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Ability to work from home: evidence from two surveys and implications for the labor market in the COVID-19 pandemic

This article examines the relationship between workers' ability to work at home, as captured in job characteristics measured by the Occupational Information Network, and the actual incidence of working at home, as measured by the American Time Use Survey and the National Longitudinal Survey of Youth 1979. For occupations in which telework is feasible, the article also estimates the proportion of workers who actually teleworked for a substantial amount of time prior to the coronavirus disease 2019 (COVID-19) pandemic. The article concludes by examining recent (April 2020) employment estimates from the Current Population Survey, aiming to gauge how the initial employment effects of the pandemic differed between occupations in which telework is feasible and occupations in which it is not.

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In an attempt to contain the coronavirus disease 2019 (COVID-19) pandemic, states and localities across the country have adopted "social distancing" measures, closing businesses and enacting stay-at-home orders. Many workers are now working remotely. Although teleworking had been on the rise even before the pandemic,[1] it has now increased substantially, with more people working at home whenever possible. A recent article by Erik Brynjolfsson et al. estimates that 31 percent of workers who were employed in early March had switched to working at home by the first week of April.[2] Even when stay-at-home orders are relaxed, many workers may continue working at home until the pandemic is fully contained.

Of course, many jobs cannot be performed remotely and require that workers be physically present at their worksites. Data on job characteristics provided by the

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Occupational Information Network (O*NET), together with occupational employment estimates from the Occupational Employment Statistics (OES) survey, make it possible to estimate the number of jobs that can and cannot be performed remotely.[3] O*NET contains occupation-level measures not only of the knowledge and skills required by an occupation, but also on how and where the work associated with that occupation is carried out. Information captured in the O*NET categories “work context” and “general work activities” is especially helpful for determining whether a job cannot be done at home. Examples of jobs that one would expect to be unsuitable for telework are jobs that involve operating equipment or interacting face to face with the public. Using O*NET and OES data, for instance, Jonathan I. Dingel and Brent Neiman estimate that 63 percent of U.S. jobs require significant onsite presence and that the remaining 37 percent can be performed entirely at home.[4]

Simon Mongey, Laura Pilossoph, and Alex Weinberg provide evidence that information on working at home in the American Time Use Survey (ATUS) is consistent with the type of O*NET measures constructed by Dingel and Neiman.[5] In a supplement to the 2017–18 ATUS, workers were asked whether they could work at home.[6] Averaging the responses to this question across individuals, Mongey, Pilossoph, and Weinberg estimate the proportion of workers in broad (two-digit census) occupations who can work at home. In addition, averaging O*NET-based estimates for more detailed occupations, they obtain an O*NET-based measure of the inability to work at home across two-digit occupations. Comparing the two measures, the authors find that, as predicted, the measures are inversely correlated.

In this article, we take a closer look at the relationship between the ability to work at home, as captured in job characteristics measured by O*NET, and the actual incidence of working at home, as measured by two U.S. Bureau of Labor Statistics surveys—the ATUS and the National Longitudinal Survey of Youth 1979 (NLSY79). Rather than comparing broader occupational averages of the incidence of working at home and the ability to work at home, we analyze behavior at the individual level. This approach allows us to (1) determine the incidence of classification errors (that is, the incidence of working at home in detailed occupations that would otherwise seem to preclude working at home) and (2) examine takeup rates (that is, the proportions of workers in detailed occupations who can work from home and actually spend a significant amount of time doing so). Working at home in response to the pandemic is more likely to increase in occupations in which teleworking is feasible and the takeup rate is relatively low. In the final section of the article, we examine recent (April 2020) employment estimates from the Current Population Survey (CPS), aiming to gauge how the initial employment effects of the pandemic differed between occupations in which telework is feasible and occupations in which it is not.

Is the O*NET-based telework feasibility measure consistent with observed telework behavior in the ATUS and the NLSY79?

Because the questions in the ATUS and the NLSY79 differ, it is difficult to construct perfectly comparable definitions of teleworkers in the two surveys. To avoid this difficulty, we formulate a plausible definition for each survey and then examine the degree to which the survey results conforming to that definition are consistent with the O*NET measure. For the ATUS, our definition is based on whether workers who worked entirely at home on

some days received pay for some of their time. For the NLSY79, our definition is based on the number of hours that respondents worked at home.

The ATUS is a single-day time-diary survey administered to a sample of individuals in households that have recently completed their participation in the CPS, the main labor force survey for the United States. The information on working at home used here is from the 2017–18 Leave and Job Flexibilities Module of the ATUS. Administered to every respondent who was a wage or salary worker, this module has a sample size of 10,071. We classify workers as telecommuters if, in response to questions about working at home, they replied that they (1) were able to and did work at home, (2) worked entirely at home on some days, and (3) were paid for at least some of the hours they worked at home. The ATUS also provides information on other variables that may be related to working at home. These variables include a worker's education level, age, gender, race, ethnicity, and marital status; the presence of children in the household; the worker's job status (full or part time); and the size of the metropolitan area in which the worker resides.[7]

Following the methodology of Dingel and Neiman, we classify occupations on the basis of their telework feasibility and then merge this information with data from the ATUS.[8] The results are summarized in table A-1 of the appendix. As indicated in the first data column of the table, approximately 54 percent of workers in the ATUS sample (1) are in occupations in which working at home is not feasible (according to the O*NET-based telework feasibility measure) and (2) did not telework. As shown in the second data column, about 2 percent of workers in the sample worked at home despite being in occupations in which telework is not feasible. Dividing the latter percentage by the percentage of workers for which working at home is predicted to be infeasible yields a relatively low classification error rate of about 4 percent. This result provides strong support for the O*NET-based measure, whose ruling out of telework for occupations in which working at home is deemed infeasible is correct about 96 percent of the time.

