The Big Shift to Remote Work

Steven J. Davis
Hoover Institution & Chicago Booth

Institute for Capacity Development
International Monetary Fund
29 March 2023
Outline, 1

1. The big shift to remote work/work from home (WFH)
2. Why the shift will stick, including:
   • How it was catalyzed by the pandemic
   • How it was amplified by policy responses to COVID-19
3. The demography & geography of WFH
4. Some benefits of the shift to WFH
5. Good or bad for productivity & innovation?
Outline, 2

6. The shift moderates wage growth
7. WFH and the surge in business startups
8. Challenges for cities and civic leaders
9. WFH and economic resilience

End

For those who are interested, and if time permits: Additional remarks on data sources, data creation, and measurement methods
The Big Shift to Remote Work
Percent of Full Paid Workdays Performed at Home in the United States, Workers 20-64, 1965 to October 2022

- AHTUS paid WFH M-F
- ACS travel mode
- SWAA

AHTUS = American Historical Time Use Survey

ACS = American Community Survey

SWAA = Survey of Working Arrangements & Attitudes

1965-1975 uses data from the American Historical Time Use Survey.
May 2020 - October 2022 uses data from the Survey of Working Arrangements and Attitudes.
Zooming into SWAA Sample Period: May 2020 to March 2023

WFH days are settling at about 27 percent of all paid workdays in the U.S.

Source: SWAA data from 114,117 survey responses weighted to match the US population. Pre-covid data from the American Time Use Survey. CHPS 241,491 respondents weighted to match the US population aged 20 to 64 in households with incomes above $25,000. Survey of Working Arrangements and Attitudes (Barrero, Bloom and Davis 2021c) https://wfhresearch.com/
Employees fall into three groups

Front-line employees, mostly non-graduates, lower paid

Professionals and managers, mostly graduates, higher paid

Specialized roles - IT support, payroll, customer support (e.g., call centers)

Source: US SWAA responses reweighted to US labor force using the CPS. Details on [https://wfhresearch.com/](https://wfhresearch.com/)
Many other pandemic-induced shifts have largely dissipated, but WFH remains at roughly 5X its pre-pandemic level (US Data)

WFH is more prevalent in industries with higher shares of professional and knowledge workers – US Data from the SWAA

Current WFH: all wage and salary employees by industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Days per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information (incl. part of tech)</td>
<td>2.72</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>2.18</td>
</tr>
<tr>
<td>Professional &amp; Business Services</td>
<td>1.98</td>
</tr>
<tr>
<td>Arts &amp; Entertainment</td>
<td>1.95</td>
</tr>
<tr>
<td>Real Estate</td>
<td>1.84</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>1.69</td>
</tr>
<tr>
<td>Government</td>
<td>1.53</td>
</tr>
<tr>
<td>Construction</td>
<td>1.51</td>
</tr>
<tr>
<td>Utilities</td>
<td>1.42</td>
</tr>
<tr>
<td>Health Care &amp; Social Assistance</td>
<td>1.33</td>
</tr>
<tr>
<td>Education</td>
<td>1.31</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.94</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>0.77</td>
</tr>
<tr>
<td>Other Personal Services</td>
<td>0.65</td>
</tr>
<tr>
<td>Hospitality &amp; Food Services</td>
<td>0.58</td>
</tr>
<tr>
<td>Transportation and Warehousing</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Source: U.S. Survey of Working Arrangements and Attitudes at www.wfhresearch.com
Sample: N=13,662 from April to July 2022
WFH Rates Are Higher at Younger Firms

Percent of full paid workdays performed at home by birth year of the employer’s firm

Source: Authors’ calculations using individual-level data from the U.S. Survey of Working Arrangements and Attitudes at www.wfhresearch.com.

Note: Birth year is the first calendar year in which the employer’s firm had one or more paid employees.
Working from Home Is Now a Global Phenomenon among Well-Educated Workers

Paid Full Days Working from Home in the Survey Week, Country-Level Conditional Means

Q: “How many full paid days are you working from home this week?”

