Why Working From Home Will Stick

Jose Maria Barrero[a] Nicholas Bloom[b] Steven J. Davis[c]

[a]ITAM Business [b]Stanford [c]Hoover Institution & Chicago Booth

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Research Questions

How much working from home (WFH) will there be as the COVID-19 pandemic ends?

What economic mechanisms support a persistent shift to WFH?

What consequences will the persistent shift to WFH bring?
[FOCUS OF TODAY'S PRESENTATION]

- For workers
- For productivity

TODAY'S TALK

Use Data from Our *Survey of Working Arrangements & Attitudes* (Barrero, Bloom, Davis, 2021) to:

1. **Present Key Facts About WFH & Self-Assessed Relative Productivity of WFH**

2. **Model: Workers & Firms Optimally Choose Amount of WFH**

   Infer workers' relative productivity of WFH from **observed choices** in **2023 *SWAA***

3. **Ask: How Would GDP, Productivity, & Welfare Differ if We Impose WFH Levels Higher/Lower Than in 2023?**

▸ Related Literature

KEY RESULTS

1. **On Average, Workers Say They Are More Efficient While WFH**

2. **Self-Assessed Relative Efficiency Rises with Amount of WFH**
   $\Rightarrow$ Revealed Preferences Carry Information About WFH Productivity

3. **Imposing 2019 Levels of WFH Would Cost:**
   - **0.9%** GDP
   - **0.3 - 1.3 %** Productivity
   - **0.1 - 2.0%** Welfare for the Average Worker

Outline

Key Facts About WFH, Productivity, & Preferences

Model Sketch

Consequences of Changing WFH Levels to the Level:

- In 2019
- In 2020
- Workers Desire

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Survey of Working Arrangements & Attitudes (SWAA)

Monthly survey of our own design, since May '20 (repeated cross sections) using market research firms

- **250,000+** responses collected from May 2020 to June 2023 (ongoing) ▸ Detail
- **Quality checks:** drop "speeders." Can also drop if fail attention check questions ▸ Detail

Target population: persons aged 20 to 64, earning >$10K in a prior year

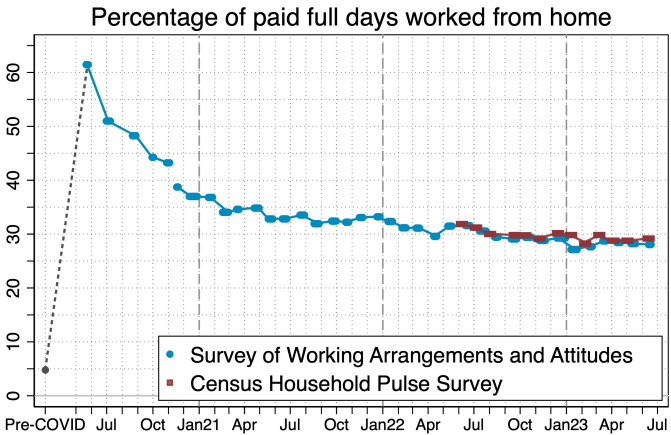
- Re-weight to 2010-2019 CPS pop. by {age × sex × education × earnings} ▸ CPS Comparison

60+ questions per wave:

- Demographics, earnings, hours worked, commuting time, spending
- **Amount of WFH** during COVID, **worker desires** & **employer plans** for after
- Experiences, perspectives on WFH

▸ Test: Political Affiliation

In 2023H1, WFH Stabilizes At ~ 28% of Full Paid Days



*Pre-COVID estimate taken from the 2017-2018 American Time Use Survey

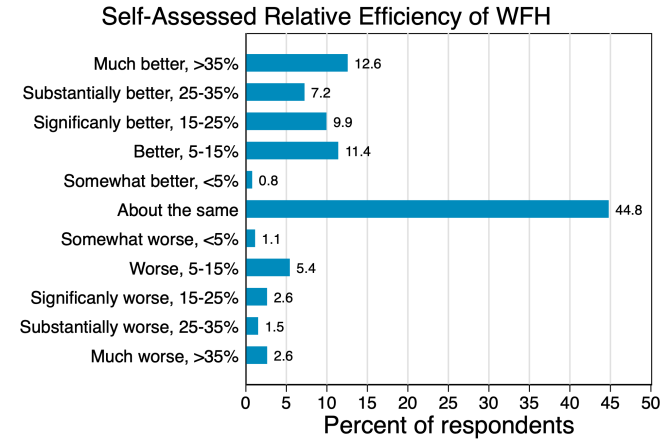
*The break in the series in November 2020 reflects a change in the survey question.

Notes: For each wave of the SWAA, we compute the percent of paid full days worked from home and plot it on the vertical axis. The horizontal-axis location shows when the survey was in the field. Before November 2020, we asked whether someone was working from home, from business premises, or not working. Since November 2021, we have asked for the number of full paid work-days and WFH days in the current or previous week. From November 2020 to October 2021, we back-cast responses to the current question using a regression model that relates the current-question responses to the responses to another question (not shown). The pre-COVID figure is from the 2017-2018 American Time Use Survey. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in a prior year to match CPS shares by age-sex-education-earnings cells. For each wave of the Household Pulse Survey, we compute the percent of paid full days worked from home based on responses of 1-2, 3-4, or 5+ days per week and average across persons with household income over $25,000.

N = 143,410 (SWAA). N = 432,904 (CHPS)

▸ Evolution of desires/plans
▸ Historical Data ▸ Breakdown Time Series
▸ Breakdown by Industry

Workers Report Higher Efficiency WFH



Overall Mean (SE) = 7.8 (0.1). N = 38696.

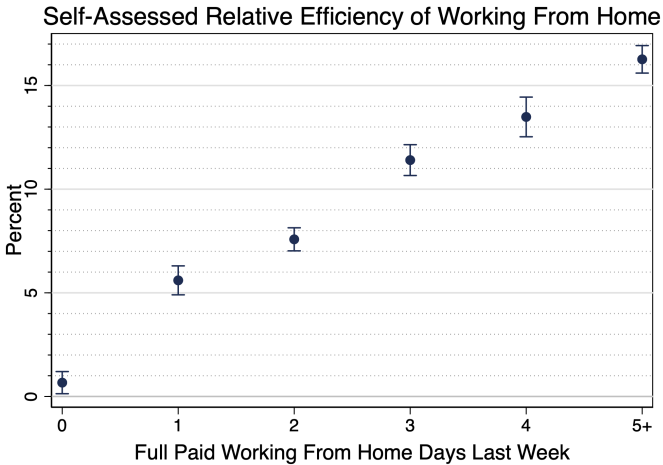
Notes: We randomize the order of the response options for the first question, keeping "About the same" in the middle. The sample includes respondents who are able to work from home and meet our $10,000 prior earnings requirement in the October 2022 to June 2023 SWAA waves. We reweight the sample to match the CPS population on cells defined by age, sex, education, and earnings. **N = 38,696**

How does your efficiency working from home compare to your efficiency working on business premises?

- *Better – I am **more** efficient at home…*
- *About the same…*
- *Worse – I am **less** efficient at home…*

*How much **more efficient [less efficient]** are you working from home than on business premises?*

Self-Assessments Rise With Actual WFH



Notes: The figure shows the average relative efficiency by the amount of actual working from home and 95% confidence intervals. The sample includes respondents who are able to work from home and meet our $10,000 prior earnings requirement in the October 2022 to June 2023 SWAA waves. We reweight the sample to match the CPS population on cells defined by age, sex, education, and earnings. **N = 33,128**

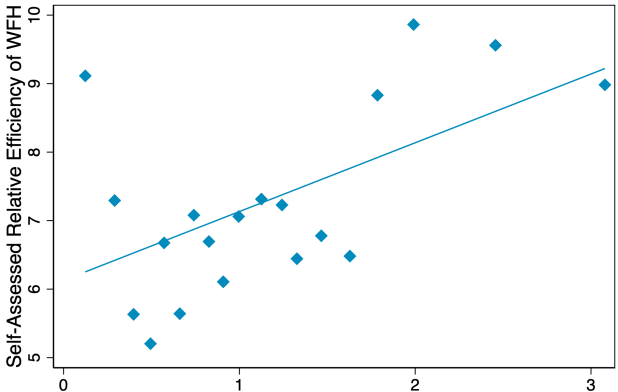
How does your efficiency working from home compare to your efficiency working on business premises?

