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RFBerlin
ROCKWOOL Foundation Berlin –
Institute for the Economy
and the Future of Work

Gormannstrasse 22, 10119 Berlin
Tel: +49 (0) 151 143 444 67
E-mail: info@rfberlin.com
Web: www.rfberlin.com

Work from Home and Disability Employment

Nicholas Bloom[*], Gordon B. Dahl[†], Dan-Olof Rooth[‡]

Abstract

There has been a dramatic rise in disability employment since the pandemic. At the same time, work from home (WFH) has risen four-fold. This paper asks whether the two are causally related. Controlling for compositional changes and labor market tightness, a 1 percentage point increase in WFH increases full-time employment by 1.0% for individuals with a physical disability. The post-pandemic increase in working from home explains 68%-85% of the rise in full-time employment. Wage data suggests that WFH increased the supply of workers with a physical disability, likely by reducing commuting costs and enabling better control of working conditions.

Keywords: Disability Employment, Work from Home

[*]Stanford University and NBER, nbloom@stanford.edu
[†]University of California, San Diego, NBER and Norwegian School of Economics, gdahl@ucsd.edu
[‡]Stockholm University, dan-olof.rooth@sofi.su.se

1 Introduction

Employment of people with a disability is remarkably low relative to the rest of the population. While individuals without a disability had employment rates of 77% in the US as of 2020, only 32% of those with a disability were employed. This disability employment gap has existed for decades (e.g., Acemoglu and Angrist, 2001) and is not unique to the US. The average disability employment gap is 27 percentage points across OECD countries and has changed little in the past decade (OECD, 2022).

One explanation for the disability employment gap is that individuals with a disability have low work capacity. An alternative explanation is that individuals with a disability could work, but are not offered accommodations which would allow them to. Indeed, disability advocates have been asking for accommodations for years without much success. Title I of the Americans with Disabilities Act (ADA) requires most employers to provide "reasonable accommodation." This includes any adjustment to the work environment, such as remote work, flextime and assistive technologies, that enables an individual with a disability to perform the functions of a job.[1] However, the reach of the ADA is limited, since it does not require a specific accommodation if its implementation would cause undue difficulty or expense. Indeed, employers have been reluctant to change the workplace, arguing that the perceived costs are too high (Kaye et al., 2011). Both the Equal Employment Opportunity Commission (EEOC) and court decisions have disproportionately ruled that employers are not obligated to adopt accommodations such as work from home (Krieger, 2010).[2]

However, recent years have seen a transformational change in flexible work arrangements, not coming from the ADA, but from the shock of Covid which forced firms to restructure and increase remote work options for all workers. To put the shift into perspective, prior to the pandemic only 7% of full days were worked from home in the US but this increased four-fold to 28% in 2023 (Barrero et al., 2023). This work from home (WFH) shock unintentionally created new employment opportunities for people with disabilities and jump started the goal of the United Nation's Agenda 2030 to make jobs more accessible for all.

At the same time as WFH became more common in the US, the employment rate for workers with a physical disability increased by 14% between 2019 and 2024.[3] In contrast, the employment rate for those without any type of disability did not materially change. This pattern differs from previous recessions, where the recovery in employment for individuals with a disability lagged behind (Kaye,

[1] See "Work at Home/Telework as a Reasonable Accommodation", available at https://www.eeoc.gov/laws/guidance/work-hometeleworkreasonable-accommodation.

[2] The perceived high costs of accommodation versus the low threat of lawsuits could be one reason the ADA has been found to have a negative effect on disability employment (Acemoglu and Angrist, 2001; DeLeire, 2001). Lise et al. (2023) show that the negative employment effect of the ADA is driven by individuals with work limitations.

[3] Calculations using the CPS show that the employment rate for workers with a physical disability age 18-64 rose from 36.2% in 2019 to 41.3% in the first half of 2024.

2010; Maestas et al., 2021).[4]

In this paper we ask whether the sharp increase in employment for people with disabilities is driven by the rise in the ability to work from home. Estimating this causal link is difficult for several reasons. First, during the pandemic there was a large inflow of individuals categorized as having a cognitive disability. If these newly disabled people have higher employability because they have less severe disabilities, this compositional change could explain the rise in disability employment. To address this issue, we examine the set of disabilities whose population size remains similar pre-post Covid (i.e., including only physical disabilities).[5] Additionally, we reweight the data based on observables. Second, reverse causality could be present if workers with a disability have a high demand for WFH. To deal with this, we use the WFH rates of non-disabled workers to characterize how WFH opportunities have changed. Third, omitted variable bias could be a problem, since labor market tightness rose by roughly 60% pre-post Covid.[6] This general increase in labor demand could make firms more willing to hire disadvantaged workers, including those with a disability. Other changes could have been happening in the labor market as well. We deal with this in two ways: by controlling flexibly for labor market tightness using non-disability employment growth, and by using an instrument based on the ex-ante probability occupations could be done from home as developed by Dingel and Neiman (2020).

More specifically, our research design is conducted at the occupation-level and leverages the fact that the change in WFH pre-post Covid varies dramatically by occupation. For example, WFH rose by 36 percentage points for computer occupations (e.g., software developers and database administrators) but by only 4 percentage points for teachers (e.g., secondary school teachers). If WFH enables disability employment, we would expect to find larger increases in disability employment for computer scientists than for teachers. The identifying assumption is that WFH changes are driven by changes in the supply and demand for workers without a disability, rather than by those with a disability. Supporting this assumption, individuals with a disability make up just 3% of the workforce, so it is unlikely that they are driving the adoption of WFH post-pandemic. The empirical analysis uses Current Population Survey (CPS) data to contrast the pre-pandemic two-year period of January 2018 to December 2019 with the post-pandemic two-year period of July 2022 to June 2024 (when overall employment has returned to pre-pandemic levels).

We find larger increases in disability employment in occupations with higher levels of working from home. All of the gains are driven by increases in full-time employment, which makes up 78% of disability

[4] We are not the first to document a rise in disability employment in the aftermath of Covid. Ne'eman and Maestas (2023) was the first paper to document this rise; similar trends were also reported by the New York Times, Economic Innovation Group, Center for Research on Disability at the University of New Hampshire, and Institute on Employment and Disability at Cornell, all using the same monthly CPS data as we do.

[5] If we include individuals with cognitive disabilities in the analysis, the estimates are larger.

[6] See https://www.stlouisfed.org/publications/regional-economist/2023/nov/labor-market-tightness-COVID19-recession-differences-across-industries

employment, with no *net* change due to WFH for part-time employment.[7] Occupations with a 1 pp increase in WFH increase full-time disability employment by 1.0%. Our analysis controls for both compositional changes and labor market tightness. Reweighting based on observable characteristics or controlling for labor market tightness has little effect on the estimates. Using Dingel and Neiman's (2020) pre-pandemic categorization of the probability an occupation could be done at home as an instrument increases the estimate to 1.3%. In contrast, we do not find an employment increase for any other major demographic group (by gender, race, age or education).

Quantitively, our results imply that 68% to 85% of the increase in full-time employment among people with physical disabilities pre-post Covid can be explained by the increase in WFH. We arrive at similar conclusions using different measures of WFH: an ACS commuting question, Lightcast job postings mentioning WFH, and a CPS question on telework.

A natural question is whether labor supply or demand forces are behind the substantial increase in full-time employment for individuals with a disability. On the supply side, WFH could lower the burden of commuting, allow better control of the working environment, and grant more flexibility in work times and hours. On the demand side, WFH could reduce accommodation costs or increase productivity for workers with a disability. We find a combination of rising employment and falling wages for workers with a physical disability in WFH occupations post-pandemic, which is consistent with increased labor supply as the dominant force.