The chart reflects country dummies in OLS regressions that control for age (20-29, 30-39, 40-49, 50-59), sex, education (Secondary, Tertiary, Graduate), 18 industry sectors and survey wave, treating the raw U.S. mean as the baseline value. We fit the regression to data for 33,091 G-SWA respondents surveyed in mid 2021 and early 2022. The “Average” value is the simple mean of the country-level conditional means. The samples exclude persons who did not finish primary school. 

HE = sample skewed to highly educated workers in the country.

Reproduced from Aksoy et al. (2022).
US, UK and Canada Have More WFH than Europe (ex. UK)

Source: Data from Google Workplace Cellphone Mobility Data
https://www.google.com/covid19/mobility/
Deviations from the Jan 3 – Feb 6 2020.
The Share of Online Vacancy Postings that Explicitly Offer Remote Work Has Risen Sharply Since Spring 2020

These statistics reflect the application of our BERT-based language model to 250+ million online job postings. The model inputs each posting and outputs whether the posting says the job allows 1+ days a week of remote work. In constructing this chart, we control for differences across countries and over time in the occupational distribution of vacancy postings. Specifically, we compute monthly, country-level shares as the weighted mean of the own-country occupation-level shares, with weights given by the U.S vacancy distribution in 2019. Our occupation-level granularity is roughly equivalent to six-digit SOC codes.

Source: Hansen et al. (2023) using Lightcast data.
The Prevalence of Postings that Allow Remote Work Varies Greatly, Even among Same-Industry Firms Recruiting in the Same Occupational Category

A. Selected Aerospace Firms (NAICS 3364), Management Occupations (SOC 11)
- Boeing
- Lockheed Martin
- Northrop Grumman
- SpaceX

B. Selected Insurance Firms (NAICS 5241), Mathematical Science Occupations (SOC 15-20)
- Mutual of Omaha Company
- UnitedHealth
- Humana

C. Selected Auto Manufacturing Firms, Engineering Occupations (SOC 17-2)
- Honda
- General Motors
- Ford
- Tesla

Source: Hansen et al. (2023) using Lightcast data.
Why the Shift Will Stick, Including:

How it was catalyzed by the pandemic

How it was amplified by policy responses to COVID-19
Why the big shift to WFH will stick, and how the pandemic catalyzed a lasting shift

1. Mass experimentation → learning and revision of prior views → re-optimization of working arrangements
2. Investments in time, equipment, systems, processes, and management practices that enable and improve WFH
3. A surge in innovation that supports WFH
4. Attitudinal shifts:
   - Stigma around WFH has plummeted
   - Infection risks became more salient, leading to greater desires for WFH
4. Stricter, longer lockdowns during the pandemic → higher levels of planned WFH after the pandemic
5. Strategic complementarities reinforced all of the above.

The rise of the internet, emergence of the cloud, and advances in two-way video technologies before the pandemic created the conditions that made possible an abrupt, big shift to remote work.
COVID-19 Compelled Firms and Workers to Experiment at Scale with Working from Home

“If you’d said three months ago that 90% of our employees will be working from home and the firm would be functioning fine, I’d say that is a test I’m not prepared to take because the downside of being wrong on that is massive.”

– James Gorman, CEO of Morgan Stanley*

Quotation from Cutter (WSJ, 2020)
Forced Experimentation: WFH productivity during the pandemic exceeded expectations. U.S. SWAA, July 2020 to March 2021

Relative to expectations, how has WFH turned out?

- **Hugely better, 20%+**
  - 20.2% of respondents

- **Substantially better - 10 to 20%**
  - 22.3% of respondents

- **Better -- up to 10%**
  - 19.0% of respondents

- **About the same**
  - 25.4% of respondents

- **Worse - up to 10%**
  - 6.9% of respondents

- **Substantially worse - 10 to 20%**
  - 3.3% of respondents

- **Hugely worse, 20%+**
  - 3.0% of respondents

Compared to your expectations **before COVID (in 2019)** how has working from home turned out for you?

