

# Why Working from Home Will Stick

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**Hoover Economic Policy Working Group**

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# Overview

- 1. WFH before, during, and after the pandemic**
- 2. Why the shift to WFH will (partly) stick**
  - a) Mass experimentation and learning → re-optimization
  - b) Investments by workers and firms that enable WFH
  - c) Attitudes: ↓WFH stigma, lingering fears of proximity
  - d) Surge of innovation that supports WFH
- 3. Some consequences of the shift to WFH**
  - a) Large benefits, mainly for the well paid and highly educated
  - b) Big loss of worker spending in city centers
  - c) Productivity boost: true (large) and measured (small)

# Survey of Working Arrangements and Attitudes

## **31,000 respondents, nine survey waves to date**

- May 2020 & monthly from July 2020 to February 2021
- This talk mostly uses data from May through December

## **US residents aged 20-64, earning \$20K+ in 2019**

- After dropping “speeders” (10% of the sample), we re-weight to match the age-sex-education distribution of workers in the 2010-2019 CPS

## **40-55 questions per wave**

- Demographics, earnings, hours worked
- Extent of WFH *during* COVID and desires/plans *after* COVID
- Experience, perspectives on WFH, contagion fears, vaccines, etc.
- Home and workplace locations, commuting time, spending, etc.
- WFH efficiency: Relative to worksite productivity and to expectations

# Sample Survey Question

6. ***After COVID, in 2022 and later, 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

