

BLS WORKING PAPERS



U.S. Department of Labor
U.S. Bureau of Labor Statistics
Office of Employment Research and Program Development

Who Telecommutes? Where is the Time Saved Spent?

By Harley Frazis

Working Paper 523
April 2020

All views expressed in this paper are those of the authors and do not necessarily reflect the views or policies of the U.S. Bureau of Labor Statistics.

JEL codes: J32, J22, D12.

Keywords: Telecommuting, Telework, Fringe Benefits, Time Use.

I thank Mark Loewenstein, Anne Polivka, Jay Stewart, Rachel Krantz-Kent and seminar participants at the University of Maryland Time-Use Group for helpful comments and suggestions.

Introduction

Over the past two decades, data sources indicate an increase in the number of employees working at home. The American Community Survey shows a 115 percent increase over the period 2005-2017 in the number of workers who work from home at least half the time (Global Workplace Analytics, 2017), to about 3 percent of the workforce. Gallup estimates an increase in the proportion of workers who have ever telecommuted from 9 percent in 1995 to 37 percent in 2015 (Jones, 2015). The American Time Use Survey (ATUS) estimates that the percentage of workers on a given day who work at home rose from 18.6 percent in 2003 to 23.7 percent in 2018, and that average hours per day worked at home for those who worked at home rose from 2.56 hours in 2003 to 2.94 hours in 2018.

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). Moreover, commuting typically scores low on measures of subjective well-being (Kahneman and Krueger 2006, Krueger et al. 2009), so telecommuting allows for commuting time to be reallocated to higher value activities.

This paper uses the ATUS to examine telecommuting. With time diaries for a single day from approximately 10,000 respondents or more for every year from 2003 through 2018, and information on the location of work, the ATUS would appear ideal to analyze trends in telecommuting. However, when analyzing work from home it is necessary to distinguish between telecommuting and unpaid overtime. While the motivations for performing work at home and the implications for worker welfare may be quite different between telecommuting and unpaid overtime¹, the basic ATUS has no means of distinguishing between them.

¹Song (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.

In 2017 and 2018 the ATUS administered the Leave and Job Flexibilities Module. Among other questions, the module includes questions allowing us to distinguish (to a certain extent) between paid work (hereafter telework or telecommuting) and unpaid work at home. The module contains questions on whether the respondent works at home, whether they are paid for the work at home, whether there are days they work only at home, and the frequency of such work. In this paper I use the module to describe what types of workdays are most likely to be telework as opposed to unpaid work at home, examine whether telework is associated with increased hours of work, characterize teleworkers, and estimate how time is reallocated between activities as a result of telecommuting.

Data and Characterization of Telework Days

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.² For episodes of work, we thus have information on whether the respondent was at a workplace, home, or somewhere else.³

The 2017-18 Leave and Job Flexibilities Module was administered to every respondent who was a wage and salary worker, resulting in a sample size of 10,071. I classify workers as telecommuters who in response to questions about working at home replied that they were able to and did work at home, that they worked entirely at home on some days, and that they were paid for at least some of the hours they work at home.⁴ Workers were classed as persons who worked unpaid overtime if they were able

² For further description of the ATUS, see Hamermesh, Frazis and Stewart (2005) and Frazis and Stewart (2007).

³ I do not distinguish between “workplace” and “somewhere else” in this paper.

⁴ 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 percent (weighted) answered “both”.

to and did work at home and were not telecommuters. There are 1,454 telecommuters and 1,384 unpaid overtime workers in the sample.

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 an indicator of whether the day 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 is telecommuting even if performed by a telecommuter.

In 2017-18, work was done entirely at home on 9.3 percent of days where any work was done on the main job. Of these, only 52 percent were performed by telecommuters, so 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 short workdays and workdays of greater than 4 hours as long. Days that accord with the conventional full-time workday are more likely to be performed by telecommuters. As shown in Table 1, long home workdays are worked by telecommuters 82 percent of the time, and restricting to weekday long home workdays are worked by telecommuters 87 percent of the time. The Job Flexibilities supplement includes questions on which days of the week are usual workdays, so we can be somewhat more specific about whether the diary day is usually a workday. The results are similar to using weekdays—restricting to usual workdays, 86 percent of long home workdays are worked by telecommuters. In contrast, short home workdays are worked by telecommuters only 31 percent of the time.

Trends in Telework

The ATUS cannot directly track trends in paid telework. However, it can detect trends in work at home and so give an indirect indication of the growth of telework.⁵ Chart 1 shows that the proportion of workdays spent entirely at home increased between 2003 and 2018. (The denominator here is total person-days with any work.) Chart 2 shows a similar increase in the proportion of workdays at home for long weekdays, the type of day most likely to be worked by telecommuters in 2017-18. The proportion of long weekday workdays spent at home was only 1.1 percent in 2003. In 2017-18, 3.8 percent of long weekday workdays were spent at home by teleworkers (along with 0.6 percent of long weekday workdays spent at home by workers without telework arrangements), indicating that days of this type spent teleworking must have substantially increased in this period. As shown in Charts 2 and 3, the percentage of workdays spent entirely at home increased in all categories of days over the 2003-18 period.

