation in the workplace is linked to poor mental health outcomes as well as adverse outcomes for employers, including unethical behavior by employees (Yan, Yang, and Zhao, 2025). Our results offer one potential explanation for why recent studies have found that remote work leads to an increase in loneliness (Cowan and Spearing, 2025) and a deterioration in several measures of health (Goux and Maurin, 2025).

Our findings suggest that employers may benefit from considering ways to improve social engagement for remote workers within their companies. Because remote interactions

[22] https://wfhresearch.com/wp-content/uploads/2025/08/WFHResearch_updates_August2025.pdf.

appear to be less effective than in-person ones in improving engagement, creativity is required to improve this situation without simply mandating that employees return to the office, which for many may be a net negative change (given the many benefits of remote work). Future research could consider why individuals do so little substitution toward more in-person interaction with non-household members outside of work when their in-person work interactions fall dramatically. Lastly, policymakers could consider ways to increase in-person engagement in local communities in era of declining club and church membership (Cox and Pressler, 2024). Our results suggest that changes in remote work since the COVID-19 pandemic are exacerbating these trends toward lower social engagement in American life.

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1 Tables

Table 1: Descriptive

	(1) Work	(2) Work_athome	(3) Alone	(4) Alone_xwork	(5) HH	(6) HH_xwork	(7) NonHH	(8) NonHH_xwork
Remote	-86.0***	371.4***	211.9***	11.6	95.5***	69.3***	-323.3***	-8.7*
	(11.2)	(10.4)	(13.9)	(7.3)	(9.9)	(7.5)	(11.0)	(4.7)
Observations	5187	5187	5187	5187	5187	5187	5187	5187
R^2	0.324	0.795	0.364	0.274	0.397	0.407	0.465	0.207
Nonremote Mean	496.3	10.7	345.6	209.9	169.2	159.3	407.8	55.1

Notes: This table shows a regression of a dependent variable on an indicator for remote work. The sample is limited to individuals in 2022–2024 with at least one minute of work in the day. The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for year, calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry and occupation dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Difference-in-difference

	(1) Work	(2) Work_athome	(3) Alone	(4) Alone_xwork	(5) HH	(6) HH_xwork	(7) NonHH	(8) NonHH_xwork
Teleworkable*Post	1.5	46.1***	31.7***	-10.3	8.5	9.4	-38.3***	0.3
	(8.0)	(10.3)	(10.5)	(6.6)	(8.0)	(7.6)	(12.8)	(5.9)
Observations	35092	35092	35092	35092	35092	35092	35092	35092
R^2	0.369	0.204	0.187	0.161	0.336	0.346	0.165	0.128
Pre-2020 Mean	331.8	32.1	301.6	220.1	274.2	264.2	352.9	110.7

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Difference-in-difference, Weekdays and Weekends

Panel A: Weekdays	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	8.3	66.0***	49.1***	-10.3	4.2	4.5	-53.6***	-4.1
	(10.6)	(14.1)	(14.8)	(8.4)	(10.1)	(9.8)	(17.8)	(5.8)
Observations	17647	17647	17647	17647	17647	17647	17647	17647
R^2	0.177	0.264	0.205	0.181	0.281	0.289	0.173	0.111
Pre-2020 Mean	421.2	37.8	317.5	215.1	220.1	209.3	395.5	85.5
Panel B: Weekends	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	-11.9	-4.1	-12.1	-4.9	10.1	12.1	5.5	8.6
	(9.6)	(3.6)	(11.0)	(9.8)	(13.4)	(12.9)	(13.2)	(11.5)
Observations	17360	17360	17360	17360	17360	17360	17360	17360
R^2	0.207	0.094	0.217	0.217	0.344	0.343	0.154	0.119
Pre-2020 Mean	107.0	17.6	261.8	232.9	410.2	402.4	245.7	174.1

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. In Panel A (B), we restrict to weekdays (weekends). The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Difference-in-difference, Alternate Dependent Variables

