Time Use Before, During, and After the Pandemic
Appendix: Using the Google Mobility Trends Database to Fill in Missing ATUS Data
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The views expressed in this appendix are those of the author and do not necessarily represent the views of the Federal Reserve System or the Federal Reserve Bank of Philadelphia.

This appendix discusses my attempts at using cellphone data from the Google Mobility Trends database to estimate time use from March 18 to May 9, 2020, during which the American Time Use Survey (ATUS) was not collected.

The Google Mobility Trends data set tracks certain cellphone users' time spent in various locations: parks, transit stations, retail and recreation establishments, grocery stores and pharmacies, workplaces, and residential locations.[1]

When Google Mobility Trends and ATUS data are available, there is a tight correspondence between their measures of time use.

The left panel of Figure A1 presents the relationship between weekly time spent at home (according to the Google Mobility Trends data set) and the fraction of work time that takes place at home (according to the ATUS) for college-educated individuals.[2] As one might expect, there is a strong relationship between these two variables.[3]

In the solid orange line, I plot the (quadratic) curve that best fits the dates plotted in the scatterplot. Using this line, I get a rough sense of what the ATUS would have recorded as the share of time that college-educated workers worked from home between March 27 and May 8,

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[1] The database is based on cellphone users who have opted to turn on their location tracking.

[2] The Google Mobility Trends data display extremely large fluctuations around holidays. In producing weekly averages of cellphone traffic data for Figures A1 and A2, I drop data from the 4th of July, Thanksgiving, Christmas Eve, and Christmas.

[3] Directly before the lockdowns, in February 2020, cellphone users spent similar amounts of time at home relative to the baseline period of January 3 to February 6, 2020. In these weeks, approximately 14 percent of college-educated workers' hours were performed at home. In contrast, in the week ending May 15, 2020, 84 percent of work hours took place at home, according to the ATUS. Google cellphone traffic in residences was up 14 percent relative to the baseline period.

2020. For example, given that the Google Mobility Trends database reports a 15 percent increase (relative to Google's prepandemic baseline period) in time spent at home for the week of May 8, the relationship depicted in the orange curve suggests a 76 percent work-from-home (WFH) share for college-educated workers for that week. I follow the same method to fill in values for WFH time for college-educated workers for the remaining weeks during which the ATUS survey was not collected.

The right panel of Figure A1 depicts a similar relationship between cellphone time in residential locations and WFH shares for workers without a college degree. Workers without a college degree spent a smaller fraction of their work hours at home. However, as was observed in the left panel, there's a positive relationship between the ATUS' measures of hours worked from home and Google's cellphone measures of time spent at home.

I follow a similar approach to impute the share of time that individuals spent alone from March 18 to May 9. I find that — among the measures in the Google Mobility Trends data set — cellphone time spent in groceries and pharmacies is most closely related to time spent alone in the ATUS. Figure A2 depicts the relationship between time in groceries and pharmacies and ATUS measures of time spent alone. The negative relationship between the two measures reflects the influence of governmental and private efforts to prevent the spread of the coronavirus. In the earliest stage of the pandemic (late February and early March 2020) individuals' time diaries and cellphone activity indicated less social isolation; the opposite is true toward the end of 2020 (during the pandemic's second wave). Using the estimated relationship between the two measures of social isolation, I estimate that — during the weeks that ATUS data collection was interrupted — roughly 54 percent of college-educated individuals' time was spent alone, with a somewhat higher share (59 percent) for individuals without a college degree.

I use these predicted values to describe trends in working from home (main article, Figure 2) and time spent alone (main article, Figure 4) during the pandemic period.