How has the trend toward increased telecommuting affected total hours of work? The previous literature has investigated the association between working at home and total hours of work, with mixed results.⁶ I regressed diary minutes of work on calendar year and demographic variables to estimate the 2003-18 trend. (The demographic variables were indicators for married, any children 17 and younger, number of children, female, interactions of female with the first three variables, education categories (high school, some college, BA+), age groups (25-54, 55+), Black, Hispanic, and full-time status.) Total daily work irrespective of workplace showed a small and not statistically significant trend.⁷ Work at home increased at the rate of .57 (standard error .06) minutes per day per year, while work not

⁵ For a complementary analysis of work at home in 2013-17 and trends in work at home over the period 2003-07 to 2013-17, see Krantz-Kent (2019).

⁶ Golden (2008) and Natti et al. (2011) show a positive association between work at home and hours of work, while Powell and Craig (2015) show a negative one.

⁷ All standard errors are computed using the replicate weights supplied on the ATUS data file (Bureau of Labor Statistics, 2019).

at home decreased by an estimated .30 (.19) minutes per day per year. To get an idea on the extent telework as opposed to unpaid work at home contributed to these trends, I estimated the probability of being a telecommuter and the probability of being an unpaid overtime worker in 2017-18 with a multinomial logit model, using the demographic covariates already included and indicators for industry and occupation at the one-digit level. Identification of the estimated probability terms accordingly comes from variation in industry and occupation. I used the coefficients from this model and generated predicted values for the entire 2003-18 sample.

Adding terms for the probability of telecommuting and the probability of being an unpaid home worker has essentially no effect on the trend coefficients. As shown in Table 2, both the probability of being a telecommuter in 2017-18 and the probability of being an unpaid home worker in the same period are associated with longer working hours over the 2003-18 period. Higher probabilities of telecommuting are associated with more time working at home and less time working outside the home.

Column 3 of Table 2 adds interactions of time with both the probability of telecommuting and the probability of being an unpaid home worker. While most of the trend coefficients are small and not significant, the interactions with telecommuting probability show a decrease in working hours at workplaces and other locations and an increase in work at home for workers with higher probabilities of telecommuting in 2017-18. This provides more indirect evidence that paid telework is largely behind the growth in work at home found in the ATUS; workers in occupations and industries characterized by high rates of telecommuting in 2017-18 were not working at home to the same extent in earlier years. The interaction of probability of telecommuting with calendar year has an insignificant negative coefficient for total hours irrespective of location, so trends in hours provide no evidence that telecommuting is associated with an increase in overall hours worked.

In results not shown, I estimated the above regressions dividing the sample into weekdays and weekends. The results provide further backing for the interpretation of the above results as reflecting an increase in telecommuting. The trend showing a shift in hours worked from workplaces and other locations to home is confined to weekdays, when telecommuters are a higher percentage of workers spending workdays at home.

Who teleworks?

Tables 3a and 3b shows descriptive statistics for the main sample from the Leave and Job Flexibilities Module. Table 4 shows the percentage of telecommuters by characteristic. Overall, 12.9 percent of the sample were telecommuters, but telework varied greatly depending on the nature of the job. Not surprisingly, there is wide variation in telework by occupation and industry. Managers and professionals have the highest rate of telework, over 20 percent in both categories. Sales and office workers have telework rates in neighborhood of 10 percent, while all other occupations have rates in the low single digits. Turning to industry, Information, Finance, and Professional and Business Services all have telework rates over 25 percent, while most other industries have rates under 10 percent, with rates for Public Administration and Manufacturing in the mid-teens.

There is also wide variation in telework rates over some personal characteristics, with college graduates having much higher rates of telework (approximately 25 percent) than those with less education. Other personal characteristics show much less variation, with men and women having virtually identical rates, as do persons in households with and without children.

We would expect that telework rates would be higher in large cities, where the infrastructure would support telework and longer commutes would generate a greater demand. This is borne out in

the data. Non-metropolitan areas have an estimated telework rate of less than 5 percent⁸, while the two largest categories (2.5 million to 5 million, and 5 million and over) show rates over 16 percent.

I ran a binary logit regression⁹ to examine whether these characteristics are associated with telework using the demographic, industry, and occupation variables used previously as well as the metropolitan area indicators in Table 4.¹⁰ Table 5 shows the results of the logit. It displays the change in the probability of having a paid telework arrangement as the specified dummy variable goes from 0 to 1, with all other variables equal to their weighted sample mean. Most of the variation across categories shown in Table 4 is reduced but still present in Table 5. The differences across industries remain very large, with Information, Finance, and Professional and Business services having probabilities of telework 14-18 percentage points greater than Education and Health Services.

Personal characteristics that would be expected to increase the desirability of telework turn out to have little effect. Neither being female nor having household children has any discernable association with telework, and while the effect of being married is positive and weakly significant ($p=.06$), it is small (1.5 percentage points).

How is the time released from commuting used?

By reducing commuting, telework opens up time for other activities. How is this time used?

