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Is Telecommuting Family-Friendly? Evidence from the American Time Use Survey

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Abstract

It has been argued that paid telecommuting is family-friendly, allowing workers the flexibility to attend to the needs of children or household tasks. This paper examines telecommuting using the 2017-18 American Time Use Survey module on Leave and Job Flexibilities. I examine the characteristics of telecommuters, and whether time is allocated toward family-oriented activities—or, to the contrary, toward work- in response to telecommuting. The main family-relevant effect of telecommuting is found to be an increase in childcare as a secondary activity.

Keywords: telecommuting, telework, work from home, fringe benefits, time use.

JEL codes: J32, D13

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Introduction and Background

Work at home done for pay as part of an arrangement with the employer—hereafter "telecommuting"—has been of increased interest to policy makers and analysts in recent years. It has been argued that telecommuting is family-friendly, allowing the flexibility to attend to the needs of children or elderly parents (Chartrand 1997; Trinko 2013)—for example, by freeing parents whose children need only limited supervision to work and simultaneously be there for their children in an emergency.

Research findings on the benefits of telecommuting to family life are mixed. An early study by Hill et al. (1996) using data from a single company found no significant difference between telecommuters and non-telecommuters in the ability to balance work and family. They noted that "on the whole the data showed little perceived influence of mobile telework on the management of household responsibilities and childcare". Dockery and Bawa (2014a, p. 179), using data from

a national Australian survey, find a positive association between working from home and employees' satisfaction with the flexibility to balance paid work and family commitments. However, in a companion paper examining how the partners of telecommuters perceive work and family balance, Dockery and Bawa (2018, p. 626) find that "very limited evidence is found of any impacts of employees working from home on family functioning".

Some have suggested that telecommuting, by blurring the boundary between work and home, is actually 'family-unfriendly'. For example, in an interview study at a Canadian telecom company Dimitrova (2003) found that workers in all occupational classifications interviewed stated that they worked longer hours after they started telecommuting. Åborg et al. (2002) followed employees from two Swedish organizations after they started telecommuting. They found that the participants worked more hours at home, worked long hours without breaks, and worked late at night and on the weekends at home.

Previous articles have examined the determinants of working from home (for example, Wight and Raley 2009; Walls et al. 2007; Sarbu 2014) and how it affects the use of time (Golden 2008; Powell and Craig 2015). These papers have for the most part not distinguished between telecommuting as a benefit and working at home to complete work from the workplace (hereafter referred to as "unpaid overtime").[1] This distinction is potentially important; much work from home is unpaid overtime rather than a fringe benefit that would be expected to benefit family life. For example, Wight and Raley (2009) found that of those who worked from home in 2004, 50% of women and 40% of men named "to finish/catch up on work" as their main reason for doing so. Given that unpaid work from home probably has different determinants and effects than telecommuting as part of a regular work schedule, it is important to exclude unpaid overtime in evaluating the effects of telecommuting.[2]

This paper uses the American Time Use Survey (ATUS) and the Leave and Job Flexibilities Module administered in the ATUS in 2017-18 to describe pre-COVID-19 telecommuting in the United States, concentrating on home production and care activities in order to examine whether telecommuting is in fact a particularly family-friendly benefit. I examine three research questions. First, I look at whether telecommuters have demographic characteristics associated with greater domestic responsibilities after accounting for occupation, industry, and other characteristics. Second, I examine how time use is affected by telecommuting to see if the time released from commuting is allocated to activities such as household production and childcare, or toward work, as well as looking at the relation between telecommuting and childcare as a secondary activity. Finally, aside from changing total amounts of time spent in particular activities, telecommuting may also allow tasks to be done at a more convenient time than is possible when market work is performed at a workplace. Accordingly, I compare the use of break time—time spent between episodes of work—between workdays spent entirely at home and workdays spent entirely at places other than home.

With one important exception, I find that telecommuting has fairly neutral effects with respect to variables relevant for family life. Workers who might be presumed to have greater

[1] There are isolated exceptions. Papers that distinguish between paid and unpaid work from home include Natti et al. (2011) and Dockery and Bawa (2014b) (the working paper version of Dockery and Bawa 2014a).

[2] Song (2009) discusses a variety of motives for supplying unpaid overtime and attempts to distinguish between them using the 2001 Work Schedules and Work at Home Supplement to the Current Population Survey.

domestic responsibilities, such as parents, are not substantially more likely to telecommute. Telecommuting also does not appear to increase household production or care for others in the household as a primary activity, but also does not appear to increase market work. I do find a substantial increase in childcare as a secondary activity.

Data and Methods

The ATUS is a single-day time-diary survey that is administered to a sample of individuals in households that have recently completed their participation in the Current Population Survey, the main labor force survey for the United States. In the time diary portion of the interview, ATUS respondents are asked to sequentially report their activities on the previous day, along with information on the start and stop time and where the respondent was.[3] For episodes of work, we thus have information on whether the respondent was at a workplace, home, or somewhere else.[4]

In 2017 and 2018 the ATUS administered the Leave and Job Flexibilities Module. The module includes questions that help distinguish between paid work and unpaid work at home. The module contains questions on whether the respondent works at home, whether they are paid for at least some of the work at home, whether there are days they work only at home, and the frequency of such work. The module was administered to every respondent who was a wage and salary worker, resulting in a sample of 10,071 workers. I classify workers as telecommuters who in response to questions about working at home in the Leave and Job Flexibilities Module replied that they were able to and did work at home, that worked entirely at home on some days, and that they were paid for at least some of the hours they work at home.[5] This definition is narrower than commonly used in this literature (Wight and Raley 2009; Golden 2008; Walls et al. 2007) in order to focus on telecommuting as a fringe benefit and to exclude unpaid overtime. There is still some ambiguity in the identification of diary days that correspond to telecommuting days; some days worked at home by workers who meet the definition of telecommuters are similar to workdays of non-telecommuters. I return to this issue below. I exclude 20 observations with missing values for the variables used to classify workers as telecommuters as well as 133 observations whose hours vary to such an extent that they cannot be classified as full-time or part-time. There are 1,449 telecommuters in the sample (13% of the sample on a weighted basis). Tables 1a and 1b show descriptive statistics.