- *Better…*
- *About the same…*
- *Worse…*

*How much **more efficient [less efficient]** are you working from home than on business premises?*

*For each day **last week**, did you **work a full day (6 or more hours)**, and if so **where?***

Self-Assessed Efficiency of WFH Rises With Commuting + Grooming Time



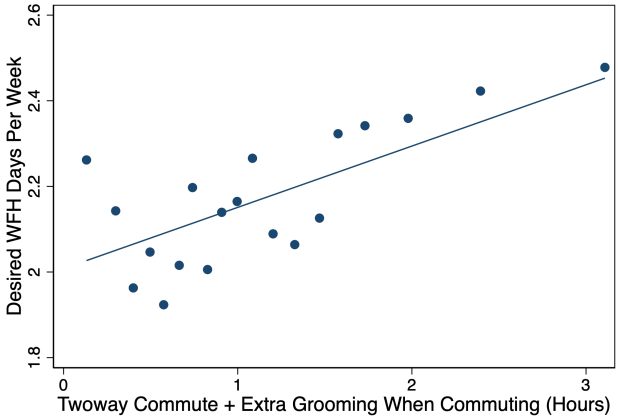
Coef. (SE): 1.00 (0.22). N = 31643

How does your efficiency working from home compare to your efficiency working on business premises?
How long do you usually spend commuting to and from work (in minutes)?
How much time do you spend on grooming and/or getting ready for work when:

- *You commute to your employer's or client's worksite?*
- *You work from home?*

Notes: We focus on persons who participated in the October 2022 to June 2023 SWAA waves, require working during the week prior to the survey, and exclude persons who report zero commuting time.

Preferences for WFH Rises With Commuting + Grooming Time



Coef. (SE): 0.14 (0.02). N = 42439

As the pandemic ends, how often would you like to have paid workdays at home?
How long do you usually spend commuting to and from work (in minutes)?
How much time do you spend on grooming and/or getting ready for work when:

- *You commute to your employer's or client's worksite?*
- *You work from home?*

Notes: We focus on persons who participated in the October 2022 to June 2023 SWAA wave and worked during the week prior to the survey. We also exclude persons who report zero commuting time.

Facts Recap: Motivating the Model

1. **On average, workers report higher efficiency when WFH than when commuting to work.**

2. **Self-assessed efficiency rises with WFH frequency in 2022-2023.**

3. **Worker preferences and self-assessed relative efficiency of WFH rise with commuting & grooming time.**

Outline

Key Facts About WFH, Productivity, & Preferences

Model Sketch

Consequences of Changing WFH Levels to the Level:

- In 2019
- In 2020
- Workers Desire

Model Overview: Who & What

Workers:

- Supply h_i hours/week, with $\delta_i \in [0, 1]$ share of WFH days/week
- Receive wage $w(h_i, \delta_i)$, consume output good

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Intermediate Firm:

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- Produces efficiency units of labor L_i from raw hours h_i

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Final Firm: Produces final output good from efficiency units $L = \int_i L_i \mathrm{d}F(i)$

Detail

Static equilibrium: firms take prices/wages as given, workers internalize impact of WFH and hours on wages, labor/output markets clear

Workers Dislike Working & Commuting

Utility from consumption, disutility from hours devoted to work:

$$\max_{h_i,\delta_i} \log(c_i) - \chi_i \frac{n_i^{1+\eta}}{1+\eta}$$

Total hours devoted to work per week:

$$n_i \equiv \underbrace{h_i}_{\text{measured hours}} + \left(\underbrace{g_i}_{\text{baseline grooming}} + \underbrace{(t_i + g_i^c)}_{\text{commuting costs}} \cdot \underbrace{(1-\delta_i)}_{\text{\% commute days/week}} \right) \underbrace{\text{DAYS}_i}_{\text{Workdays}}$$

Budget constraint: $c_i = w(h_i, \delta_i)h_i/p$

Where:

- δ_i = share of WFH days
- t_i = daily commute time
- g_i = baseline grooming/day, g_i^c extra grooming on commute days

Intermediate Firm's Technology

Production function for efficiency units:

$$L_i = \underbrace{A_i}_{\text{Overall productivity}} \left(\underbrace{h_i(1-\delta_i)}_{\text{In-person hours}} + \underbrace{B_i}_{\text{WFH productivity shifter}} \left(\underbrace{h_i\delta_i}_{\text{WFH hours}} \right)^{\alpha} \right)$$

Where α governs substitutability of WFH and in-person work

$\alpha < 1 \Rightarrow$ WFH hours become less effective as they increase

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Where α governs substitutability of WFH and in-person work

$\alpha < 1 \Rightarrow$ WFH hours become less effective as they increase

Maximize profits from selling efficiency units of labor:

$$\max_{h_i, \delta_i} A_i \left(h_i(1-\delta_i) + B_i(h_i\delta_i)^{\alpha} \right) - w_i h_i$$

In practice, workers say they work more when they don't commute. We assume this is unpaid work and account for it in worker utility and production.

Inferring Productivity Parameters A_i, B_i

Intermediate Firm's Optimality Conditions Imply:

$$A_i = w_i$$

$$B_i = \frac{1}{\alpha}(h_i \delta_i)^{1-\alpha}$$

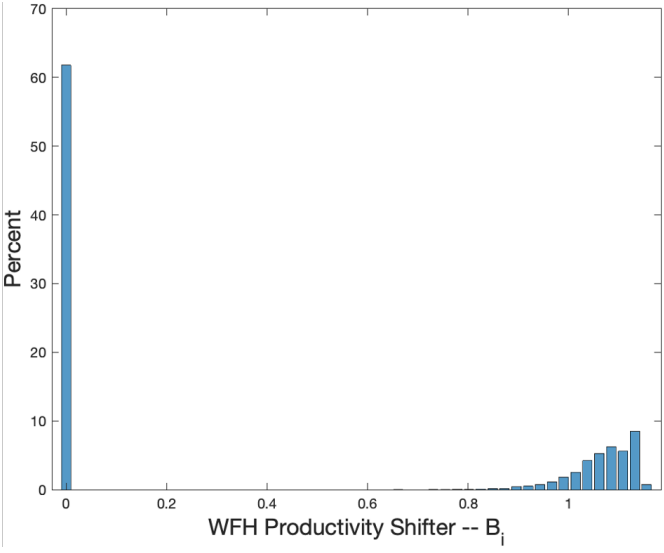
Everything on the RHS is data, except for α.

Calibrate α to minimize average distance between $B_i(\alpha)$ and worker self-assessed productivity of WFH b_i:

$$\min_{\alpha} \sum_i (B_i(\alpha) - b_i)^2 \Rightarrow \alpha = 0.97$$

Inferring preference parameters

Distribution of WFH Productivity Shifter B_i



Notes: The figure shows the distribution of B_i, the worker-specific shifter that governs the relative productivity of worker i in WFH mode. We use SWAA data from October 2022 to June 2023, focusing on workers who reported at least 20 hours of work in the week prior to the survey. In this version, we assume workers allocate a fraction f_i of commuting and grooming time saving to unpaid work based on their relevant survey responses.

WFH Productivity Shifter B_i by Industry

Notes: The figure shows the average of B_i, the worker-specific shifter that governs the relative productivity of worker i in WFH mode, by industry of the respondent's current job. We winsorize the chart at the 1st and 99th percentile and use SWAA data from October 2022 to June 2023, focusing on workers who reported at least 20 hours of work in the week prior to the survey. In this version, we assume workers allocate a fraction f_i of commuting and grooming time saving to unpaid work based on their relevant survey responses.

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Counterfactual Exercises

Set working arrangements $\{\delta_i\}$ exogenously & solve for new equilibrium

Compare counterfactual against 2022-2023 equilibrium

Imposing 2019 WFH Levels Means:

- **2019:** $\delta_i = 0.1$ if WFH in 2023 > 0, otherwise 0

  "No WFH, except rarely (once every two weeks) for people who currently WFH in 2022-2023."

Imposing 2019 Levels of WFH Lowers Output & Productivity

Counterfactual	$100\times$ $\Delta \log(pY)$	$\Delta \log(pY/H)$	$\Delta \log(pY/(H+T+G))$
	Output	Measured Productivity	Productivity if Hours Include Commuting & Grooming
2019	-0.9	-0.3	-1.3

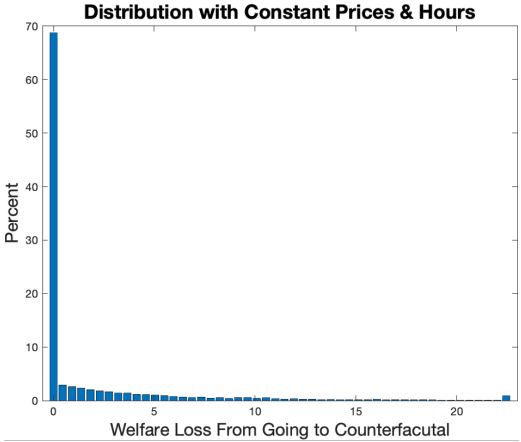
Notes: The table shows $100\times$ the log-difference between 2022-2023 outcomes and the counterfactual, with positive numbers indicating a higher outcome in 2022-2023. H, T, and G are total paid hours of work, time commuting, and grooming, namely: $H = \int_i h_i \mathrm{d}F(i)$, $T = \int_i t_i(1-\delta_i)\mathrm{DAYS}_i \mathrm{d}F(i)$, $G = \int_i [g_i + g_i^c(1-\delta_i)]\mathrm{DAYS}_i \mathrm{d}F(i)$.