As a first step in answering this question, I briefly discuss the measurement of commuting. 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

⁸ Approximately 6 percent of the “non-metropolitan” sample are observations for which metropolitan status is not identified.

⁹ A multinomial logit including unpaid overtime as another outcome category, as in the previous section, yielded very similar results.

¹⁰ Metropolitan area size indicators were not included in the predictors of telework status in the previous section due to lack of continuity of the underlying CPS variables.

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 associated with work.¹¹ However, the 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.¹²

I use two methods to attempt to account for commuting time foregone by telecommuting. 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 long workdays that are one of the respondent's usual workdays, as the previous section demonstrated 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

¹¹ There is no explicit "commuting" category in ATUS.

¹² This excludes 620 observations.

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 second method 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.¹³

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 Table 6. 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

¹³ Another approach would be to compare time use trends from 2003-18 for occupations/industries with varying proportions of telecommuters in 2017-18 (differences-in-differences). Attempts along this line yielded imprecise estimates.

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.

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,¹⁶ and average the differences weighting by the frequency in each category (weighted by the sample weights). The cell sizes within each category range from 53 to 116, so I do not use covariates to further correct the differences.

Table 7 shows the difference in minutes between commuting days and telework days in the listed activities for respondents classified as telecommuters. 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. Increased Leisure and Sleeping account for essentially all of the time released from these categories. TV Watching in turn accounts for the majority of the increase in Leisure. Changes in the other categories of primary activities examined are small and not statistically significant.

The evidence that telecommuting increases time spent caring for others in the household is mixed. Child and Household Care (as a primary activity) is estimated to decrease by a statistically insignificant 3 minutes, 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.

¹⁶ 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.

Contrary to expectation, the coefficient on Child and Household Care is more strongly negative though still not significant. For the sample as a whole, Secondary Childcare increases 36 minutes on telecommuting days, significant at the 5 percent level. Restricting to parents in this case increases the estimate to a highly significant 144 minutes per day. Thus, while there is no evidence of any effect on Child and Household Care as a primary activity¹⁷, there is strong evidence that telecommuting allows parents to supervise their children as a secondary activity. Finally, for parents Eating and Drinking increases about a quarter of an hour on telecommuting days (and consequently so does the broader category Personal Care).

I now turn to the regression specification. In order to incorporate the information on frequency of telecommuting into the analysis in an economical manner, I represent telecommuting status by predicted days telecommuting, generated as follows. As above, I interpret as telecommuting days workdays that are over 4 hours, are worked entirely at home, and that are on one of the respondent's usual workdays. I regress indicators for such workdays on indicators for each category of frequency of telecommuting as well as the regressors in the previous section and calculate predicted telecommuting status using the coefficients from this regression. I then regress time in an activity on predicted telecommuting status and the regressors in the previous section. 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.

Results are shown in Table 8. The first column shows the coefficient on predicted (long, usual) workdays at home for each dependent variable listed (in minutes per day). As with the within-telecommuter analysis, Leisure shows the strongest effect of telecommuting among the primary activities, with an increase of 66 minutes per predicted day of telecommuting. The difference between

¹⁷ Restricting to Child Care rather than Child and Household Care yields similar results.

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. 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 1 percent 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. 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 75 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 117 minutes, compared to 21 minutes on ordinary commuting days.

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 percent), leisure (30 percent), and personal care (mostly sleeping, 20 percent).¹⁸ 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. In any event, one would expect a minimal effect of telecommuting on consumption expenditures compared to the effect of changes in market work on consumption, so the absence of evidence of a substantial effect of telecommuting on household production is not surprising.

Conclusion

The ATUS has shown an increase in market work done at home since its inception in 2003. Other data sources have shown an increase in formal telecommuting arrangements. In this paper I use the 2017-18 Leave and Job Flexibilities Module to the ATUS to provide indirect evidence confirming the growth of telecommuting, describe the characteristics of telecommuters, and estimate how time is reallocated between activities in response to telecommuting.

I find that weekdays where the worker works more than 4 hours are the type of day most likely to be telecommuting rather than unpaid overtime, and the proportion of these workdays worked at

¹⁸The text of Aguiar, Hurst, and Karabarbounis (2013) shows a higher percentage reallocated to leisure as they classify sleeping as leisure.

home grew markedly over the period. In addition, workdays by workers with the characteristics most likely to be telecommuters in 2017-18 also had substantial growth in the proportion worked at home.

Professionals and managers, workers in the Information, Finance, and Professional and Business Services industries, and college graduates were most likely to be telecommuters. Somewhat surprisingly in view of the fact that telecommuting is often classed as a “family-friendly” benefit, women and parents were not more likely to be telecommuters.

I used two methods to estimate how time is reallocated due to telecommuting. One method is based on comparing telecommuting and regular commuting days for telecommuters, while the other regresses time in an activity on predicted days telecommuting. Both methods show that a high proportion of reallocated time is spent on leisure, and that time spent commuting and grooming is reduced. There is no evidence that time saved by telecommuting is allocated to Child and Household Care as a primary activity, or that telecommuting increases household production. However, telecommuting is associated with a large increase in secondary childcare. This constitutes the main piece of evidence supporting classifying telecommuting as a family-friendly benefit.