Our first research question is the relationship between telecommuting and personal characteristics associated with domestic production. Specifically, I examine gender, marital status, and the presence of children, as women spend more time in household activities and care of household members than men, married persons more than single, and parents more than non-

[3] For further description of the ATUS, see Hamermesh, Frazis and Stewart (2005) and Frazis and Stewart (2007).

[4] I do not distinguish between "workplace" and "somewhere else" in this paper. As with the workplace, other locations aside from home have no clear connection to domestic activities.

[5] The specific question is "Are you paid for the hours that you work at home, or do you just take work home from the job?" Of those responding either "paid" or "both", 13 % (weighted) answered "both".

parents.[6] To answer this question, I estimated a logit regression on telecommuting status on the following characteristics. I include indicators for the following variables: female, married, any children under 18, full-time status, Black and Hispanic. In addition, I include four categories of educational attainment (less than high school, high school graduate, some college, and Bachelors degree and above), three categories of age (less than 25, between 25 and 54, 55 and above), eight categories of metropolitan area status (non-metropolitan, metropolitan but size not identified, size 100 thousand to 250 thousand, population 500 thousand to 1 million, population 1 million to 2.5 million, population 2.5 million to 5 million, and population 5 million and greater), and the occupational and industry categories in Table 1a. I also enter the number of children as a continuous variable.

Table 1a: Descriptive Statistics (weighted)

Variable	**Mean**	**Std. Dev.**
Telecommuter	0.130	0.336
Full-time	0.811	0.391
Female	0.478	0.500
Married	0.513	0.500
Any children	0.332	0.471
< High School	0.077	0.266
High School Graduate	0.263	0.440
Some College	0.257	0.437
BA+	0.402	0.490
White, Non-Hispanic	0.642	0.479
Black, Non-Hispanic	0.189	0.391
Hispanic	0.169	0.375
Age <= 24	0.142	0.349
Age 25-54	0.652	0.476
Age >= 55	0.205	0.404
Management	0.159	0.366
Professional	0.281	0.449
Service	0.159	0.366
Sales	0.078	0.268
Office	0.132	0.339
Agricultural Occ.	0.008	0.087
Construct. Occ.	0.041	0.198
Installation/Repair	0.029	0.167
Production	0.060	0.238
Transp. Occ.	0.054	0.226
Agriculture/Mining	0.016	0.124
Construction	0.048	0.213

[6] See Tables 1 and 3 of Bureau of Labor Statistics (2019). Within gender, both married men and married women report more time in household activities than their single counterparts (1.64 vs. 1.07 hours per day for men, 2.60 vs. 1.74 hours per day for women).

Table 1a (continued)

Variable	Mean	Std. Dev.
Manufacturing	0.113	0.317
Whole./Ret. Trade	0.125	0.331
Transportation	0.051	0.220
Information	0.019	0.136
Finance	0.072	0.259
Prof./Bus. Services	0.117	0.321
Education/Health	0.258	0.437
Leisure	0.091	0.287
Other services	0.038	0.191
Public administration	0.053	0.224
Non-metro/not identified	0.136	0.342
Metro, not identified	0.039	0.194
Metro 100K – 250K	0.070	0.255
Metro 250K –500K	0.069	0.254
Metro 500K –1M	0.114	0.318
Metro 1M – 2.5M	0.185	0.388
Metro 2.5M –5M	0.140	0.347
Metro 5M+	0.248	0.432

Notes: N = 9,918

Table 1b: Reported frequency of telecommuting (paid telecommuters)

Reported frequency	Weighted %	N
5 or more days a week	16.0	242
3 to 4 days a week	12.3	153
1 to 2 days a week	17.2	240
At least once a week	10.0	149
Once every 2 weeks	12.9	185
Once a month	13.5	199
Less than once a month	18.1	247

Notes: N = 1,415

Our second research question examines the effect of telecommuting on time use. Two measurement issues need to be addressed before we can analyze this question: 1) distinguishing telecommuting days from regular workdays; and 2) measuring commuting time.

Not all days with work performed at home are part of a regular, paid arrangement with the employer. From the diary data, I examine all workdays where work at the main job is done entirely at home. I use the telecommuting status of the worker as defined above as an indicator of whether the workday is telecommuting or unpaid overtime. (Note that workers who state that they never work at home in response to supplement questions may nevertheless have workdays at home in the diary.) Of course, some days worked at home by telecommuters may be unpaid overtime. For example, it is unlikely that a workday consisting of a half-hour of work at home on a weekend is telecommuting even if performed by a telecommuter. Accordingly, I identify telecommuting days

as days with the characteristics of days worked mostly by telecommuters rather than workers not defined as telecommuters.