Our paper is related to a literature, largely outside of economics, which documents the extent of telework for those with a disability prior to the pandemic (e.g., Bailey and Kurland, 2002; Linden and Milchus, 2014). Immediately prior to the pandemic, people with a disability had low rates of WFH, which were only slightly higher than for those without a disability, 5.9% and 4.9%, respectively (Schur et al., 2020). A more directly related literature examines disability employment trends based on whether a job can be done at home during the Covid period and immediately thereafter (Ameri et al., 2023; Ne'eman and Maestas, 2023; Ozimek, 2022). For example, Ne'eman and Maestas (2023) categorizes jobs into teleworkable and non-teleworkable and finds a larger increase in disability employment in teleworkable jobs from April 2021 through June 2022. Our paper adds to this literature by looking at employment once markets are back to normal post-covid (starting in July 2022) and using a research design which accounts for compositional changes, reverse causality, and omitted variable bias.

Our paper is also related to research on workplace flexibility as well as accommodations for workers with a disability (Aizawa et al., 2023; Chen et al., 2023; Mas and Pallais, 2017, 2020; Maestas et al.,

[7] While there is no net change for part-time disability employment due to WFH, it is possible that WFH drew some individuals into part-time work and caused others to switch from part-time to full-time work, with the net effect only showing up as an increase in full-time employment.

2019). It is also related to how financial incentives affect the employment of individuals with a disability (Black et al., 2002; Deshpande, 2016; French and Song, 2014; Kostøl and Mogstad, 2014; Maestas et al., 2013).[8] On the demand side, work has examined the impact of hiring quotas on disability employment (Lalive et al., 2013; Szerman, 2022). Our paper adds to this literature by demonstrating that universal changes in workplace flexibility have a first-order impact on drawing individuals with a disability into the labor market.

Finally, a related literature has examined the impact of working from home on various parts of the economy, including housing, commuting, property prices, employment promotions and retention and productivity (see Aksoy et al., 2022; Choudhury et al., 2021; Emanuel and Harrington, 2024; Emanuel et al., 2023; Gibbs et al., 2023; Gupta et al., 2022; Bloom et al., 2024). The magnitude of the impacts we find suggest that the rise in disability employment could be one of the largest long run effects of WFH, particularly with population aging which will steadily increase the share of workers with a disability.

2 Data

Our empirical analysis leverages monthly data from the Current Population Survey (IPUMS-CPS, 2024), which is the source for official statistics related to disability and labor force status in the United States.[9] We combine this with different measures of work from home. Our estimation sample includes individuals between the ages of 18 and 64 from January 2018 to June 2024. We use the standard CPS definitions for employment variables and aggregate the 4-digit Standard Occupational Code (SOC) for workers to a 2-digit level. CPS sampling weights are used in all of our analyses.

2.1 Definition of Disability

The CPS collects information on a respondent's disability status by using six questions which ask about: a) hearing difficulty, b) vision difficulty, c) cognitive difficulty, d) ambulatory difficulty, e) self-care difficulty, and f) independent living difficulty. Using this definition, 8% of the population, or roughly 15 million working age individuals (age 18-64) are classified as having a disability in the pre-Covid period.

[8]Recent work examines how DI receipt impacts financial distress and other family members (Autor et al., 2019; Deshpande et al., 2021; Deshpande and Lockwood, 2022).

[9]The ACS asks similar questions, but as the BLS states, "the CPS is the best source of data for the labor force statistics of people with a disability" (email from Sean Smith at BLS December 2, 2024; see also https://www.bls.gov/cps/cpsdisability_faq.htm). The reason is that the BLS recognizes that disability and employment are collected with better accuracy in the CPS, in part due to the mode of survey collection (the CPS uses trained interviewers) and context of the survey. The BLS told us in email correspondence that "[d]isability data from the CPS cannot be directly compared with data from other surveys". Consistent with this, the fraction of working-age individuals with a reported disability is 40% higher in the ACS in 2022-2023. Moreover, the correlation of our main outcome variable using the two surveys is only 0.33, which is consistent with a large amount of noise in the ACS data. Another survey, the CPS-ASEC, includes a work disability measure, but the sample size is too small for an occupational-level analysis.

One of these disability categories, cognitive difficulties, expanded substantially after the pandemic, rising from around 6 million before Covid to over 7 million after Covid (see Figure A1). If the inflow of newly disabled individuals have higher employability, for example because they have less severe disabilities, this compositional change could drive a rise in disability employment. In contrast, the other five disability categories remained stable before versus after Covid at around 9 million in total. We label these remaining categories as “physical disabilities”, recognizing that self-care and independent living could involve non-physical limitations as well. Our analysis uses the five physical disability categories whose population size remained similar before and after Covid to minimize compositional changes, noting if we include the cognitive category, the estimates are larger (see Appendix Table A3). We measure employment outcomes the two years prior to Covid (January 2018 to December 2019) and the two years after Covid lock-downs have ended and employment is back at pre-Covid levels (July 2022 to June 2024). We omit the Covid years of 2020 to 2021.[10]

Out of the 9 million individuals with a physical disability in our sample, 36% of them are working (3.2 million), of whom 78% are employed full-time (2.5 million). The average age is 50.4, with 48% of the sample male and 76% white. In terms of education, 48% have more than high school.

A natural question is how many individuals who report a disability are on disability insurance (SSDI). Using the July 2019 Disability Supplement to the CPS, we find that 30% of those with a physical disability are also on SSDI. Unfortunately, this information is not available for other months. We note that if there is no effect of WFH on SSDI recipients, the effect for individuals not on SSDI would be larger than the estimates reported below.

2.2 Definition of Work from Home

We calculate WFH rates by occupation, using workers without a disability. Our main WFH measure is from the American Community Survey (ACS) transportation to work question, comparing the change between 2022 (the last year available) and 2019 (IPUMS-USA, 2024). The question reads: “How did this person usually get to work LAST WEEK?”, with one possible response being ”Worked from home”. We calculate the fraction who answer “Worked from home” separately for each year and occupation.

We also show robustness using three other measures. One is the share of job-postings offering remote work by occupation from Hansen et al. (2023). Another is the CPS question from October 2022 which asks: “At any time last LAST WEEK, did (you/name) telework or work at home for pay?” The final measure, which is also our instrument and can be used to look at the reduced form, is the pre-pandemic probability a two-digit occupation can be done from home, as developed by Dingel and

[10]During the Covid period, there is an unexplained dip in the number of individuals with a disability, likely due to problems the Census Bureau encountered in interviewing people during Covid.

Neiman (2020). They classify nearly 1,000 occupations as able or unable to be done entirely from home using pre-pandemic data from O*NET, and take averages for aggregate occupation groups.

3 Results

3.1 Trends in Disability Employment

We start by examining overall changes in disability employment. Figure 1 left panel highlights how disability employment (excluding anyone who reports a cognitive difficulty) has surged post-pandemic. This extends prior work by Ne'eman and Maestas (2023) by looking at more recent years (July 2022-June 2024) and controls for compositional changes by excluding the cognitive category. Prior to the pandemic, there were two years of stable employment followed by a sharp, temporary drop during Covid. The pre-pandemic employment trends mirror those for workers without a disability. However, post-Covid the employment patterns diverge. Disability employment rises by 12.4% while non-disability employment remains constant.[11] This represents the reduced-form effect of the Covid shock on the disability employment gap, but does not identify the role of WFH.

Figure 1 right panel shows that the entire increase in disability employment post-Covid comes from a drop in individuals not in the labor force. Early in the pandemic, there is a sharp drop in employment fully mirrored by a rise in unemployment, with little change in labor force participation. In contrast, post-pandemic there is a sharp increase in employment fully mirrored by a decline in individuals not in the labor force, with little change in unemployment. This sharp increase in employment could be driven either by individuals with a disability being more likely to enter or to remain in the labor force.