References

- Aguiar, Mark, Erik Hurst, and Loukas Karabarbounis. 2013. "Time Use during the Great Recession." American Economic Review, 103 (5): 1664-96.
- Allard, Mary Dorinda, Suzanne Bianchi, Jay Stewart, and Vanessa Wight. 2007. "Comparing Childcare Measures in the ATUS and Earlier Time-Use Studies", Monthly Labor Review 130(5): 27-36.
- Burda, Michael, and Daniel S. Hamermesh. 2009. "Unemployment, market work and household production." NBER Working Paper 14676.
- Bureau of Labor Statistics. 2019. American Time Use Survey User's Guide. Retrieved from <https://www.bls.gov/tus/atususersguide.pdf>.
- Chartrand, Sabra. 1997, July 6. "Building an Argument for Telecommuting." New York Times. Retrieved from <https://archive.nytimes.com/www.nytimes.com/library/jobmarket/070697sabra.html>.
- Frazis, Harley and Jay Stewart. 2007. "Where Does the Time Go? Concepts and Measurement in the American Time-Use Survey", in Hard to Measure Goods and Services: Essays in Memory of Zvi Griliches, Ernst Berndt and Charles Hulten, eds., NBER Studies in Income and Wealth, University of Chicago Press 73-97.
- Global Workplace Analytics, 2017. 2017 State of Telecommuting in the US Employee Workforce. Retrieved from <https://globalworkplaceanalytics.com>.
- Golden, Lonnie. 2008. "Limited Access: Disparities in Flexible Work Schedules and Work-at-home," Journal of Family and Economic Issues, Springer, vol. 29(1), pages 86-109, March.
- Hamermesh, Daniel S., Harley Frazis, and Jay Stewart. 2005. "Data Watch—The American Time Use Survey", Journal of Economic Perspectives 19:1 (Winter), 221-232.
- Jones, Jeffrey M. 2015, August 19. "In U.S., Telecommuting for Work Climbs to 37%." Retrieved from <https://news.gallup.com/poll/184649/telecommuting-work-climbs.aspx>.
- Kahneman, Daniel, and Alan B. Krueger. 2006. "Developments in the Measurement of Subjective Well-Being." Journal of Economic Perspectives, 20 (1): 3-24.
- Kawaguchi, Daiji, Jungmin Lee, and Daniel S. Hamermesh. 2012. "A Gift of Time." NBER Working Paper No. 18643.
- Kimbrough, Gray. 2019. "Measuring commuting in the American Time Use Survey." Journal of Economic and Social Measurement, vol. 44, no. 1, pp. 1-17, 2019.
- Krantz-Kent, Rachel M., 2019. "Where did workers perform their jobs in the early 21st century?" Monthly Labor Review, U.S. Bureau of Labor Statistics, July, <https://doi.org/10.21916/mlr.2019.16>.
- Krueger, Alan B., Daniel Kahneman, David Schkade, Norbert Schwarz, and Arthur A. Stone. 2009. "National Time Accounting: The Currency of Life," in Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being, Alan B. Krueger, ed., University of Chicago Press, 9-86.

Lee, Jungmin, Daiji Kawaguchi, and Daniel S. Hamermesh. 2012. "Aggregate Impacts of a Gift of Time," American Economic Review, vol. 102(3), 612-16.