FIGURE A1

Work-from-home time in the ATUS and residential time in Google Mobility Trends, people with a college degree and people without a college degree, 2020
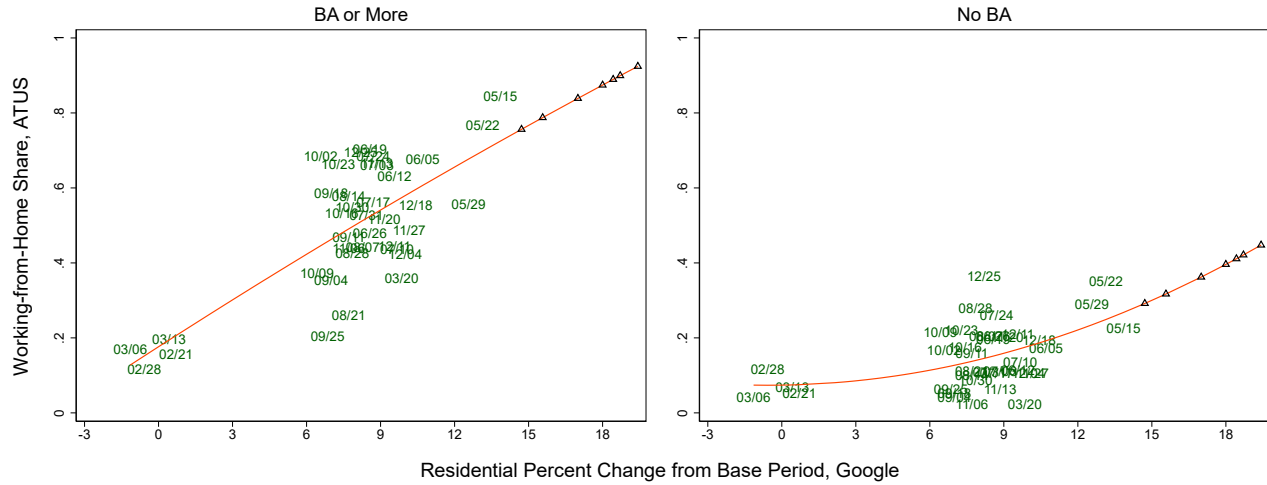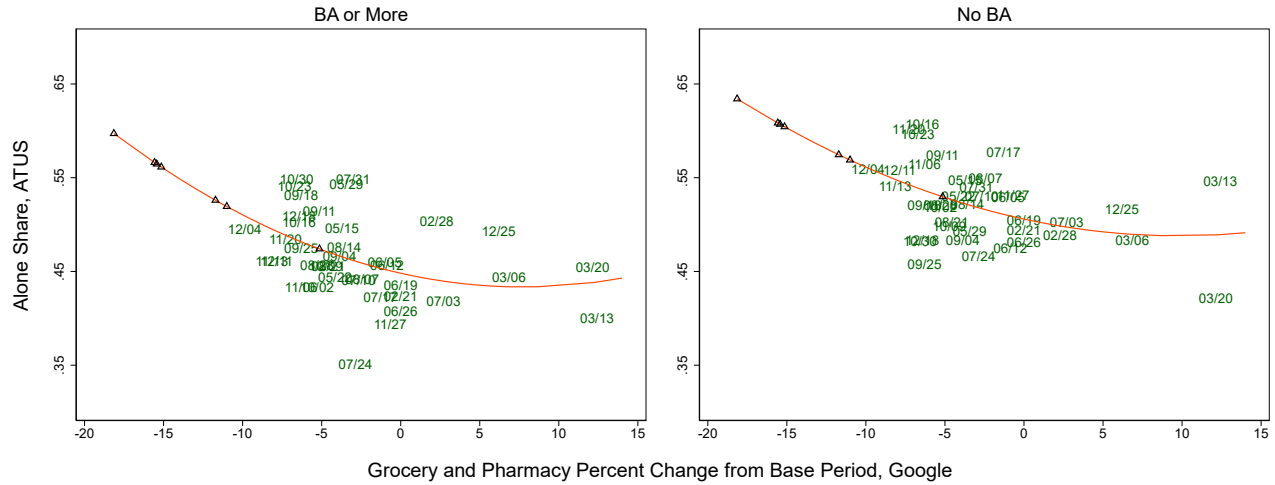

Data Source: ATUS and Google Mobility Trends

Note: The horizontal axis refers to the change in the amount of time individuals spent in a residence, compared to the base period (January 3 to February 20, 2020). The vertical axis refers to the ATUS share of work time that takes place in a residence, computed for surveyed individuals with a college degree (left panel) and without a college degree (right panel). The dates in the figures refer to the final day of the given week. I include weeks ending February 21 to March 20, 2020, and weeks ending May 15 to December 25, 2020. The orange solid line gives the quadratic curve that best fits the scattered dates. The Google Community Reports data begin in the week ending February 21, 2020. The ATUS was not collected between March 18 and May 9, 2020. The hollow triangles give residential cellphone activity from March 27 to May 8, 2020, along with their location on the orange curve.

FIGURE A2

Alone time in the ATUS and grocery and pharmacy time in Google Mobility Trends, people with a college degree and people without a college degree, 2020

Data Source: ATUS and Google Mobility Trends

Note: The horizontal axis refers to the change in the amount of time individuals spent in a grocery store or a pharmacy, compared to the base period (January 3 to February 20, 2020). The vertical axis refers to the ATUS share of eligible time that took place alone, computed for surveyed individuals with a college degree (left panel) and without a college degree (right panel). The dates in the figures refer to the final day of the given week. I include the weeks ending February 21 to March 20, 2020, and the weeks ending May 15 to December 25, 2020. The orange solid line gives the quadratic curve that best fits the scattered dates. The Google Community Reports data begin in the week ending February 21, 2020. The ATUS was not collected from March 18 to May 9, 2020. The hollow triangles give grocery and pharmacy cellphone activity for the weeks between March 27 and May 8, 2020, along with their location on the orange curve.