In a complementary analysis, we find that employment after the onset of a disability is higher post pandemic. In Table A1 we look at individuals who were employed and had no disability in the first month they are surveyed in the CPS, but then report having a disability 12 months later. In the post-covid period, these individuals are 11% more likely to remain employed after the onset of their disability compared to the pre-covid period.[12]

Figure 2 highlights how striking the increase in disability employment is by comparing it to five other key labor-market splits. The upper left graph copies the left panel of Figure 1 for comparability. The remaining five graphs show similar trends in employment growth, but with splits by gender, age, education, race and nativity. While disability employment growth is clearly higher than non-disability employment growth, none of the other demographic splits show sizable differences. The conclusion is that individuals with a disability were uniquely impacted over this time period, with an exceptionally

[11]The average monthly number of employed workers with a physical disability rises from 3.23 million in 2018-2019 to 3.63 million in July 2022-June 2024.

[12]Similarly, individuals who were *not* initially working and acquire a disability are more likely to become employed in the post-covid period, although this result is not statistically significant.

high level of post-pandemic employment growth.[13]

The increase in disability employment appears to be an international phenomenon. We were able to obtain employment data by disability status for the United States and five other countries.[14] As Figure A3 shows, in five countries (Australia, Canada, France, Spain, and the US) there is a substantially larger increase in disability employment (average of 10%) compared to non-disability employment (average of 2%) from 2019 to 2022. In one country (the United Kingdom) we see no difference, with no employment change for either group.[15]

3.2 Disability Employment and Work from Home

In the prior subsection, we documented positive post-pandemic employment trends for individuals with a disability. Correlational evidence from the Survey of Workplace Arrangements and Attitudes (Barrero et al., 2021, 2024) suggests that the ability to work from home helps to keep individuals with a disability in the labor market (see Figure A4). In this section, we examine whether there is a causal link between WFH and the rise in disability employment.

Identification and Estimation. To estimate the causal relationship, we conduct an analysis grouped at the occupation level (86 two-digit occupations) using CPS data. Prior to the pandemic, WFH rates were low in most occupations. Post-pandemic, some occupations experienced large increases in WFH, while others did not (see Figure A5). We use this variation across occupations to estimate the impact of WFH on disability employment.

Specifically, we regress the percent change in disability employment in an occupation on the change in WFH opportunities in an occupation. To measure WFH opportunities we do not use the change in WFH rates for workers with a disability. The reason is that reverse causality could be present if workers with a disability have a high demand for WFH. Instead, we use the WFH rates of *non-disabled* workers post versus pre pandemic. The identifying assumption is that WFH changes in an occupation are driven by changes in the supply and demand for workers without a disability, but not for those with a disability. This is a reasonable assumption, since workers with a disability comprise only 3% of those employed in the two years prior to Covid (2018-2019).

The corresponding regression model is:

$$\% \Delta EMP_j^d = \beta \Delta WFH_j^{nd} + \epsilon_j \tag{1}$$

[13]For context, note that the disability employment gap is also larger than for any other major demographic split (see Figure A2).

[14]The definition of disability varies across countries, and does not distinguish between types of disability as in the US data. We were able to collect data for 2022 and 2019 for a limited set of countries. We tried to get data for other OECD countries such as Germany, Japan, Italy, and Sweden, but the appropriate data was not readily available.

[15]The UK differs from the other countries as it experienced no rise in unemployment during Covid due to extremely generous furlough schemes, see e.g., Spencer et al. (2023).

where j indexes occupations and the superscripts d and nd denote "disability" and "no disability", respectively. We define the percent change in disability employment before versus after Covid in an occupation ($\%\Delta EMP_j^d$) as the number of individuals with a disability who are employed post-Covid (the sum from July 2022 to June 2024 in CPS data) minus the number employed pre-Covid (Janaury 2018 to December 2019), all divided by the number employed pre-Covid. The change in WFH (ΔWFH_j^{nd}) is the WFH rate in an occupation post-Covid (2022) minus the rate pre-Covid (2019) for non-disabled workers. Since occupations differ in size, this affects how precisely the LHS variable is measured; therefore, we weight the regression by the estimated variance of the LHS variable, calculated using 1,000 bootstrap iterations.

However, equation (1) could still suffer from omitted variable bias, since labor market tightness rose post pandemic and this could be positively correlated with changes in WFH at the occupation level. This could make firms more willing to hire disadvantaged workers, including those with a disability. We deal with this in two ways: by controlling flexibly for non-disability employment growth (as a measure of occupational labor-market tightness)[16] and by instrumenting for changes in WFH at the occupation level. The expanded regression model is:

$$\%\Delta EMP_j^d = \beta \Delta WFH_j^{nd} + f(\%\Delta EMP_j^{nd}) + \epsilon_j \tag{2}$$

where $f(\cdot)$ is a polynomial in the percent change in non-disability employment in an occupation. For the IV version of this regression, the corresponding first stage equation is:

$$\Delta WFH_j^{nd} = \gamma DN_j + f(\%\Delta EMP_j^{nd}) + \epsilon_j \tag{3}$$

where DN_j is the Dingel and Neiman (2020) pre-pandemic measure for the probability an occupation can be worked from home. For the instrument to be valid, it needs to be excludable from equation (2), which is plausible given that it is measured pre-pandemic.

Our occupation-level regressions assume that occupations are sticky for individuals with a disability. This is likely to be true, as they are at an age when occupational switching is uncommon. Indeed, the majority of individuals with a disability are over the age of 40 (see Figure A6). Moreover, as we show in Appendix Table A3, our results are not driven by individuals below 40.

Main results. Table 1 reports regression results for total employment, full-time employment, and part-time employment for individuals with a physical disability. We begin by discussing results for full-time employment (usually working $\geq$35 hours) since most workers with a disability work full time (78%) and because this is where the impact of WFH is the largest. Results for total and part-time

[16] We cannot control for labor market tightness using the ratio of job vacancies to unemployment, as the Job Openings and Labor Turnover Survey does not collect information about job tightness at the occupation level (only for 17 industries).

employment are discussed next.

Panel B, column (1) reports an estimate without controls for labor market tightness or composition reweighting; there is a strong link between WFH and full-time disability employment. In column (2) we add in a third order polynomial in non-disability employment, which serves as a flexible control for labor market tightness. These terms make little difference, highlighting that the relationship between rising WFH and full-time disability employment across occupations is largely uncorrelated with non-disability employment growth. In columns (3) and (4) we account for observable changes in composition across our two time periods using inverse propensity score weighting based on age, gender, race, and education.[17] This results in only a small reduction in the estimates. Our baseline estimate in column (4), which controls for both labor market tightness and compositional change, is 1.022. In other words, a 1 percentage point rise in WFH in an occupation leads to a 1.0% increase in full-time disability employment. A back of the envelope calculation reveals that the post pandemic increase in working from home explains 68% of the rise in full-time employment.[18]

Columns (5)-(7) use an instrumental variable approach as an additional way to estimate the causal impact.[19] Our instrument is the Dingel and Neiman (2020) measure for the probability an occupation can be done entirely from home. They use O*NET data prior to the pandemic to classify occupations. This instrument is plausibly independent of other occupation level demand shocks which occurred as a result of Covid. The instrument also strongly predicts the rise in work from home by occupation, with first-stage F-statistics between 28-43 for full-time employment. We also report the *VtF* confidence intervals proposed by Lee et al. (2023), finding the estimates remain statistically significant.[20] As in columns (2)-(4), controls for labor market tightness and composition reweighting make little difference. The IV estimate in the last column is 1.268, which implies that WFH explains 85% of increase in full-time employment. This is 24% larger compared to our non-instrumented estimate in column (4), which could be due to measurement error in our WFH variable. However, the difference is not statistically significant.

We now turn to estimates for both total and part-time employment. For part-time employment, the estimates are negative but with very large standard errors. Using our baseline specification, column (4) in panel C reports an estimate of -0.098, which indicates that WFH had virtually no impact on part-time disability employment. The IV estimates are even more imprecise, and therefore uninformative. For total employment, column (4) in panel A estimates an effect of 0.608 which is

[17]Specifically, we regress the probability an observation will be in the pre-period on a fully-interacted model of age (5 categories), gender (2 categories), race (3 categories), and education (3 categories). We then reweight each post-period observation so that the distribution based on observables is the same as in the pre period.