	(1)	(2)	(3)	(4)	(5)
	Any HH Children <18	College Grad	Married	Age	Female
Teleworkable*Post	-0.005	0.006	-0.008	0.314	0.014
	(0.019)	(0.013)	(0.016)	(0.381)	(0.014)
Observations	35092	35092	35092	35092	35092
R^2	0.289	0.465	0.245	0.249	0.364
Pre-2020 Mean	0.510	0.441	0.607	39.836	0.466

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. The dependent variables, in minutes, are: 1) an indicator for having any household children under the age of 18; 2) an indicator for being (at least a) 4-year college graduate; 3) an indicator for being married; 4) age; and 5) a female indicator. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We include ATUS weights and cluster at the occupation level. The exceptions are that we do not control for number of household children under the age of 18; education attainment; marital status; age; and female in columns 1–5, respectively. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Difference-in-difference, Female/Male and Age 25–39/40–55

Panel A: Female	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	14.5	52.4***	43.5***	-7.2	4.2	0.5	-35.7**	3.2
	(12.1)	(13.9)	(12.8)	(9.4)	(12.5)	(12.0)	(16.1)	(8.3)
Observations	17270	17270	17270	17270	17270	17270	17270	17270
R^2	0.359	0.248	0.220	0.172	0.363	0.370	0.188	0.155
Pre-2020 Mean	298.4	32.9	280.0	216.0	297.0	286.6	342.6	116.4
Panel B: Male	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	-14.8	37.0***	19.3	-12.2	13.9	19.0*	-43.3***	-3.4
	(10.9)	(11.2)	(14.7)	(9.2)	(11.1)	(10.5)	(15.6)	(8.3)
Observations	17725	17725	17725	17725	17725	17725	17725	17725
R^2	0.409	0.219	0.203	0.201	0.358	0.368	0.199	0.151
Pre-2020 Mean	360.9	31.4	320.5	223.7	254.3	244.8	361.9	105.7
Panel C: Age 25–39	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	-8.1	49.5***	26.9**	-10.5	16.8	17.0	-37.6**	6.3
	(10.6)	(11.5)	(13.2)	(9.8)	(11.3)	(10.5)	(15.0)	(8.0)
Observations	16642	16642	16642	16642	16642	16642	16642	16642
R^2	0.376	0.232	0.227	0.198	0.375	0.384	0.191	0.169
Pre-2020 Mean	328.3	27.5	271.1	200.2	283.0	273.3	370.3	121.0
Panel D: Age 40–55	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	18.5	45.2***	37.8**	-12.4	-0.4	1.1	-37.1**	-7.2
	(13.0)	(11.8)	(15.8)	(9.6)	(10.1)	(9.8)	(17.4)	(8.1)
Observations	18349	18349	18349	18349	18349	18349	18349	18349
R^2	0.407	0.240	0.195	0.177	0.344	0.353	0.193	0.130
Pre-2020 Mean	335.3	36.6	331.5	239.6	265.7	255.4	335.9	100.7

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. In Panel A (B), we restrict to female (male) individuals, and in Panel C (D), we restrict to those who are between the ages of 25–39 (40–55). The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). The exceptions are that we do not control for female in Panels A and B, though we still control for age in Panels C and D. We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Difference-in-difference, Not Alone/Alone and (No) HH Children < 18