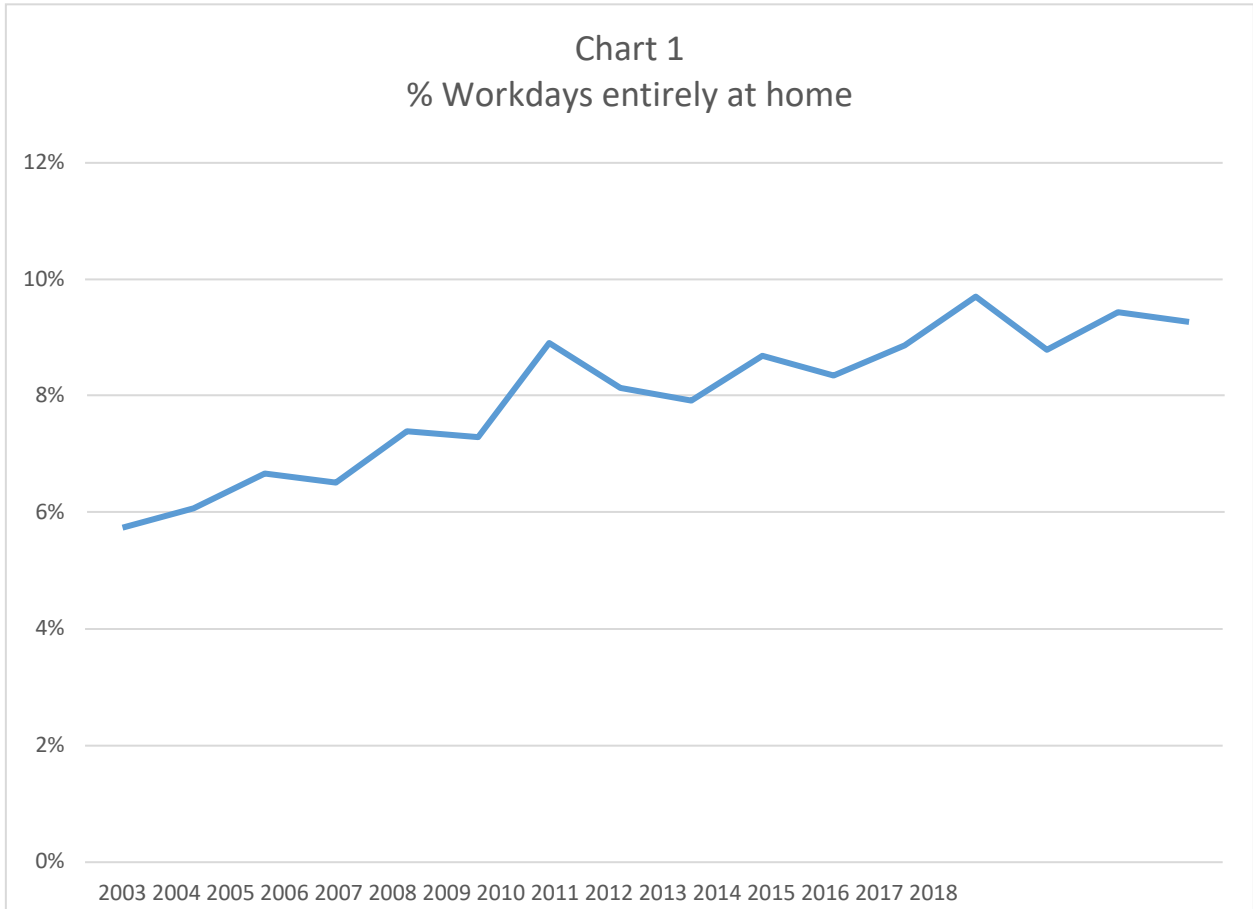
McGuckin, Nancy and Nakamoto Yukiko. 2004. "Trips, Chains, and Tours—Using an Operational Definition." Retrieved from <http://onlinepubs.trb.org/onlinepubs/archive/conferences/nhts/mcguckin.pdf>

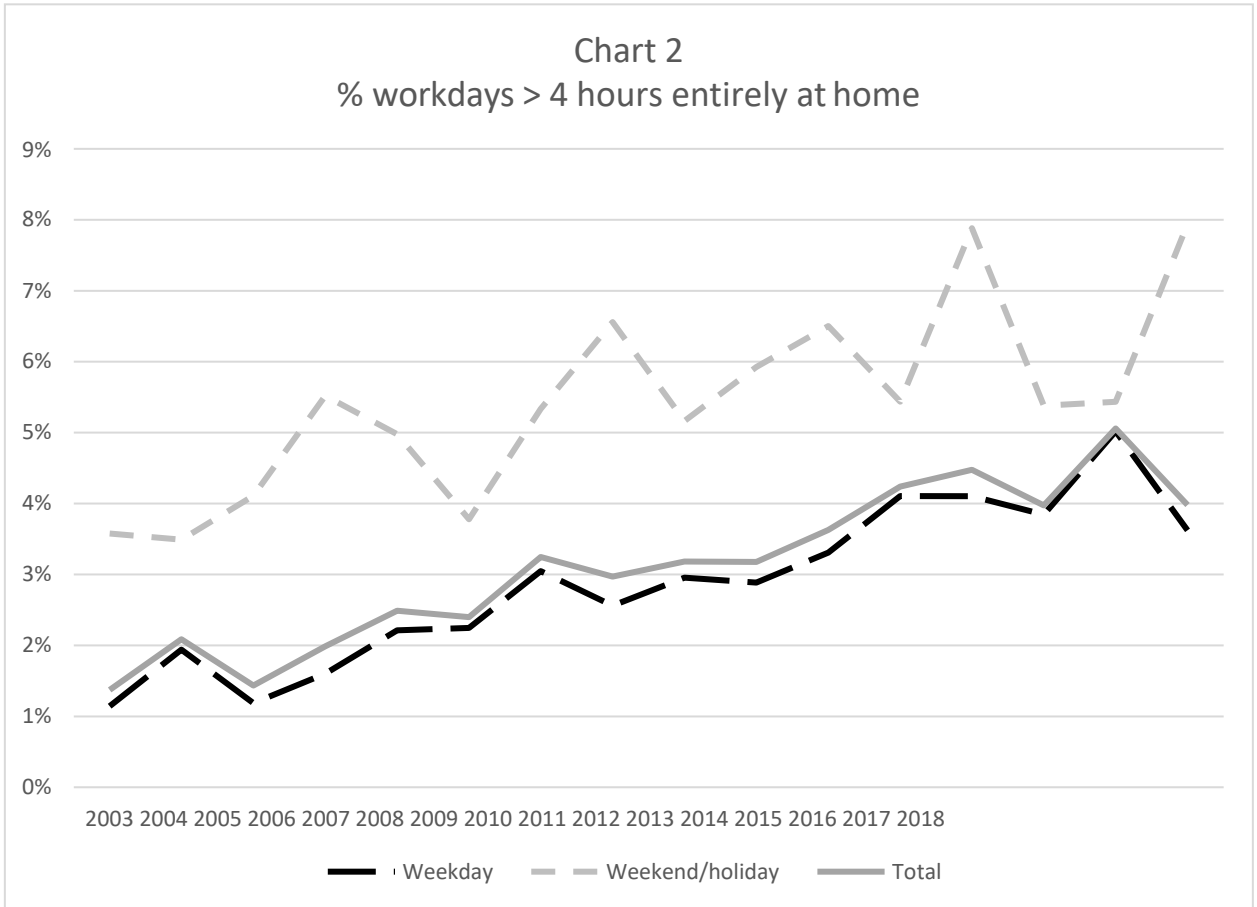
Natti, Jouko, Mia Tammelin, Timo Antilla, and Satu Ojala. 2011. "Work at home and time use in Finland." New Technology, Work, and Employment, vol. 26(1), 68-77.