[18]Work from home increased by 9 percentage points, which when multiplied by our coefficient estimate of 1.022 equals 9.2%. This is 68% of the observed increase of 13.5% over the same sample period.

[19]First stage estimates can be found in Table A2.

[20]The VtF confidence intervals are an alternative to Anderson-Rubin confidence intervals; the VtF confidence intervals are shorter and do not change whether estimates are statistically significant at the 5% level compared to Anderson-Rubin.

statistically significant at the 10% level. The IV estimate in column (7) is 0.734, but not statistically significant. These estimates are smaller than for full-time employment, which is not surprising since total employment includes part-time employment.

Robustness and Heterogeneity. We now turn to robustness and heterogeneity, reporting estimates only for full-time employment. So far, we have been using a WFH measure based on the transportation-to-work question from the ACS, coding WFH as an answer of "worked from home". In Table 2, we use several other WFH measures as robustness checks. For comparison, the first row repeats our analysis from panel B of Table 1 which uses the baseline ACS measure. In row 2, we use the number of job postings which mention WFH using data collected by Lightcast (see Hansen et al., 2023). In row 2 column (4), which controls for labor market tightness and compositional changes, we estimate a 1.135 percent increase in disability employment for every 1 percentage point increase in WFH mentions in job postings. Turning to the IV estimate in column (7), which uses the same instrument as before, we estimate a 1.574 percent increase. When scaled relative to the average change in WFH, the IV estimate using the job posting variable is similar to the IV estimate using the ACS variable.[21]

In the third row, we use the telework variable from the CPS to measure WFH levels in 2023. For this measure, we cannot construct a changes variable, as the question was not asked pre-Covid. Despite the ACS variable being measured in changes and the CPS in levels, the correlation between the two is 0.95. Hence, it is not surprising that the estimates in row 3, when scaled relative to the average (by a factor of 2 = 0.18/0.09), are roughly similar to the effect sizes found in row 1. For completeness, we also report the reduced form effect of our instrument using the Dingel and Neiman classification measured pre-Covid, and find roughly similar effects after scaling (by a factor of 4.2 = 0.38/0.09). In summary, using a variety of WFH definitions, based on information coming from both workers and employers, we find a robust effect on disability employment.

In Table A3 we examine robustness to a range of alternatives, including excluding employees below age 40, including cognitive disabilities, and splitting by disability type and by gender.

4 Mechanisms

A natural next question is whether labor supply or demand forces are behind the substantial increase in full-time employment for individuals with a disability.

On the supply side, WFH may reduce commuting costs, which for workers with a disability can

[21]Since the mean change in WFH using the job posting variable is two-thirds the size of the mean ACS change (.06 versus .09), to compare the estimates in row 2 to row 1, we multiply by two-thirds. When we do this, the scaled estimate in row 2 columm (4) for job postings is 26% smaller than the comparable ACS estimate in row 1 (1.135*.67 = .670 versus 1.022). When we use the instrument, the scaled estimate is somewhat smaller (1.574*.67 = 1.055 versus 1.268). The fact the estimate in column (4) is smaller than the IV estimate in column (7) is likely due to measurement error in the job posting data.

be extremely high. Workers with vision or physical restrictions are often unable to drive or even use public transit, requiring them to use more expensive commuting options like taxis or relying on family members to drive. WFH can also reduce the per hour disutility of working, since employees can better optimize their home working environment. For example, at home employees can better control their desk set-up, lighting, background noise, or bathroom and kitchen accessibility and layout. In addition, WFH can grant more flexibility in work times and hours.

On the demand side there are three potential factors. First, WFH could lower the cost of employing workers with a disability by avoiding the need to provide accommodations at the workplace, such as ramps, elevators, and automatic doors. Second, the hiring process for WFH jobs may also impede discrimination, since it is harder to observe if an employee has a disability in a video interview. Finally, WFH may increase the relative productivity of workers with a disability if controlling their working environment increases their productivity. For example, an employee with a hearing disability can be more productively work in the absence of background noise, which is easier to achieve at home.

To distinguish between demand and supply impacts in the market for workers with a disability, we examine the effects on wages. If increasing WFH mainly impacts the supply of workers with a disability, we should see a fall in their wages as the supply curve moves along the demand curve. If instead rising WFH primarily impacts demand, we should see rising wages. In Table 3, we explore wage growth in high versus low WFH occupations before versus after the pandemic.[22] For workers with a disability, wages fell by 1.4% in high WFH occupations, but rose by 2.5% in low WFH occupations. The difference-in-difference is a statistically significant -3.9% drop in wages. This is consistent with a greater increase in labor supply of workers with a disability in high WFH occupations. Of course, the drop in relative wages could be due to lower wage growth in high versus low WFH occupations more generally. To account for this possibility, we take a triple difference, i.e., differencing out the corresponding change for workers without a disability. If anything, wages grew slightly faster for workers without a disability in high versus low WFH occupations (2.0% versus 1.7%). The triple difference is a statistically significant -4.2%.[23]

Increased employment and falling wages for workers with a disability are consistent with increased labor supply. Of course, increases in demand from productivity or reductions in costs borne by employers could also be in play, but the fall in wages suggest supply effects are the dominant driver of rising disability employment. The fact that the increase in employment of people with disabilities is not coming from a decrease in unemployment also suggests supply-side factors are first-order (see Figure 1b).

[22]For this analysis, we use three-year windows before and after the pandemic and a more parsimonous specification to increase precision, as earnings are only available for one-fourth of the sample.

[23]If we perform a placebo analysis looking at wage changes in two periods both occurring pre-covid (2017-2019 versus 2014-2016), we find a triple difference which is a statistically insignificant increase of 1.7% (s.e.=2.1).

5 Conclusion

The pandemic fundamentally changed many aspects of the labor market. New technologies such as remote teleconferencing altered the structure of the workplace, affecting both where and how work gets done. These adaptations were not put into place to target workers with a disability, but rather introduced due to Covid and applied universally to all workers. This paper provides causal evidence that the increase in WFH due to Covid led to a dramatic increase in disability employment. Our estimates imply that the post-Covid rise in WFH increased the full-time employment of individuals with a physical disability by 9% on average, and by as much as 36% in computer occupations. Our findings indicate that individuals with a disability have substantial work capacity. WFH provides individuals with a disability who were previously not able to realize this capacity the means to do so.

Moving forward, WFH could have even larger impacts on disability employment as firms continue to develop and adopt remote work technologies. This has major implications not just for labor markets and disability workers, but given their importance in overall labor markets for longer-run growth and fiscal balance.