As shown in the third data column of table A-1, about 33 percent of workers in the ATUS sample (1) are in occupations in which working at home is feasible (according to the O*NET-based telework feasibility measure) and (2) did not telework. As seen in the fourth data column, the percentage of those who are in occupations in which telework is feasible and who did telework is about 11 percent. Dividing this percentage by the percentage of workers for which working at home is predicted to be feasible yields an estimated takeup rate of about 25 percent.

Table 1 shows estimates for the ability-to-telework rate, the classification error rate, and the takeup rate. The entries in the table's first data column provide ability-to-telework rates by various worker characteristics. One sees that workers with less education tend to be in jobs in which working at home is not feasible, as is the case for workers who are younger than 25, not married, or Hispanic. Teleworking is also less feasible in part-time jobs and in jobs found in nonmetropolitan areas. Working at home is generally feasible in management, professional, and administrative support jobs, but not in most service, construction, transportation, and production jobs. Similarly, while telework feasibility is high in the information, financial activities, professional and business services, and public administration industries, it is low in the leisure and hospitality, agriculture, and construction industries.

Table 1. Telework statistics, by demographic, occupational, industry, and job-task characteristics, ATUS and NLSY79 (in percent)

Category	ATUS			NLSY79		
	Ability-to-telework rate	Classification error rate	Takeup rate	Ability-to-telework rate	Classification error rate	Takeup rate
All	43.6	3.9	24.7	44.8	5.6	21.6
Educational attainment						
Less than a high school diploma	10.7	0.4	7.7	17.0	4.4	3.7
High school diploma, no college	24.5	1.4	11.3	30.3	4.0	12.8
Some college or associate's degree	36.4	3.0	16.3	42.5	5.0	18.2
Bachelor's degree and higher	67.5	10.8	31.4	70.5	11.3	28.7
Age						
15 to 24 years	23.7	0.0	11.5	—	—	—
25 to 54 years	46.7	5.0	27.8	—	—	—
55 years and older	48.1	4.7	20.1	—	—	—
Comparable NLS age range (51–59)	46.6	5.1	22.2	—	—	—
Presence of children						
No children	44.7	3.9	23.5	44.0	4.8	20.5
Children	42.0	4.0	26.6	50.1	11.4	28.4
Job status						
Full time	47.2	4.6	25.8	46.8	5.9	22.0
Part time	28.7	1.9	17.1	32.2	4.0	18.3
Gender						
Men	40.0	3.5	27.8	38.8	5.7	25.5
Women	47.6	4.4	21.9	51.5	5.5	18.4
Maritial status						
Not married	34.4	2.3	21.1	39.3	5.0	18.7
Married	50.2	5.4	26.5	47.7	5.9	22.9
Race or ethnicity						
Non-Hispanic White	48.7	5.2	26.4	46.9	6.0	22.8
Black	39.5	2.8	24.2	33.5	3.9	16.0
Hispanic	28.9	1.5	14.4	39.0	4.9	12.8
Occupations						
Management, business, and financial occupations	86.6	13.6	29.7	86.5	22.0	23.4
Professional and related occupations	64.4	8.2	28.1	64.3	7.7	28.5
Service occupations	7.9	2.0	7.0	13.4	4.2	6.3
Sales and related occupations	31.9	4.3	29.2	30.1	8.4	36.4
Office and administrative support occupations	59.2	5.9	10.4	61.5	4.6	7.7
Farming, fishing, and forestry occupations	0.0	0.9	—	0.0	0.0	—

See footnotes at end of table.

Table 1. Telework statistics, by demographic, occupational, industry, and job-task characteristics, ATUS and NLSY79 (in percent)

Category	ATUS			NLSY79		
	Ability-to-telework rate	Classification error rate	Takeup rate	Ability-to-telework rate	Classification error rate	Takeup rate
Construction and extraction occupations	0.0	2.6	—	0.0	4.0	—
Installation, maintenance, and repair occupations	1.0	1.2	0.0	3.9	3.0	0.0
Production occupations	0.4	1.7	0.0	3.9	3.9	0.0
Transportation and material moving occupations	0.3	1.1	0.0	1.3	2.0	0.0
Industries						
Agriculture, forestry, fishing, and hunting	8.3	3.0	20.4	16.0	29.7	25.3
Mining, quarrying, and oil and gas extraction	55.9	28.0	26.3	15.0	0.0	52.6
Construction	17.3	2.6	13.0	21.8	6.3	10.5
Manufacturing	36.4	4.6	31.6	36.6	2.7	16.5
Wholesale and retail trade	26.9	2.1	19.3	29.3	2.4	22.8
Transportation and utilities	25.4	1.8	22.2	26.4	2.3	13.8
Information	71.2	4.2	36.9	77.3	16.8	37.3
Financial activities	77.9	17.2	29.6	75.3	11.2	27.3
Professional and business services	69.9	9.0	40.8	68.5	10.1	30.1
Education and health services	48.9	3.7	15.8	49.7	6.1	19.2
Leisure and hospitality	13.0	0.9	12.7	20.5	5.3	19.9
Other services	31.0	7.1	14.0	55.5	13.7	19.0
Public administration	65.2	7.3	16.5	54.9	3.5	13.7
Industry missing	—	—	—	50.2	12.3	30.4
Area						
Nonmetropolitan area	31.8	1.5	10.8	—	—	—
Metropolitan area, unknown size	39.6	4.5	17.2	—	—	—
Metropolitan area, 100,000–250,000	40.4	2.5	28.1	—	—	—
Metropolitan area, 250,000–500,000	40.1	3.8	13.7	—	—	—
Metropolitan area, 500,000–1,000,000	42.4	4.8	21.6	—	—	—
Metropolitan area, 1,000,000–2,500,000	44.8	4.5	25.4	—	—	—
Metropolitan area, 2,500,000– 5,000,000	49.5	6.0	31.0	—	—	—
Metropolitan area, 5,000,000+	48.8	4.0	29.5	—	—	—
PDII task measures						
Time on physical tasks						
Almost all	—	—	—	16.6	3.1	9.8

See footnotes at end of table.