Panel A: Not Alone in Household	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	5.2	46.4***	30.9***	-12.9*	6.8	8.0	-36.1***	0.2
	(8.4)	(10.6)	(11.5)	(7.0)	(8.8)	(8.6)	(13.5)	(6.3)
Observations	29253	29253	29253	29253	29253	29253	29253	29253
R^2	0.375	0.207	0.164	0.113	0.272	0.286	0.170	0.125
Pre-2020 Mean	329.6	32.3	281.2	200.5	309.3	298.0	344.5	104.6
Panel B: Alone in Household	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	-21.0	51.3***	35.0	9.1	0.0	0.0	-44.2*	2.5
	(19.5)	(16.6)	(25.9)	(20.8)	(.)	(.)	(25.5)	(14.2)
Observations	5699	5699	5699	5699	5699	5699	5699	5699
R^2	0.436	0.328	0.244	0.226	.	.	0.255	0.251
Pre-2020 Mean	348.7	30.3	461.5	373.1	0.0	0.0	418.3	158.6
Panel C: HH Children Under 18	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	2.1	41.9***	20.0	-16.3*	8.2	6.1	-30.7*	0.9
	(10.7)	(12.3)	(12.6)	(8.3)	(11.6)	(10.7)	(15.9)	(7.1)
Observations	20358	20358	20358	20358	20358	20358	20358	20358
R^2	0.399	0.235	0.201	0.124	0.297	0.312	0.195	0.125
Pre-2020 Mean	324.2	32.2	251.1	172.4	364.8	352.8	331.4	95.4
Panel D: No HH Children Under 18	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work	Work_athome	Alone	Alone_xwork	HH	HH_xwork	NonHH	NonHH_xwork
Teleworkable*Post	1.8	49.8***	46.4***	-0.7	5.3	8.8	-44.3***	-1.2
	(12.3)	(10.9)	(14.8)	(10.4)	(9.6)	(9.1)	(15.9)	(9.0)
Observations	14640	14640	14640	14640	14640	14640	14640	14640
R^2	0.388	0.238	0.184	0.159	0.298	0.309	0.195	0.168
Pre-2020 Mean	339.8	32.0	354.2	269.8	180.0	172.1	375.3	126.6

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. In Panel A (B), we restrict to those who are not alone in their household (alone in their household), and in Panel C (D), we restrict to those who have household children under 18 (those who do not have household children under 18). The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We do not control for number of household children in any Panel. We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

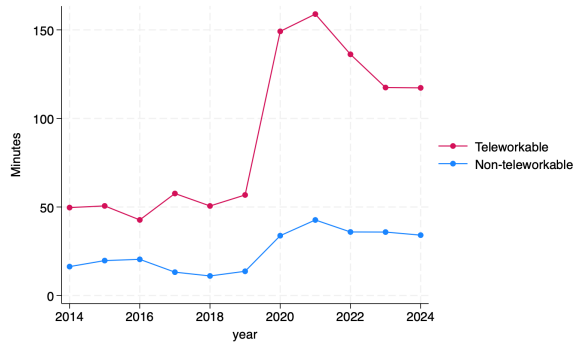
Table 7: Difference-in-difference, IV, Remote

	(1) Work	(2) Alone	(3) Alone_xwork	(4) HH	(5) HH_xwork	(6) NonHH	(7) NonHH_xwork
Remote	16.34	344.39***	-111.75*	92.53	102.00	-416.19***	3.71
	(86.22)	(93.65)	(67.65)	(81.61)	(80.79)	(105.36)	(63.54)
N	35092	35092	35092	35092	35092	35092	35092
R2	0.334	0.126	0.094	0.305	0.306	0.108	0.092
First-stage Coef	0.09	0.09	0.09	0.09	0.09	0.09	0.09
First-stage SE	0.02	0.02	0.02	0.02	0.02	0.02	0.02
K–P rk Wald F	19.67	19.67	19.67	19.67	19.67	19.67	19.67

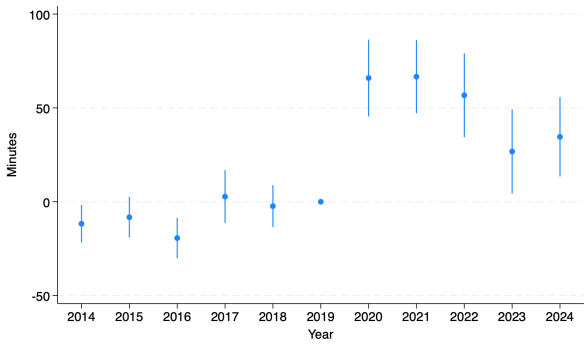
Notes: This table shows a regression of a dependent variable, where we instrument an indictor for remote work, where we include those who do not work on the diary day as 0, with an interaction of an indicator for telework-able occupation and post-Covid year (2022–2024). We include occupation and year fixed effects. The dependent variables, in minutes, are: 1) work; 2) activities with nobody else present; 3) activities other than work with nobody else present; 4) activities with at least one household member present; 5) activities other than work with at least one household member present; 6) activities with at least one non-household member present; and 7) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 1: Work From Home, Minutes and Share