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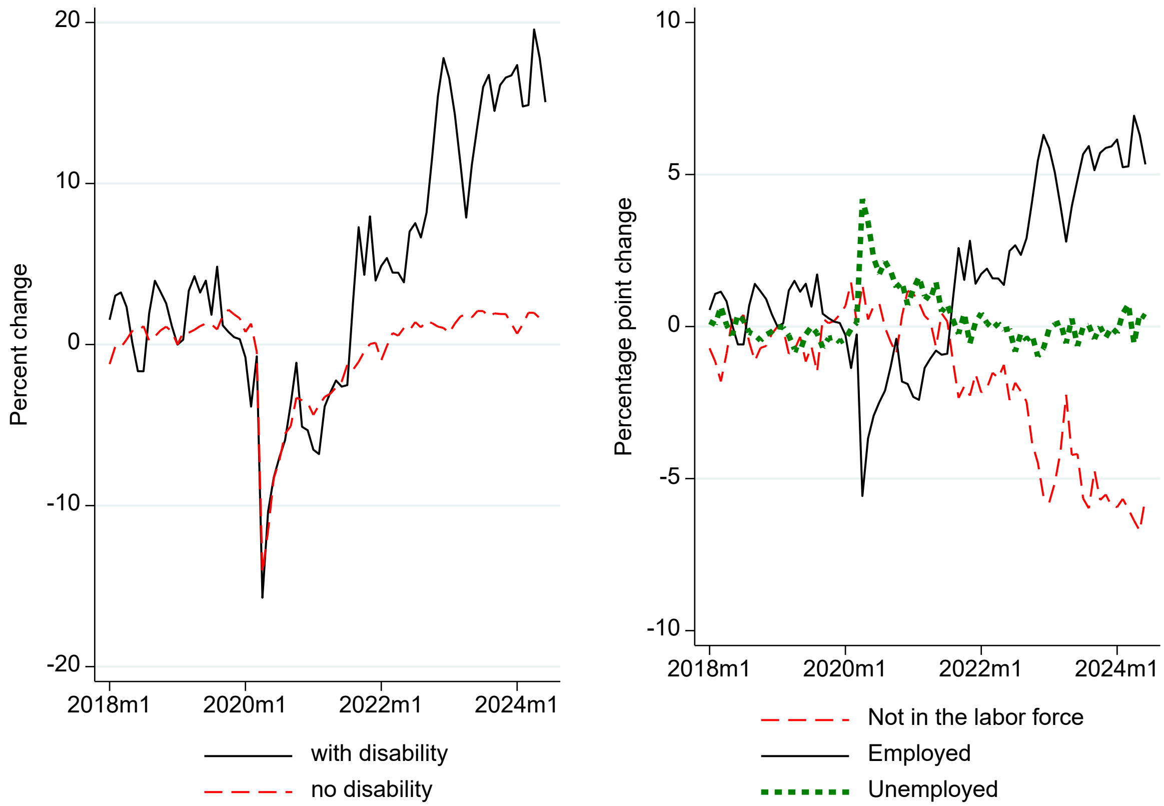
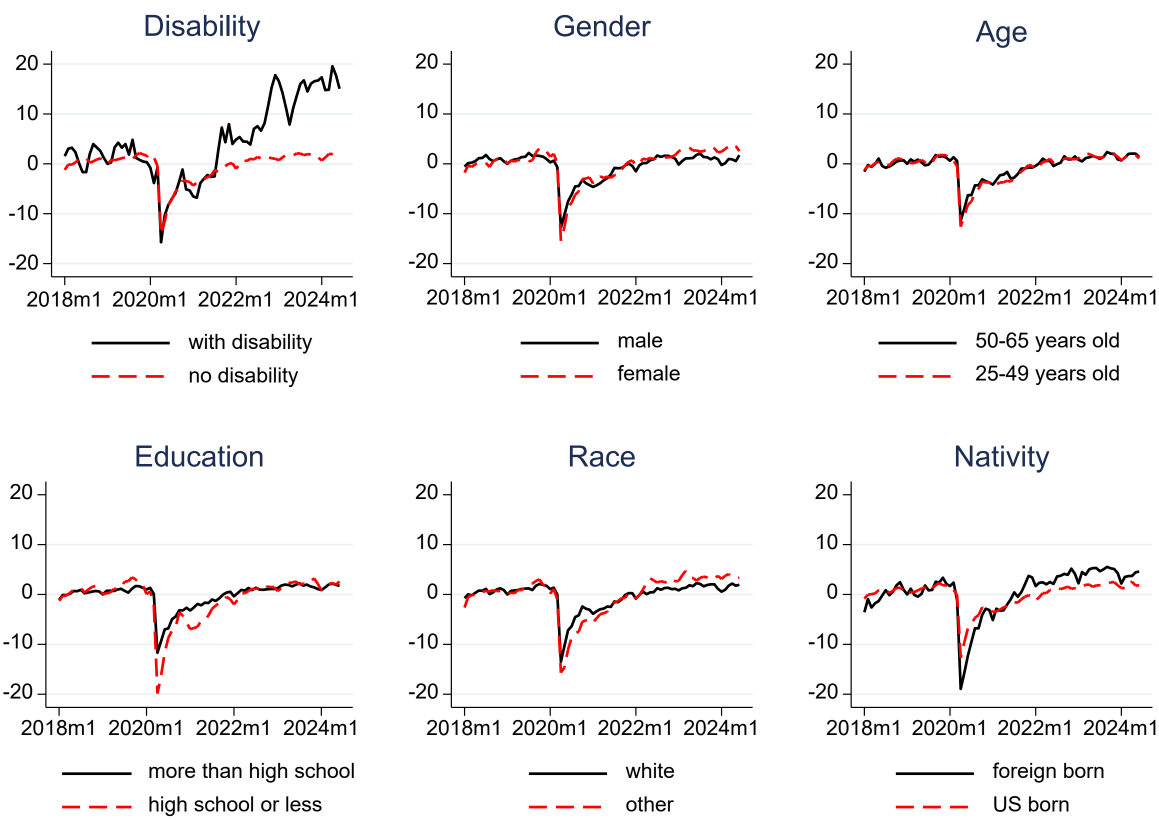
Figure 1. Disability employment increased post pandemic from rising labor force participation



Notes: The left panel graphs the percent change in the employment rate relative to January 2019 for those with and without a physical disability (18-64 years old) using CPS data. The right panel decomposes the population with a physical disability into employment, unemployment and not being in the labor force (relative to January 2019).

Figure 2. Disability employment rose faster than for any other major demographic group



Notes: See notes to Figure 1. Foreign born is defined as born abroad and immigrated after the year 2000.

Table 1: The effect of WFH on employment of workers with a disability; by total, full-time, and part-time status

	Dependent variable: Percent change in disability employment pre/post covid						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Panel A: Total disability employment			
Change in occupation WFH share	.888**	.713**	.784**	.608*	.717	.589	.734
	(.338)	(.323)	(.332)	(.314)	(.592)	(.588)	(.467)
					[-.406, 1.827]	[-.526, 1.691]	[-.117, 1.678]
				Panel B: Full-time disability employment			
Change in occupation WFH share	1.153***	1.148***	1.040***	1.022***	1.270**	1.132**	1.268**
	(.381)	(.349)	(.368)	(.336)	(.529)	(.518)	(.565)
					[.276, 2.275]	[.157, 2.113]	[.226, 2.400]
				Panel C: Part-time disability employment			
Change in occupation WFH share	-.379	-.109	-.371	-.098	-1.659	-1.605	-.842
	(.688)	(.677)	(.695)	(.684)	(1.130)	(1.151)	(1.037)
					[-3.798, .413]	[-3.784, .502]	[-2.835, 1.028]
First stage F-test:							
Total employment					38.9	38.2	23.5
Fulltime employment					42.9	42.4	28.4
Parttime employment					26.5	25.9	19.0
Controls for labor market tightness		X		X			X
Composition reweighted			X	X		X	X
Instrument for WFH measure					X	X	X

Notes: The dependent variable is the percent change in the number of individuals with a physical disability who report being employed in an occupation between January 2018 to December 2019 and July 2022 to June 2024 in the CPS, using the CPS provided survey weights. Full-time and part-time disability employment are defined as usually working ≥35 and <35 hours per week, respectively, and total is the sum of the two. The independent variable is defined as the change in the fraction of individuals *without* a disability who report "worked from home" in 2022 versus 2019 using the transportation-to-work question from the ACS. Controls for labor market tightness are a third-order polynomial of the change in (total, full-time, or part-time) nondisabled employment post versus pre covid. Composition reweighted uses the underlying micro-data to create an inverse propensity score weight based on a fully interacted regression model for age (5 categories), gender (2 categories), race (3 categories), and education (3 categories). The instrument is the predetermined WFH probability for an occupation taken from Dingel & Neiman (2020). Occupation is defined using 2-digit standard occupational classification codes (97 occupations), merging occupations if there are less than 10 workers with a disability, which yields 86 occupations for estimation. Robust standard errors in parentheses; VtF confidence intervals (Lee et al. 2023) in brackets. Since occupations differ in size, this affects how precisely the LHS variable is measured; therefore, we weight the regressions by the estimated variance of the LHS variable, calculated using 1,000 bootstrap iterations.
***p<.01, **p<.05, * p<.10

