The impact of COVID-19 on work from home of ethnic groups in the U.S.: Evidence from time-use data

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Abstract

Purpose – The purpose of this paper is to analyze the impact of the COVID-19 pandemic on participation and time allocated to work from home by ethnic/racial group.

Design/methodology/approach – The authors employ U.S. time-use data (American Time Use Survey, ATUS) for the 2017 – 2020 period and a parametric approach in their analysis.

Findings – Estimates show that the time allocated to WFH increased during COVID-19, especially for women. This increase is likely driven by more workers shifting to WFH (higher participation) rather than by longer hours worked by those who already teleworked. We also find relevant differences in the impact of COVID-19 on WFH by ethnic/racial group. Among ethnic/racial groups, only Asians increased WFH compared to White Americans. Within this ethnic group, we find significant differences across genders. Asian men increased participation in WFH, whereas Asian women increased both participation and hours worked when compared to White American women. Differences in this racial/ethnic group could be explained by previous research, which demonstrates a higher ability of Asians to perform job tasks remotely. However, this finding could also be attributed to an increase in discrimination during the COVID-19 pandemic.

Originality/value – This paper contributes to the recent and limited literature exploring the heterogeneous impact of COVID-19 on participation and time allocated to WFH by ethnic/racial

group. Understanding the mechanisms driving vulnerable populations' abilities to work during socioeconomic downturns is of high policy importance.

Keywords: COVID-19, ethnicity, work from home, hours worked, time use, U.S

1. Introduction

The COVID-19 pandemic caused significant changes in the daily lives of people around the world. Work activities were particularly affected by government-imposed social-distancing measures aimed at slowing the spread of the virus. Following the stay-at-home measures, business organization changed dramatically, as a large proportion of the workforce switched to working (work) from home (WFH) (Mas and Pallais, 2020). In May 2020, WFH increased to 38 percent of workers in the U.S. due to the pandemic (Gaffney *et al*., 2021). From the worker's perspective, the sudden shift to teleworking posed many challenges in relation to working time and balancing work with family time and other home-based activities.

The COVID-19 virus has been called the "great equalizer,"[1] but this likely does not reflect the differential impact of the pandemic response on historically marginalized populations in the U.S. Presumably, the pandemic affected these populations differently, as time resources, human resources, and financial resources for adapting to changes were ex-ante unequally distributed. This paper investigates two relevant, and rather unexplored, research questions. First, we examine whether the COVID-19 pandemic disproportionally impacted participation in WFH by African Americans, Asians, and Latinx relative to White Americans. Second, we examine whether and the extent to which the pandemic differentially affected the time allocated to WFH by ethnic/racial minority groups. Both questions are crucial for understanding the work patterns of ethnic/racial minority groups and to apprise the health risks related to work during the pandemic. These groups are especially vulnerable to negative labor market shocks due to more precarious jobs (Zhang *et al*., 2022), limited savings and wealth (Canilang *et al.*, 2020; Couch *et al*., 2020), and also are more likely to be exposed to work-related health risks (Goldman *et al.*, 2021). Both questions help to better understand the impacts of COVID-19 on different ethnic/racial groups and to design policy responses to address the needs of these populations.

[1] Twitter post on March 31, 2020, by the New York governor Andrew Cuomo.

To examine these research questions we use parametric methods that employ representative time-use data of the U.S. population collected by the American Time-Use Survey (ATUS) for the 2017 – 2020 period. These data allow for identification of the place/location of work and precisely measure the effective time allocated to WFH by individuals.

There are several key results that emerge from our analysis. First, we find that the time allocated to WFH increased during COVID-19, especially for women. This increase is likely driven by more workers shifting to WFH (higher participation) rather than by longer hours worked from home by existing teleworkers. Second, there are relevant differences in the impact of COVID-19 on WFH by ethnic/racial groups. Among ethnic/racial groups, only Asians increased WFH compared to White Americans. Within this ethnic group, we find significant differences across genders. For Asian men, the increase in WFH is explained exclusively by higher participation in WFH. Asian women also participated more in WFH during COVID-19, but those who participated also worked more hours from home when compared to White American women. Possible explanations for these differences include the higher ability of Asians to perform job tasks remotely and an increase in discrimination against Asians during the COVID-19 pandemic. Finally, the general response to COVID-19 by increasing WFH likely reduced the risk of contagion related to work, especially for women and Asians.

This research contributes to the literature in several ways. First, we document the heterogeneous impact of COVID-19 on WFH by ethnic/racial groups. Our approach is unique, using a large time-use dataset that allows for precise measurement of time allocated to WFH by individuals. Second, our method and data allow us to better investigate the mechanisms driving the differences between groups by comparing the pre-pandemic and the pandemic adoption of WFH across ethnic/racial groups. This method and data could also be used to monitor how workers (also by ethnicity) behave in terms of WFH in the post-pandemic period, which is extremely important from both a positive and normative point of view. Third, we shed light on the impact of COVID-19 on the time allocated to WFH. This topic, and especially the differential effect on ethnic/racial groups of workers, has received surprisingly little attention in the literature.

The paper is organized as follows. Section 2 outlines the recent literature on ethnicity and WFH during the pandemic. Section 3 describes the data used and the empirical strategy we employ in

our analysis. Section 4 presents the results. Section 5 summarizes and briefly discuss the main conclusions of our research.