To help identify telecommuting days, Table 2 shows how workdays of different types corresponded to telecommuting status as measured by the Leave and Job Flexibilities Module in 2017-18. Overall, work was done entirely at home on 9.3% of days where any work was done on the main job.[7] Of these, only 53% were performed by telecommuters, implying that a substantial proportion of home workdays were unpaid work at home. The proportion of days worked at home performed by telecommuters varies substantially by the length of the workday and by day of week. Hereafter, I refer to workdays of 4 hours or less as part workdays and workdays of greater than 4 hours as full. Days that accord with the conventional full-time workday are more likely to be performed by telecommuters. Full home workdays were worked by telecommuters 82% of the time. Restricting to weekdays, full home workdays were worked by telecommuters 87% of the time.

Table 2: Days Worked at Home by Telecommuters as Percentage of Total Days Worked at Home

	Type of Day				
	Weekdays	*Weekends/ Holidays*	*Usual workday*	*Not usual workday*	*Total*
Length of Workday					
Days<=4 hours	28.4	32.6	30.1	31.5	30.9
Days>4 hours	86.8	44.4	85.9	39.3	82.0
Total	64.2	34.1	63.7	32.3	52.4

The Leave and Job Flexibilities Module includes questions on which days of the week are usual workdays, so we can be somewhat more precise about whether the diary day is usually a workday rather than assuming that usual workdays are equivalent to weekdays. The results from using usual workdays are similar to using weekdays—restricting to usual workdays, 86% of full home workdays were worked by telecommuters. In contrast, part home workdays were worked by telecommuters only 31% of the time. In accordance with the pattern found in Table 2, in what follows, I define telecommuting days as full home workdays worked by telecommuters on one of their usual workdays.

As reduction in time spent commuting would be expected to be a first-order effect of telecommuting, it is also important to properly measure commuting time. The ATUS coding lexicon subdivides the travel category into subcategories for travel associated with different activities. It codes travel in accordance with the first activity performed at the destination, with the exception that trips home are coded in accordance with the last activity performed at the origin. For commuting trips without intervening stops, this is straightforward—direct trips from home to work or from work to home would both be coded as "travel related to working".[8] However, the

[7] On an unweighted basis, 779 respondents worked entirely at home on their main job.

[8] There is no explicit "commuting" category in the ATUS coding lexicon (Bureau of Labor Statistics 2018).

coding rules may lead to anomalous results for commutes with intervening stops. For example, consider a person driving a half-hour to a coffee shop before work, and then driving 5 more minutes to work. The first leg of the trip would be coded as travel associated with a consumer purchase, and only the second leg would be coded as travel associated with work.

To mitigate this problem, Kimbrough (2019) (building on the work of McGuckin and Nakamoto 2004) suggested defining commuting trips as trips either beginning at home and ending at work, or beginning at work and ending at home, and with stops of no more than 30 minutes. I use this definition (implemented using the Stata code supplied by Kimbrough) in the current paper. Commuting is treated as missing for diaries that do not begin or end at home, and I limit the sample to observations with non-missing measures of commuting.[9]

With these measurement issues resolved, I use two methods to estimate the effect of telecommuting on time use. The first is simply to compare commuting with non-commuting workdays for telecommuters. I refer to this method as the within-telecommuters specification. I restrict this comparison to full workdays that are one of the respondent's usual workdays, as I demonstrated above that these are the most likely to be worked by employees with a telecommuting arrangement, and thus are less likely to be unpaid work at home. Note that by restricting the comparison to telecommuters, this method does not suffer from bias due to choice of telecommuting status. To the extent that the activities of telecommuting and regular commuting days are independent of each other, the comparison will reflect the effect of telecommuting on activity duration for telecommuters (i.e., the effect of treatment on the treated). This method may give misleading results if activities are shifted between days due to the availability of telecommuting. For example, household tasks might be shifted to telecommuting days from other days but the overall time in such tasks not increased.

The within-telecommuters specification is implemented as follows. Telecommuters interviewed about telecommuting days are drawn from the same population as telecommuters interviewed about commuting days, as the assignment of which day they are interviewed about is random. However, frequent telecommuters are more likely to be interviewed on telecommuting days than infrequent telecommuters, so a simple comparison of activities on telecommuting vs. non-telecommuting days would to some extent compare the time-use of frequent vs. infrequent telecommuters. This may lead to bias if frequent and infrequent telecommuters spend their time differently independently of telecommuting. I estimate the difference in time spent in an activity between telecommuting and commuting days within each category of response to the frequency of telecommuting question,[10] and average the differences weighting by the frequency in each category (weighted by the sample weights). The cell sizes within each category range from 59 to 126, so I do not use covariates to further correct the differences. The total sample size for the within-telecommuters specification is 631.

[9] This excludes 470 observations. The overall regression sample size is 9,448.

[10] The frequency categories are 1) 5 or more days a week, 2) 3 to 4 days a week, 3) 1 to 2 days a week, 4) At least once a week, 5) once every 2 weeks, 6) once a month, and 7) less than once a month. I group the last two categories together. Note that even for the first category, 14 % (weighted) of full usual workdays are reported as worked away from home.