Powell, Abigail and Lyn Craig. 2015. "Gender differences in working at home and time use patterns: evidence from Australia." Work, Employment and Society vol. 29(4), 571-589.

Song, Younghwan. 2009. "Unpaid work at home." Industrial Relations vol. 48(4), 578-588.

Trinko, Katrina. 2013. "How telecommuting could rejuvenate family life in America." Washington Times. Retrieved from <https://www.washingtontimes.com/news/2013/mar/3/trinko-how-telecommuting-could-rejuvenate-family-l>.





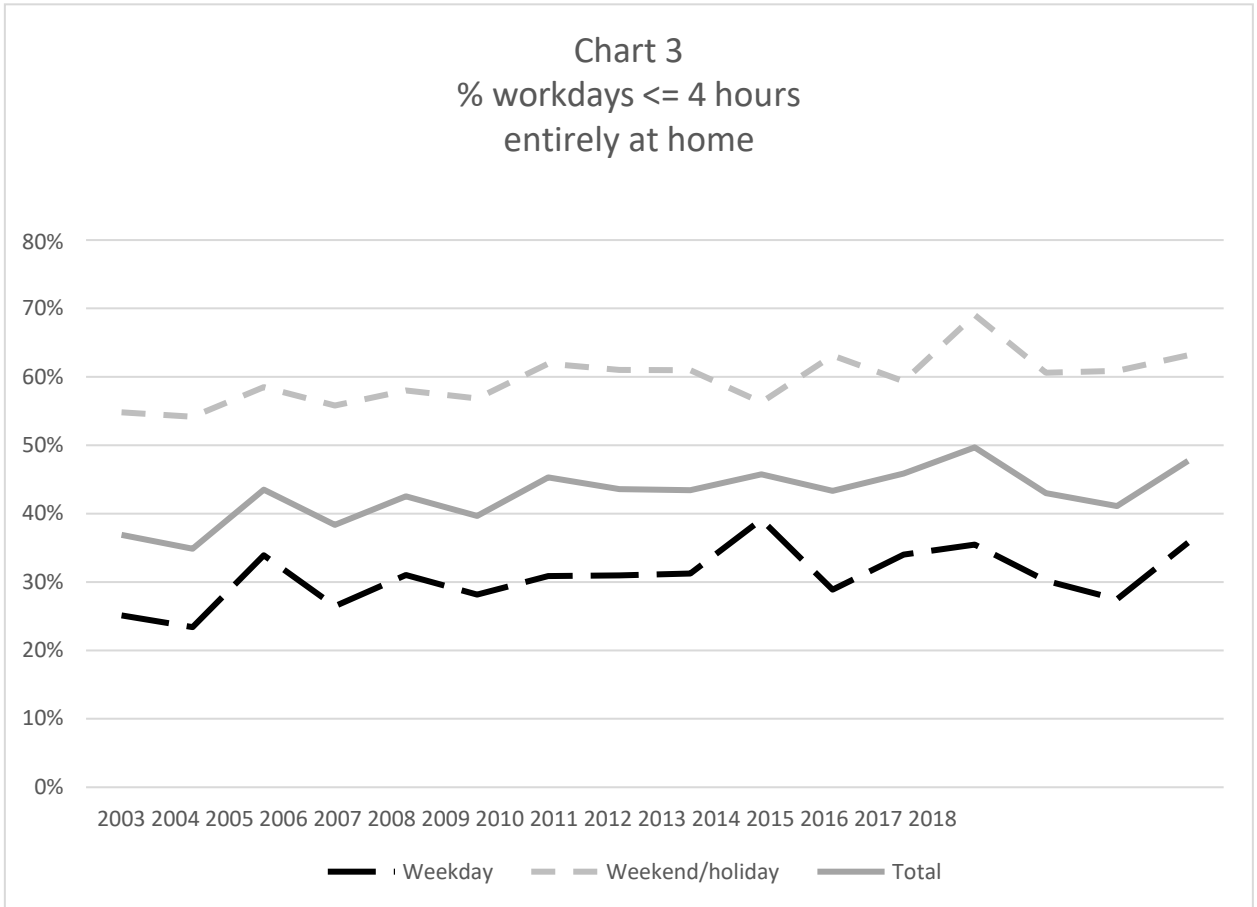


Table 1

Days Worked at Home by Telecommuters as Percentage of Total Days Worked at Home

Percentage Telework, Workdays at Home	Weekends/ Holidays		Usual workday	Not usual workday	Total
	Weekdays				
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%