Table 2: The effect of WFH on full-time employment of workers with a disability; using different WFH measures

	Dependent variable: Percent change in disability employment pre/post covid by occupation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Panel A: Change in occupation WFH share			
ACS WFH measure	1.153***	1.148***	1.040***	1.022***	1.270**	1.132**	1.268**
(mean=.09)	(.381)	(.349)	(.368)	(.336)	(.529)	(.518)	(.565)
					[.276, 2.275]	[.157, 2.113]	[.226, 2.400]
Job postings (Lightcast)	1.483***	1.247**	1.376***	1.135**	1.686**	1.504**	1.574**
(mean=.06)	(.491)	(.490)	(.472)	(.468)	(.708)	(.689)	(.776)
					[.384, 2.990]	[.239, 2.766]	[.180, 3.366]
				Panel B: Level of occupation WFH share			
CPS WFH measure	.504***	.490***	.449**	.430**	.556**	.495**	.537**
(mean=.18)	(.181)	(.173)	(.177)	(.167)	(.238)	(.233)	(.243)
					[.104, 1.008]	[.053, .937]	[.082, 1.015]
Dingel&Neiman	.185**	.190***	.164**	.169**	-	-	-
(mean=.38)	(.079)	(.071)	(.078)	(.068)			
First stage F-test:							
Job postings					27.9	27.4	17.2
CPS measure					60.9	60.3	36.1
Controls for labor market tightness		X		X			X
Composition reweighted			X	X		X	X
Instrument for WFH measure					X	X	X

Notes: See notes to Table 1. See Section 2.2 for definitions of the different WFH measures.
***p<.01, **p<.05, * p<.10

Table 3: Wages by disability status in high versus low WFH occupations before and after the pandemic

	Jan 2017-Dec 2019 (1)	July 2021-June 2024 (2)	% difference (2)-(1) / (1)	Diff in Diff row (b) – row(a)	Triple Diff
	Mean Hourly Real Wage				
Workers with a disability					
a. High WFH occupation	25.99	25.62	-1.4		
			(1.5)		
b. Low WFH occupation	19.73	20.22	2.5		
			(1.4)		
				-3.9	
				(2.0)	
Workers without a disability					
a. High WFH occupation	28.16	28.73	2.0		
			(0.2)		
b. Low WFH occupation	21.06	21.41	1.7		
			(0.2)		
				0.3	
				(0.3)	
					-4.2
					(2.0)

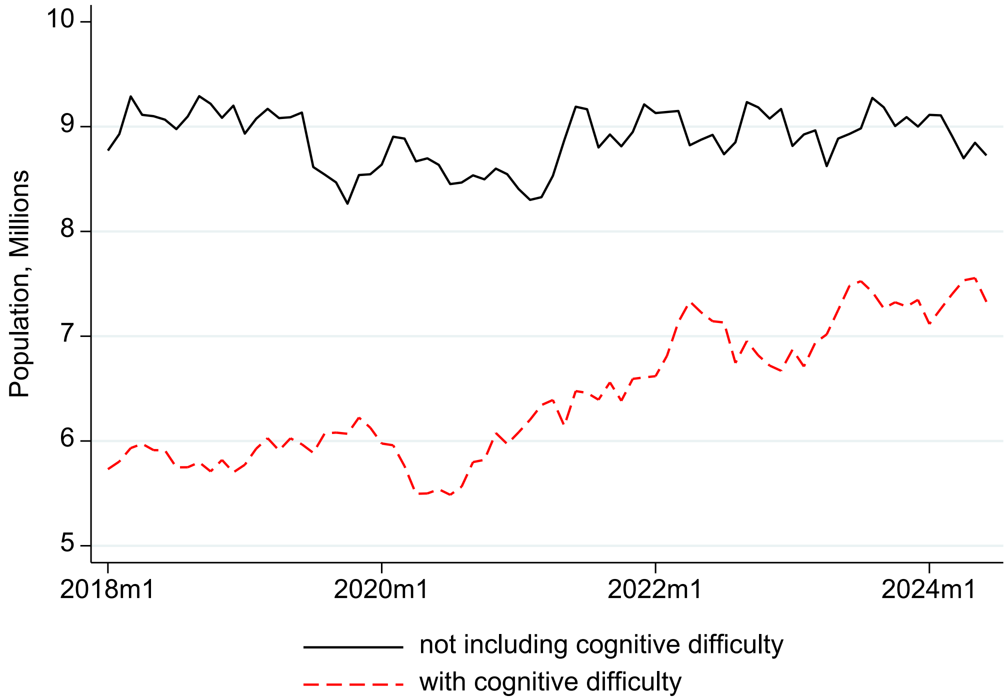
Notes: Each cell in columns (1) and (2) reports average wages using data from the CPS, adjusted using the CPI with 2017 as the base year. High WFH and Low WFH occupations defined as occupations with above or below median occupational WFH rates. We trim wages by excluding values below the Federal minimum wage of $7.25 and by excluding values greater than $100 (>29th percentile). Standard errors calculated using the bootstrap with 500 iterations.
***p<.01, **p<.05, * p<.10

Online Appendix

"Work from Home and Disability Employment"

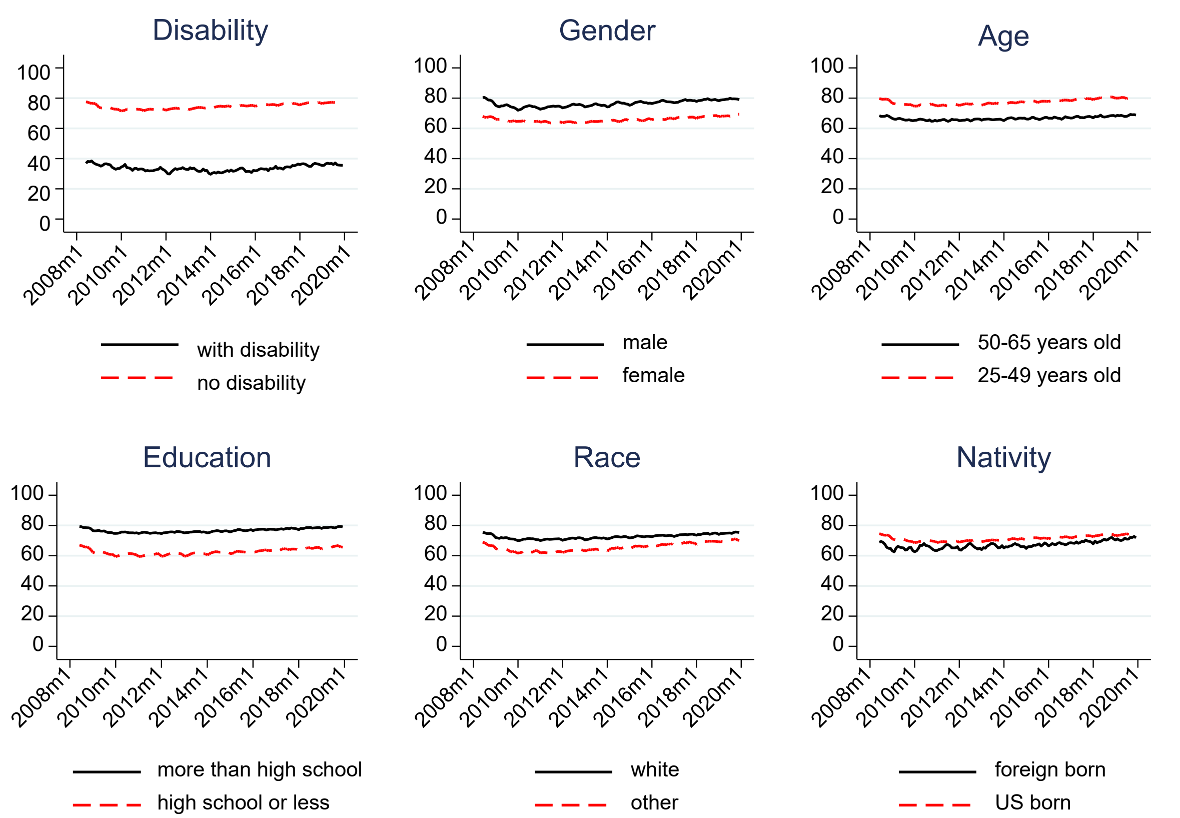
Nicholas Bloom, Gordon B. Dahl, and Dan-Olof Rooth