The second method I use to estimate the effect of telecommuting on time use is to compare the time use of telecommuters to non-telecommuters after correcting for covariates. I refer to this as the regression specification. This method allows us to compare total time use over all days rather than just comparing commuting with telecommuting days, and thus corrects for shifting of activities between days. However, it does not eliminate bias due to endogeneity of the choice of telecommuting and telecommuting frequency.[11]

In order to incorporate the information on frequency of telecommuting into the regression analysis in an economical manner, in the regression specification I represent telecommuting status by predicted days telecommuting, generated as follows.[12] As above, I interpret as telecommuting days workdays that are over 4 hours, are worked entirely at home, are on one of the respondent's usual workdays, and are by respondents that the Leave and Job Flexibilities Module identifies as telecommuters. I run the regression $C=X\delta_1+Z\delta_2+u$ where C is an indicator for telecommuting day, X is a vector of control variables identical to those from the logit regression, Z is a vector of variables on telecommuting participation and frequency indicators, and u a residual. I then run regressions $t_k = X\beta_k + \gamma\hat{C} + e$, where t_k is time in activity k, β_k a vector of coefficients for the control variables, and $\hat{C}$ predicted probability of telecommuting. In this set-up the identifying variation in $\hat{C}$ is generated by variation in frequency of telecommuting. As additional controls for scheduling constraints from market work, I add variables for usual hours worked on the main job and number of days usually worked per week. (Note that including these variables implicitly assumes that telecommuting does not change the respondent's responses to questions about his or her usual work schedule even if telecommuting changes actual hours worked.) I also include an indicator for having a flexible work schedule.[13]

Aside from changing total amounts of time spent in particular activities, telecommuting may also allow tasks to be done at a more convenient time than is possible when market work is performed at a workplace. Our third research question accordingly compares the use of break time—time spent between episodes of work—between workdays spent entirely at home and workdays spent entirely at places other than home. I use the within-telecommuters method described above, confining the comparison to workers who meet our telecommuting criteria, and workdays that are part of the worker's usual schedule and have more than 4 hours of work. I additionally restrict the sample to workers reporting flexible schedules. One issue with this comparison is that workers may work fewer hours on days they spend at home than at work. To adjust for this, I include hours of work reported in the diary as a regressor, but otherwise the difference is estimated as in the within-telecommuters method.

An extremely long break between intervals of work raises the issue of whether we should consider the day a workday comparable with days spent at a workplace, or a half-day of paid work

[11] Another approach would be to compare time use trends from 2003-18 for occupations/industries with varying proportions of telecommuters in 2017-18 (difference-in-differences). Attempts along this line yielded imprecise estimates.

[12] See Gershuny (2012) for a similar technique.

[13] This variable is derived from the Leave and Job Flexibilities Module. I classify workers as having a flexible schedule if they can frequently or occasionally vary the times they begin or end work. See Pabilonia and Vernon (2020) for another example of use of this variable in a similar context.

followed by an interval of unpaid overtime. I deal with this issue in two ways. First, I estimate specifications where I restrict break time to 2 hours or to 4 hours. In addition, I limit work breaks to those between 6 am and 9 pm to exclude very early and late spells of work. (This last restriction makes only a small difference in the estimates.)

For all time use comparisons, I categorize time use into the following mutually exclusive categories: personal care (mostly sleeping and grooming), child and household care, household production, leisure, non-commuting travel, work (on main job)[14], commuting, and other. For each of these activities, minutes performing that activity as a primary activity is used as a dependent variable; the sum of these variables adds up to 1440 minutes. I also include TV watching and exercise, subsets of leisure, as dependent variables, as well as sleeping, grooming, and eating and drinking, subsets of personal care. A list of the activity codes included in each category is found in Appendix Table A1.1. This categorization is similar to that used in Aguiar, Hurst and Karabarbounis (2013), with personal care distinguished from leisure, and non-commuting travel included to examine whether it is a complement or substitute for commuting travel. The ATUS also asks during which primary activities children are in the respondent's care; the total duration of these activities is used as a measure of childcare as a secondary activity.[15]

Results and Discussion

Table 3 shows the percentage of telecommuters by selected characteristic. Overall, 13% of the sample were telecommuters, but telecommuting varied greatly depending on the nature of the job. Not surprisingly, there is wide variation in telecommuting by occupation and industry.[16] Managers and professionals have the highest rate of telecommuting among occupations, over 20% in both categories. The Information, Finance, and Professional and Business Services industries all have telecommuting rates over 25%.

Do persons with characteristics associated with care for household members and household production participate in telecommuting at higher rates? Married persons have a higher rate of telecommuting than persons with other marital statuses, 16 vs. 9 %. Parents have a somewhat higher rate of telecommuting than non-parents, 16 vs. 11 %. However, there is essentially no difference in rates of telecommuting between men and women.

[14] Telecommuting status is collected only for the main job. Classifying work on other jobs as work increases the point estimate of the effect of telecommuting on work in the within-telecommuter specification, though not to the extent that the estimate is statistically significant. Reclassifying work on other jobs has little effect on the regression specification.

[15] Allard et al. (2007) contains a thorough discussion of the secondary childcare measure in the ATUS and its relation to measures in other surveys.

[16] Recent analyses of the suitability of different occupations for telework (with reference to the COVID-19 pandemic) include Dey et al. (2020) and Mongey, Pilossoph, and Weinberg (2020).