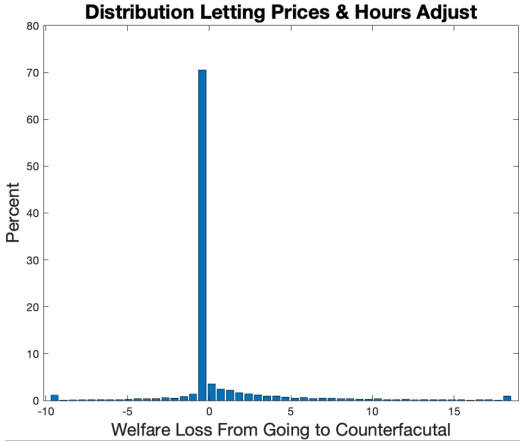
Average Consumer Loses If We Impose 2019 WFH Levels

Counterfactual	Constant Hours, Prices, Wages	Hours, Prices, Wages Free to Adjust
2019	−1.6	−0.1

Notes: The table shows the average percent cut to 2022-2023 consumption required to attain the same consumer welfare distribution as the counterfactual. For each counterfactual we can compute consumer welfare leaving hours, prices, and wages constant, so that the shift in welfare comes entirely from commuting/grooming time savings. When we let hours, prices, and wages adjust, the difference in welfare across economies reflects commuting time savings and differences in relative prices.

Average Welfare Effect Masks Wide Dispersion





Notes: Each figure shows the distribution of percentage cuts to 2022-2023 consumption that would be required to make the worker indifferent with their utility under "2019" working arrangements. The left chart holds work hours and prices constant, thereby focusing on time savings from commuting. The chart on the right allows hours and prices to adjust, comparing across equilibrium outcomes in the baseline and counterfactual worlds. Both charts are winsorized at the 1st and 99th percentiles.

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2020 Counterfactual

Set working arrangements $\{\delta_i\}$ exogenously & solve for new equilibrium

Compare counterfactual against 2022-2023 equilibrium

Imposing 2020 WFH Levels Means:

- $\delta_i = 1$ if ever WFH since COVID, otherwise 0 But assume under lockdown the productivity shifter is $\max\{B_i, 0.5\}$

  "Anyone who can remotely WFH does so full time."

Imposing 2020 Levels of WFH Lowers Output & Productivity Even More

Counterfactual	$100\times \Delta \log(pY)$	$100\times \Delta \log(pY/H)$	$100\times \Delta \log(pY/(H+T+G))$
	Output	Measured Productivity	Productivity if Hours Include Commuting & Grooming
2019	−0.9	−0.3	−1.3
2020	−10.9	−11.4	−9.9

Notes: The table shows $100\times$ the log-difference between 2022-2023 outcomes and the counterfactual, with positive numbers indicating a higher outcome in 2022-2023. H, T, and G are total paid hours of work, time commuting, and grooming, namely: $H = \int_i h_i \mathrm{d}F(i)$, $T = \int_i t_i(1-\delta_i)\mathrm{DAYS}_i \mathrm{d}F(i)$, $G = \int_i [g_i + g_i^c(1-\delta_i)]\mathrm{DAYS}_i \mathrm{d}F(i)$.

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Let Workers Have a Preferred WFH Level?

Utility from consumption, disutility paid hours & from WFH levels that differ from your own:

$$\max_{h_i,\delta_i} \log(c_i) - \frac{\chi_i}{1+\eta} h_i^{1+\eta} - \frac{1}{2}(\delta_i - \gamma_i)^2$$

Where:

- γ_i = preferred share of WFH days per week
  As the pandemic ends, how often would you like to have paid workdays at home?
- δ_i = actual share of WFH days per week
- h_i = measured/paid hours worked per week

Budget constraint: $c_i = w(h_i, \delta_i)h_i/p$

Giving Workers Their Ideal WFH Level Has Big Productivity Costs

Counterfactual	$100\times \Delta \log(pY)$	$100\times \Delta \log(pY/H)$	$100\times \Delta \log(pY/(H+T+G))$
	Output	Measured Productivity	Productivity if Hours Include Commuting & Grooming
2019	−0.9	−0.3	−1.3
2020	−10.9	−11.4	−9.9
Worker desired amount of WFH	−5.1	−4.4	−4.6

Notes: The table shows $100\times$ the log-difference between 2022-2023 outcomes and the counterfactual, with positive numbers indicating a higher outcome in 2022-2023. H, T, and G are total paid hours of work, time commuting, and grooming, namely: $H = \int_i h_i \mathrm{d}F(i)$, $T = \int_i t_i(1-\delta_i)\mathrm{DAYS}_i \mathrm{d}F(i)$, $G = \int_i [g_i + g_i^c(1-\delta_i)]\mathrm{DAYS}_i \mathrm{d}F(i)$.

▸ Avg. Welfare Effects ▸ Firms Set WFH Unilaterally

Conclusion

WFH days: **7%** pre-COVID, **61%** May 2020, *converging* to ∼**28%** in 2023

Facts about WFH Choice and Self-Assessed Productivity:

1. On average, workers report **higher efficiency** when WFH than when commuting to work.
2. Self-assessed efficiency **rises with WFH frequency** in 2022-2023.
3. Worker preferences and self-assessed relative efficiency for WFH **rise with commuting & grooming time**.

Forced return to 2019 levels of WFH:

- **0.3%** *loss to measured productivity*, **1.3%** accounting for *time savings*
- **0.1%** average *cut to consumption,* much *heterogeneity*

Related Literature

Working from Home before COVID: Bloom, Liang, Roberts, Zhichun, & Ying (2015), Mas & Pallais (2017), Song and Gao (2020)

Working from Home during COVID: Bai, Brynjolfsson, Jin, Steffen, & Wan (2020), Barrero, Bloom, and Davis (2020), Bick, Blandin, and Mertens (2022), Brynjolfsson, Horton, Ozimek, Rock, Sharma and TuYe (2020), Cicala (2020) Möhring, Naumann, Reifenscheid, Wenz, Rettig, Krieger, Friedel, Finkel, Cornesse, Blom (2020), Ozimek (2020), Papanikolaou & Schmidt (2020), Davis, Ghent, and Gregory (2022), Brynjolfsson, Horton, Makridis, Mas, Ozimek, Rock, and Hong-Yi TuYe (2022), Lambert, Hansen, Bloom, Davis, Sadun, Taska (2022), Alekseeva, Dalla Fontana, Genc, Ranjbar (2022), Vernon and Pabilonia (2022), Ranganathan and Das (2022), Lewandowski, Lipowska, and Smoter (2022), Han, Bloom, and Liang (2022), Choudhury, Khanna, Makridis, Schirmann (2022), Kwan and Matthies (2022), Frey and Presidente (2022), Emanuel, Harrington, & Pallais (2022)

Selection & Treatment Effects: Emanuel and Harrington (2022), , Atkin, Schoar, Shinde (2022)

Spatial Implications: Liu and Su (2022), Dalton, Dey, Loewenstein (2022), Mondragon and Wieland (2022), Delventhal and Parhomenko (2022), Brinati, Cavallo, Cravino, and Drenik (2022), Gupta, Mittal, and van Nieuwerburgh (2022)

Pandemic-induced shift toward technologies that support WFH: Bloom, Davis and Zhestikova (2020)

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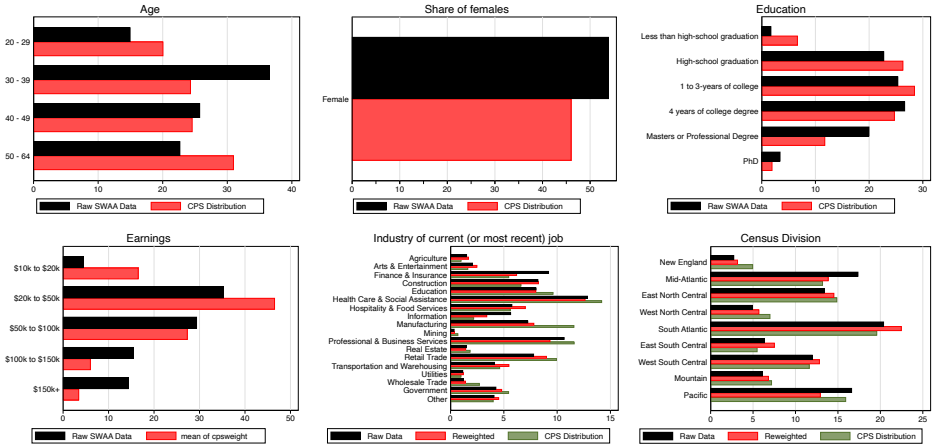
Survey Responses vs. CPS



Notes: Each figure shows the distribution of raw survey responses, survey responses reweighted to match the share of persons aged 20 to 64 in a given {age x sex x education x earnings} cell in the 2010 – 2019 CPS (focusing on those who earned more than \$20,000 a year), and the corresponding distribution in the January to October 2022 SWAA waves.