2. The COVID-19 pandemic and time allocated to WFH by ethnic/racial minority groups

A large body of literature documents the surge of WFH during the COVID-19 pandemic (Belzunegui-Eraso and Erro-Garcés, 2020; Barrero *et al.* 2021; Erro-Garcés *et al.*, 2022) and how access and ability to WFH is highly unequal across genders (Adams-Prassl *et al.*, 2020; Alon *et al.*, 2020; Carli, 2020), education/skill levels (Mongey *et al.*, 2021; Zimpelmann *et al.*, 2021; Haider and Anwar, 2022), and occupations (Adams-Prassl *et al.*, 2020; Béland *et al.*, 2020; Borjas and Cassidy, 2020; Dingel and Neiman, 2020; Lopes and Carreira, 2022). In the U.S., empirical evidence shows a heterogeneous distribution of WFH across ethnic/racial groups. For example, the U.S. Bureau of Labor Statistics (2020) reports that in August 2020, WFH was more common among Asians (44 percent) than Whites (23 percent), Blacks (21 percent), and Hispanics (16 percent). That being said, little is known about the mechanisms driving WFH differences across ethnic/racial groups, though authors have hypothesized several explanations and mechanisms. First, ethnic/racial minorities are less likely to be employed in occupations that can be performed from home (Borjas and Cassidy, 2020; Yasenov, 2020; Haider and Anwar, 2022). Several papers classify occupations based on the extent they are "teleworkable," following the seminal paper by Dingel and Neiman (2020), and find that Hispanics are less likely to WFH while Asians have the highest probability to WFH (Yasenov, 2020; Gambau *et al.*, 2022)). Asfaw (2022) also shows that Hispanic workers are overrepresented in occupations with the lowest ability to WFH.

Second, human capital differences across ethnic/racial groups may have contributed to the unequal participation in WFH. Many studies show a positive association between higher education and greater adoption of telework (Pigini and Staffolani, 2019; Lopez-Igual and Rodriguez-Modrono, 2020). Highly educated/skilled workers are more able to perform tasks independently and adapt to new work settings. Using data from the Current Population Survey (CPS), Asfaw (2022) finds evidence that the lower levels of college education in Black and Hispanic workers explains their lower ability to telework compared to White workers. Among the highly educated, evidence suggests that Asians were best prepared to cope with the working restrictions the

pandemic presented. Kao and Thompson (2003) document that Asians have higher college attainment relative to White Americans and also represent a higher concentration in STEM (science, technology, engineering and math) majors. Likely, STEM fields have greater access to 'teleworkable' jobs as they use more consistently ICT and digital tools.

Third, discrimination could have also caused differences in WFH participation across ethnic/racial groups during the pandemic. Discrimination on an ethnic/racial basis is widespread in the U.S. and partly explains labor market disadvantages once all relevant human capital and demographic attributes of workers are taken into account (Altonji and Blank, 1999). How could COVID-19 increase discrimination related to WFH? It has been plausibly argued that during economic recessions, when labor resources become scarcer, there is less pressure on employers who have the taste for discrimination to lay off minority workers, as opposed to equally qualified white workers (Altonji and Blank, 1999; Couch and Fairlie, 2010). The same argument would theoretically apply to WFH during COVID-19. In this case, the choice would be between laying off workers or assigning workers to WFH, which discriminatory employers might do on an ethnic/racial basis.[2] The literature also shows that periods of crisis increase scapegoating and activate antipathy toward minority groups (Bursztyn *et al.*, 2022). The U.S. witnessed an increase in anti-Asian sentiments and racial scapegoating of this minority group during the pandemic (Cheah *et al.*, 2020; Tessler *et al*., 2020). Several papers document increasing discrimination manifested through more hate incidents against Asians (Cao *et al.*, 2022) and through the decline in demand for services provided by them (Luca *et al.*, 2022). Evidence also shows that one third of Asian Americans feared threats and physical attacks during the COVID-19 outbreak, and eight in ten believe violence against them increased in the U.S. (Ruiz *et al*., 2021). Therefore, this discriminatory environment might have affected daily behaviors and work location preferences of Asians, regardless of employer preferences and decisions. Many Asian workers may have chosen to WFH, where contact with others is limited and potential for discrimination is reduced.

The sudden shift to WFH during the pandemic presented several risks and challenges related to working time: working long hours, blurring of boundaries between work and home life, and work-life balance (Predotova and Vargas Llave, 2021; Erro-Garcés *et al.*, 2022). The impact of COVID-19 on the time allocated to WFH has received surprisingly little attention in the literature.

[2] Or, in cases in which the employer must reallocate part of the workforce to remote work, employers might relocate workers on an ethnic/racial basis.

Among the few studies, in 2020, an e-survey on several EU countries documented that a higher share of teleworkers worked long hours (between 41 and 60 hours) compared to those working at the workplace (Predotova and Vargas Llave, 2021). Restrepo and Zebellos (2022) found that during COVID-19, individuals working from home increased paid work activities more than individuals working on-site. The existing literature provides little background on the mechanisms driving differences in time allocation to WFH across ethnic/racial groups and how economic shocks affect these differences. What we know and could infer form studies on immigrants is that ethnic/racial minorities present several vulnerabilities in the labor market that might affect time allocation to paid WFH. Research shows that ethnic minorities and immigrants usually have precarious jobs, which implies unstable work schedules, high levels of part-time work, and higher variability in the number of hours worked (Mcdowell *et al.*, 2009; Porthé *et al.*, 2010; Finnigan and Hunter, 2018; Sisk and Donato, 2018; Storer *et al*., 2020). These vulnerabilities are likely exacerbated during recessions. Moreover, Dustmann (1997) argues that, especially during economic downturns, immigrants perceive higher uncertainty than natives and react by accumulating more precautionary savings. One way to accomplish this during the pandemic might have been to work longer hours from home. These theoretical arguments point to a differential impact of the pandemic on hours worked from home of ethnic/racial minorities compared to whites but are ambiguous on the sign of the effect.