Table 3: Percentage Telecommuters by Selected Characteristics

Total	**12.9**		
Part-time	7.4	Construction/extraction	2.5
Full-time	14.1	Maintenance occupation	1.1
Men	13.2	Production	1.2
Women	12.5	Transport occupation	0.9
< HS	1.2	Ag, forestry, and fishing/Mining	10.9
HS Grad	3.7	Construction	4.6
Some College	7.3	Manufacturing	13.4
BA+	24.6	Wholesale/retail	7.3
Non-Hispanic White	15.4	Transp. & Utilities	7.0
Non-Hispanic Non-white	11.3	Information	25.7
Hispanic	4.8	Finance	26.5
No Household Children	11.3	Prof/business services	31.7
Any Household Children	16.0	Education and health	8.7
Spouse or partner present	9.2	Leisure & Hospitality	2.4
Other Mar. Status	16.2	Other Services	10.2
Age 16-24	2.8	Public Administration	13.8
Age 25-54	15.4	Non-metro. or not ident.	4.7
Age 55+	11.8	Metro, not identified	8.7
Manager	27.7	Metro area 100K - 250K	11.1
Professional	20.3	Metro area 250K - 500K	8.2
Service occupation	3.1	Metro area 500K - 1M	11.5
Sales	12.6	Metro area 1M - 2.5M	14.1
Office occupation	8.3	Metro area 2.5M - 5M	17.6
Farm/fish occupation	0.7	Metro area 5M+	16.6

Notes: N = 9,818

Table 4 displays the logit results in the form of the change in the probability of having a paid telecommuting arrangement as the specified dummy variable goes from 0 to 1, with all other variables equal to their weighted sample mean variables.[17] The first column shows estimates for the sample as a whole. The association of telecommuting with gender remains minimal. Estimates for married and for having at least one child in the household are greatly reduced and are not statistically significant at standard levels. A substantial part of the reduction in the association with these variables moving from the bivariate association to the logit is accounted for by their

[17] Standard errors in this and all subsequent tables are computed by using replicate weights, a method that accounts for the complex survey design of the ATUS. See Bureau of Labor Statistics (2022, p. 42-43) and references cited therein.

association with being in the prime-age category 25 to 54 and with higher education. (The table additionally shows the estimated effect of going from one child to two, which is also minimal.[18])

The second and third columns show estimated comparisons for men and women respectively. The estimates in both columns are small and similar to those for the sample as a whole. Overall, there is little evidence that workers with more domestic responsibilities are more likely to participate in telecommuting. Neither being female, having (own) household children, or being married has a large association with telecommuting.

Table 4: Estimated Effects of Selected Characteristics on Probability of Telecommuting from Logit

	All	**Men**	**Women**
Female – Male	-0.002		
	(0.005)		
Married – Not Married	0.009*	0.010	0.013*
	(0.005)	(0.010)	(0.008)
1 Child – 0 Child	0.001	-0.003	0.005
	(0.006)	(0.011)	(0.010)
2 Child – 1 Child	0.000	0.002	-0.001
	(0.004)	(0.006)	(0.007)
N	9,918	4,888	5,030

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

We now turn to the effect of telecommuting on time use. Telecommuting would be expected to have substantial effects on time use, as at the very least, by reducing commuting, telecommuting opens up time for other activities. Table 5 shows the difference in minutes between commuting days and telecommuting days in the listed activities for respondents classified as telecommuters, restricted to days of the week that are usual workdays. (Results using weekdays instead of usual workdays are similar.) The table indicates that telecommuting saves over an hour per day of commuting time. In addition, about a quarter of an hour less time is spent on grooming. There is no evidence that this time is used in household production and child and household care, but the sample includes non-parents as well as parents, who arguably are most likely to supply care. The results of restricting the sample to parents is shown in the second column. Contrary to expectation, the coefficient on child and household care is negative though not significant. [19] Increased leisure and sleeping account for most of the time released from commuting and grooming, and all of the time released for parents. TV watching in turn accounts for the majority of the increase in leisure.

[18] These findings are in contrast to a previous finding using Australian data. Dockery and Bawa (2014a, b) show substantial positive associations between telework on the one hand and marital status and the presence of children on the other. (Dockery and Bawa 2014a mention results restricting to paid telework, compatible with the definition in this paper.)

[19] Restricting to Child Care rather than Child and Household Care yields similar results.

In contrast to the concern in the previous literature that telecommuting is associated with overwork, there is no evidence that work hours are greater on days worked from home. The point estimate is less than a quarter of an hour, though not precisely estimated.

While family-oriented primary activities do not appear to increase on telecommuting days, secondary childcare increases 41 minutes, significant at the 5% level. Restricting to parents in this case increases the estimate to a highly significant 160 minutes per day. Thus, there is strong evidence that telecommuting allows parents to supervise their children as a secondary activity.

Table 5: Difference between telecommuting and ordinary commuting days, minutes per day, full usual workdays, telecommuters

Activity	Entire Sample	Parents	Men	Women
Personal Care	7.6	31.7**	-5.9	13.4
	(8.9)	(12.4)	(10.5)	(13.0)
Sleep	19.2	28.7	8.7	21.5
	(11.7)	(18.7)	(10.8)	(16.3)
Grooming	-13.4***	-13.5***	-15.9***	-11.8**
	(4.7)	(4.1)	(3.1)	(5.6)
Eating and Drinking	1.9	16.7	0.8	4.2
	(5.5)	(18.1)	(8.3)	(5.3)
Child & Household Care	0.3	-10.2	6.5	-2.9
	(7.6)	(9.3)	(8.0)	(10.7)
Household production	7.1	-2.1	-5.4	17.4
	(15.0)	(28.7)	(10.7)	(24.3)
Leisure	41.6**	53.5**	49.9*	43.0**
	(19.4)	(22.1)	(28.1)	(17.9)
TV	36.4**	38.8*	32.7*	45.7***
	(14.3)	(21.1)	(19.8)	(17.1)
Exercise	-3.0	-1.3	-4.6	0.4
	(2.9)	(3.7)	(3.7)	(3.6)
Non-commuting travel	1.6	5.0	-0.9	6.8
	(5.8)	(8.0)	(8.3)	(6.5)
Other	20.9	11.6	56.3	-22.0*
	(29.8)	(11.0)	(42.0)	(11.4)
Work	-12.0	-33.3	-44.4*	17.5
	(17.7)	(32.4)	(24.4)	(16.6)
Commuting	-67.2***	-56.2***	-56.1***	-73.2***
	(5.4)	(5.4)	(6.4)	(7.8)
Secondary Childcare	40.8**	159.7**	35.5	53.4*
	(19.6)	(69.7)	(25.7)	(30.2)
N	631	333	322	284