- **Hugely better -- I am 20%+ more productive than I expected**
- **Substantially better -- I am to 10% to 19% more productive than I expected**
- **Better -- I am 1% to 9% more productive than I expected**
- **About the same**
- **Worse -- I am 1% to 9% less productive than I expected**
- **Substantially worse -- I am to 10% to 19% less productive than I expected**
- **Hugely worse -- I am 20%+ less productive than I expected**

Reproduced from Barrero et al. (2021c).
Desired and planned levels of WFH after the pandemic increase with WFH productivity surprises during the pandemic

Source: Response to the questions:

After COVID, in 2022 and later, how often would you like to have paid workdays at home?

After COVID, in 2022 and later, how often is your employer planning for you to work full days at home?

Compared to your expectations before COVID (in 2019) how has working from home turned out for you?

Notes: This figure shows bin scatters of worker desires and employer plans for WFH after the pandemic against WFH productivity surprises during the pandemic.

Data are from 30,750 survey responses collected from July 2020 to March 2021 and reweighted to match the share of working age respondents in the 2010-2019 CPS in a given (age x sex x education x earnings) cell. We did not ask about productivity relative to expectations in May 2020.

The Distribution of WFH Productivity Relative to Expectations
27-Country Sample, Mid 2021 and Early 2022

WFH productivity, relative to expectations

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hugely better, 20%+</td>
<td>18.6</td>
</tr>
<tr>
<td>Substantially better - 10 to 20%</td>
<td>22.0</td>
</tr>
<tr>
<td>Better - up to 10%</td>
<td>15.8</td>
</tr>
<tr>
<td>About the same</td>
<td>31.0</td>
</tr>
<tr>
<td>Worse - up to 10%</td>
<td>6.3</td>
</tr>
<tr>
<td>Substantially worse - 10 to 20%</td>
<td>3.5</td>
</tr>
<tr>
<td>Hugely worse, 20%+</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Question: Compared to your expectations before COVID (in 2019) how has working from home turned out for you?
- Hugely better – I am 20%+ more productive than I expected
- Substantially better – I am to 10% to 19% more productive than I expected
- Better – I am 1% to 9% more productive than I expected
- About the same
- Worse – I am 1% to 9% less productive than I expected
- Substantially worse – I am to 10% to 19% less productive than I expected
- Hugely worse – I am 20%+ less productive than I expected

Sample of 19,027 G-SWA respondents in mid 2021 and early 2022 who worked mainly from home at some point during the COVID-19 pandemic.

Reproduced from Aksoy et al. (2022).
WFH Productivity Surprises Are Positive, on Average, in All Countries

WFH productivity, relative to expectations

**Question**: “Compared to your expectations before COVID how has working from home turned out for you?”

Country-level values are conditional means. The “Average” value is the simple mean of the country-level conditional means.

Reproduced from Aksoy et al. (2022).
Planned levels of WFH after the pandemic rise with WFH productivity surprises during the pandemic.

Questions:
-- Compared to your expectations before COVID, how has working from home turned out for you?
-- After COVID, in 2022 and later, how often is your employer planning for you to work full days at home?

This pattern holds in all 27 countries. See appendix to Aksoy et al. (2022).

Vertical scale: How many days per week, on average, employers plan for respondents to WFH after the pandemic ends.

N = 18,455 individual-level observations in 27 countries.
The foregoing evidence provides powerful support for a three-part explanation of how and why the pandemic catalyzed a large, lasting uptake in WFH:

1. The pandemic drove a mass, compulsory experiment in WFH.
2. Mass experimentation generated new information and shifted perceptions about the feasibility and productivity of WFH.
3. The shift in perceptions drove a re-optimization of working arrangements, which included a large, lasting shift to much higher WFH levels.

The pre-conditions for the shift were also in place: Major advances during previous decades in the technologies, infrastructure, and products that support the internet, two-way video, and other forms of remote interaction.
This explanation and supporting evidence do not imply the big shift to WFH raised productivity. To see this point, consider a simple example:

• Before the pandemic, suppose all workers and their employers perceive WFH to be 10 percent less productive than onsite work.
• Suppose, as well, that all workers are willing to accept a 5 percent pay discount to WFH, in line with evidence presented below.

No one works from home in these circumstances, because the perceived productivity loss exceeds the willingness to pay. Now consider what happens in reaction to a pandemic that forces employers and workers to WFH for weeks or months.