Table 2
Trends in Work by Location, 2003-18

Dependent variable: Minutes of work				
Year ¹	0.30	0.30		0.21
	(0.19)	(0.19)		(0.30)
Prob. Unpaid Overtime		49.07 ***		4.37
		(18.41)		(36.88)
Prob. Telecommute		24.76 **		57.81 **
		(10.46)		(24.00)
Prob. Unpaid Overtime x Year				4.02
				(2.94)
Prob. Telecommute x Year				-2.97
				(2.12)
Dependent variable: Minutes of work workplace/other				
Year ¹	-0.27	-0.27		0.29
	(0.18)	(0.18)		(0.29)
Prob. Unpaid Overtime		-17.46		-42.80
		(19.93)		(36.71)
Prob. Telecommute		-39.48 ***		34.74
		(11.26)		(23.59)
Prob. Unpaid Overtime x Year				2.17
				(3.02)
Prob. Telecommute x Year				-6.69 ***
				(2.13)
Dependent variable: Minutes of work at home				
Year ¹	0.57 ***	0.56 ***		-0.08
	(0.06)	(0.06)		(0.07)
Prob. Unpaid Overtime		66.53 ***		47.16 ***
		(8.30)		(13.43)
Prob. Telecommute		64.23 ***		23.07 **
		(5.79)		(10.04)
Prob. Unpaid Overtime x Year				1.85
				(1.24)
Prob. Telecommute x Year				3.72 ***
				(0.95)
n	109,221	.	109,221	109,221

¹Year = Calendar year - 2000.

* p < .10

** p < .05

*** p < .01

Table 3a
Descriptive Statistics (weighted)

Variable	Mean	Std. Dev.
Teleworker	0.130	0.336
Full-time	0.811	0.391
Female	0.478	0.500
Married	0.586	0.493
Any children	0.401	0.490
< HS	0.077	0.266
HS Grad	0.263	0.440
Some College	0.257	0.437
BA+	0.403	0.490
White, Nonhisp.	0.642	0.479
Black, Nonhisp.	0.189	0.391
Hispanic	0.169	0.375
Age <= 24	0.142	0.349
Age 25-54	0.653	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	0.225
Agriculture/Mining	0.016	0.124
Construction	0.048	0.213
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

Table 3a, continued

Variable	Mean	Std. Dev.
Non-metro. or 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

N = 9,920

Table 3b

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

N=1,415

Table 4

Percentage Telecommuters by Selected Characteristics

Total	12.9	Prod., transport, etc. occupation	1.3
Part-time	6.9	Ag, forestry, and fishing/Mining	11.1
Full-time	14.5	Construction	4.5
Men	13.1	Manufacturing	14.0
Women	12.6	Wholesale/retail	6.8
< HS	1.4	Transp. & Utilities	6.8
HS Grad	3.8	Information	26.9
Some College	7.6	Finance	26.4
BA+	24.6	Prof/business services	31.2
Non-Hispanic White	15.4	Education and health	9.4
Non-Hispanic Nonwhite	11.4	Leisure & Hospitality	2.3
Hispanic	5.1	Other Services	9.7
No Household Children	12.5	Public Administration	13.4
Any Household Children	13.4	Non-metro. or not ident.	4.4
Spouse or partner present	15.8	Metro, not identified	9.2
Other Mar. Status	8.7	Metro area 100K - 250K	11.9
Age 16-24	2.6	Metro area 250K - 500K	7.9
Age 25-54	15.5	Metro area 500K - 1M	11.8
Age 55+	11.8	Metro area 1M - 2.5M	13.8
Manager/Professional	23.1	Metro area 2.5M - 5M	18.3
Service occupation	2.4	Metro area 5M+	16.4
Sales & Office occupation	10.1		
Farm/fish occupation	0.6		
Construction/maintenance occupation	2.2		