Another determinant of WFH changes during the pandemic could be related to the overall redistribution of time across daily activities, and the extent to which this differed across ethnic/racial groups. A recent study by Aksoy *et al*. (2023) finds that worldwide, the average daily time savings due to cuts in commuting time for those working from home was about 72 minutes, and that around 40 percent of that time saved was allocated to paid work in main and secondary jobs. The time savings that occurred from a reduction in commuting likely benefited ethnic/racial minorities, who usually spend more time commuting due to residential segregation and higher use of public transport (Easley, 2018; Dilmaghani, 2022). The findings by Aksoy *et al.* (2023) suggest that minority workers allocated more time saved from commuting to WFH compared to white workers.

3. Data and empirical strategy

3.1 Data

Our analysis uses the American Time-Use Survey (ATUS) for the years 2017 – 2020, conducted by the U.S Bureau of Labor Statistics (BLS). The ATUS sample is randomly selected among respondents of the Current Population Survey (CPS) survey and is representative of the U.S. population aged 15 and older.[3] Designated respondents are first invited by mail to participate in the survey. The information is collected through computer-assisted telephone interviewing (CATI), which minimizes human error and allows the interviewer to control the consistency of information. The interview is a combination of structured questions and conversational interviewing in which participants list the time (in minutes) allocated to each item in a detailed set of activities performed in the 24 hours prior to the survey.[4] In addition, respondents are asked to report their primary and secondary activities—in case they perform several activities contemporaneously—the place where these activities are performed, and with whom. Time-use surveys are a unique instrument to collect information about how much time individuals devote to working activities and the location where the activities were performed. Moreover, the time-use diary method is regarded as qualitatively superior in measuring daily behavior compared to other survey methods that collect information about the frequency and duration of activities due to: (i) the short recall period, which reduces error (Ribar 2015); (ii) the episodic/chronological format that records a continuous sequence of activities (must add up to 24 hours), which aids recall and deters misrepresentation (under- or overestimation) of particular activities (Juster *et al*., 2003)[5]; and (iii) a higher reliability, as activities may be performed several times during the day and their duration may be recorded for each instance (Sullivan *et al.*, 2021). ATUS data has been collected consistently since 2003 and allows comparability across years. For the year 2020, ATUS did not collect information on time use between March 18 and May 9, which coincided with the period when people were advised to stay home in order to prevent the spread of the virus. Hence, the data is not representative of all of year 2020. Given that restrictions on economic activity in the U.S. began in mid-March 2020, we consider the May – December 2020 time frame as the COVID-19

[3] The ATUS data set is publicly available upon registration. We used the American Time-use Survey Extract Builder to extract the data (Hofferth *et al*., 2017). https://www.atusdata.org/atus/

[4] ATUS diary days are assigned randomly and distributed across the days of the week, with 10 percent allocated to each day of the week and 25 percent allocated to Saturday and Sunday. This distribution is based on research showing that on weekends the allocation of time is different from working days (Horrigan and Herz, 2004).

[5] Overrepresentation may occur principally for activities that are perceived as socially desirable, such as child education.

period. We consider the 2017 – 2019 time span as the pre-pandemic period.[6] We attribute the changes in time worked from home between these two periods to the pandemic. This assumption is consistent with several studies showing that population-level patterns in time use change gradually (Gershuny and Sullivan, 2019), and therefore the sudden change (from one year to the next) could be attributed to the pandemic (Sullivan *et al*. 2021).

Table I. Sample means by gender and by period.

	MEN		WOMEN	
	Pre-Covid	Covid	Pre-Covid	Covid
VARIABLES	Mean	Mean	Mean	Mean
White	0.69	0.71	0.72	0.68
Black	0.08	0.08	0.13	0.12
Asian	0.07	0.06	0.05	0.04
Latinx	0.17	0.15	0.11	0.15
Age (years)	40.80	41.29	40.10	39.72
Married	0.55	0.59	0.49	0.55
No children	0.68	0.63	0.66	0.67**
Child 0-2	0.09	0.08	0.07	0.09
Child 3-5	0.09	0.08	0.07	0.08**
Child 6-12	0.17	0.22	0.19	0.18
Child 13-17	0.11	0.15	0.15	0.14
Less than secondary	0.03	0.02	0.01	0.04
Secondary	0.58	0.56	0.55	0.45**
Degree	0.21	0.23	0.25	0.28
Post graduate	0.18	0.19	0.18	0.24
Observations	1068	209	1193	214

Source: Author's own creation on ATUS data 2017-2020. ** ($p<0.05$) indicate that means are statistically different between periods.