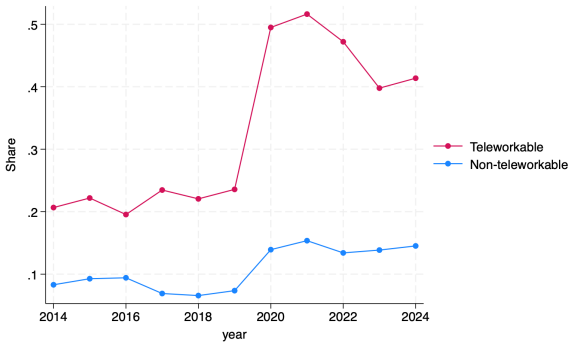
(a) Minutes of Work From Home



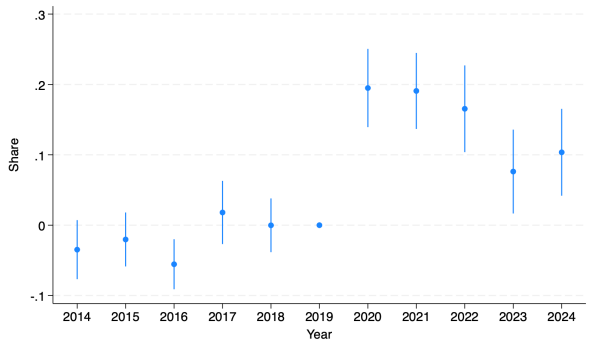
(b) Minutes of Work From Home



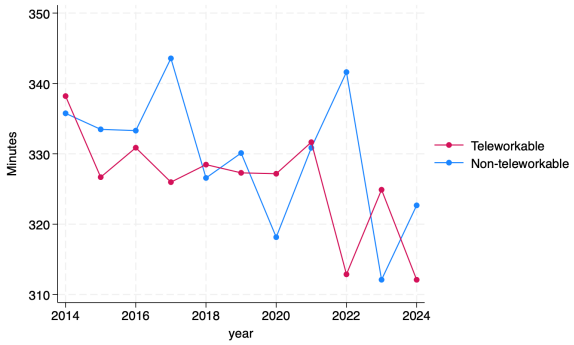
(c) Share of Work Minutes at Home (Conditional on Working)



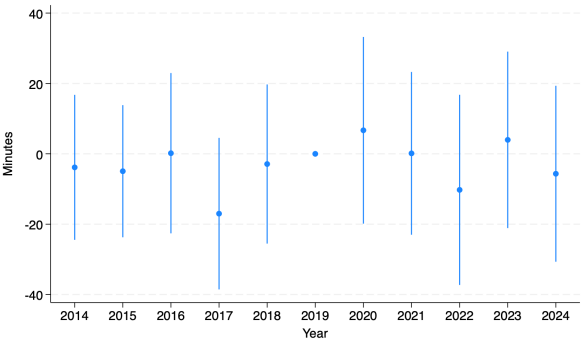
(d) Share of Work Minutes at Home (Conditional on Working)