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

Results for men and women separately are shown in the third and fourth column. There are no statistically significant differences in the estimated telecommuting effects between men and women for child and household care, household production, or secondary childcare. Men are estimated to work for 44 minutes less on telecommuting days (p=.07), and this difference is 62 minutes more negative than the corresponding difference for women (p=.04). The estimated effect of for men roughly corresponds to the difference between "other activities" on telecommuting days and on other working days being 56 minutes for men (though imprecisely estimated—p=.18), 78 minutes greater than for women (p=.06). Much of this appears to be due to men working an hour more on average on second jobs on telecommuting days.

Table 6 shows results for the specification regressing minutes in an activity on predicted (full, usual) workdays at home as well as control variables. The first column of the top panel shows the coefficient on predicted workdays at home for the entire sample (in minutes per day). As with the within-telecommuters analysis, child and household care and household production have relatively small coefficients that are not statistically significant at conventional levels. As shown in the third column of Table 6, the difference between the within-telecommuters and the regression specification is also not significant for these activities. The point estimate for secondary childcare is large, implying a greater than one-for-one increase in time from reallocated commuting, and statistically significant both overall and in the parents' sample. Focusing on the parents' sample, the difference in the estimated effects on secondary childcare between the two specifications is large—over 80 minutes—but not statistically significant. It is interesting to note that for parents on telecommuting days, secondary childcare when work is the primary activity averages 123 minutes, vs. 21 minutes on ordinary commuting days.

The difference between the two methods in the implied effect of a day of telecommuting on leisure is small and not statistically significant, as shown in the third column. Leisure shows the strongest effect of telecommuting among the primary activities, with an increase of 61 minutes per predicted day of telecommuting. In other words, the effect of telecommuting days on total time during the week spent in leisure implied by the regression is accounted for by the difference between telecommuting and non-telecommuting days, lending support to the within-telecommuters estimate representing the total effect.

The estimated effect of telecommuting on grooming is more negative in the regression specification than in the within-telecommuting specification. Given the nature of the activities included in grooming, it seems more probable that this reflects telecommuters having a lesser taste for grooming more than any substitution of activities across days. Activities such as dressing or showering would be expected to have their main benefit on the day they occur.

The estimated effect on TV watching is smaller than in the within-telecommuters specification and no longer significant, but the estimated difference in the effects between specifications is also not significant. Exercise does show a significant effect of telecommuting that is not apparent in the within-telecommuters specification, and the difference between the specifications is significant at the 5% level. Here it is not clear whether this reflects substitution across days or telecommuters having a greater propensity to exercise. Other primary activities show smaller and non-significant effects.

In results not shown, omitting the work schedule variables "usual hours worked on main job" and "number of days usually worked" has little effect on most categories of time use.

However, it does reduce the magnitude of the estimate of the reduction in work hours from time use from 30 minutes to 5 minutes, though the estimates in both specifications are quite imprecise with standard errors over half an hour.

Table 6: Regression Results and Comparison to Within-Telecommuter Results

	Coef. on Predicted Full Usual Days at Home (minutes per day)		**Difference from Within-Telecommuter Comparison**	
	Entire Sample	*Parents*	*Entire Sample*	*Parents*
Activity				
Personal Care	-24.7	-8.1	32.2	39.8*
	(18.1)	(19.0)	(21.9)	(22.0)
Sleep	6.5	18.5	12.8	10.2
	(15.6)	(17.3)	(21.0)	(26.2)
Grooming	-34.8***	-32.7***	21.5***	19.3***
	(4.5)	(5.1)	(6.1)	(6.6)
Eating and Drinking	2.7	8.7	-0.8	7.9
	(-6.6)	(9.0)	(8.5)	(19.6)
Child & Household Care	10.3	-1.7	-10.0	-8.5
	(8.5)	(18.5)	(11.0)	(21.1)
Household production	12.3	43.9	-5.2	-46.0
	(17.1)	(28.0)	(23.3)	(42.3)
Leisure	61.0***	102.4***	-19.3	-48.9
	(23.2)	(33.1)	(30.1)	(38.5)
TV	29.4	35.0	7.0	3.7
	(21.0)	(21.7)	(25.1)	(28.7)
Exercise	18.9**	15.0*	-21.9**	-16.3*
	(8.3)	(8.3)	(8.8)	(8.7)
Non-commuting travel	11.0	24.5	-9.4	-19.5
	(8.9)	(15.3)	(11.0)	(16.0)
Other	8.4	-9.4	12.5	21.0
	(16.4)	(15.2)	(36.6)	(18.8)
Work	-30.4	-81.4	18.5	48.0
	(35.5)	(50.2)	(41.6)	(61.6)
Commuting	-47.9***	-70.1***	-19.3	13.9
	(8.2)	(7.6)	(12.3)	(10.1)
Secondary Childcare	90.0***	242.0***	-49.2	-82.3
	(24.4)	(58.3)	(30.8)	(85.3)
N	9,448	4,096		