Table 1. Telework statistics, by demographic, occupational, industry, and job-task characteristics, ATUS and NLSY79 (in percent)

Category	ATUS			NLSY79		
	Ability-to-telework rate	Classification error rate	Takeup rate	Ability-to-telework rate	Classification error rate	Takeup rate
More than half	—	—	—	31.3	5.6	13.2
Less than half	—	—	—	54.1	7.0	20.3
Almost none	—	—	—	74.3	12.7	26.0
Time on repetitive tasks						
Almost all	—	—	—	27.1	4.2	13.1
More than half	—	—	—	36.4	3.8	13.0
Less than half	—	—	—	51.6	6.3	20.0
Almost none	—	—	—	59.4	8.6	28.9
Time on managing or supervising						
Almost all	—	—	—	53.1	6.7	19.8
Half or more	—	—	—	52.2	7.3	24.1
Less than half	—	—	—	44.0	5.8	21.3
Almost none	—	—	—	40.7	4.9	21.9
Solve problems of 30+ minutes						
1+/day	—	—	—	55.5	7.7	26.8
1+/week	—	—	—	44.5	5.7	18.4
1+/month	—	—	—	36.1	5.1	12.7
Never	—	—	—	24.3	2.5	12.6
Use high school+ math						
1+/day	—	—	—	46.7	4.3	26.2
1+/week	—	—	—	46.8	9.6	24.9
1+/month	—	—	—	52.3	10.6	22.6
Never	—	—	—	42.9	4.5	20.1
Longest document typically read at job						
< 1 page	—	—	—	27.4	3.2	12.6
2–5 pages	—	—	—	50.1	6.1	19.9
6–10 pages	—	—	—	55.9	4.1	25.0
11–25 pages	—	—	—	60.3	11.9	29.5
25+ pages	—	—	—	68.6	11.7	26.0
Never	—	—	—	14.8	5.9	15.7
Frequency of personal contact with people other than coworkers or supervisors						
A lot	—	—	—	40.7	5.3	21.3
A moderate amount	—	—	—	51.8	7.1	20.7
A little	—	—	—	49.4	6.2	19.1
None at all	—	—	—	42.8	4.2	28.8
Frequency of personal contact with customers or clients						
A lot	—	—	—	36.8	5.7	18.7
Some	—	—	—	54.3	6.7	20.8
None at all	—	—	—	47.9	4.4	25.9

See footnotes at end of table.

Table 1. Telework statistics, by demographic, occupational, industry, and job-task characteristics, ATUS and NLSY79 (in percent)

Category	ATUS			NLSY79		
	Ability-to-telework rate	Classification error rate	Takeup rate	Ability-to-telework rate	Classification error rate	Takeup rate
Frequency of personal contact with suppliers or contractors						
A lot	—	—	—	44.8	6.7	17.4
Some	—	—	—	47.0	6.7	20.8
None at all	—	—	—	42.7	4.3	23.6
Frequency of personal contact with students or trainees						
A lot	—	—	—	54.6	5.7	22.3
Some	—	—	—	42.7	3.9	20.2
None at all	—	—	—	42.8	6.7	22.3
Frequency of personal contact with patients						
A lot	—	—	—	24.3	5.0	10.6
Some	—	—	—	49.2	4.6	27.9
None at all	—	—	—	47.2	5.7	22.0

Note: ATUS = American Time Use Survey, NLSY79 = National Longitudinal Survey of Youth 1979, NLS = National Longitudinal Surveys, PDII = Princeton Data Improvement Initiative, O*NET = Occupational Information Network.

Source: Authors' calculations using the 2017–18 Leave and Job Flexibilities Module of the ATUS, the most recent interview (2016–17) of the 1979 cohort of the NLSY79, and job-content data provided by O*NET.

The NLSY79 is a second source of data on hours worked at home. It is a survey of 12,686 individuals who were ages 14 to 21 in 1979. These individuals were interviewed annually from 1979 to 1994, and every 2 years after that. We use information from the most recent NLSY79 interview (round 27), which was conducted from October 2016 through November 2017, when respondents were ages 51 to 59. The sample used here is restricted to respondents who provided full information on their education, gender, race, wages, hours worked at home, occupation, and job tasks. The resultant sample size is 4,293.

For the NLSY79, our telework measure is derived from individual responses to a question about the number of hours per week respondents usually worked at home while at their current or most recent employer. Some workers in the NLSY79 work at home just a few hours a week, and, for our present purposes, it is not useful to designate them as teleworkers. During a pandemic, teleworking is a realistic alternative to working onsite only if individuals can work at home on a nearly full-time basis or at least for a considerable number of hours. In the ATUS, we address this issue by classifying workers as teleworkers only if they worked entirely at home on some days. In the NLSY79, we classify workers as teleworkers only if they usually worked at home at least 8 hours a week, which roughly corresponds to working at home for a full day.[9] As shown below, with this restriction, the NLSY79 data look very similar to the ATUS data. Like the ATUS, the NLSY79 has information on a worker's age, gender, race, ethnicity, and marital status; the presence of children in the household; and the worker's job status (full or part time).

As with the ATUS, we merge the O*NET-based telework feasibility measure with data from the NLSY79.[10] The results are summarized in table A-2 of the appendix. The estimates for the ability-to-telework rate, the classification error rate, and the takeup rate are presented in table 1. As shown in the table's fourth data column, approximately 45 percent of workers in the NLSY79 sample are in occupations in which working at home is feasible. The classification error rate, shown in the fifth data column, is about 6 percent, just a tad higher than the rate for workers of comparable age in the ATUS.