Appendix Figure A1. Number of people with physical and cognitive disabilities over time



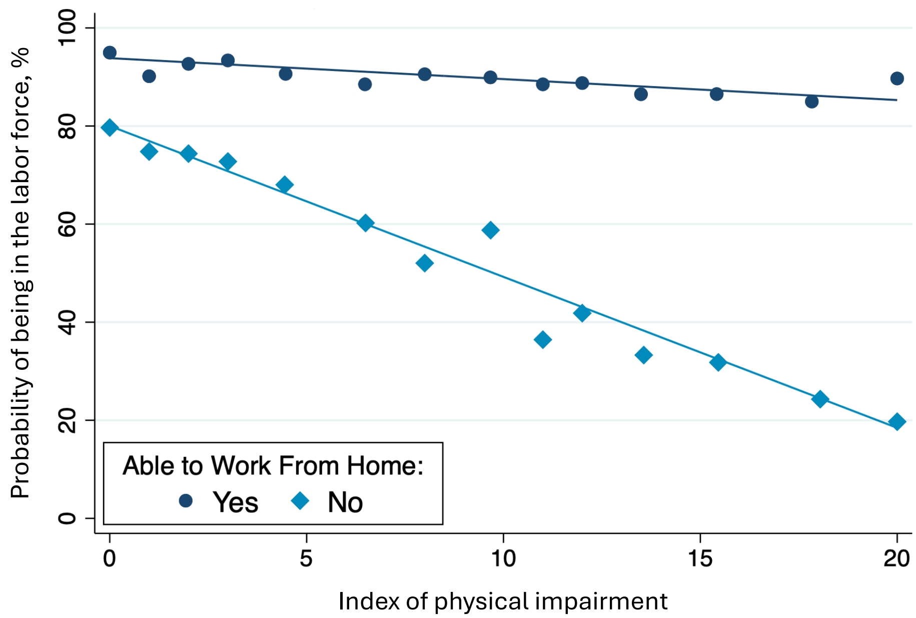
Notes: CPS counts of the number of people (18-64 years old) with physical difficulties (i.e., not including a cognitive difficulty) and cognitive difficulties. Physical difficulties include hearing, vision, ambulatory, self-care and independent living.

Appendix Figure A2. The disability employment gap is larger than for other demographic splits



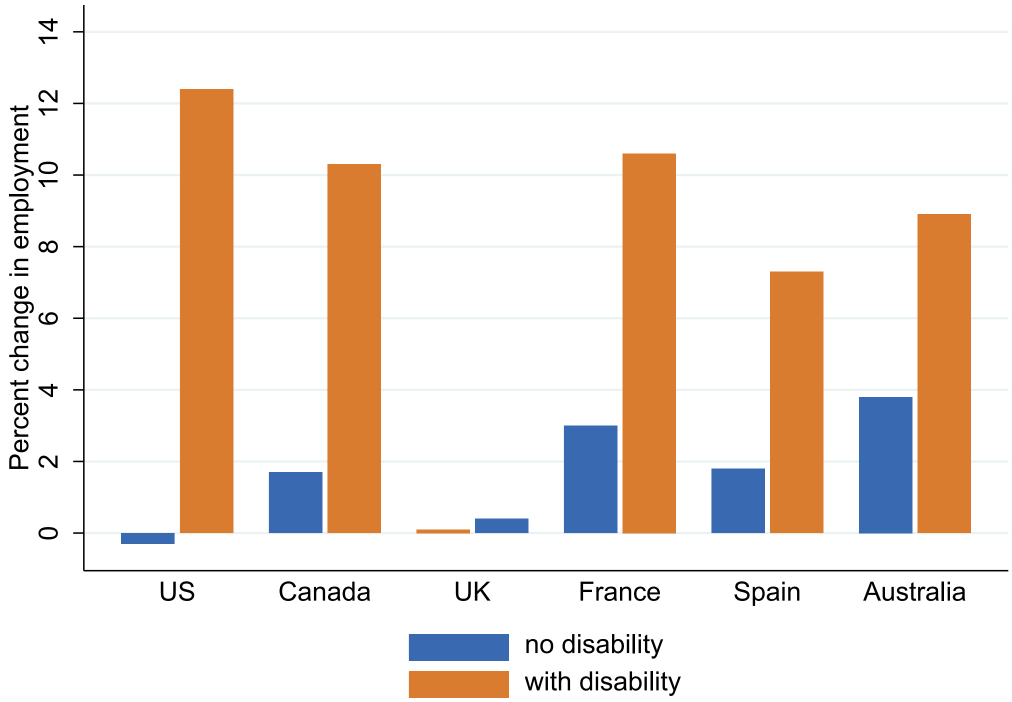
Notes: Employment gaps by disability status, gender, age, education, race and nativity using CPS data. Foreign born is defined as born abroad and immigrated after the year 2000.

Appendix Figure A3. The ability to work from home increases disability labor force participation



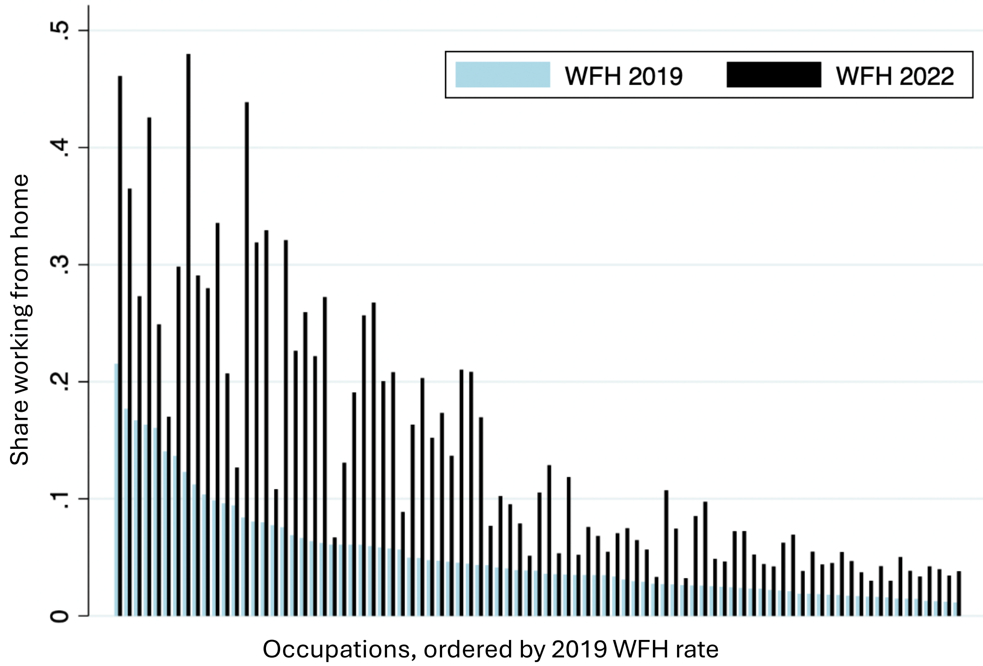
Notes: The figure plots data from Barrero et al. (2024) on labor force participation (LFP) and physical impairment, separately by whether an individual's current (or most recent) job allows them to work from home. Index of physical impairment is constructed using the question: "The following items are about activities you might do during a typical day. Does your health currently limit you in these activities?" The index sums up answers of 0 ("No, not limited at all"), 1 ("Yes, limited a little"), and 2 ("Yes, limited a lot") for 10 activities such as the ability to carry groceries, climb stairs, or walk one block. Labor force participation is constructed using the question: "Last week what was your work status?" There is a strong negative relationship between physical impairment and working status for individuals who cannot work from home, going from 80% LFP for those with no physical impairment to only 20% for those with the highest level of physical impairment. In contrast, for employees who can work from home, the decline in LFP is modest, going from 95% to 90%. The data comes from the March to July 2023 waves of the Survey of Workplace Arrangements and Attitudes, which polls US residents each month with questions on demographics, working status, and attitudes (Barrero et al. 2021). The sample includes persons aged 40 or more who pass all attention check questions, reweighted for those earning $10,000 or more in a prior year to match the Current Population Survey by age, sex, education and earnings. N = 14,314.