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

Table 6 (continued):

	Coef. on Predicted Full Usual Days at Home (minutes per day)		Difference from Within-Telecommuter Comparison	
	Men	*Women*	*Men*	*Women*
Activity				
Personal Care	-15.2	-37.5*	9.3	51.0*
	(29.8)	(21.6)	(31.0)	(26.4)
Sleep	1.4	0.5	7.3	21.1
	(26.9)	(17.4)	(28.3)	(24.5)
Grooming	-36.8***	-32.0***	20.9***	20.2***
	(5.9)	(6.8)	(6.8)	(7.3)
Eating and Drinking	19.4*	-8.5	-18.6	12.7
	(10.3)	(8.5)	(12.4)	(10.1)
Child & Household Care	21.5*	-6.9	-15.0	4.0
	(12.9)	(12.5)	(14.3)	(17.4)
Household production	47.1**	3.8	-52.5**	13.6
	(23.1)	(21.2)	(25.2)	(35.3)
Leisure	53.4	47.1	-3.4	-4.1
	(36.1)	(32.5)	(45.6)	(36.6)
TV	24.6	21.8	8.1	23.9
	(31.3)	(25.7)	(36.7)	(31.2)
Exercise	10.9	17.4**	-15.5	-17.1**
	(12.0)	(8.2)	(12.7)	(8.0)
Non-commuting travel	1.7	18.6	-2.6	-11.8
	(16.2)	(11.7)	(18.8)	(12.8)
Other	-30.2	25.8	86.5*	-47.8*
	(20.4)	(22.8)	(50.1)	(28.3)
Work	-23.7	-7.5	-20.7	25.0
	(54.4)	(47.1)	(62.0)	(49.8)
Commuting	-54.6***	-43.2***	-1.5	-30.0*
	(10.4)	(10.1)	(14.9)	(15.7)
Secondary Childcare	97.9***	67.7**	-62.4	-14.3
	(36.3)	(33.8)	(43.3)	(43.6)
N	9,448	4,096		

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

I perform an additional check on the compatibility of the within-telecommuters and the regression specifications by dividing the regression sample into "usual workdays" and "not usual workdays". If there are large effects of telecommuting in the not-usual-workdays subsample, the assumption underlying the within-telecommuters specification that activities are not shifted between days in response to telecommuting is weakened. Table 7 shows the results of this exercise. (Results using weekdays and weekends to divide the sample are similar.) The large increase in

leisure and in secondary childcare and the decrease in time spent grooming are observed in the usual-day subsample but not in the not-usual day subsample. The largest coefficient on predicted workdays at home in the not-usual-workday regressions is 45 minutes for non-commuting travel, in contrast to a near-zero coefficient on usual workdays.

Table 7: Coefficient on Predicted Full Usual Workday at Home (minutes per day), by Usual Workday Status

	Coef. on Predicted Full Usual Days at Home	
	Usual Workday	*Not Usual Workday*
Activity		
Personal Care	-16.9	-33.9
	(21.0)	(29.8)
Sleep	17.4	-13.3
	(18.6)	(23.7)
Grooming	-42.9***	-9.8
	(5.8)	(7.5)
Eating and Drinking	10.1	-18.1
	(8.4)	(11.2)
Child & Household Care	15.1	-8.2
	(10.3)	(15.3)
Household production	13.3	12.8
	(20.3)	(32.6)
Leisure	80.3***	6.1
	(25.9)	(43.8)
TV	28.8	29.7
	(24.4)	(32.5)
Exercise	16.1*	27.7*
	(9.0)	(15.9)
Non-commuting travel	-0.6	45.3**
	(8.4)	(22.7)
Other	16.7	-18.3
	(19.8)	(27.2)
Work	-41.9	-8.3
	(36.1)	(15.6)
Commuting	-65.9***	4.6
	(10.3)	(5.5)
Secondary Childcare	115.5***	1.7
	(31.2)	(45.2)
N	5,351	4,097

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

Results from the regression specification for men and women are shown in the bottom panel of Table 6. The estimates are qualitatively similar to the equivalent estimates from the

within-telecommuters specification, with some important exceptions. Men are estimated to devote 47 minutes per day in increased household production per predicted day of telecommuting, statistically significant at the 5 % level. The difference with the within-telecommuters specification is also statistically significant. The discrepancy between the two estimates could reflect either men shifting household tasks to non-telecommuting days, or telecommuting men having more of a preference for household production. The increase in "other activities" for men associated with telecommuting is found in both the within-telecommuters and regression specification, though the proportion attributable to a reduction in work is smaller in the regression specification.

Aside from changing total amounts of time spent in particular activities, telecommuting may also allow tasks to be done at a more convenient time than is possible when market work is performed at a workplace. To examine this possibility, I compared the use of break time—time spent between episodes of work—between workdays spent entirely at home and workdays spent entirely at places other than home, as outlined in the methods section. I estimate specifications where I restrict break time to 2 hours or to 4 hours. Results are shown in Table 8. There is some increase in caring activities, especially in the specification including longer breaks. The specification restricting breaks to less than 2 hours shows a significant increase in care, but less than 1 minute per workday. Household production increases, but much of the increase is accounted for increased food preparation and clean up, possibly due to decreased options to purchase food (or a disinclination to eat pre-prepared "brown-bag" food). Overall, there is some evidence that telecommuting allows caring and household production activities to be shifted to more convenient times, but the effect appears small.