Looking at other entries in the fourth data column of table 1, one sees estimates that are quite similar to those obtained from the ATUS. Workers with less education are concentrated in jobs in which working from home is generally not feasible. Black, Hispanic, male, unmarried, and part-time workers also are more likely to be in jobs in which teleworking is not feasible. Working at home is generally feasible in management, professional, and administrative support jobs, but not in most service, sales, farming, construction, and transportation jobs. Similar to the occupation results, the industry results obtained from the NLSY79 largely mirror those obtained from the ATUS.

Round 27 of the NLSY79 also added variables based on individual responses to questions about the nature of a worker's job duties. Looking at these variables, which are similar to those in O*NET, suggests that lower skilled jobs with repetitive tasks are typically jobs in which telework is not feasible (according to the O*NET criteria). The same is true for jobs that require physical tasks or contact with patients and, to a lesser extent, for jobs that involve personal contact with customers.[11]

Takeup rates in the ATUS and the NLSY79

As shown in appendix table A-1, about 44 percent of workers in the ATUS sample are in jobs in which telework is feasible. However, because only about 11 percent of workers in the sample (1) are in jobs in which telework is feasible and (2) did work at home, the takeup rate is only about 25 percent.

As seen in the third data column of table 1, the takeup rate is higher for more educated workers, workers in full-time jobs, and men, and it is lower for Hispanics. Examined by age group, the takeup rate is the highest for workers ages 25 to 54 and the lowest for workers younger than 25. Workers in larger metropolitan areas have a higher takeup rate, as do workers in management, professional, and sales occupations. Similarly, the industry estimates indicate higher takeup rates in the information industry and the professional and business services industry. The takeup rate is quite low in service occupations and office and administrative support occupations.

Turning to the NLSY79 and looking at the sixth data column in table 1, one sees that the overall takeup rate is a little less than 22 percent, comparable to the rate for workers of similar age in the ATUS. The other entries in the column show basic patterns similar to those in the ATUS. The takeup rate is lower for Hispanics and workers with less education. It is higher for men and people with children in the household. The takeup rate is very low in service occupations and office and administrative support occupations, and it is higher in jobs that involve more complex cognitive tasks such as frequent problem solving and reading long documents.

The most striking feature of the takeup rate estimates is that they are so low. As noted earlier, the overall takeup rate is 25 percent in the ATUS sample and 22 percent in the NLSY79 sample, whose respondents are older, on average. Even for the groups with the highest takeup rates, these rates generally top out at around 30 percent.

However, both anecdotal reports and the evidence provided by Brynjolfsson et al. indicate that, in response to the COVID-19 pandemic, takeup rates are much higher than this percentage.[12]

Two factors determine the takeup rate: the employers' willingness to let workers telework and the workers' desire to work at home when they are offered the opportunity.[13] There are several possible reasons why employers might be reluctant to let their workers telework. Working from home may require costly investments in computers or improved internet access. Alternatively, employers might see telework as a job perk given only to the most deserving workers. Likewise, employers might be concerned about difficulties in monitoring the behavior of employees working at home. (There are reports that employers are now increasing their use of surveillance software to monitor the work habits of their teleworking employees.[14])

As mentioned earlier, the ATUS asks workers not only whether they work at home, but also whether they can work at home. Workers may interpret the latter question as being primarily about the employer's telework policies. An affirmative response would then indicate that a formal agreement or an informal understanding with the employer allows workers to work at home.[15] Across the entire ATUS sample, 45 percent of workers who can telework actually do so under our definition. Although this percentage is almost double the takeup rate (as we have measured it), it still indicates that, for whatever reason, a majority of workers choose not to telework when given the opportunity. It is possible that many workers miss the social interactions at the workplace, forfeiting the time-saving benefits of telework.[16]

Implications for the labor market in the COVID-19 pandemic

The COVID-19 pandemic has led to widespread employment losses as businesses have closed, stay-at-home orders have been enacted, and workers and customers have made efforts to avoid close interactions with others. Teleworking has enabled some workers to continue working while maintaining social distancing. Table 2 presents CPS estimates of the change in employment and unemployment between February and April 2020. Separate estimates are presented for workers in occupations in which the O*NET-based telework feasibility measure predicts that working at home is feasible. All estimates shown are not seasonally adjusted.[17]

The CPS estimates indicate that, overall, employment fell by 16 percent from February to April, and the unemployment rate increased by 11 percentage points. However, employment fell by 21 percent in occupations in which telework is not feasible, compared with 8 percent in occupations in which telework is feasible. Over the same period, the unemployment rate increased by 14 percentage points in occupations in which telework is not feasible, but only by 6 percentage points in occupations in which telework is feasible.

In a recent article published in the June 2020 *Monthly Labor Review*, Matthew Dey et al. use a taxonomy developed by Joseph S. Vavra to identify vulnerable industries at the beginning of the COVID-19 pandemic.[18] The authors show that while job losses were widespread throughout the economy from February to March, they were especially severe in these initially vulnerable, or highly exposed, industries. Table 2 breaks down employment and unemployment estimates for the highly exposed industries and for the remainder of the economy. In the highly exposed industries, workers in occupations in which working at home is not feasible were especially hard hit by the pandemic. For these occupations, employment fell by 42 percent between February and April, and the unemployment rate rose by 32 percentage points. By comparison, in occupations also located in the highly exposed industries but in which working at home is feasible, employment fell by a still substantial but smaller 22 percent, and the unemployment rate increased by 18 percentage points. In February, only 15 percent of

employment in the highly exposed industries was in occupations in which telework is feasible. As a result, the overall fall in employment in these industries was very large (39 percent) and not far off from the reduction in employment in jobs in which working at home is not feasible.