(e) Total Minutes of Work



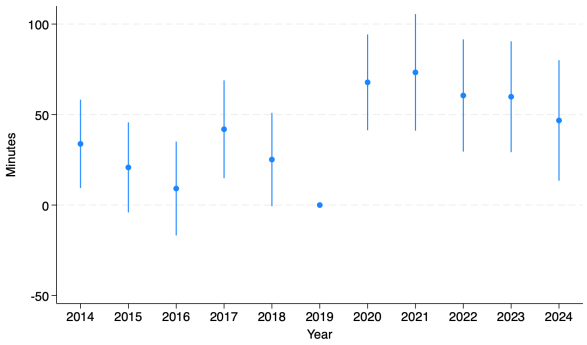
(f) Total Minutes of Work



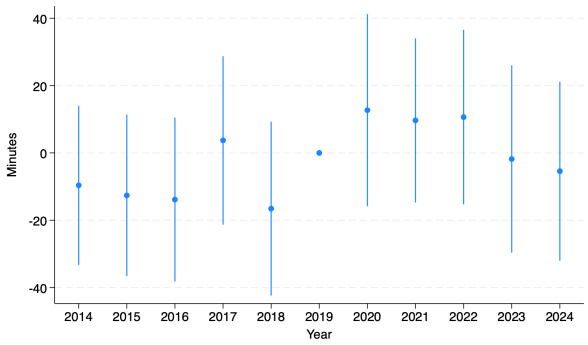
Notes: These graphs show mean values and event studies of minutes of work from home (Panels a and b), the share of work minutes at home (conditional on working) (Panels c and d), and total minutes of work (Panels e and f). For the mean value plots (Panels a, c, and e), we use ATUS weights. For the event study plots (Panels b, d, and f), we regress the dependent variable on interactions of an indicator for teleworkable occupation and year dummies, as well as occupation and year fixed effects. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level.

Figure 2: **Total** Minutes Alone, with HH Members, and with Non-HH Members

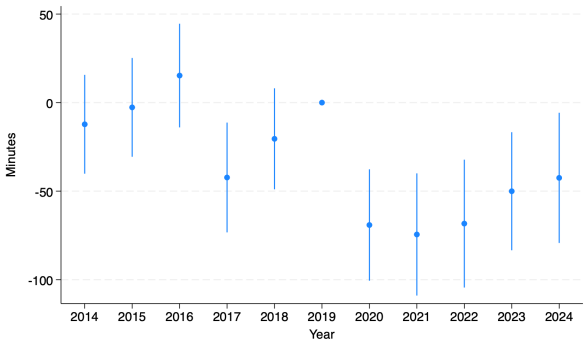
(a) Minutes Alone



(b) Minutes with HH Members



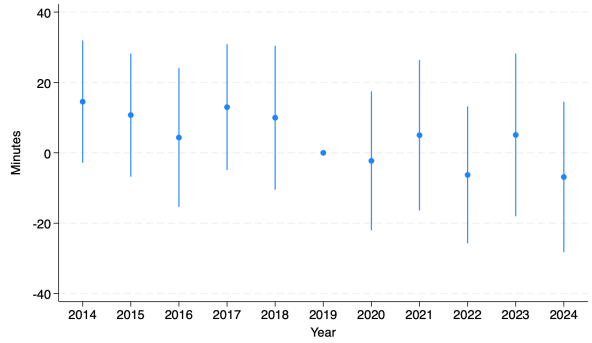
(c) Minutes with Non-HH Members



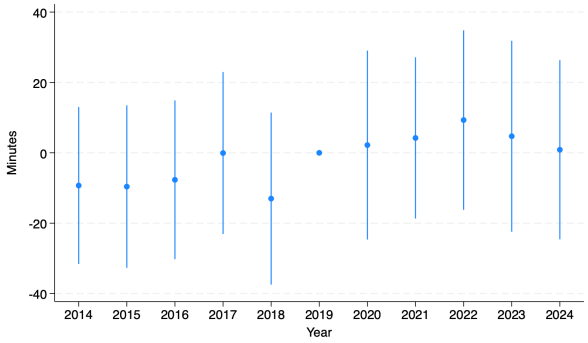
Notes: These graphs event studies for minutes in activities with nobody else (Panel a), minutes in activities with at least one household member present (Panel b), and minutes in activities with at least one non-household member present (Panel c). We regress the dependent variable on interactions of an indicator for teleworkable occupation and year dummies, as well as occupation and year fixed effects. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level.