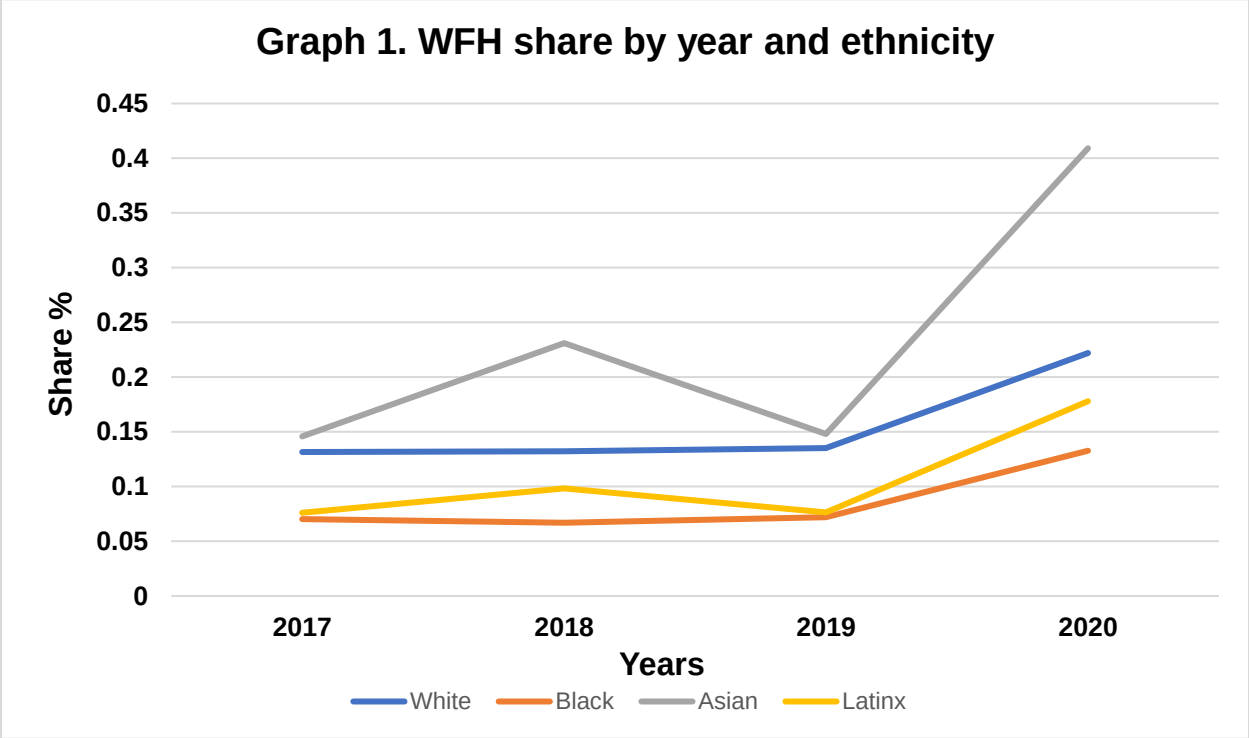
ATUS also includes a rich set of information on respondents' household and demographic characteristics. Table 1 shows the summary statistics of the sample, by gender and period. Samples are comparable in terms of observed characteristics.[7] The survey's response rate decreased by 3 percentage points during the pandemic, from 42 percentage points in 2019 to 39 percentage points

[6] We pooled together the three years prior to the pandemic (2017, 2018, and 2019) to have a sufficient number of observations to estimate the coefficients in the truncated regression. Estimations on the pooled sample of the pre-pandemic period show that years 2017, 2018, and 2019 are not significantly different in terms of the dependent variables. Results are available upon request.

[7] The use of weights was not possible for the 2017 – 2020 period. ATUS provides the comparable probability weight *wt20* only for 2019 and 2020. Summary statistics assessed only for years 2019 and 2020 yield the same results. Results are available upon request.

in 2020. This decrease in response rate was mainly related to data collection issues and followed a steady decrease since 2003 (Bureau of Labor Statistics, 2021). It is likely unrelated to respondents' characteristics and thus, unlikely to bias our results. Generally, the data quality is preserved across the surveys. This allows us to compare the pandemic sample with the pre-pandemic sample (Flood *et al.*, 2022). After dropping low-quality observations and observations with missing information,[8] the usable dataset is composed of 5,063 men and 4,650 women.

Graph I: Share of WFH workers in the sample used in the analysis



Source: Author's own creation

Graph 1 shows the shares of WFH workers in the sample used in the analysis. Asians participated more in WFH than White Americans before the pandemic, especially during year 2018, and had a higher increase compared to White Americans during the pandemic. African American and Latinx show a lower participation in WFH before and after the pandemic compared to White Americans.

3.2 Empirical strategy

We aim to analyze whether the pandemic affected the time worked from home (or teleworking) by ethnic/racial group and to what extent. In our sample we have a large number of zeros, as 71

[8] The data quality variable is assessed by the interviewers and indicates whether the data from a particular interview should be used. Non-usable data include those with wrong answers and incorrect recall of activities.

percent of the respondents declare to be working on-site exclusively. Generally, the large number of zeros is a distinctive feature of the time-use data. While Tobit is the appropriate method when zeros originate from censoring, it yields biased results when zeros mainly originate from a mismatch between the observed period (one diary day) and the longer period the research aims to analyze (generally much longer than one day) (Stewart, 2013). Previous research used ordinary least square (OLS) models to obtain unbiased estimates (Vargas, 2016; Muchomba and Kaushal, 2022; Pabilonia and Victoria, 2022). Following this literature, we employ OLS to estimate the intensity of work from home (Equation. 1). The specification of the baseline model is as follows:

$$WFH(minutes)_i = \pi_0 + \boldsymbol{\chi'Minority'_i} + \boldsymbol{\psi Pan_i} + \Theta'_i\boldsymbol{Minority'_i} * \boldsymbol{Pan}_i + \boldsymbol{\lambda' X'}_i + \boldsymbol{\varphi'}_s + \boldsymbol{\gamma'}_o + \varepsilon_i \quad (1)$$