Appendix Figure A4. Changes in disability employment across countries, 2022 versus 2019



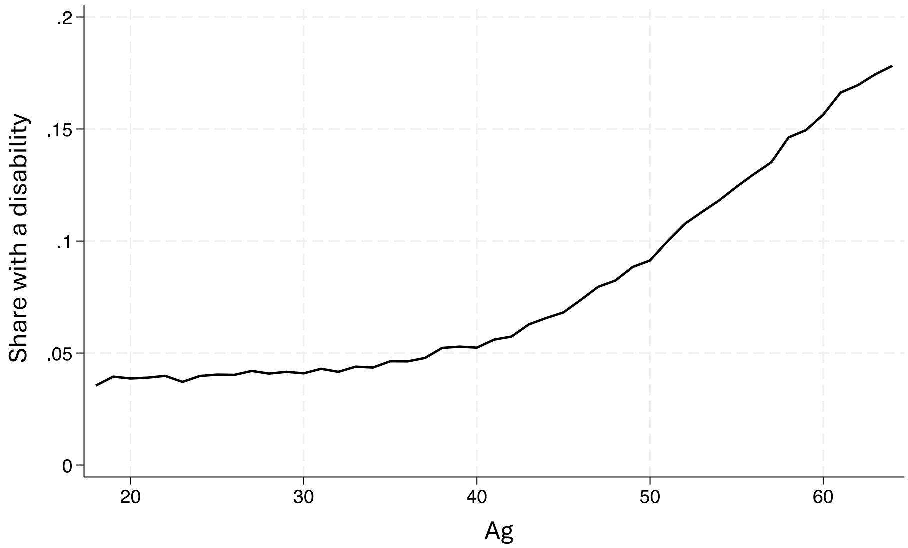
Notes: Percent changes in the employment rate between 2019 and 2022 for those with and without a disability. Calculations using data from the US CPS and the UK Labor Force Survey. The numbers for Canada, France and Spain are from publicly available statistics from national labor force surveys. This figure also uses unit record data from Household, Income and Labour Dynamics in Australia Survey [HILDA] conducted by the Australian Government Department of Social Services (DSS). The findings and views reported in this paper, however, are those of the author[s] and should not be attributed to the Australian Government, DSS, or any of DSS' contractors or partners. DOI 10.26193/R4IN30.

Appendix Figure A5. WFH rates in 2019 and 2022 across occupations



Notes: Work from home rates (WFH) for workers without a disability in 2019 and 2022 using the transportation-to-work question from the ACS. There are 86 occupations.

Appendix Figure A6. Fraction of individuals with a disability, by age



Notes: Fraction of individuals in the US with a disability by age based on CPS data between May 2008-December 2019.

Appendix Table A1: Employment after acquiring a disability before versus after covid by initial employment status

	January 2018- December 2019 (1)	July 2022- June 2024 (2)	Difference, % (2)-(1) / (1)	Difference in Difference row (b) – row (a)
Panel A: Employed with no disability in wave 1				
a. Share employed if no disability one year later	92.9	93.1	0.2	-
			(0.3)	
b. Share employed if disability one year later	70.9	78.9	11.3	-
			(3.9)	
				11.1
				(3.9)
Panel B: Not employed and no disability in wave 1				
a. Share employed if no disability one year later	26.9	26.8	-0.4	-
			(2.6)	
b. Share employed if disability one year later	6.7	10.2	51.9	-
			(36.9)	
				52.3
				(37.1)

Notes: This table examines how employment changes after the onset of a disability, and how this differs pre versus post pandemic. The structure of the CPS data is that individuals are asked their disability and employment status in the first month they are surveyed (wave 1), and then again twelve months later (wave 5). Panel A takes the set of individuals who were employed and had no disability in wave 1 and then calculates the fraction still employed 12 months later, separately by whether they acquired a disability. We do this exercise first for the pre-pandemic period (January 2018-December 2019) and then for the post-pandemic period (July 2022-June 2024). Panel B conducts a similar analysis, but for individuals who were not employed and had no disability in wave 1. The third column reports the percent change in employment rates post versus pre covid, i.e., 11.3%=(78.9-70.9)/78.9. The final column reports the difference in difference estimator. Standard errors calculated using the bootstrap with 500 iterations. ***p<.01, **p<.05, * p<.10

Appendix Table A2: First stage regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Panel A: First stage estimates for Table 1					
	Total disability employment			Full-time disability employment			Part-time disability employment		
Predetermined probability an occupation can be done remotely	.133***	.132***	.126***	.145***	.145***	.133***	.100***	.100***	.103***
	(.021)	(.021)	(.026)	(.022)	(.022)	(.025)	(.019)	(.020)	(.024)
First stage F-test	38.9	38.2	23.5	42.9	42.4	28.4	26.5	25.9	19.0
				Panel B: First stage estimates for Table 2					
	Job postings			CPS Measure					
Predetermined probability an occupation can be done remotely	.109***	.109***	.107***	.332***	.331***	.314***			
	(.021)	(.021)	(.026)	(.042)	(.043)	(.052)			
First stage F-test	27.9	27.4	17.2	60.9	60.3	36.1			
Controls for labor market tightness			X			X			X
Composition reweighted		X	X		X	X		X	X

Notes: First stage regressions corresponding to Table 1. See notes to Table 1.
***p<.01, **p<.05, * p<.10

Appendix Table A3: The effect of WFH on full-time employment of workers with a disability; heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS	1.022***	1.017**	1.191***	1.238***	.897*	1.250***	.887	.841***	.422	-.852
	(.336)	(.420)	(.453)	(.341)	(.498)	(.419)	(.579)	(.315)	(.530)	(1.158)
IV	1.268**	1.326**	1.272**	1.398***	.660	1.758***	1.152	.975***	.241	-1.723
	(.565)	(.638)	(.579)	(.541)	(.804)	(.633)	(.763)	(.468)	(.809)	(1.550)
	Baseline	Age 40+	Unweighted	Including cognitive disabilities	Only functional limitations	Only sensory impairments	Disabled in both waves	Disabled in one wave	Male	Female

Notes: See notes to Table 1. Column 1 repeats the baseline estimates from Table 1. Column 2 limits the sample to those age 40 or older. Column 3 does not weight by the estimated variance of the left-hand side variable. Column 4 includes individuals reporting a cognitive difficulty. Columns 5 and 6 split the sample into two disability groups: those that only include only ambulatory, self-care, or independent living difficulties (functional limitations) and only hearing or vision difficulties (sensory impairments). Column 7 includes individuals who report a physical disability in both survey waves, while column 8 uses individuals who report in only one wave. Columns 9 and 10 split by gender. The estimates are based on the same specifications used in columns 4 and 7 of Table 1. Robust standard errors in parentheses.
***p<.01, **p<.05, * p<.10