• Based on experiences during the pandemic, suppose half of workers (and their employers) learn that WFH is about as (un)productive as expected, while the other half learns it is $\Delta$ percent more productive than expected.
Discussion, 3

Three cases:

i. When $0 < \Delta < 5$, WFH levels return to zero after the pandemic ends. In this case, the positive productivity surprise is too small to trigger a lasting change in working arrangements.

ii. When $5 < \Delta < 10$, half of workers stick with WFH after the pandemic ends, because they now face a productivity discount of only $10 - \Delta$ percent, which is smaller than their willingness to pay to WFH.

- In this case, the productivity surprise triggers a lasting shift to WFH and a productivity fall of $\left(\frac{1}{2}\right)(10 - \Delta)$ percent.

- For example, if the pandemic leads half of workers to conclude that WFH is only 2 percent less productive than onsite work ($\Delta = 8$), then economy-wide productivity falls 1 percent.
iii. When $\Delta > 10$, the productivity surprise drives a lasting shift to WFH and a productivity rise of $\frac{1}{2}(\Delta - 10)$ percent.

Thus, when forced experimentation leads to a lasting shift to WFH, it can bring higher or lower productivity.

In some preliminary analysis that draws on data for the United States, Barrero et al. (2021) estimate that the lasting shift to WFH raised the economy-wide level of labor productivity by about 1 percent. The productivity effect could be larger or smaller in other countries, and it could well be negative in some countries. Indeed, it could be negative in some industries and regions within the United States, even if it’s positive on average.
Our explanation for the big shift also addresses another question: If WFH is now attractive for many employees and organizations, why did the shift not happen sooner and more gradually?

Answer: The full benefits of WFH went unrecognized and unrealized before the pandemic drove a sudden, huge surge in experimentation that led to major revisions in perceptions about the feasibility and productivity of WFH.

The *simultaneity* of large-scale experimentation is important in this regard. A law firm, for example, could have experimented with WFH before the pandemic. What it could not have done was experiment with WFH when the courts and other firms – including clients, rival law firms, consultants, and suppliers – also worked remotely.

Had the pandemic not occurred, our evidence suggests that the big shift to WFH would have taken place much more slowly over many years.
Investments in time, equipment, systems, processes, and management practices have enabled and entrenched WFH

- The pandemic prompted firms to invest in new equipment and new technologies that support remote work (Riom and Valero, 2020, and Eberly et al., 2021)
- Barrero et al. (2021c) quantify capital investments at home in response to the pandemic and worker time devoted to learning how to WFH. They estimate the value of these pandemic-induced investments at 0.7 percent of a year’s GDP.
- Criscuolo et al. (2021) and Riom and Valero (2020) present evidence that firms adopted new managerial practices to support WFH in reaction to the pandemic.
- Bloom, Davis and Zhestkova (2021) find that, in the wake of the pandemic, new patent applications shifted toward technologies that support WFH and remote interactions more generally.
- All of these various investments in equipment, skills, technologies, and managerial practices create durable forms of capital and knowledge that improve performance in the WFH mode now and in the future.
COVID-19 Shifted Patent Applications to Technologies that Support WFH

- When the market for WFH-related products and services suddenly expanded five-fold, it triggered an acceleration of new technologies that support WFH and remote interactions.
- Examples: better AV, better remote collaboration tools
- This surge in innovation efforts will likely lead to ongoing improvements in the relative performance of WFH and remote interactions.

The Social Acceptance of Work from Home Is Much Greater Now than before the Pandemic

Change Index for Social Acceptance of WFH

Question: “Since the COVID pandemic began, how have perceptions about WFH changed among people you know?” Response options and assigned index values: Improved among almost all (95%), most (70%) or some (25%), No change (0%), and Worsened among almost all (-95%), most (-70%) or some (-25%).

The chart reports regression-adjusted conditional means. We fit the regression to data for 36,078 G-SWA respondents surveyed in mid 2021 and early 2022.

Reproduced from Aksoy et al. (2022).
Long Social Distancing: 12% of U.S. respondents say they plan no return to pre-COVID activities after the pandemic ends, and another 44% plan less than a complete return.