Equation 1 estimates the aggregate (unconditional) average changes in time worked from home during the pandemic. These changes could be driven by two (non-mutually exclusive) sources. First, by an increase in participation in WFH. Workers working exclusively on-site before COVID-19 (reporting zero time spent in WFH) started to spend a positive amount of time in WFH during COVID-19. Second, the average time spent in WFH increased because workers that engaged in WFH spent more time in this activity during COVID-19 compared to the pre-COVID period. To identify each effect, we employ a Probit model to estimate the probability of participation in WFH (extensive margin) and an OLS regression to estimate the intensity of participation (intensive margin), conditional on participating. This method pertains to the two-part models family that accounts for the mass of zeros (Cragg, 1971).[9] The specifications of the models are the following:

$$WFH(0,1)_i = \alpha_0 + \gamma_0\boldsymbol{Pan}_{ti} + \beta'_0\boldsymbol{Minority}_i + \delta'_0\boldsymbol{Pan}_{ti} * \boldsymbol{Minority}_i + \varphi'_0\boldsymbol{X'}_i + \boldsymbol{\varphi'}_{s,0} + \boldsymbol{\gamma'}_{o,0} + \varepsilon_{i,0} \quad (2) \quad \text{(extensive margin)}$$

$$WFH(minutes)_i = \alpha_1 + \gamma_1\boldsymbol{Pan}_{ti} + \beta'_1\boldsymbol{Minority}_i + \delta'_1\boldsymbol{Pan}_{ti} * \boldsymbol{Minority}_i + \varphi'_1\boldsymbol{X'}_i + \boldsymbol{\varphi'}_{s,1} + \boldsymbol{\gamma'}_{o,1} + \varepsilon_{i,1} \quad (3) \quad \text{(intensive margin)}$$

[9] This method assumes that the zeros are true zeros and not censored values of a positive outcome as assumes the Heckman selection model (Belotti *et al.*, 2015). Hence, the two-part model is the appropriate method for our data.

3.2.1 Dependent variables

The dependent variable in Equation 1, $WFH(minutes)_i$, is defined as the total amount of time (in minutes) devoted to paid work (main job and secondary job) performed at home by respondent *i*. It has zero value for respondents declaring they work exclusively outside home. In Equation 2, the dependent variable $WFH(0,1)$ equals 1 if the respondent *i* declares to have spent a positive amount of time (minutes>0) in paid WFH, and 0 otherwise. In Equation 3 the dependent variable considers only respondents declaring a positive amount of time allocated to WFH. In the estimations, we include respondents (between 18 and 65 years old) who declare their place of work and are not engaged in the armed forces. In the analysis, we consider only work days (from Monday to Friday). Around 10 percent of the respondents declare to have worked both from home and at the workplace.

3.2.2 Explanatory and control variables

The vector ($\boldsymbol{Minority'_i}$) includes four dummies to measure the ethnicity/race of respondents (White American, African American, Asian, and Latinx).[10] The dummy $\boldsymbol{Pan}_i$ equals 1 for the COVID-19 pandemic period and 0 otherwise. In both equations, our main explanatory variables are the interactions between the dummy pandemic $\boldsymbol{Pan}_i$ and the set of dummies measuring the ethnicity/race of respondents $\boldsymbol{Minority'_i}$. The interaction's coefficients measure the impact of the pandemic on participation and work time for each ethnic/racial group, with respect to the reference category, White American. Based on the mechanisms discussed above, we expect a differential impact the pandemic on WFH of ethnic/racial groups.

In both equations, the vector $\boldsymbol{X'}$ includes individual-level characteristics that might affect the propensity to participate and the time spent in paid WFH. The age of the respondent (*Age)* is likely positively related to the worker's experience and hence may increase participation in WFH. But, on the contrary, younger workers could be more tech savvy and more likely to telework using ICT (Haider and Anwar 2022). We allow for a non-linear effect of age by including its quadratic form (*Age squared*). Since couples living in the same household may manage and share housework tasks and work differently compared to singles, especially during the pandemic, we include a dummy for marital status (*Married*). Childcare is also a primary activity within the household, which likely

[10] We excluded the respondents declaring two or more races. We defined Latinx as respondents that have either a father and mother born in any of the Central American and Caribbean countries or South America.

affects hours worked, especially during the COVD-19 pandemic, when schooling services were interrupted. We use a set of dummies equal to 1 if the respondent has children in each of the following age groups: *No children, children 0 – 2 years, children 3 – 5 years, children 6 – 12 years, children 13 – 17 years.* These dummies allow for a different effect of children depending on their age. We also include a set of educational attainment dummies (*Less than secondary, Secondary, Degree, Postgraduate*) which capture the level of skills of the workers. The vector $\boldsymbol{X'}$ also includes a set of 16 dummies, one for every range of family income[11]. This is to control for any unobserved effect related to wealth that could affect the willingness to work. In all equations, we use: (i) occupation fixed effects $\boldsymbol{\gamma'}_o$ to account for the heterogeneous effect of the COVID-19 pandemic on occupations; and (ii) state-pandemic fixed effects $\boldsymbol{\varphi}'_s$ to capture the different levels of restrictions and policy reactions to the pandemic across U.S. states.[12] Standard errors are clustered at the state level. For the exact definition of the variables included in our empirical specification, refer to Table 1A in the Appendix.

4. Results

The results of our regressions are presented in Table 2. Specifications 1 – 3 are estimated only for men while specifications 4 – 6 are estimated only for women. All regressions include the interactions between the dummy pandemic and the ethnic dummies to explore the heterogeneity in the reaction to the pandemic and also control for the whole set of individual characteristics, occupation, and state-pandemic fixed effects.