Table 2. Changes in CPS employment and unemployment statistics, by ability to telework and industry exposure, February–April 2020

Telework status	Percent change in employment			Percentage-point change in unemployment rate		
	Total	Exposed industries	Nonexposed industries	Total	Exposed industries	Nonexposed industries
Unable to telework	-21.2	-41.5	-14.6	14.3	32.3	8.7
Able to telework	-7.7	-22.1	-6.7	6.2	18.1	5.4
Total	-15.9	-38.6	-11.1	11.0	30.1	7.2

Source: Authors' calculations based on February–April 2020 Current Population Survey (CPS) data and O*NET job-content data.

The percent reduction in employment in the remaining industries was substantial, but not nearly as large as that in the highly exposed industries. However, the same pattern holds here as in the highly exposed industries: the percent reduction in employment and the increase in the unemployment rate were substantially smaller in occupations in which it is possible to work at home. Specifically, in occupations in which telework is not feasible, employment fell by 15 percent between February and April, and the unemployment rate rose by 9 percentage points. By comparison, in occupations in which telework is feasible, employment fell by 7 percent over the same period, and the unemployment rate increased by 5 percentage points. In February, 44 percent of employment in the less highly exposed industries was in occupations in which telework is feasible, which moderated both the overall reduction in employment and the increase in unemployment in those industries.

Table 3 presents CPS estimates of employment and unemployment, by major industry.[19] As indicated by the final entries in the table's second and third data columns, across the entire economy, employment fell by 16 percent from February to April, and the unemployment rate increased by 11 percentage points. Examining the entries in the first three data columns, one sees that, for the most part, industries in which a higher proportion of workers can telework have a smaller reduction in employment and a smaller increase in unemployment. An even stronger relationship between employment loss and the ability to telework is evident in the remaining columns of the table. The fourth and fifth data columns show that, in every industry except agriculture, workers in occupations in which telework is feasible have a smaller percent decline in employment. In some industries, this difference is very large. For example, in information, employment fell by 37 percent in occupations in which telework is not feasible, but only by 2 percent in occupations in which telework is feasible. In the category of other services, the corresponding numbers are 36 percent and 8 percent. The table's seventh and eight data columns, which break down the change in industry unemployment rates by the ability to work at home, tell the same story. In every industry, unemployment increased by a smaller amount for workers who are in occupations in which telework is feasible.

Table 3. Industry statistics

Industry	Percent share of employed able to telework (April 2020)	Labor market outcomes		Percent change in employment (February–April 2020)			Percentage-point change in unemployment rate (February– April 2020)		
		Percent change in employment (February–April 2020)	Percentage-point change in unemployment rate (February–April 2020)	Able to telework	Not able to telework	Difference	Able to telework	Not able to telework	Difference
Financial activities	81.1	-6.1	3.7	-5.8	-7.2	1.4	2.8	7.2	-4.4
Information	80.4	-11.8	9.3	-2.1	-37.3	35.2	5.8	21.1	-15.3
Professional and business services	71.6	-9.6	5.5	-6.4	-16.8	10.4	3.5	10.0	-6.5
Public administration	57.0	-3.8	3.4	-1.5	-6.7	5.1	3.2	3.8	-0.6
Education and health services	47.9	-13.9	9.4	-12.5	-15.2	2.8	8.8	9.9	-1.1
Manufacturing	41.0	-13.7	9.2	-3.9	-19.5	15.5	4.3	12.3	-8.0
Mining, quarrying, and oil and gas extraction	40.3	-14.9	4.2	5.5	-24.8	30.3	4.2	5.1	-0.8
Other services	39.9	-27.2	19.4	-8.4	-35.9	27.5	10.6	24.3	-13.6
Transportation and utilities	32.7	-10.9	8.7	4.7	-16.9	21.6	4.9	10.4	-5.5
Wholesale and retail trade	26.5	-16.4	12.6	-9.4	-18.6	9.2	7.6	14.2	-6.6
Construction	20.7	-16.6	10.2	-11.9	-17.8	5.8	5.1	11.3	-6.2
Leisure and hospitality	20.3	-42.0	32.1	-25.5	-45.1	19.6	22.9	34.1	-11.2
Agriculture, forestry, fishing, and hunting	8.1	-1.2	-1.7	-4.3	-1.0	-3.3	-5.9	-1.3	-4.5
Total	45.8	-15.6	10.8	-7.9	-21.2	13.3	6.2	14.3	-8.1

Source: Authors' calculations based on Februrary–April 2020 Current Population Survey data and O*NET job-content data.

Conclusion

Our analysis of merged O*NET–ATUS data and merged O*NET–NLSY79 data indicates that about 45 percent of U.S. employment is in occupations in which telework is feasible. However, a much lower percentage of workers actually worked at home prior to the COVID-19 pandemic. Specifically, only a little more than 10 percent of workers in the ATUS spent any paid workday working only at home, and a similar percentage in the NLSY79 usually spent more than 8 hours a week working at home. Thus, according to both surveys, the implied takeup rate —that is, the percentage of workers who were in occupations in which telework is technologically feasible and who

actually worked at home—was quite low prior to the pandemic. According to the ATUS, the takeup rate was about 25 percent. In the NLSY79, with its sample of older workers, the takeup rate was about 22 percent.

Many workers have begun working at home in response to the pandemic. CPS estimates indicate that, from February to April, the drop in employment in occupations in which telework is feasible was considerably smaller than the drop in employment in occupations in which telework is not feasible. This differential effect exists both within and across major industries, and it is likely to persist throughout the pandemic. The extent to which working patterns will be permanently affected by the pandemic is an open question. One might speculate that the takeup rate will increase permanently as workers and employers become more comfortable with telework arrangements.