As the COVID-19 pandemic ends, which of the following would best fit your views on social distancing?

N = 62,751.

The sample includes respondents from the February 2022 to January 2023 SWAA waves. The SWAA samples US residents aged 20 to 64 who earned $10,000 or more in 2019 or 2021. (In January, February, and March 2022 we randomized across the two years and asked about the prior year starting with the March 2022 survey.)

Note: Long Social Distancing intentions are slowly waning, according to SWAA data, suggesting that their effects are also waning and will continue to do so. That is what we find in our analysis of labor force participation behavior.

Reproduced from Barrero et al. (2022).
WFH Rate Rises with the Strength of Social Distancing Intentions

Notes: The sample includes respondents who are employed or unemployed and who are able to work from home (as revealed by having done so during the pandemic) in the February 2022 to January 2023 waves of the SWAA. The Current Amount of Working from Home is based on responses to “Currently (this week) what is your work status?” “For each day last week, did you work a full day (6 or more hours), and if so where?” N = 36,278.

Sample: Respondents who are either working or unemployed, and able to work from home.

Reproduced from Barrero et al. (2022).
How have societal experiences during the pandemic (deaths, lockdowns) influenced WFH levels?
Do National Differences in Pandemic Experiences Affect Planned WFH Levels in the Post-Pandemic Economy?

• We use regression models to investigate how national (and regional) pandemic experiences affect employer plans re WFH in the post-pandemic economy and other outcomes.

• We focus on the role of pandemic severity, as measured by cumulative COVID deaths per capita, and the cumulative severity and duration of government-mandated lockdown measures.

• We measure cumulative COVID deaths per capita through the end of the month before the survey wave. Data on COVID deaths are from the Johns Hopkins Coronavirus Resource Center at https://coronavirus.jhu.edu.

• To measure cumulative lockdown stringency to date, we draw on the widely used data described in “Oxford COVID-19 Government Response Tracker.” See Hale et al. (2021) for a description of the data, which are available at www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.
Do National Differences in Pandemic Experiences Affect Planned WFH Levels in the Post-Pandemic Economy?

• For each country (or region), we construct an index that combines the severity and duration of government restrictions on commercial and social activity, following the approach in Baker et al. (2022). We first compute the monthly Lockdown Stringency Value for country $c$ in month $t$ as:

$$LSI_{ct} = \text{Max}\{\text{SIPO}, (3/4)\text{BCO} + (1/4)\text{SCO}\}$$

where SIPO = 1 when a shelter-in-place order is in effect, 0 otherwise; BCO = 1 when a broad-based business closure order is in effect; and SCO = 1 when schools are closed. These indicator variables can take fractional values when an order is in effect part of the month or part of the country in question. Second, for any given country, we cumulate the Lockdown Stringency Values from March 2020 through the month before the survey wave.
### Table 2. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns

<table>
<thead>
<tr>
<th>Outcome</th>
<th>(1) Current WFH days per week</th>
<th>(2) Desired WFH days per Week</th>
<th>(3) Planned WFH days per Week</th>
<th>(4) Amenity value of option to WFH 2-3 days a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Lockdown Stringency</td>
<td>0.204** (0.078)</td>
<td>0.085 (0.057)</td>
<td>0.136*** (0.047)</td>
<td>0.363 (0.418)</td>
</tr>
<tr>
<td>Cumulative COVID-19 deaths per capita</td>
<td>-0.005 (0.086)</td>
<td>0.044 (0.059)</td>
<td>-0.039 (0.056)</td>
<td>0.263 (0.299)</td>
</tr>
<tr>
<td>Observations</td>
<td>33091</td>
<td>36078</td>
<td>34875</td>
<td>36078</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.098</td>
<td>0.069</td>
<td>0.086</td>
<td>0.057</td>
</tr>
</tbody>
</table>

**Column (3): Two standard deviation increase in CLS is associated with 0.27 more planned WFH days after the pandemic, which equals 38% of the average planned WFH days.**

**Note:** All regressions control for log real GDP per capita, gender, 4 age groups, 3 education groups, 18 industry sectors, and wave effects. COVID deaths and lockdown stringency measures are standardized to zero mean and unit standard deviation across countries. Errors clustered at the country level.
Table 3. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns, adding controls for cumulative mask mandates