The results in Specification 1 show that during the pandemic, the average time spent working from home increased by around 56 minutes for the reference category (White Americans). Compared to White Americans, the WFH time of Asian men went from less 29 minutes before the pandemic to 135 minutes more during COVID-19. African American and Latinx men show no significant changes in their WFH behavior during the pandemic. Specification 2 estimates changes in the probability to participate in WFH (extensive margin) across periods, while Specification 3 estimates changes in the WFH time, conditional on participation (intensive margin). Results show that the increase of WFH time during COVID-19 was likely mainly driven by a higher participation of 15.8 percent, while the time of those who engaged decreased, on average, by 63 minutes. This

[11] The lowest and the highest range are: less than 5,000$ and more than 150,000$, respectively.
[12] Due to the low number of observations, we could not account for state-specific restrictions over time.

suggests that those who began teleworking as a result of the pandemic could have spent substantially less time in WFH than those who had already been teleworking prior to the pandemic. Actually, many new teleworkers started doing a limited number of tasks from home, and they faced many organizational challenges during working time, including managing family and household issues. This finding is in contrast with survey evidence on EU countries showing longer working hours both for new and existing teleworkers during the pandemic (Predotova and Vargas Llave, 2021).[13] For Asian men, the higher WFH time is exclusively explained by the higher engagement of 19.5 percent in WFH compared to White American men.

The results of Specifications 4 – 6 for women resemble the patterns that we found for men, but with some important differences. First, the impact of COVID-19 on WFH is around 40 minutes longer for women. This is explained by an increase of 25 percent in participation in WFH while, conditional on participation, the time spent in WFH decreased by more than 1.5 hours. Arguably, if women had to choose between WFH and working onsite, all else being equal, they would probably favor WFH due to increasing household responsibilities, especially childcare, during the pandemic (Albanesi and Kim, 2021). Given these extra responsibilities and the larger amount of time allocated to them, those women engaged in paid WFH allocate less time to this activity. This result is consistent with Bick *et al*. (2021), who found that women increased participation in WFH more than men.

Second, we find that Asian women worked, on average, 2.5 more hours than White American women during the pandemic. This result is explained by both an increase in participation of 24 percent, and by an increase of 2.5 hours in WFH of those who participated. This suggests that the Asian women who started to telework during COVID-19 spent substantially more time in this activity than White American women. Also, Latinx women increased their time allocated to WFH during the pandemic by 1.5 hours relative to White American women, despite experiencing no changes in WFH participation. Third, in the pre-pandemic period, the participation of African American and Latinx women in WFH was lower relative to White American women, but the pandemic smoothed out these differences across groups.

[13] Our analysis cannot rule out that existing (usual) teleworkers also spent less time working from home during COVID-19, explaining part of the average decrease (-63 minutes) in time spent in WFH for those who participated. In our data we cannot distinguish new teleworkers from existing teleworkers to precisely disentangle this mechanism.

Table II. Baseline estimations. Work from home and telework by gender.

	(1)	(2)	(3)	(4)	(5)	(6)
	Men	Men	Men	Women	Women	Women
VARIABLES	Unconditional	Participation	Conditional	Unconditional	Participation	Conditional
Pandemic	55.75***	0.158***	-63.10***	97.96***	0.255***	-90.78***
	(12.57)	(0.0201)	(15.68)	(17.64)	(0.0408)	(25.47)
African-American	-6.819	-0.0151	-4.241	-15.40	-0.0694**	24.00
	(12.06)	(0.0263)	(33.70)	(10.68)	(0.0276)	(27.42)
Asian	-28.56*	-0.0482	-28.80	-33.69*	-0.0554	-44.74
	(16.50)	(0.0302)	(37.88)	(18.51)	(0.0437)	(36.29)
Latinx	17.29	0.0234	25.37	-23.79**	-0.0905***	-52.87
	(11.96)	(0.0257)	(24.95)	(9.416)	(0.0321)	(44.94)
African-American*Pandemic	4.965	0.0261	13.61	0.573	0.0130	-4.159
	(33.96)	(0.0687)	(74.42)	(43.72)	(0.0822)	(44.46)
Asian*Pandemic	134.7***	0.195***	45.03	149.7***	0.238**	154.9**
	(35.43)	(0.0586)	(32.30)	(42.46)	(0.114)	(74.31)
Latinx*Pandemic	-43.40	-0.106*	23.63	6.239	0.0653	88.00**
	(31.98)	(0.0593)	(36.85)	(41.50)	(0.0848)	(38.77)
Age	4.284**	0.0104*	6.306	8.139**	0.0182**	8.815
	(2.128)	(0.00586)	(5.644)	(3.656)	(0.00771)	(8.542)
Age 2	-0.0310	-7.15e-05	-0.0762	-0.0846*	-0.000189**	-0.0915
	(0.0253)	(6.29e-05)	(0.0613)	(0.0437)	(8.84e-05)	(0.101)
Married	-0.0966	0.00464	4.078	-25.94**	-0.0211	-70.09***
	(9.393)	(0.0198)	(23.46)	(12.07)	(0.0251)	(16.65)
Children 0-2	12.19	0.0272	15.01	-10.48	-0.00809	-8.683
	(13.93)	(0.0268)	(19.82)	(14.48)	(0.0294)	(35.69)
Children 3-5	-3.232	-0.00411	-9.148	-3.832	0.0221	-48.88**
	(10.43)	(0.0221)	(20.78)	(9.717)	(0.0270)	(22.44)
Children 6-12	0.839	0.00226	-19.21	14.83	0.0289	11.82
	(11.34)	(0.0222)	(20.15)	(9.132)	(0.0240)	(15.72)
Children 13-17	32.49***	0.0453*	23.66	-6.409	0.0198	-53.06***
	(11.75)	(0.0231)	(19.09)	(10.50)	(0.0185)	(19.49)
Secondary	32.77*	0.164*	-88.99	7.511	0.0739	153.7
	(16.39)	(0.0892)	(81.74)	(24.68)	(0.136)	(149.8)
Degree	86.82***	0.263***	-63.81	51.44*	0.205	130.3
	(17.69)	(0.0871)	(86.01)	(25.66)	(0.132)	(146.8)
Post graduate	108.2***	0.306***	-82.93	73.73***	0.248*	138.0
	(20.83)	(0.0865)	(86.65)	(25.42)	(0.131)	(146.6)
Occupation FE	yes	yes	yes	yes	yes	yes
State*Pandemic FE	yes	yes	yes	yes	yes	yes
Constant	-12.06		575.6***	-5.803		338.1
Observations	3,644	3,644	927	3,349	3,349	970
R-squared	0.181		0.189	0.199		0.233