Appendix

Table A-1. Percentage of workers in telework status categories in the ATUS, by demographic, occupational, and industry characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
All	54.2	2.2	32.8	10.8
Educational attainment				
Less than a high school diploma	88.9	0.4	9.9	0.8
High school diploma, no college	74.4	1.1	21.8	2.8
Some college or associate's degree	61.7	1.9	30.5	5.9
Bachelor's degree and higher	29.0	3.5	46.3	21.2
Age				
15 to 24 years	76.3	0.0	21.0	2.7
25 to 54 years	50.6	2.6	33.8	13.0
55 years and older	49.4	2.5	38.5	9.7
Comparable NLS age range (51–59)	50.7	2.7	36.3	10.3
Presence of children				
No children	53.2	2.2	34.2	10.5
Children	55.7	2.3	30.8	11.2
Job status				
Full time	50.4	2.4	35.0	12.2
Part time	70.0	1.4	23.8	4.9
Gender				
Men	57.9	2.1	28.9	11.1
Women	50.1	2.3	37.1	10.4
Marital status				
Not married	64.0	1.5	27.2	7.3
Married	47.1	2.7	36.9	13.3
Area				
Nonmetropolitan area	67.1	1.0	28.4	3.4

See footnotes at end of table.

Table A-1. Percentage of workers in telework status categories in the ATUS, by demographic, occupational, and industry characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
Metropolitan area, unknown size	57.6	2.7	32.8	6.8
Metropolitan area, 100,000–250,000	58.1	1.5	29.0	11.3
Metropolitan area, 250,000–500,000	57.6	2.3	34.7	5.5
Metropolitan area, 500,000–1,000,000	54.9	2.8	33.2	9.2
Metropolitan area, 1,000,000–2,500,000	52.7	2.5	33.4	11.4
Metropolitan area, 2,500,000–5,000,000	47.5	3.0	34.2	15.4
Metropolitan area, 5,000,000+	49.2	2.0	34.4	14.4
Race or ethnicity				
Non-Hispanic White	48.6	2.7	35.8	12.9
Black	58.8	1.7	29.9	9.6
Hispanic	70.0	1.1	24.8	4.2
Occupations				
Management, business, and financial	11.6	1.8	60.9	25.7
Professional and related	32.7	2.9	46.3	18.1
Service	90.2	1.9	7.3	0.6
Sales and related	65.2	2.9	22.6	9.3
Office and administrative support	38.4	2.4	53.1	6.1
Farming, fishing, and forestry	99.1	0.9	0.0	0.0
Construction and extraction	97.4	2.6	0.0	0.0
Installation, maintenance, and repair	97.9	1.2	1.0	0.0
Production	97.9	1.7	0.4	0.0
Transportation and material moving	98.6	1.1	0.3	0.0
Industries				
Agriculture, forestry, fishing, and hunting	89.0	2.8	6.6	1.7
Mining, quarrying, and oil and gas extraction	31.8	12.4	41.2	14.7
Construction	80.5	2.2	15.1	2.3
Manufacturing	60.7	2.9	24.9	11.5
Wholesale and retail trade	71.6	1.6	21.7	5.2
Transportation and utilities	73.3	1.4	19.7	5.6

See footnotes at end of table.

Table A-1. Percentage of workers in telework status categories in the ATUS, by demographic, occupational, and industry characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
Information	27.6	1.2	45.0	26.3
Financial activities	18.3	3.8	54.8	23.0
Professional and business services	27.4	2.7	41.4	28.5
Education and health services	49.2	1.9	41.2	7.7
Leisure and hospitality	86.2	0.7	11.4	1.7
Other services	64.1	4.9	26.6	4.4
Public administration	32.3	2.5	54.5	10.8

Note: NLS = National Longitudinal Surveys.

Source: Authors' calculations using the 2017–18 Leave and Job Flexibilities Module of the American Time Use Survey (ATUS).

Table A-2. Percentage of workers in telework status categories in the NLSY79, by demographic, occupational, industry, and job-task characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
All	52.2	3.1	35.1	9.7
Educational attainment				
Less than a high school diploma	79.3	3.6	16.4	0.6
High school diploma, no college	66.9	2.8	26.4	3.9
Some college or associate's degree	54.6	2.9	34.8	7.7
Bachelor's degree and higher	26.2	3.4	50.3	20.2
Gender				
Men	57.8	3.5	28.9	9.9
Women	45.9	2.7	42.0	9.5
Race or ethnicity				
Non-Hispanic White	49.9	3.2	36.2	10.7
Black	64.0	2.6	28.1	5.4
Hispanic	58.1	3.0	34.0	5.0
Marital status				
Not married	57.7	3.0	32.0	7.3
Married	49.2	3.1	36.8	10.9
Presence of children				
No children	53.4	2.7	35.0	9.0
Children	44.2	5.7	35.9	14.3

See footnotes at end of table.

Table A-2. Percentage of workers in telework status categories in the NLSY79, by demographic, occupational, industry, and job-task characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
Job status				
Full time	50.1	3.1	36.5	10.3
Part time	65.1	2.7	26.3	5.9
Occupations				
Management, business, and financial	10.5	3.0	66.3	20.2
Professional and related	32.9	2.7	46.0	18.3
Service	83.0	3.6	12.5	0.9
Sales and related	64.0	5.9	19.2	11.0
Office and administrative support	36.8	1.8	56.8	4.7
Farming, fishing, and forestry	100.0	0.0	0.0	0.0
Construction and extraction	96.0	4.0	0.0	0.0
Installation, maintenance, and repair	93.2	2.9	3.9	0.0
Production	92.4	3.7	3.9	0.0
Transportation and material moving	98.7	2.0	1.3	0.0
Industries				
No industry reported	43.7	6.1	34.9	15.3
Agriculture, forestry, fishing, and hunting	59.1	24.9	12.0	4.1
Mining, quarrying, and oil and gas extraction	85.0	0.0	7.1	7.9
Construction	73.3	5.0	19.5	2.3
Manufacturing	61.7	1.7	30.6	6.0
Wholesale and retail trade	69.0	1.7	22.6	6.7
Transportation and utilities	71.9	1.7	22.8	3.7
Information	18.9	3.8	48.5	28.8
Financial activities	22.0	2.8	54.7	20.5
Professional and business services	28.3	3.2	47.8	20.6
Education and health services	47.3	3.1	40.2	9.5
Leisure and hospitality	75.3	4.2	16.4	4.1
Other services	38.4	6.1	45.0	10.5
Public administration	43.5	1.6	47.4	7.5
PDII task measures				
Time on physical tasks				
Almost all	80.9	2.6	15.0	1.6
More than half	64.8	3.9	27.2	4.1
Less than half	42.7	3.2	43.1	11.0

See footnotes at end of table.