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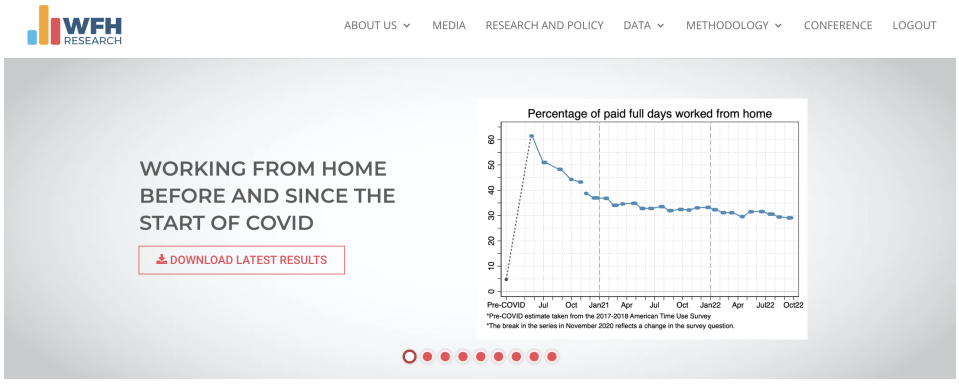
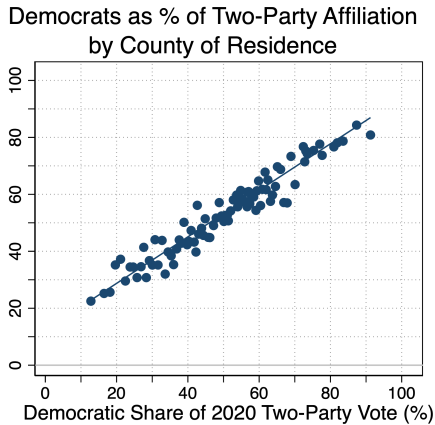
Code and (Anonymized) Data Available at www.wfhresearch.com



To sign up for monthly results updates please click here.
Download our **time series data on the extent of working from home.**

Data Test: Political Affiliation by County



Slope of linear regression = .82 (.01). N = 76630.

Notes: Data are from the January 2022 to June 2023 SWAA waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. The figure shows the average share of Democrats affiliating with one of the two major parties (i.e. excluding *Independent (neither party)* and *Others*) for each of 100 quantiles by two-party vote share in the 2020 presidential election at the county level. **N = 76,630.**

Generally speaking, do you usually think of yourself as a Republican, Democrat, Independent, or what?

- *Strong Democrat*
- *Not very strong Democrat*
- *Independent, close to Democrat*
- *Independent (neither party)*
- *Independent, close to Republican*
- *Not very strong Republican*
- *Strong Republican*
- *Other/Don't know/Rather not say*

Attention Check Question #1

What is 3 + 4?

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Attention Check Question #2

In how many big cities with more than 500.000 inhabitants have you lived?

Please note that **this question only serves the purpose to check your attention.**

Irrespective of your answer, please insert the number 33.

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Attention Check Question #3

What color is grass?

The fresh, uncut grass, not leaves or hay. Make sure that you select purple as an answer so we know you are paying attention.

- ○ Magenta
- ○ Black
- ○ Purple
- ○ Green
- ○ White
- ○ Blue
- ○ Brown

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SWAA Fielding Details

We contract with market research firms (e.g. IncQuery) to field each monthly SWAA wave.

Research firms rely on wholesale aggregators (e.g. Lucid) for lists of potential survey participants

- Aggregators pool potential respondents from pre-determined lists of people
- Invitations don't give any information about our survey topic, only expected time for completion.
- Respondents take the survey using a computer, smartphone, iPad or like device $\Rightarrow$ **we miss people who never use such devices**

We drop "speeders" (answer too quickly to take seriously): $\sim$16% of sample.
Median response time: 7 to 12 minutes, after dropping speeders
Dropping those who fail attention checks ($\sim$12%) sharpens some results

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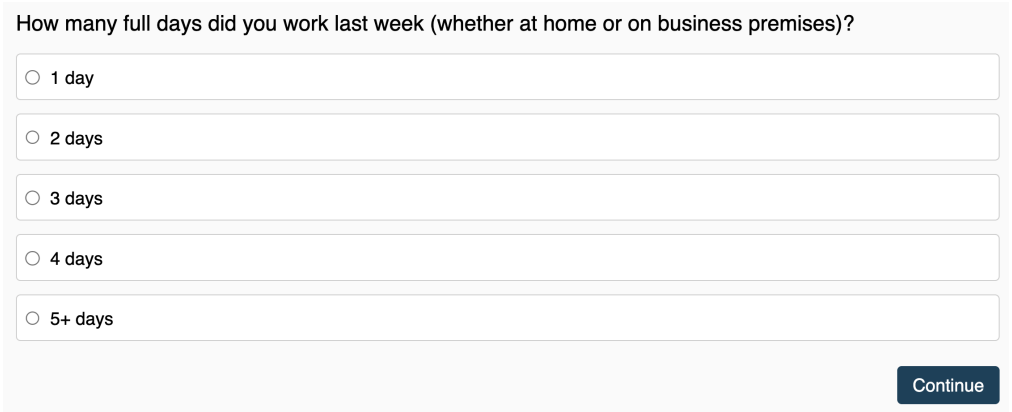
Nov 2020 - Oct 2021 WFH Questions (1/2)



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Nov 2020 - Oct 2021 WFH Questions (2/2)

Nov 2021 & Later: Work Status Question

Last week what was your work status?

- ○ Working for pay, whether on business premises or working from home
- ○ Still employed and paid, but not working
- ○ Unemployed, looking for work
- ○ Unemployed, awaiting recall to my old job
- ○ Not working, and not looking for work

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May - Oct 2020 WFH Questions

Currently (this week) what is your work status?

- *Working on my business premises*
- *Working from home*
- *Still employed and paid, but not working*
- *Unemployed*
- *Not working, and not looking for work*

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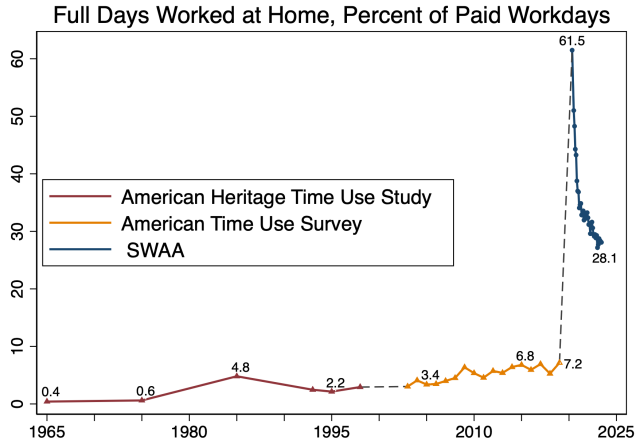
WFH Rising Since 1960s, Jumps in 2020



Notes: For each dataset we compute the average percent of full paid days that were work from home days during the survey's reference period. In the SWAA we re-weight the sample of US residents aged 20 to 64 meeting an earnings threshold of $10,000 in a prior year ($20,000 for survey waves before April 2021) to the CPS. In ATUS/AHTUS we set a $20,000 earnings threshold in 2019 dollars and use the provided population weights.