Source: Author's own creation. For conditional and unconditional estimations, the method used is OLS. For participation, the method used is Probit. The dependent variable is expressed in minutes. The reference category for the ethnic/racial dummies is: White-American. Reference categories of the independent covariates are: Single, separated or divorced; no children; Less than secondary, workdays. Errors (in parentheses) are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

What factors drive the differences in WFH among ethnic/racial groups? Besides the higher college attainment relative to the White American group (Kao and Thompson, 2003), the sizable concentration and preference of Asians for STEM majors likely gave easier access to 'teleworkable' jobs during the pandemic. As discussed earlier in the paper, another factor that could explain the higher participation in WFH by Asians is the rise of anti-Asian sentiment during the pandemic. Discrimination might have pushed many Asians to WFH, rather than onsite.

Regarding the effects of the other covariates, we find that age (which is also a proxy for tenure/experience) is positively related with WFH for both men and women. Being married and having young children decreases only the time WFH of women, likely showing that women forgo work time for household/childcare time. Individuals with a college degree or higher are more likely to participate in WFH.

4.1 Robustness checks

In this section, we check the robustness of our results to changes in the comparison period, to a different specification of the dependent variable, and to the use of Tobit as an estimation method.[14] Specifications 1 – 2 in Table 3 show estimates that consider, as a comparison, only year 2019, by gender. Specification 3 – 4 present estimates that restrict the comparison sample to May – December for years 2017 – 2019. This is to rule out any impact of seasonality of working time. Overall, the sign and significance of these results do not change substantially from the results in Table 2. In Specifications 5 – 6, we use the number of hours the respondent worked per week at all jobs as the dependent. The major advantage of using the weekly hours is the non-dependence upon a single-day observation, which is one of the main limitations of time-use data. To improve identification of work's location, we consider only respondents that declare to be working either from home or at workplace.[15] Finally, in Specifications 7 – 8 we estimate the models using the Tobit method. The results are similar to baseline estimations of Table 2.

[14] Note that the decrease in the number of observations may have affected the consistency of some estimates. In some estimations, we use a broader category of occupations (high skill versus low skill). This is because the number of observations for some occupations was too low to estimate a within-occupation effect. Along these lines, we also estimate models without occupation fixed effects. The results are qualitatively similar and available upon request by the authors.

[15] We do not have information for when the respondents usually worked over the course of the entire week. However, by restricting the sample only to those working either from home or outside home (i.e., by excluding those working in both places), we increase the chances that respondents work exclusively in one of the two locations.

Table III. Robustness checks

VARIABLES	(1) Men Period 2019-2020	(2) Women Period 2019-2020	(3) Men Seasonality 2017-2020	(4) Women Seasonality 2017-2020	(5) Men Weekly hrs.	(6) Women Weekly hrs.	(7) Men Tobit	(8) Women Tobit
Pandemic (1)	67.61***	92.78***					213.7***	254.2***
	(14.00)	(20.04)					(2.253)	(44.55)
African-American	-1.839	6.931	0.495	-11.84	-0.675	-1.456	-37.49***	-107.3**
	(22.33)	(27.94)	(19.63)	(13.71)	(1.253)	(1.005)	(4.701)	(44.51)
Asian	-30.34	-92.38***	-26.69	-50.13**	-3.010**	-2.471	-96.81***	-93.12
	(25.22)	(28.79)	(23.28)	(23.06)	(1.417)	(1.773)	(8.210)	(59.35)
Latinx	26.08	6.665	31.26*	-20.97	0.271	-2.931***	46.79***	-157.0***
	(18.35)	(21.33)	(17.14)	(13.71)	(0.831)	(0.893)	(6.026)	(49.55)
African-American*Pandemic (1)	4.313	-5.899					59.93***	91.96
	(37.07)	(49.55)					(12.63)	(115.6)
Asian*Pandemic (1)	132.3***	175.9***					291.6***	300.5***
	(46.83)	(60.14)					(13.11)	(89.94)
Latinx*Pandemic (1)	-46.58	-24.93					-135.1***	169.4
	(40.35)	(47.26)					(13.55)	(113.6)
Pandemic (2)			67.33***	108.7***				
			(14.33)	(16.90)				
African-American*Pandemic (2)			-2.395	6.805				
			(37.44)	(39.60)				
Asian*Pandemic (2)			123.1***	153.2***				
			(33.20)	(42.58)				
Latinx*Pandemic (2)			-59.63*	10.35				
			(32.78)	(35.87)				
Pandemic (3)					6.661***	11.13***		
					(1.044)	(1.289)		
African-American*Pandemic (3)					-0.753	0.399		
					(3.526)	(3.140)		
Asian*Pandemic (3)					8.600**	11.96**		
					(3.354)	(4.529)		
Latinx*Pandemic (3)					-4.358*	0.362		
					(2.587)	(2.678)		
Occupation FE	yes	yes	yes	yes	yes	yes	yes	yes
State*Pandemic FE	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-167.6**	99.83	-18.35	-75.97	-3.656	-7.505		
Observations	1,612	1,428	2,589	2,316	4,781	4,400	3,644	3,349
R-squared	0.260	0.287	0.205	0.223	0.224	0.240		