Table A-2. Percentage of workers in telework status categories in the NLSY79, by demographic, occupational, industry, and job-task characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
Almost none	22.4	3.3	55.0	19.3
Time on repetitive tasks				
Almost all	69.9	3.0	23.6	3.5
More than half	61.1	2.4	31.7	4.8
Less than half	45.4	3.1	41.2	10.3
Almost none	37.1	3.5	42.2	17.2
Time on managing or supervising				
Almost all	43.7	3.1	42.6	10.5
Half or more	44.3	3.5	39.6	12.6
Less than half	52.8	3.2	34.6	9.4
Almost none	56.4	2.9	31.7	8.9
Solve problems of 30+ minutes				
1+/day	41.0	3.4	40.6	14.9
1+/week	52.3	3.2	36.3	8.2
1+/month	60.7	3.3	31.5	4.6
Never	73.9	1.9	21.2	3.1
Use high school+ math				
1+/day	51.0	2.3	34.5	12.3
1+/week	48.1	5.1	35.2	11.7
1+/month	42.7	5.0	40.5	11.8
Never	54.5	2.6	34.3	8.6
Longest document typically read at job				
< 1 page	70.3	2.3	23.9	3.5
2–5 pages	46.9	3.1	40.1	10.0
6–10 pages	42.3	1.8	42.0	14.0
11–25 pages	35.0	4.7	42.5	17.8
25+ pages	27.7	3.7	50.7	17.9
Never	80.2	5.0	12.5	2.3
Frequency of personal contact with people other than coworkers or supervisors				
A lot	56.2	3.1	32.0	8.7
A moderate amount	44.7	3.4	41.1	10.7
A little	47.5	3.1	40.0	9.4
None at all	54.8	2.4	30.5	12.3
Frequency of personal contact with customers or clients				
A lot	59.7	3.6	29.9	6.9
Some	42.6	3.1	43.0	11.3
None at all	49.8	2.3	35.5	12.4
Frequency of personal contact with suppliers or contractors				

See footnotes at end of table.

Table A-2. Percentage of workers in telework status categories in the NLSY79, by demographic, occupational, industry, and job-task characteristics

Category	Telework status category			
	Unable to telework and did not telework	Unable to telework and did telework	Able to telework and did not telework	Able to telework and did telework
A lot	51.5	3.7	37.0	7.8
Some	49.4	3.6	37.2	9.8
None at all	54.8	2.5	32.6	10.1
Frequency of personal contact with students or trainees				
A lot	42.8	2.6	42.5	12.2
Some	55.0	2.2	34.1	8.6
None at all	53.4	3.9	33.3	9.6
Frequency of personal contact with patients				
A lot	71.9	3.8	21.7	2.6
Some	48.5	2.3	35.4	13.7
None at all	49.7	3.0	36.9	10.4

Note: NLSY79 = National Longitudinal Survey of Youth 1979, PDII = Princeton Data Improvement Initiative.

Source: Authors' calculations using the most recent interview (2016–17) of the 1979 cohort of the NLSY79.

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SUGGESTED CITATION

Matthew Dey, Harley Frazis, Mark A. Loewenstein, and Hugette Sun, "Ability to work from home: evidence from two surveys and implications for the labor market in the COVID-19 pandemic," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, June 2020, https://doi.org/10.21916/mlr.2020.14.

NOTES

1 Analyzing diary information in the American Time Use Survey (ATUS), Rachel Krantz-Kent finds that, from 2003–07 to 2013–17, workers in management, professional, and related occupations increased their time working at home. (See Krantz-Kent, “Where did workers perform their jobs in the early 21st century?” *Monthly Labor Review*, July 2019, https://doi.org/10.21916/mlr.2019.16.) The increased work at home documented by Krantz-Kent could possibly involve tasks done at home during a workday spent primarily at the workplace. However, as reported by Global Workforce Analytics and Flexjobs, the American Community Survey shows that the number of workers who worked at home at least half the time increased by 115 percent from 2005 to 2017. (See *2017 state of telecommuting in the U.S. employee workforce* (Global Workforce Analytics and Flexjobs, 2017).) According to Lexico.com, teleworking is defined as “the action or practice of working from home, making use of the Internet, email, and the telephone” (https://www.lexico.com/en/definition/teleworking). Most of the increase in work at home presumably involves teleworking. In this article, the terms teleworking and working at home are used interchangeably.

2 Erik Brynjolfsson, John J. Horton, Adam Ozimek, Daniel Rock, Garima Sharma, and Hong Yi Tu Ye, “COVID-19 and remote work: an early look at US data,” Working Paper 27344 (Cambridge, MA: National Bureau of Economic Research, April 2020), https://www.nber.org/papers/w27344.

3 O*NET data are produced under the sponsorship of the U.S. Department of Labor's Employment and Training Administration. Initially, the information in the O*NET database was collected by occupational analysts. Over time, this information has been updated through surveys of both occupational experts and each occupation's worker population. The OES survey is a U.S. Bureau of Labor Statistics survey that measures, by geography and industry, occupational employment and wages in the United States.

4 Jonathan I. Dingel and Brent Neiman, "How many jobs can be done at home?" white paper (Chicago, IL: Becker Friedman Institute for Economics at the University of Chicago, April 2020), https://bfi.uchicago.edu/wp-content/uploads/BFI_White-Paper_Dingel_Neiman_3.2020.pdf.