Figure 3: Minutes **Outside of Work** Alone, with HH Members, and with Non-HH Members

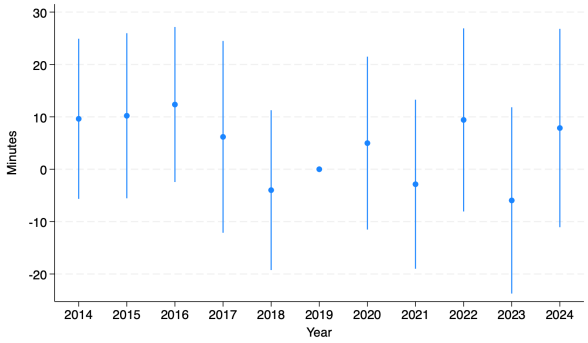
(a) Minutes Alone



(b) Minutes with HH Members



(c) Minutes with Non-HH Members



Notes: These graphs event studies for minutes in activities other than work with nobody else present (Panel a), minutes in activities other than work with at least one household member present (Panel b), and minutes in activities other than work spent with at least one non-household member present (Panel c). We regress the dependent variable on interactions of an indicator for teleworkable occupation and year dummies, as well as occupation and year fixed effects. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level.

A Appendix Tables

Table A.1: Summary Stats, Descriptive

Variable	Not Remote	Remote	p-value
Age	39.56	39.59	0.931
Metropolitan	0.87	0.93	0.000
Non-metropolitan	0.12	0.06	0.000
Metro status not identified	0.01	0.01	0.975
Married - spouse present	0.55	0.58	0.090
Married - spouse absent	0.02	0.01	0.002
Widowed	0.01	0.01	0.957
Divorced	0.09	0.09	0.895
Separated	0.02	0.02	0.210
Never married	0.31	0.30	0.393
HH Children<18	0.92	0.88	0.418
Female	0.42	0.54	0.000
White	0.78	0.72	0.000
Black	0.13	0.12	0.451
Asian	0.06	0.14	0.000
Other Race	0.03	0.03	0.609
Hispanic	0.24	0.12	0.000
Born in US	0.74	0.79	0.006
Under High School	0.08	0.01	0.000
High School	0.29	0.11	0.000
Between HS and Bachelors	0.22	0.15	0.000
Bachelors	0.24	0.41	0.000
Above Bachelors	0.17	0.32	0.000
Weekday	0.90	0.83	0.000

Notes: This table shows means of variables for the sample used in the descriptive analysis, separately by those who did not work at least one minute in the day, and those who did. We report the p-value from a regression of the variable on remote work status, using robust standard errors and ATUS weights. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Summary Stats, Difference-in-difference

Variable	Not Teleworkable	Teleworkable	p-value
Age	39.58	39.89	0.020
Metropolitan	0.85	0.91	0.000
Non-metropolitan	0.14	0.09	0.000
Metro status not identified	0.01	0.01	0.023
Married - spouse present	0.55	0.62	0.000
Married - spouse absent	0.02	0.01	0.000
Widowed	0.01	0.01	0.021
Divorced	0.09	0.08	0.007
Separated	0.03	0.02	0.000
Never married	0.30	0.26	0.000
HH Children<18	0.97	0.92	0.002
Female	0.40	0.54	0.000
White	0.79	0.79	0.236
Black	0.14	0.10	0.000
Asian	0.05	0.08	0.000
Other Race	0.03	0.02	0.117
Hispanic	0.24	0.12	0.000
Born in US	0.73	0.83	0.000
Under High School	0.11	0.01	0.000
High School	0.34	0.13	0.000
Between HS and Bachelors	0.27	0.18	0.000
Bachelors	0.18	0.39	0.000
Above Bachelors	0.09	0.29	0.000

Notes: This table shows means of variables for the sample used in the difference-in-difference analysis, separately by if one's occupation was not teleworkable or teleworkable. We report the p-value from a regression of the variable on teleworkable status, using robust standard errors and ATUS weights. *** p<0.01, ** p<0.05, * p<0.1