Computation details:

- **ATUS/AHTUS:** Paid days involve paid work on their main job for 6 or more hours. WFH days involve *"Paid work at home"* for 6 or more hours.
- **SWAA:** *For each day* ***last week,*** *did you* ***work a full day (6 or more hours)*** *and, if so,* ***where?***

Measuring the Amount of WFH

For each day ***last week***, did you ***work a full day (6 or more hours)***, and if so ***where?***

Day of the week	Worked at ***employer or client site***	Did not work 6 or more hours	Worked ***from home***
Monday	○	○	○
Tuesday	○	○	○
Wednesday	○	○	○
Thursday	○	○	○
Friday	○	○	○
Saturday	○	○	○
Sunday	○	○	○
	Worked at *employer or client site*	**Did not work 6 or more hours**	**Worked *from home***

Previous approaches: ▸ Nov 2020 - Oct 2021 ▸ May - Nov 2020 Approach

Imputing Employer Plans When None Reported

May 2020 to December 2021: Assume no WFH post-COVID

- If employer has not announced/spoken about this, WFH may not be feasible for this job
- OR employer does not intend to allow WFH post-COVID

May 2020 to December 2021: Use current working status

- **In not currently WFH:** assume no WFH post-COVID
- **If current WFH 1+ days/week:** use average for other workers currently doing some WFH

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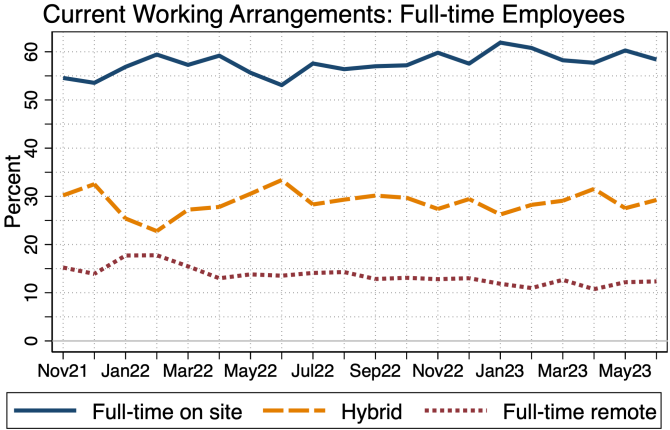
Among Wage/Salary Employees, Hybrid is 2× Full Remote

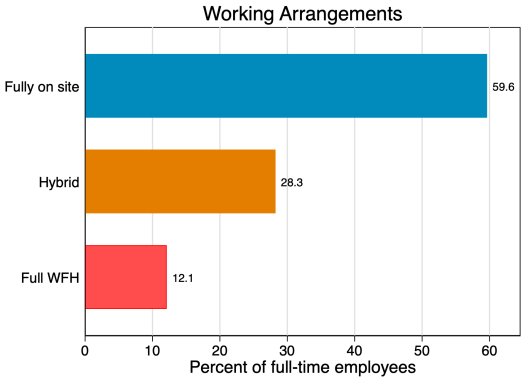


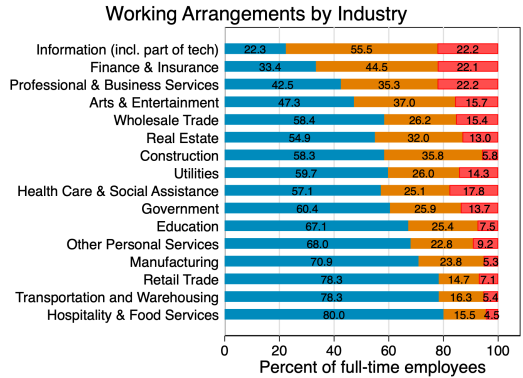
*The sample includes wage and salary employees who worked 5 or more days during the survey reference week.

Notes: For each wave, we compute the percent of full-time (i.e. work 5+ days/week) wage and salary employees who either i) worked all their days on business premises; ii) worked some days on busines premises and some days at home; or iiii) worked all all days at home during the survey's reference week. Then we plot each percentage on the vertical axis. The sample covers the November 2021 to June 2023 waves of the SWAA. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in a prior year to match CPS shares by age-sex-education-earnings cells. **N = 71,647**

▸ Able to WFH

Hybrid is the Dominant Mode of WFH in Every Industry





Notes: Data are from the December 2022 to March 2023 SWAA waves and focus on full-time wage and salary employees. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 125,242 (SWAA). N = 330,238 (HHP)**

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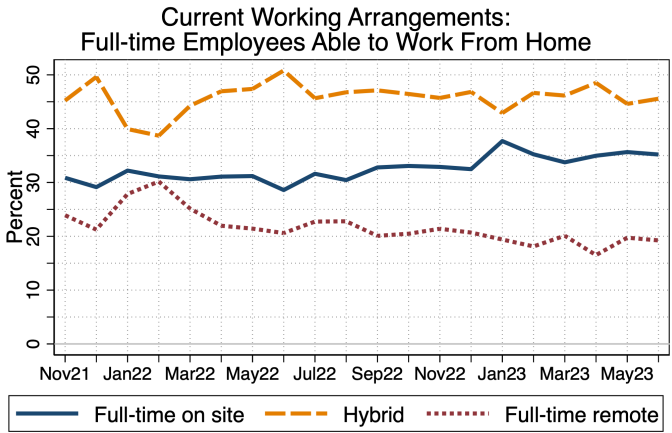
Mechanisms Why WFH Will Stick

1. **Experimentation** and **learning** to overcome inertia & biased expectations
   ▸ Model ▸ Evidence
2. **Investments** enabling WFH ▸ Evidence
3. **Worker demand** in a tight labor market
4. **Investments** enabling WFH ▸ Evidence
5. Diminished **stigma** ▸ Evidence
6. **Long Social Distancing** ▸ Evidence
   - Implications for **labor force, output, college wage premium**
7. **Technical change** (not in this talk, see Bloom, Davis, & Zhestkova, 2021) ▸ Detail

Among Employees who can WFH, Hybrid Dominates



*The sample includes wage and salary employees who are able to work from home and worked 5 or more days during the survey reference week.

Notes: For each wave, we compute the percent of full-time (i.e. work 5+ days/week) wage and salary employees who can work from home and either i) worked all their days on business premises; ii) worked some days on busines premises and some days at home; or iiii) worked all all days at home during the survey's reference week. Then we plot each percentage on the vertical axis. The sample covers the November 2021 to June 2023 waves of the SWAA. We re-weight the sample of US residents aged 20 to 64 earning $10,000 or more in a prior year to match CPS shares by age-sex-education-earnings cells.
N = 53,295

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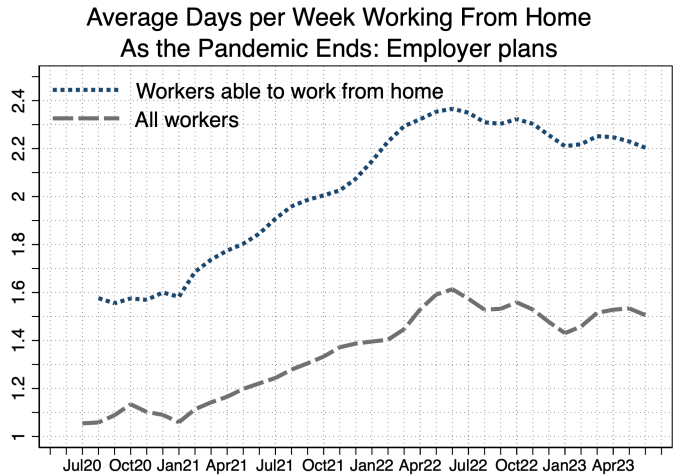
Employer Plans for Post-COVID WFH: Rise & Then Hit A Ceiling in mid-2022



Notes: Data are from the July 2020 to June 2023 SWAA Waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. In each month we project employer plans for post-COVID working from home based on the average responses to the question: "As the pandemic ends, how often is your employer planning for you to work full days at home?" Then we compute a three-month moving average of the monthly averages, except at the endpoints where we use a two-month moving average.

N = 108,820 (all respondents) and 77,252 (able to work from home)

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How Did We Get Here?
Measuring Plans for post-COVID WFH

As the pandemic ends, how often ***is your employer planning*** for you to work full days at home?

- ○ Never
- ○ About once or twice per month
- ○ 1 day per week
- ○ 2 days per week
- ○ 3 days per week
- ○ 4 days per week
- ○ 5+ days per week
- ○ My employer has not discussed this matter with me or announced a policy about it
- ○ I have no employer

Projecting Post-COVID WFH

Assign 0 days (0%) to respondents who choose:

- *Never*
- *About once or twice per month*

For other choices assign:

- 20% if *1 day per week*
- 40% if *2 days per week*
- ...