Table 5

Estimated Effects of Selected Characteristics on Telecommuting from Logit

Full-time - Part-time	0.004 (0.007)		Construct. - Ed./Health	0.040 * (0.022)
Female - Male	-0.001 (0.005)		Mfg. - Ed./Health	0.114 *** (0.020)
Married - Other	0.014 *** (0.005)		Whole./Ret. - Ed./Health	0.043 *** (0.014)
Any child - No child	-0.003 (0.005)		Transp./Util. - Ed./Health	0.069 *** (0.023)
Clg. Grad - Some Clg.	0.050 *** (0.008)		Information - Ed./Health	0.148 *** (0.031)
Clg. Grad - HS Grad	0.068 *** (0.009)		Finance - Ed./Health	0.135 *** (0.022)
Clg Grad. - HS Dropout	0.077 *** (0.016)		Prof./Bus. - Ed./Health	0.168 *** (0.021)
Black - Non Hisp. White	-0.020 *** (0.006)		Leisure - Ed./Health	0.016 (0.015)
Hisp. - Non Hisp. White	-0.035 *** (0.006)		Other Serv. - Ed./Health	0.092 *** (0.026)
Age < 25 - Age 25-54	-0.044 *** (0.007)		Pub. Admin. - Ed./Health	0.056 *** (0.016)
Age > 54 - Age 25-54	-0.015 ** (0.006)		Nonmetro - Metro 5M+	-0.052 *** (0.007)
Professional - Manager	-0.035 *** (0.010)		Unid. Metro - Metro 5M+	-0.031 *** (0.012)
Service - Manager	-0.070 *** (0.010)		Met 100-250K - Met 5M+	-0.024 ** (0.011)
Sales - Manager	-0.046 *** (0.011)		Met 250-500K - Met 5M+	-0.043 *** (0.009)
Office - Manager	-0.059 *** (0.009)		Met 500K-1M - Met 5M+	-0.030 *** (0.008)
Farm/fish - Manager	-0.086 *** (0.010)		Met 1-2.5M - Met 5M+	-0.025 *** (0.009)
Construction - Manager	-0.072 *** (0.010)		Met 2.5 -5M - Met 5M+	-0.011 (0.009)
Maintenance - Manager	-0.085 *** (0.009)		Construct. - Ed./Health	0.040 * (0.022)
Production - Manager	-0.084 *** (0.008)			
Transport - Manager	-0.084 *** (0.008)			

Table 6

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)

Table 7

Difference between telecommuting and ordinary commuting days, minutes per day, long usual workdays, telecommuters.

Activity	Whole Sample		Parents	
Personal Care	6.8		32.7	***
	(9.3)		(11.1)	
Sleep	24.7	***	31.9	**
	(9.4)		(13.7)	
Grooming	-15.9	**	-13.2	***
	(3.7)		(3.4)	
Eating and Drinking	-1.8		14.3	***
	(4.6)		(5.2)	
Child & Household Care	-2.5		-12.1	
	(6.2)		(9.9)	
Household production	1.5		-4.6	
	(12.7)		(24.2)	
Leisure	57.3	***	52.9	***
	(14.5)		(20.1)	
TV	43.0	***	40.6	**
	(10.4)		(18.9)	
Exercise	-3.5		-0.5	
	(2.8)		(3.7)	
Non-commuting travel	-1.5		4.9	
	(4.9)		(6.4)	
Other	5.9		12.7	
	(17.6)		(10.0)	
Work	-0.1		-30.6	
	(13.0)		(20.7)	
Commuting	-67.3	***	-55.9	***
	(5.4)		(5.5)	
Secondary Childcare	36.1	**	144.2	***
	(17.8)		(32.9)	
n	631		341	

Table 8

Regression Results and Comparison to Within-Telecommuter Results

	Coef. on Predicted Long Usual Days at Home		Difference from Within- Telecommuter Comparison	
	Entire Sample	Parents	Entire Sample	Parents
Personal Care	-33.7 * (17.5)	-40.1 ** (19.6)	40.5 * (21.6)	72.9 *** (22.6)
Sleep	0.2 (15.4)	-2.4 (18.6)	24.5 (19.0)	34.3 (23.0)
Grooming	-35.9 *** (4.4)	-35.7 *** (6.1)	19.9 *** (5.2)	22.5 *** (6.6)
Eating and Drinking	1.0 (6.5)	0.1 (8.5)	-2.8 (7.8)	14.2 (9.0)
Child & Household Care	12.0 (8.1)	19.7 (18.4)	-14.6 (10.1)	-31.8 (21.3)
Household production	8.1 (17.0)	39.2 (27.2)	-6.6 (22.1)	-43.9 (41.9)
Leisure	61.0 *** (22.9)	83.8 *** (27.6)	-3.7 (25.9)	-30.9 (33.1)
TV	21.6 (20.9)	30.3 (21.4)	21.4 (22.7)	10.2 (26.9)
Exercise	20.3 ** (8.2)	19.2 ** (8.9)	-23.8 *** (8.6)	-19.6 ** (9.3)
Non-commuting travel	13.0 (8.8)	21.2 (13.2)	-14.6 (10.3)	-16.4 (14.1)
Other	14.5 (15.9)	9.5 (24.1)	-8.6 (26.0)	3.1 (25.3)
Work	-25.0 (34.7)	-63.0 (42.0)	24.9 (38.9)	32.4 (48.3)
Commuting	-50.0 *** (8.3)	-70.4 *** (8.2)	-17.3 (12.4)	14.6 (11.4)
Secondary Childcare	85.9 *** (23.7)	219.1 *** (55.6)	-49.9 * (29.0)	-74.9 (62.9)
n	9,448	4,534		