Table A.3: Descriptive, Code Remote Work as 0 if No Work During Day

	(1) Work	(2) Work_athome	(3) Alone	(4) Alone_xwork	(5) HH	(6) HH_xwork	(7) NonHH	(8) NonHH_xwork
Remote	68.1***	362.2***	215.9***	-21.0***	14.9*	-14.9**	-233.0***	-33.5***
	(8.4)	(9.4)	(10.7)	(7.2)	(8.2)	(6.7)	(8.0)	(4.8)
Observations	9058	9058	9058	9058	9058	9058	9058	9058
R^2	0.423	0.791	0.327	0.232	0.365	0.378	0.287	0.174
Nonremote Mean	302.4	6.5	325.1	242.4	270.1	264.1	307.6	92.6

Notes: This table shows a regression of a dependent variable on an indicator for remote work. Here, remote work is coded as 0 if the individual did not work in the day. The sample is limited to in 2022–2024. The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for year, calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry and occupation dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Descriptive, Time with Work- and Non-work-related Non-household Members

	(1) NonHH, Work-related	(2) NonHH, Non-work-related
Remote	-314.5***	-19.2***
	(11.2)	(6.7)
Observations	5187	5187
R^2	0.487	0.228
Nonremote Mean	350.6	67.8

Notes: This table shows a regression of a dependent variable on an indicator for remote work. The sample is limited to individuals in 2022–2024 with at least one minute of work in the day. The dependent variables, in minutes, are: 1) activities with at least one non-household member that is work-related (such as a coworker) present, and 2) activities with at least one non-household member that is not-work-related (such as a friend) present. We control for year, calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry and occupation dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table A.5: Difference-in-difference, Time with Work- and Non-work-related Non-household Members

	(1)	(2)
	NonHH, Work-related	NonHH, Non-work-related
Teleworkable*Post	-36.4***	-3.3
	(11.4)	(6.3)
Observations	35092	35092
R^2	0.248	0.127
Pre-2020 Mean	246.3	113.3

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. The dependent variables, in minutes, are: 1) activities with at least one non-household member that is work-related (such as a coworker) present, and 2) activities with at least one non-household member that is not-work-related (such as a friend) present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table A.6: Difference-in-difference, Include Observations with Missing Occupation Code

	(1) Work	(2) Work_athome	(3) Alone	(4) Alone_xwork	(5) HH	(6) HH_xwork	(7) NonHH	(8) NonHH_xwork
Teleworkable*Post	-3.2	52.9***	42.9***	-9.0	11.6*	12.2*	-52.5***	1.2
	(7.1)	(10.9)	(11.7)	(5.8)	(6.9)	(6.7)	(14.4)	(5.1)
Observations	42699	42699	42699	42699	42699	42699	42699	42699
R^2	0.455	0.213	0.192	0.198	0.354	0.364	0.200	0.104
Pre-2020 Mean	269.7	26.5	307.8	241.5	300.8	292.6	312.1	115.5

Notes: This table shows a regression of a dependent variable on an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024), as well as occupation and year fixed effects. We include observations with a missing occupation code, and assign these individuals a 0 for teleworkable occupation. The dependent variables, in minutes, are: 1) work; 2) work at home; 3) activities with nobody else present; 4) activities other than work with nobody else present; 5) activities with at least one household member present; 6) activities other than work with at least one household member present; 7) activities with at least one non-household member present; and 8) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