<table>
<thead>
<tr>
<th>Outcome</th>
<th>(1) Current WFH days per week</th>
<th>(2) Desired WFH days per Week</th>
<th>(3) Planned WFH days per Week</th>
<th>(4) Amenity value of option to WFH 2-3 days a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Lockdown Stringency</td>
<td>0.174* (0.092)</td>
<td>-0.000 (0.064)</td>
<td>0.135** (0.055)</td>
<td>0.119 (0.472)</td>
</tr>
<tr>
<td>Cumulative COVID-19 deaths per capita</td>
<td>-0.002 (0.085)</td>
<td>0.052 (0.046)</td>
<td>-0.039 (0.056)</td>
<td>0.286 (0.267)</td>
</tr>
<tr>
<td>Cumulative Mask Mandates</td>
<td>0.060 (0.086)</td>
<td>0.169*** (0.054)</td>
<td>0.002 (0.046)</td>
<td>0.484* (0.251)</td>
</tr>
<tr>
<td>Observations</td>
<td>33091</td>
<td>36078</td>
<td>34875</td>
<td>36078</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.099</td>
<td>0.074</td>
<td>0.086</td>
<td>0.058</td>
</tr>
</tbody>
</table>

**Note**: The measure of Cumulative Mask Mandates is standardized to zero mean and unit standard deviation across countries. Specifications and samples are otherwise identical to the ones in Table 2. Errors clustered at the country level.
### Table 4. Lockdown Effects Are Stronger for the More Educated

<table>
<thead>
<tr>
<th>Outcome</th>
<th>(1) Current WFH days per week</th>
<th>(2) Desired WFH days per Week</th>
<th>(3) Planned WFH days per Week</th>
<th>(4) Amenity value of option to WFH 2-3 days a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Restricting the Sample to Persons with a College Degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative Lockdown</td>
<td>0.282***</td>
<td>0.092</td>
<td>0.170**</td>
<td>0.503</td>
</tr>
<tr>
<td>Stringency</td>
<td>(0.097)</td>
<td>(0.067)</td>
<td>(0.064)</td>
<td>(0.433)</td>
</tr>
<tr>
<td>Cumulative COVID-19 deaths per capita</td>
<td>-0.037</td>
<td>0.035</td>
<td>-0.059</td>
<td>0.337</td>
</tr>
<tr>
<td>(0.106)</td>
<td>(0.075)</td>
<td>(0.066)</td>
<td>(0.347)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>22210</td>
<td>24054</td>
<td>23317</td>
<td>24054</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.085</td>
<td>0.058</td>
<td>0.075</td>
<td>0.049</td>
</tr>
<tr>
<td>B. Restricting the Sample to Persons with a Graduate Degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative Lockdown</td>
<td>0.410***</td>
<td>0.144**</td>
<td>0.266***</td>
<td>0.380</td>
</tr>
<tr>
<td>Stringency</td>
<td>(0.139)</td>
<td>(0.059)</td>
<td>(0.086)</td>
<td>(0.401)</td>
</tr>
<tr>
<td>Cumulative COVID-19 deaths per capita</td>
<td>-0.113</td>
<td>-0.025</td>
<td>-0.105</td>
<td>0.180</td>
</tr>
<tr>
<td>(0.118)</td>
<td>(0.055)</td>
<td>(0.075)</td>
<td>(0.335)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>10954</td>
<td>11826</td>
<td>11468</td>
<td>11826</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.082</td>
<td>0.056</td>
<td>0.088</td>
<td>0.036</td>
</tr>
</tbody>
</table>

**Note:** This table uses the same specifications and measures as Table 2. Errors clustered at the country level.
Strategic complementarities

Strategic complementarities amplify the direct effects of all the forces discussed above. Specifically, WFH becomes more attractive relative to work in the office when a larger share of coworkers, customers, clients, etc. also works remotely. This force operates most clearly in the extreme: when no one else works in the office, there’s no point in commuting to reap the benefits of face-to-face interactions.