Impute value for respondents choosing:

- *My employer has not discussed this matter with me or announced a policy about it*

Detail

Sketch of a Theoretical Framework

Two technologies giving payoff x_{it} to firm i at time t

Traditional (known payoff): $x \sim F_i^T(x; p_t)$ $p_t \in \{\text{pandemic, normal}\}$

- $F_i^T(x; \text{normal})$ FOSD $F_i^T(x; \text{pandemic})$ $\forall x$

Remote (expected payoff): $x \sim F_i^R(x; \gamma_t, \theta_{it})$

- $\gamma_t \equiv$ activity share of firms operating remote technology
- $\theta_{it} \equiv$ information and beliefs at t about $F_i^R(\cdot)$
- If $\gamma' > \gamma$, then $F_i^R(x; \gamma', \theta)$ FOSD $F_i^R(x; \gamma, \theta)$ (strategic complementarity)
- Sunk cost/investment to try out $C_i \geq 0$

Consequences of a Pandemic

For some, profitable to switch to *Remote* and pay one-time cost C_i

Some firms switching $\Rightarrow$ profitable for more firms to switch

Firms get the chance to update their information/beliefs θ_{it} about $F_i^R(\cdot)$

Consequences of a Pandemic

For some, profitable to switch to *Remote* and pay one-time cost C_i

Some firms switching $\Rightarrow$ profitable for more firms to switch

Firms get the chance to update their information/beliefs θ_{it} about $F_i^R(\cdot)$

Stickiness in the remote technology because:

- Already paid switching cost C_i
- γ rises relative to before the pandemic $\Rightarrow$ remote more profitable than before (cf. Davis, Ghent, and Gregory, 2022)
- If priors θ were too pessimistic, forced, coordinated experimentation eliminates bias against remote
- Additionally: Learning about *Remote* could be easier if γ is high

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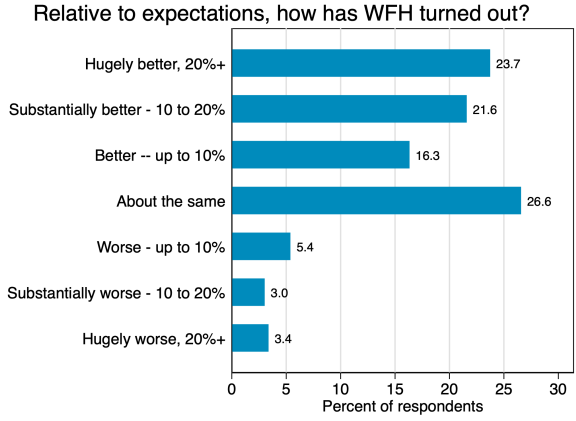
1. Forced experimentation and learning overcome inertia

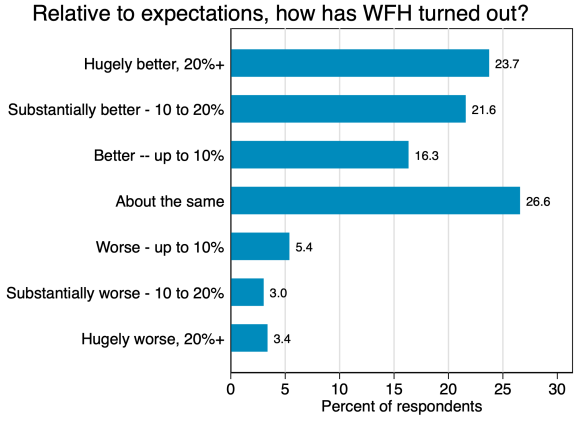


Compared to your expectations ***before COVID (in 2019),*** *how has working from home turned out for you [in terms of productivity/efficiency]?*

▸ Time series ▸ Back

Notes: Data are from the July 2020 to April 2022 SWAA Waves, for respondents who worked from home at some point since the start of the COVID-19 pandemic. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 53,004**

1. Forced experimentation and learning overcome inertia



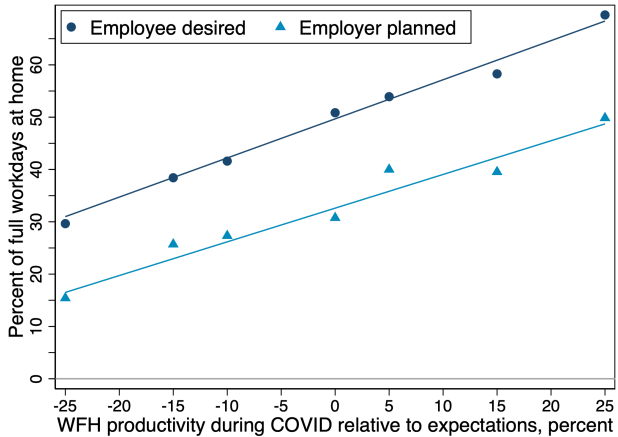
Two effects:

- High realized payoffs under WFH for some
- Experimentation reveals pessimistic priors about WFH

Time series Back

Notes: Data are from the July 2020 to April 2022 SWAA Waves, for respondents who worked from home at some point since the start of the COVID-19 pandemic. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 53,004**

Desired and Planned Post-COVID WFH Increase with WFH Productivity Surprises



Notes: Data are from the July 2020 to April 2022 SWAA Waves and focus on respondents who have worked from home at some point since the start of COVID. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 49,097.**

▸ Global Evidence ▸ Back

2. Investments enabling WFH

2020 Investment into WFH adds up to $\sim 0.7\%$ of GDP

How many hours have you invested in learning how to work from home effectively (e.g., learning how to use video-conferencing software) and creating a suitable space to work?

- **Mean:** 15.0 hours (SE = 0.2)

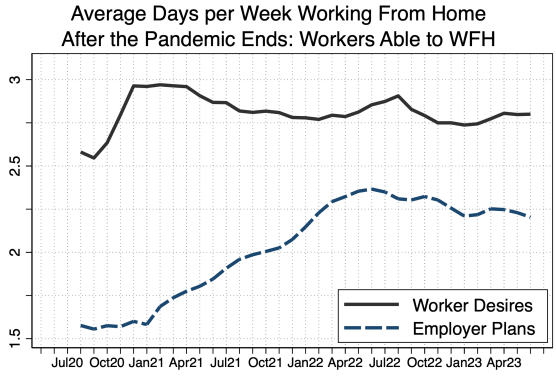
How much money have you and your employer invested in equipment or infrastructure to help you work from home effectively – computers, internet connection, furniture, etc.?

- **Mean:** $561 (SE = 9)

Additionally, firms have made investments on business premises

NIPA Investment Back

3. Workers Consistently Want More WFH Than Employers are Planning



***As the pandemic ends**, how often would you **like to** have paid workdays at home?*

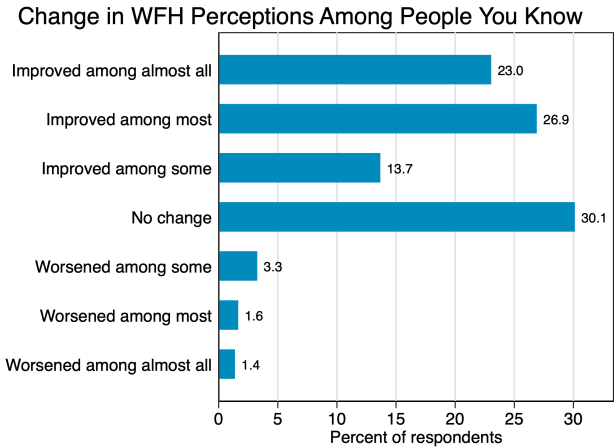
- *Never*
- *...*
- *5+ days per week*

***As the pandemic ends,** how often is **your employer planning** for you to work full days at home?*

Notes: Data are from the August 2020 to June 2023 SWAA waves focusing on respondents who are able to work form home. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings}. Each month, we compute average worker desired and employer planned working from home days as the pandemic ends. The figure shows three-month moving averages (exc. two-month moving averages at the ends). **N = 114,314 (employer plans). N = 122,934 (worker desires).**

▸ All workers ▸ Talent retention ▸ Reasons for liking WFH/WBP ▸ Back

4. WFH Stigma Has Diminished

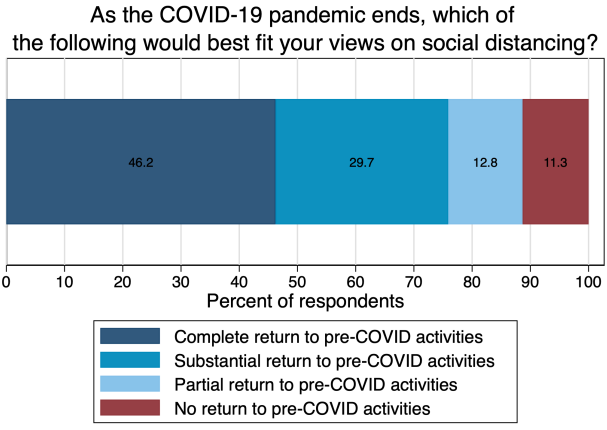


Notes: Data are from the July 2020 to October 2021 and March to May 2022 SWAA waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 66,520.**

Since the COVID pandemic began, ***how have perceptions about working from home (WFH) changed among people you know?***

- Time series
- Reaction to stigma drop
- Back

5. Long Social Distancing



Notes: Data are the February to June 2023 SWAA waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 93,933.**

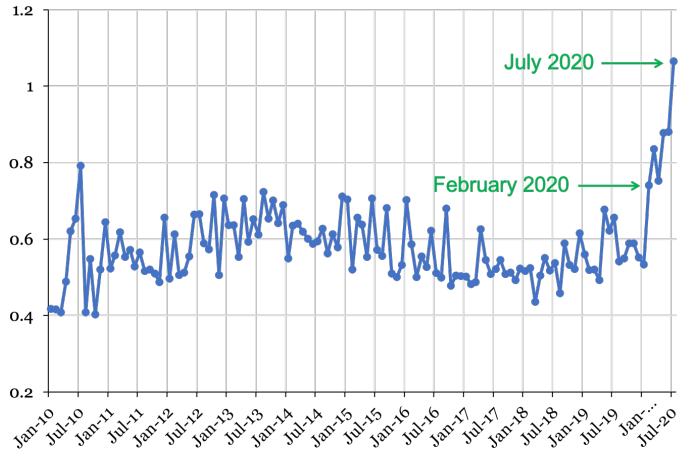
As the COVID-19 pandemic ends, *which of the following would best fit your views on social distancing?*

- *Complete return to pre-COVID activities...*
- *Substantial return to pre-COVID activities...*
- *Partial return to pre-COVID activities...*
- *No return to pre-COVID activities...*

▸ Time series
▸ Implications
▸ Back

Redirected Technical Change

WFH Patents as % of Patent Applications



Source: Bloom, Davis, and Zhestkova (2021)

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Long Social Distancing: Implications

People who intend to continue social distancing are **more likely to be out of the labor force, lowering the aggregate participation rate by 2.5 percentage points** (**1.4** on an earnings-weighted basis).