Table A.7: Difference-in-difference, IV, Minutes Work from Home

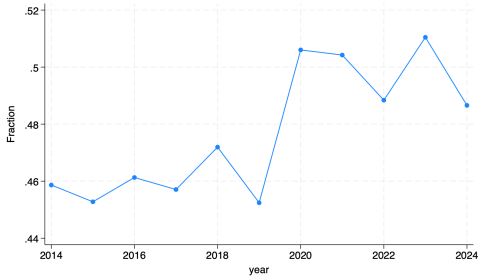
	(1) Work	(2) Alone	(3) Alone_xwork	(4) HH	(5) HH_xwork	(6) NonHH	(7) NonHH_xwork
Minutes Work from Home	0.03	0.69***	-0.22*	0.18	0.20	-0.83***	0.01
	(0.17)	(0.18)	(0.13)	(0.16)	(0.16)	(0.21)	(0.13)
N	35092	35092	35092	35092	35092	35092	35092
R2	0.34	0.18	0.13	0.30	0.30	0.13	0.09
First-stage Coef	46.12	46.12	46.12	46.12	46.12	46.12	46.12
First-stage SE	10.27	10.27	10.27	10.27	10.27	10.27	10.27
K–P rk Wald F	20.16	20.16	20.16	20.16	20.16	20.16	20.16

Notes: This table shows a regression of a dependent variable, where we instrument minutes of work from home with an interaction of an indicator for teleworkable occupation and post-Covid year (2022–2024). We include occupation and year fixed effects. The dependent variables, in minutes, are: 1) work; 2) activities with nobody else present; 3) activities other than work with nobody else present; 4) activities with at least one household member present; 5) activities other than work with at least one household member present; 6) activities with at least one non-household member present; and 7) activities other than work with at least one non-household member present. We control for calendar month, and day-of-week fixed effects; a holiday indicator; a quadratic in age; metropolitan statistical area (MSA) size dummies; marital status dummies; number of household children; sex; race (black, Asian, other, with white as the omitted category); a Hispanic ethnicity indicator; an indicator for being born in the U.S.; educational attainment dummies (below high school, high school, between high school and Bachelors, Bachelors, and above Bachelors); and detailed industry dummies (4-digit Census codes). We use ATUS weights and cluster at the occupation level. *** p<0.01, ** p<0.05, * p<0.1

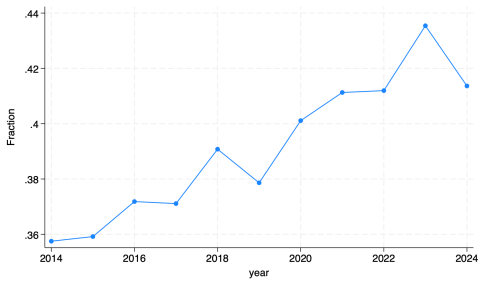
B Appendix Figures

Figure B.1: Fraction in Teleworkable Jobs and College Educated

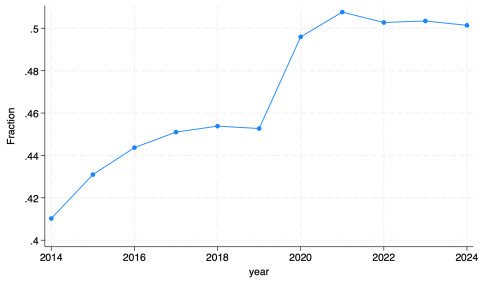
(a) Teleworkable Jobs



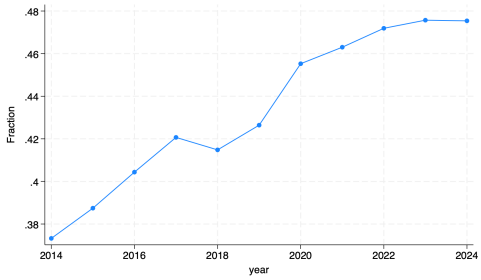
(b) Teleworkable Jobs, Sample Not Restricted to People with an Industry Code



(c) College



(d) College, Sample Not Restricted to People with an Industry Code



Notes: These graphs show the fraction of the sample that was in teleworkable jobs (Panels and b) and that had at least a 4-year college degree (Panels c and d). Panels a and c are limited to those with an occupation code, as in our main sample. Panels b and d are not limited to those with an occupation code. In Panel b, those without an occupation code are assigned 0 for teleworkable job status.