Source: Author's own creation. Estimation method for specifications 1-6 is OLS. Estimation method for estimations 7-8 is Tobit. The dependent variable in specifications 1-4 and 7-8 is expressed in minutes. The dependent variable in specifications 5-6 is weekly hours. The independent variables are included in all the models. Errors (in parentheses) are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

5. Conclusions and discussion

Social-distancing measures imposed by governments during the COVID-19 pandemic led to dramatic changes in the labor market. Due to existing inequalities, these impacts have been felt differently across vulnerable groups of the population. This article examined whether and the extent to which the COVID-19 pandemic unevenly affected the participation and time allocated to

WFH by ethnic/racial groups in the U.S. We employed time-use data, which identifies the location of work and precisely measures the time allocated to paid work.

Our empirical analysis leads to several key findings. First, the results suggest that participation in WFH increased during COVID-19, especially for women, and that this led to an overall increase in time allocated to WFH by the labor force. While the overall increase in participation is a direct consequence of lockdowns, the disproportionate impact on women is less clear in the literature. We argue that one explanation could be that women may favor WFH more than men due to increasing household responsibilities and the need to manage family and care for their children. This argument is more compelling when we show that women who engage in WFH spend less time in this activity, possibly because they spend additional time taking care of household responsibilities.

Second, the pandemic only affected the participation in WFH of Asians. It is far from obvious in the literature why this ethnic group reacted differently to the pandemic shock. One compelling argument is that the rise in anti-Chinese/Asian sentiments and discrimination during the pandemic compelled Asians to choose WFH, where contact with others, and therefore potential discrimination, is limited compared to onsite work. Identifying the "pure" effect of discrimination in the presence of other unobserved factors, such as the abilities and motivation of individual workers, is not an easy task, especially when using cross-sectional data as in our case. This limit of our analysis, which is common in many other studies, could be addressed when new datasets that track WFH behavior of individuals over time become available to researchers.

Third, our study sheds some light on the changes in working time of teleworkers during the pandemic. Our results contradict existing evidence showing that pandemic-period teleworkers worked longer hours during the pandemic compared to teleworkers before the pandemic. If the extent decision to work less was fully deliberate, work-life balance may have improved during COVID-19. However, considering the time gained by working less was likely used to complete other obligatory or "stressful" tasks during the pandemic, wellbeing—defined as more time spent in activities that bring higher satisfaction (e.g., leisure, relaxing, activities with family)—was probably unaffected by this reduction in time spent in WFH. However, if the option to WFH continues at an increased level after the pandemic period, as evidence suggests (Barrero, Bloom and Davis, 2021), and teleworkers continue working fewer hours from home, work-life balance

and wellbeing of teleworkers could improve substantially. We also find that Asian and Latinx women showed a different pattern compared to the other groups, increasing hours WFH during the pandemic. We do not have an explanation for these differences that is supported by existing literature. However, we believe that understanding the underlying mechanisms that drive such differences is an interesting and promising topic for future research.

Our study highlights differences in both participation and hours worked in WFH, which are both important patterns to study for an increasingly efficient and digitized work landscape. The understanding of these patterns would provide useful information and guidance to practitioners and policymakers striving to increase the effectiveness of WFH practices and improve workers' wellbeing. This becomes crucial in the aftermath of socioeconomic shocks like recessions or pandemics, and when wealth and resources are unequally distributed across the population.

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APPENDIX

Table 1A. Definition of the variables

VARIABLES	DEFINITION	SOURCE
Dependent variables		
$PaidWork(minutes)_i$	Amount of time (in minutes) spent in work from home	ATUS 2017-2020
	Explanatory and control variables	
Pandemic	Dummy equal to 1 if period May-December 2020, 0 otherwise.	-//-
White American	Dummy equal to 1 if White only, and 0 otherwise	
African American	Dummy equal to 1 if Black only, and 0 otherwise	-//-
Asian	Dummy equal to 1 if Asian only, and 0 otherwise	-//-
Latinx	Dummy equal to 1 if respondents that have both father and mother born in any of the Central America and Caribbean countries and South America, and 0 otherwise	-//-
Age	Age in years	-//-
Age squared	The square of age.	-//-
Married	Dummy equal to 1 if the respondent is married, 0 otherwise.	-//-
No children, children 0-2 years, children 3-5 years, children 6-12 years, children 13-17 years	5 dummy variables equal to 1 if the respondent has a child in these age groups, 0 otherwise.	-//-
Less than secondary Secondary, Degree, Post graduate	6 dummy variables for each of the educational level specified.	-//-
Household income	16 dummies, one for every range of family income.	-//-