Separate survey questions find that many individuals remain **out of the labor force because of fears of infection with COVID-19 or other diseases.** Such fears **lower the participation rate** by **2 percentage points** (**1.4** on an earnings-weighted basis).

Lower labor force participation **reduces US potential output** by nearly **1 percent** and **shrinks the college wage premium.**

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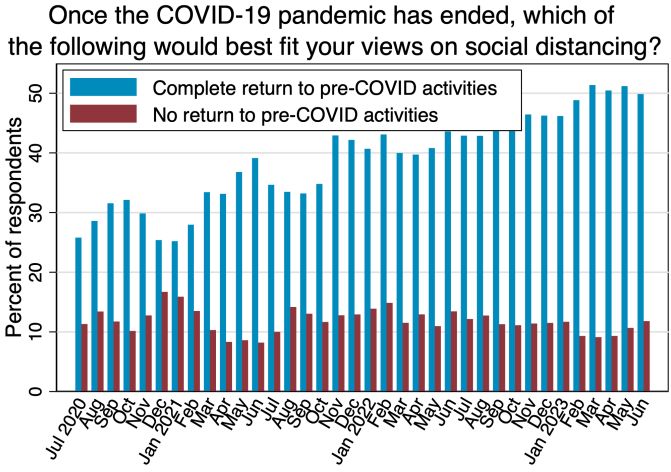
FEARS OF SOCIAL PROXIMITY OVER TIME



Once the COVID-19 pandemic has ended, *which of the following would best fit your views on social distancing?*

- Complete return to pre-COVID activities...
- Substantial return to pre-COVID activities...
- Partial return to pre-COVID activities...
- No return to pre-COVID activities...

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Notes: Data are from the July 2020 to June 2023 SWAA waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. **N = 161,631.**

4. Lower Stigma Predicts Higher WFH Desires & Plans

Perceptions about WFH	Percent WFH days post-COVID (SE) Employee desired		Employer planned		N
Improved among almost all (90 to 100%)	59.3	(0.3)	37.5	(0.3)	17,961
Improved among most	49.7	(0.3)	27.2	(0.3)	16,702
Improved among some	42.6	(0.4)	22.4	(0.4)	7,831
No change	31.7	(0.4)	13.6	(0.3)	13,172
Worsened	36.8	(0.7)	21.0	(0.6)	3,503

Notes: This table estimates the percent share of days spent working from home post-COVID desired by workers and planned by their employers, as a function of how the employee believes perceptions about working from home have changed since the onset of the pandemic. Data are from the July 2020 to October 2021 and March to May 2022 SWAA waves. We exclude workers who claim to have "no employer" in the employer plans question and impute employer planned working days for respondents who claim not to have received any clear indication from their employer. We re-weight raw responses to match the share of working age respondents in the 2010-2019 CPS in a given {age x sex x education x earnings} cell.

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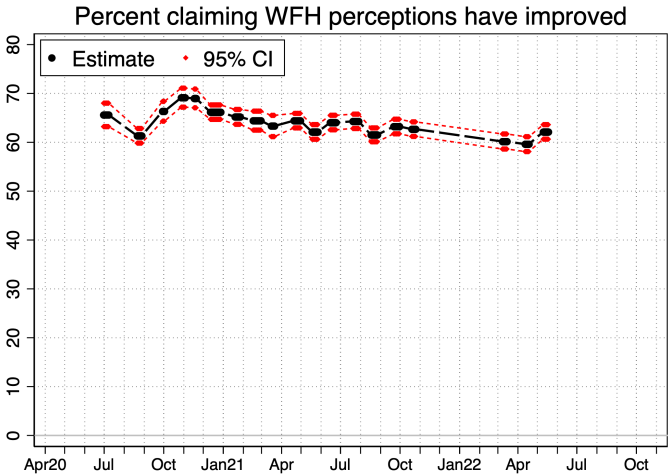
Evolution of perceptions about WFH



Notes: Responses to the question "Since the COVID pandemic began, how have perceptions about working from home (WFH) changed among people you know?" Data are from 68,250 survey responses collected between May 2020 and October 2021. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell.

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Final Good Firm Problem

Choose efficiency units to maximize profits, taking output price p as given:

$$\max_L pL^{2/3} - L$$

Optimality requires $p = \frac{3}{2}L^{1/3} \Rightarrow$ In equilibrium, GDP is: $\frac{3}{2}L$

Back

Inferring Worker Disutility of Work χ_i

Employment Contracts Acceptable to the Firm: $\{w(h_i), \delta(h_i), h_i\}$

- Closed form solutions for $w(h_i)$ and $\delta(h_i)$

Obtain χ_i From Worker's Optimality Condition:

$$\frac{w'(h)}{w(h)} + \frac{1}{h_i} = \chi_i [h_i + g_i \text{DAYS}_i + (t_i + g_i^c) \cdot (1 - \delta_i(h))) \text{DAYS}_i]^\eta \cdot [-(t_i + g_i^c) \text{DAYS}_i \delta'(h)]$$

$1/\eta$ is the Frisch elasticity of labor supply, which we calibrate to 0.5

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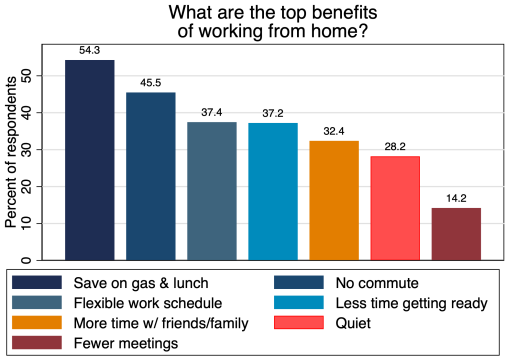
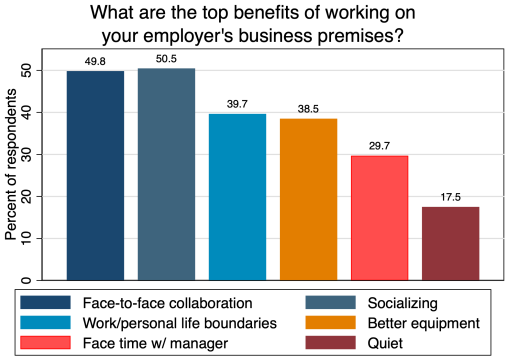
Top 3 Benefits of WFH vs. Commuting to Work





Note: Data are from the July to September 2022 SWAA waves. We re-weight raw responses to match the 2010-2019 CPS pop. by {age × sex × education × earnings} cell. We asked respondents the following two questions: *"What are the top benefits of working from home? Please choose up to three,"* and *''What are the top benefits of working on your employer's business premises? Please choose up to three."* **N = 13,645.**

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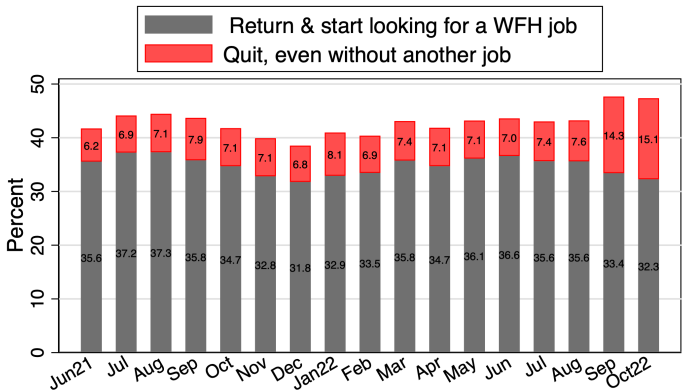
Failing to Offer WFH Could Make It Difficult to Attract Talent

If my employer announced that all employees must return to the worksite 5+ days a week the month-after-next, I would:



*Sample: Respondents WFH 1 or more days per week during the reference week.

How would you respond if your employer announced that all employees must return to the worksite 5+ days a week starting [month-after-next]?