It is of interest to compare my results to papers examining shifts in time use from exogenous shocks. Burda and Hamermesh (2009) examine changes in market work due to changes in unemployment and find most or all of the decline in market work is offset by household production. Aguiar, Hurst, and Karabarbounis (2013) similarly examine changes in time use from business cycle movements in market work and find that recession-driven reductions in market work are reallocated mostly to household production (approximately 30%), leisure (30%), and personal care (mostly sleeping, 20%).[20] Lee, Kawaguchi, and Hamermesh (2012) and Kawaguchi, Lee and Hamermesh (2012) examined the reallocation of reduced work hours due to changes in overtime regulations in Japan and Korea. They found that most reallocation was toward leisure in Japan and toward personal care in Korea, with negative effects on household production. Kawaguchi, Lee, and Hamermesh (2012) find that controlling for consumption expenditure has little effect, while the business cycle effects found in the other papers referenced imply that household production substitutes to some extent for lost market consumption over the business cycle.

While loosening the constraint on household time, the introduction of telecommuting does not otherwise provide an incentive to increase household production or care of household members. While contrary to the hopes of some of its adherents, the absence of evidence of a substantial effect of telecommuting on household production is perhaps not surprising.

[20] The text of Aguiar, Hurst, and Karabarbounis (2013) shows a higher percentage reallocated to leisure as they classify sleeping as leisure.

Table 8: Minutes per day in break activity, home day minus no home day, full usual workdays, telecommuters

	Maximum Breaktime	
	<= 2 hrs	*<=4 hrs*
Activity		
Personal Care	6.5**	12.4***
	(2.9)	(4.0)
Sleep	1.7	4.3
	(1.6)	(2.7)
Eating and Drinking	4.3*	7.1***
	(2.6)	(2.4)
Child & Household Care	0.9**	3.0**
	(0.4)	(1.2)
Household production	3.1**	4.9*
	(1.2)	(2.6)
HH production — food prep/clean	2.0**	2.7
	(1.0)	(2.4)
Food prep/cleanup	1.1	2.2***
	(0.8)	(0.8)
Leisure	-0.8	3.2
	(1.8)	(2.1)
TV	0.9	2.6**
	(1.1)	(1.3)
Exercise	0.3	0.3
	(0.9)	(0.8)
Total Breaktime	9.2**	21.8***
	(4.1)	(6.2)
N	359	398

Notes: Replicate-weight standard errors in parenthesis; * p < .10; ** p < .05; *** p < .01

Conclusion

In this paper I use the 2017-18 Leave and Job Flexibilities Module to the ATUS to describe the characteristics of telecommuters and estimate how time is reallocated between activities in response to telecommuting. My focus is on telecommuting as an employee benefit and its role in balancing work and family obligations. Accordingly, one distinction with most of the previous literature is my use of a relatively strict definition of telecommuting, requiring entire workdays to be worked at home and at least part of the work at home paid for by the employer.

I used two methods to estimate how time use is affected by telecommuting. One method is based on comparing telecommuting and regular commuting days for telecommuters, while the other regresses time in an activity on the predicted proportion of days telecommuting. Both methods show that time spent commuting and grooming is reduced, and that a high proportion of

the resulting time saved is spent on leisure. There is little evidence that time saved by telecommuting is allocated to child and household care as a primary activity, or that telecommuting increases household production. There is some evidence that telecommuting allows mid-workday time to be allocated toward child and household care and household production, but the effect is small. Moreover, persons likely to have greater domestic responsibilities such as women and parents were not more likely to be telecommuters. However, telecommuting is associated with an increase in secondary childcare by several hours.

Finally, some of the previous literature argues that telecommuting can have negative consequences on family life by leading to overwork as the boundaries between home and job are blurred. I find no evidence that telecommuting leads to increases in hours of work. Thus, the main effect of telecommuting on time-use related to domestic responsibilities appears to be to increase secondary childcare, with neutral effects otherwise.

Engaging in secondary childcare while working at home plausibly results in attention being diverted from job tasks more frequently than would be the case in the workplace. The consequences of this for productivity and career prospects is a topic for further research.

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Appendix

Table A1.1: ATUS Codes for Activity Variables

Category	ATUS Codes
Personal Care	01 (Personal Care), 11 (Eating and Drinking)
Sleep	0101 (Sleeping)
Grooming	0102 (Grooming)
Eating and Drinking	11 (Eating and Drinking)
Child and Household Care	03 (Caring For & Helping Household Members)
Household production	02 (Household Activities), 04 (Caring For & Helping NonHH Members), 07 (Consumer Purchases), 08 (Professional & Personal Care Services), 09 (Household Services)
Leisure	12 (Socializing, Relaxing, and Leisure), 13 (Sports, Exercise, and Recreation)
TV	120303 (Television and movies (not religious))
Exercise	1301 (Participating in Sports, Exercise, or Recreation)
Non-commuting travel	18 (Travel), excluding commuting
Work	0501 (Work) excluding 050102 (Work on other jobs), 0502 (Work-related activities)
Other	050102 (Work on other jobs), 0503 (Income Generating Activities), 0504 (Job Search and Interviewing), 0599 (Work and Work-Related Activities, not elsewhere classified), 06 (Education), 10 (Government Services & Civic Obligations), 14 (Religious and Spiritual Activities), 15 (Volunteer Activities), 16 (Telephone Calls)