5 Simon Mongey, Laura Pilossoph, and Alex Weinberg, "Which workers bear the burden of social distancing policies?" Working Paper 27085 (Cambridge, MA: National Bureau of Economic Research, May 2020), https://www.nber.org/papers/w27085.

6 An examination of the ATUS data suggests that the percentage of workers who indicate they can work at home is somewhat higher than the percentage of workers who work at home, but the former appears to be significantly lower than the percentage of workers who are working at home in response to the pandemic. We suspect that workers in the ATUS indicate they can work at home if a formal agreement or an informal understanding with their employer allows them to work at home, rather than whether or not teleworking is technologically feasible given the nature of the job.

7 In a recent article, Harley Frazis analyzes the relationship between teleworking and the ATUS variables. (See Frazis, "Who telecommutes? Where is the time saved spent?" Working Paper 523 (U.S. Bureau of Labor Statistics, April 2020), https://www.bls.gov/osmr/research-papers/2020/pdf/ec200050.pdf.) Our current analysis differs from that of Frazis in that we use O*NET information to determine whether working at home is technologically feasible. A recent article by Rose Woods pictorially depicts some of the relationships between teleworking and the ATUS variables. (See Woods, "Job flexibilities and work schedules in 2017–18," *Spotlight on Statistics* (U.S. Bureau of Labor Statistics, April 2020), https://www.bls.gov/spotlight/2020/job-flexibilities-and-work-schedules/home.htm.)

8 Occupations in O*NET are based on an extended version of the Standard Occupational Classification (SOC) system structure. The ATUS uses a slightly aggregated version of the SOC-based 2010 occupation codes. There are many cases in which multiple O*NET occupations map to a single ATUS occupation. In these cases, we first average the O*NET estimates at the ATUS occupation level and then apply Dingel and Neiman's ("How many jobs can be done at home?") definition for telework feasibility.

9 As noted earlier, our NLSY79 and ATUS definitions of teleworkers do not fully correspond to each other. In the NLSY79, some individuals who usually work at home 8 hours a week may never work full days at home, in which case they would not be counted as teleworkers under the ATUS definition. And there are workers we classify as teleworkers in the ATUS who report teleworking less than once a week in response to a question about the frequency of teleworking. These workers would likely not be counted as teleworkers under the NLSY79 definition.

10 The NLSY79 uses 2002 census occupation codes. There are many cases in which multiple O*NET occupations map to a single NLSY79 occupation. In these cases, we first average the O*NET responses and then apply the Dingel and Neiman's ("How many jobs can be done at home?") definition for telework feasibility.

11 In the NLSY79 questionnaire, "physical tasks" are defined broadly as "standing, handling objects, operating machinery or vehicles, or making or fixing things with your hands." Since occupations with a high O*NET value for any of these characteristics are classified as jobs in which teleworking is not feasible, it is not surprising that jobs that NLSY79 respondents identify as physical fall into this category. The same observation applies to jobs that workers in the NLSY79 identify as requiring extensive personal contact, because occupations with a high O*NET value for dealing with the public are classified as jobs in which teleworking is not feasible. We had hoped that the NLSY79 variables on the time spent on physical tasks and on the frequency of personal contacts would be helpful in ascertaining whether or not teleworking in an occupation is feasible, but these variables did not improve the predictive performance of the O*NET measure.

12 Brynjolfsson et al., "COVID-19 and remote work."

13 Another possible explanation for the low estimated takeup rates is that job variations within an occupation result in some error in our measure of whether a worker is in a job in which working at home is technically feasible.

14 See Drew Harwell, "Managers turn to surveillance software, always-on webcams to ensure employees are (really) working from home," *The Washington Post*, April 30, 2020, https://www.washingtonpost.com/technology/2020/04/30/work-from-home-surveillance/.

15 Formal telework agreements are common in the federal government, but rare in the private sector. According to National Compensation Survey estimates, flexible workplace agreements covered only 7 percent of private sector workers in 2019.

16 See Alana Semuels, "The coronavirus is making us see that it's hard to make remote work actually work," *Time*, March 13, 2020, https://time.com/5801882/coronavirus-spatial-remote-work/.

17 After our article was written, Dimitris Papanikolaou and Lawrence D. W. Schmidt published a working paper that uses ATUS information on whether workers work from home, measuring the extent to which workers in an industry can telework. Similarly to us, the authors find that, during the early stage of the COVID-19 pandemic, employment fell by a greater amount in industries in which fewer workers were working from home prior to the pandemic. See Papanikolaou and Schmidt, "Working remotely and the supply-side impact of Covid-19," Working Paper 27330 (Cambridge, MA: National Bureau of Economic Research, June 2020), https://www.nber.org/papers/w27330.

18 See Matthew Dey, Mark A. Loewenstein, David S. Piccone Jr, and Anne E. Polivka, "Demographics, earnings, and family characteristics of workers in sectors initially affected by COVID-19 shutdowns," *Monthly Labor Review*, June 2020, https://doi.org/10.21916/mlr.2020.11; and Joseph S. Vavra, "Shutdown sectors represent large share of all U.S. employment" (Chicago, IL: Becker Friedman Institute for Economics at the University of Chicago, March 31, 2020), https://bfi.uchicago.edu/insight/blog/key-economic-facts-about-covid-19/. The highly exposed industries identified by Vavra are "Restaurants and Bars, Travel and Transportation, Entertainment (e.g., casinos and amusement parks), Personal Services (e.g., dentists, daycare providers, barbers), other sensitive Retail (e.g., department stores and car dealers), and sensitive Manufacturing (e.g., aircraft and car manufacturing)."

19 Our estimates differ slightly from published CPS estimates because of such things as the treatment of missing industry codes.

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