This type of strategic complementarity also operates at the level of organizations. As an example, it makes more sense for a law firm to allow or encourage partners, associates, and other staff to WFH when clients also work remotely.

In short, WFH makes more sense when others WFH than when everyone works on business premises.
The Demography and Geography of WFH
WFH Rates Are Similar for Men and Women

Percentage of paid full days worked from home

Source: Responses to the questions:
- Currently (this week) what is your work status?
- For each day last week, did you work a full day (6 or more hours), and if so where?

Notes: For each wave, we compute the percent of paid full days worked from home in the SWAA. The horizontal-axis location shows when the survey was in the field. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in 2019 or 2021 to match CPS shares by age-sex-education-earnings cells. N = 37,750

U.S. Data
WFH Rates Are Much Higher for College-Educated Workers than for Others

Source: Responses to the questions:
- Currently (this week) what is your work status?
- For each day last week, did you work a full day (6 or more hours), and if so where?

Notes: For each wave, we compute the percent of paid full days worked from home in the SWAA. The horizontal-axis location shows when the survey was in the field. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in 2019 or 2021 to match CPS shares by age-sex-education-earnings cells.

N = 108,597
WFH Rates Are Lowest for Older Workers, Highest for Persons in Their 30s

Source: Responses to the questions:
- Currently (this week) what is your work status?
- For each day last week, did you work a full day (6 or more hours), and if so where?

Notes: For each wave, we compute the percent of paid full days worked from home in the SWAA. The horizontal-axis location shows when the survey was in the field. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in 2019 or 2021 to match CPS shares by age-sex-education-earnings cells.
N = 108,696

U.S. Data

SWAA data from May 2020 to January 2023
Smoothed with a 3 month centered moving average
WFH Rates Are Higher for Men and Women with Children Under 14

Source: Responses to the questions:
- Currently (this week) what is your work status?
- For each day last week, did you work a full day (6 or more hours), and if so where?

Notes: For each wave, we compute the percent of paid full days worked from home in the SWAA. The horizontal-axis location shows when the survey was in the field. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in 2019 or 2021 to match CPS shares by age-sex-education-earnings cells.
N = 95,556

U.S. Data
WFH is more prevalent in places with higher population density.

Source: 66,815 SWAA responses Jan 21 to Aug 22 weighted to match the US population. Details on https://wfhresearch.com/
The Extent of WFH Opportunities Vary Greatly Across Cities

Percent of vacancy postings that explicitly say job offers hybrid or remote work

Notes: Natural Language Processing of all online jobs in the US, around 43m in 2022 from Lightcast, and obtained from www.wfhmap.com

U.S. Data
Reproduced from Hansen et al. (2023)
Median distance from home to employer worksite rose by about 1 mile after the pandemic.

Notes: Distance data measured from Gusto payroll data on over 1 million Americans comparing the addresses on employees' work location and their home location. Includes fully remote workers. The distance to work is the median (50th percentile).

Reproduced from Barrero et al. (2023a).
Median distance to work rose more for those who earn more

Notes: Distance data measured from Gusto payroll data on over 1 million Americans comparing the addresses on employees' work location and their home location. Includes fully remote workers. The distance to work is the median (50th percentile).
One third of employees with annual earnings >$150K now live more than 100 miles from their employer’s location.

Percent of employees who live more than 100 miles away by earnings bucket

Share of workers living >100 miles from the office

U.S. Data
Notes: Distance data measured from Gusto payroll data on over 1 million Americans comparing the addresses on employees’ work location and their home location. Includes fully remote workers. The distance to work is the median (50th percentile)
14% of employees who are 35-44 years old now live more than 100 miles from their employer’s location.

Percentage of employees who live more than 100 miles away by age group

- 20-24
- 25-34
- 35-44
- 45-54
- 55-64
Median distance rose most in the Information sector

Notes: Distance data measured from Gusto payroll data on over 1 million Americans comparing the addresses on employees’ work location and their home location. Includes fully remote workers. The distance to work is the median (50th percentile)/
Almost 40% of Information sector workers now live more than 100 miles away from their employer’s location.
One quarter of Information sector workers now live more than 700 miles from their employer’s location.

75th percentile of distance to employer location by industry