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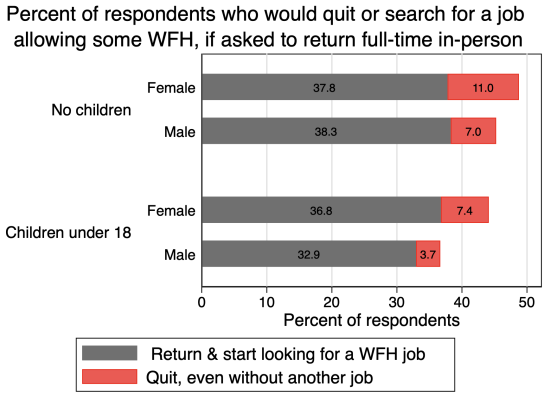
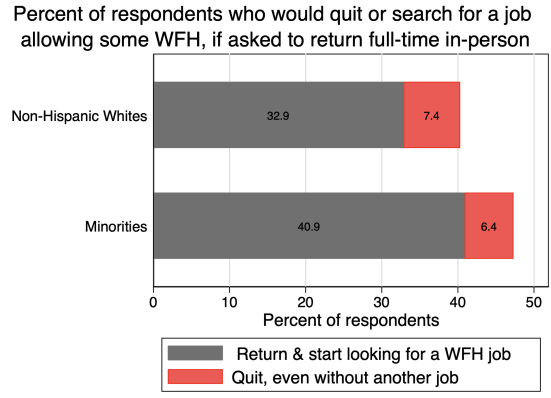
Particularly For Diverse Talent





Notes: Responses to the question: *''How would you respond if your employer announced that all employees must return to the worksite 5+ days a week starting [month-after-next]?"* Data are from 10,175 survey responses collected between June and October 2021. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell.

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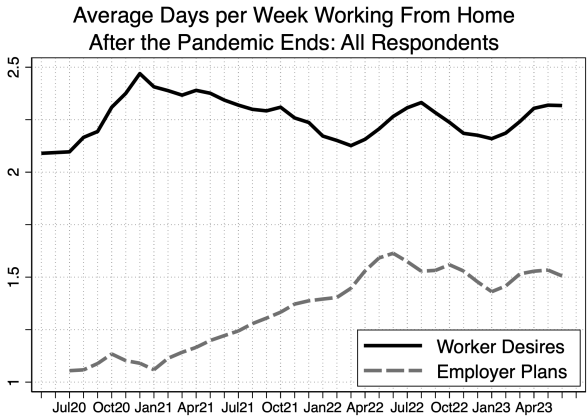
Workers Consistently Want More WFH Than Employers are Planning



***As the pandemic ends**, how often would you **like to** have paid work-days at home?*

***As the pandemic ends,** how often is **your employer planning** for you to work full days at home?*

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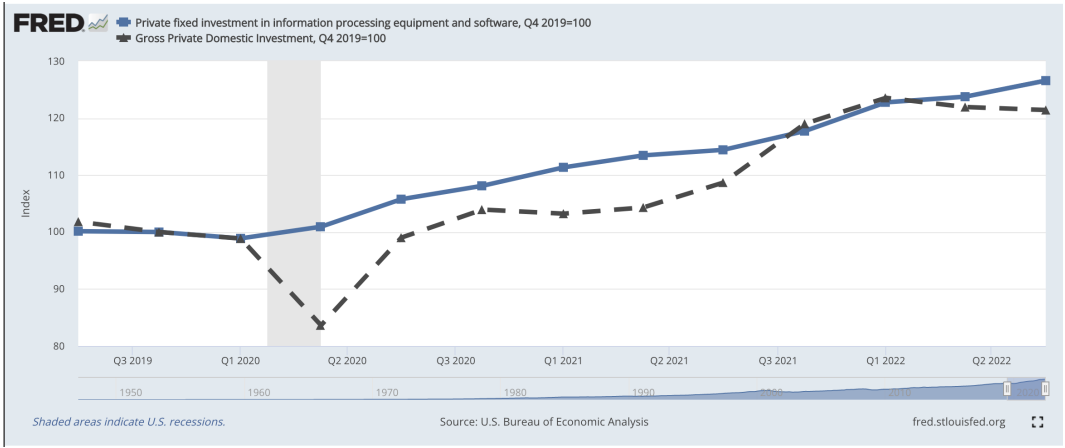
Notes: Data are from the May 2020 to June 2023 SWAA Waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell. Each month, we compute the average percent of worker desired and employer planned full paid working days after the end of the end of the pandemic. The figure shows three-month moving averages for each variable,

Business Investment in NIPA Data



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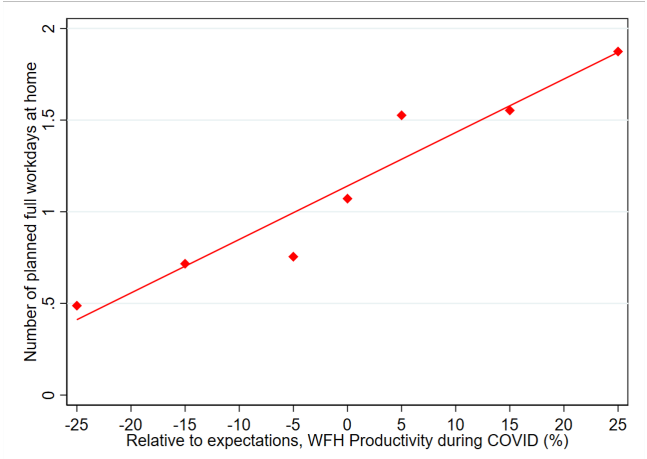
Learning from Experimentation: Global Evidence



Source: Global Survey of Working Arrangements. See Aksoy, Cevat Giray, Jose Maria Barrero, Nicholas Bloom, Mathias Dolls, Steven J. Davis, and Pablo Zárate (2022), "Working From Home Around the World," *Brookings Papers on Economic Activity (Forthcoming).*

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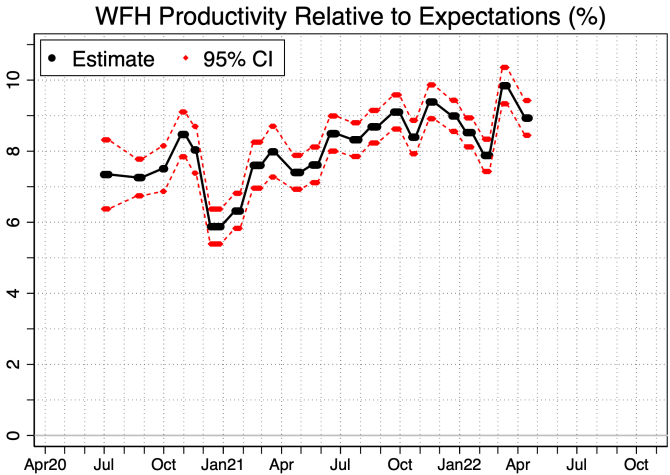
Evolution of the productivity surprise



Notes: Responses to the question "Compared to your expectations before COVID (in 2019),how has working from home turned out for you [in terms of productivity/efficiency]?" Data are from the July 2020 to April 2022 SWAA waves. We re-weight raw responses to match 2010-2019 CPS pop. by {age × sex × education × earnings} cell.

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Productivity & Output Costs If Firms Choose WFH Unilaterally in 2023

Counterfactual	$100\times\Delta\log(pY)$ Output	$100\times\Delta\log(pY/H)$ Measured Productivity	$100\times\Delta\log(pY/(H+T+G))$ Productivity if Hours Include Commuting & Grooming
2019	−1.9	−0.8	−2.1
2020	−11.0	−11.9	−10.3
Worker desired amount of WFH	−8.7	−8.7	−8.4

Notes: The table shows $100\times$ the log-difference between 2022-2023 outcomes and the counterfactual, with positive numbers indicating a higher outcome in 2022-2023. H, T, and G are total paid hours of work, time commuting, and grooming, namely: $H = \int_i h_i \mathrm{d}F(i)$, $T = \int_i t_i(1-\delta_i)\mathrm{DAYS}_i \mathrm{d}F(i)$, $G = \int_i [g_i + g_i^c(1-\delta_i)]\mathrm{DAYS}_i \mathrm{d}F(i)$.

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Consumer Welfare Effects

Counterfactual	Constant Hours, Prices, Wages	Hours, Prices, Wages Free to Adjust
2019	−1.6	−0.1
2020	-3.4	-9.3
Worker desired amount of WFH	6.6	3.4

Notes: The table shows the average percent cut to 2022-2023 consumption required to attain the same consumer welfare distribution as the counterfactual. For each counterfactual we can compute consumer welfare leaving hours, prices, and wages constant, so that the shift in welfare comes entirely from commuting/grooming time savings. When we let hours, prices, and wages adjust, the difference in welfare across economies reflects commuting time savings and differences in relative prices.

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