«

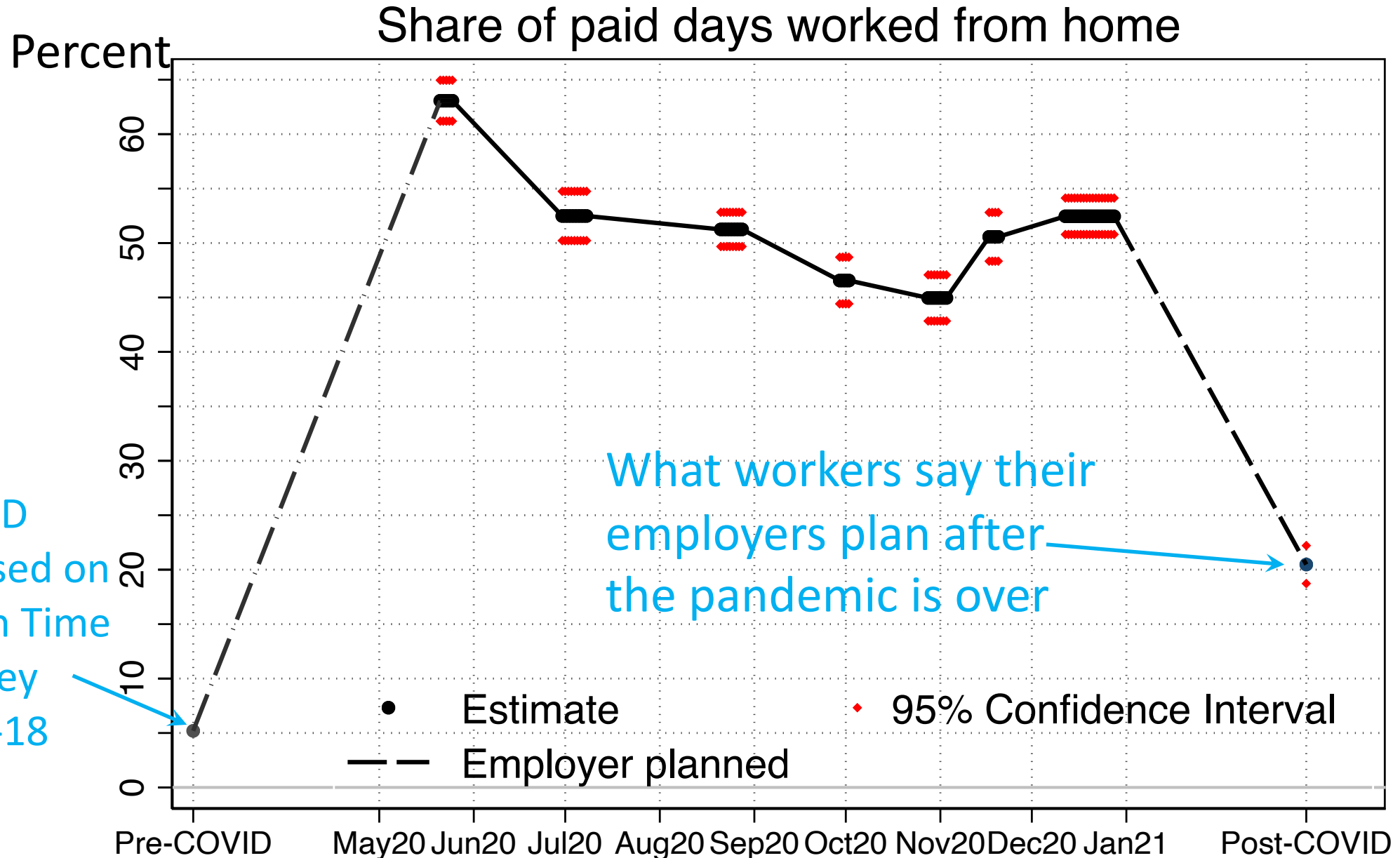
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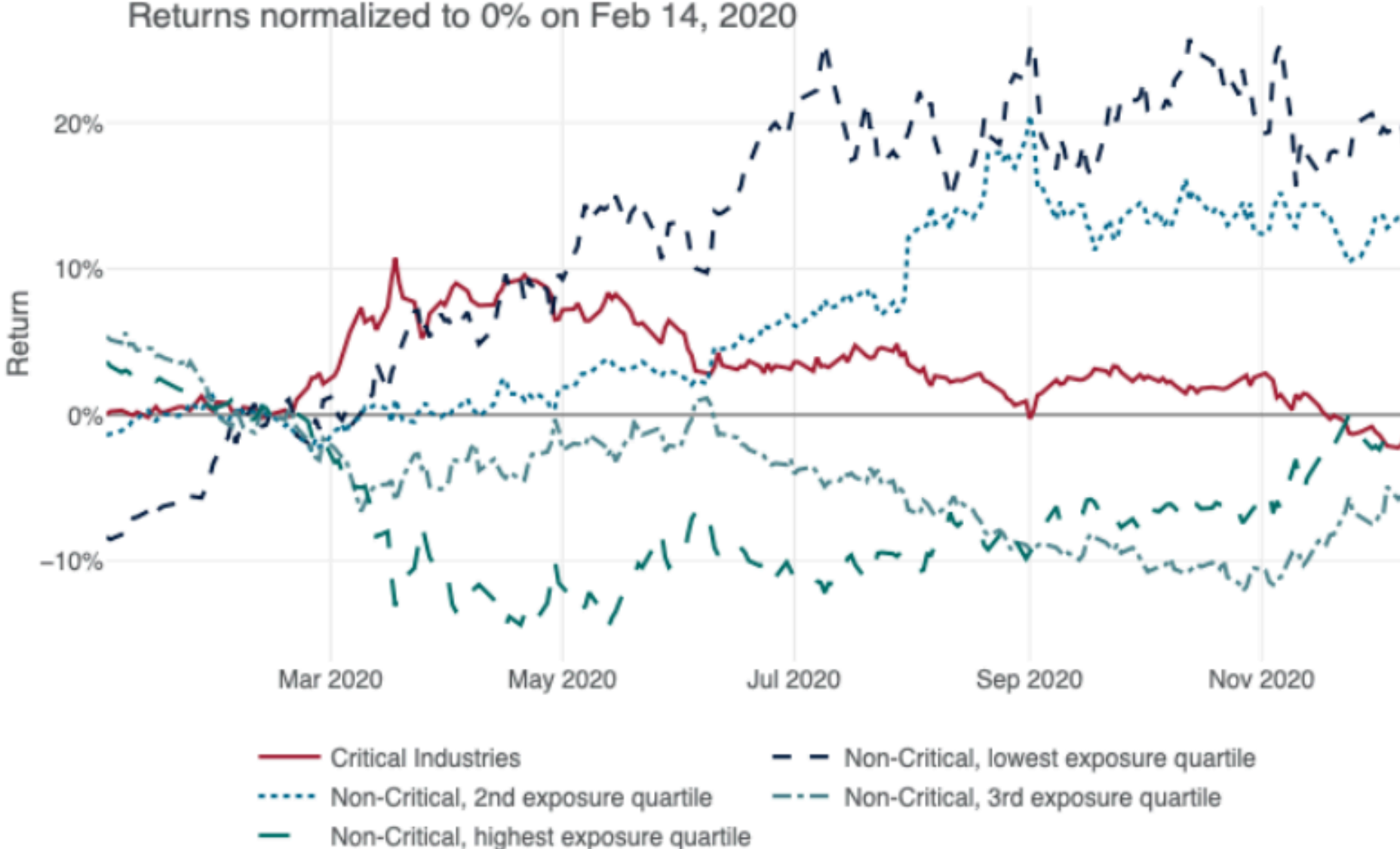


# How Much WFH Before, During, and After COVID?



# Equity Markets Think the Shift to WFH Is a Big Deal

Cumulative returns relative to the market since Jan 1, 2020  
Returns normalized to 0% on Feb 14, 2020



Firms outside “Critical Industries” sorted into quartiles based on the fraction of workers in their industry that can feasibly work from home.

This chart is from <https://sites.google.com/site/lawrencedwscmidt/covid19> and is based on work by Schmidt and Papanikalaou (2020).

**Why the Shift  
to WFH Will  
(Partly) Stick**

# 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 (2020)

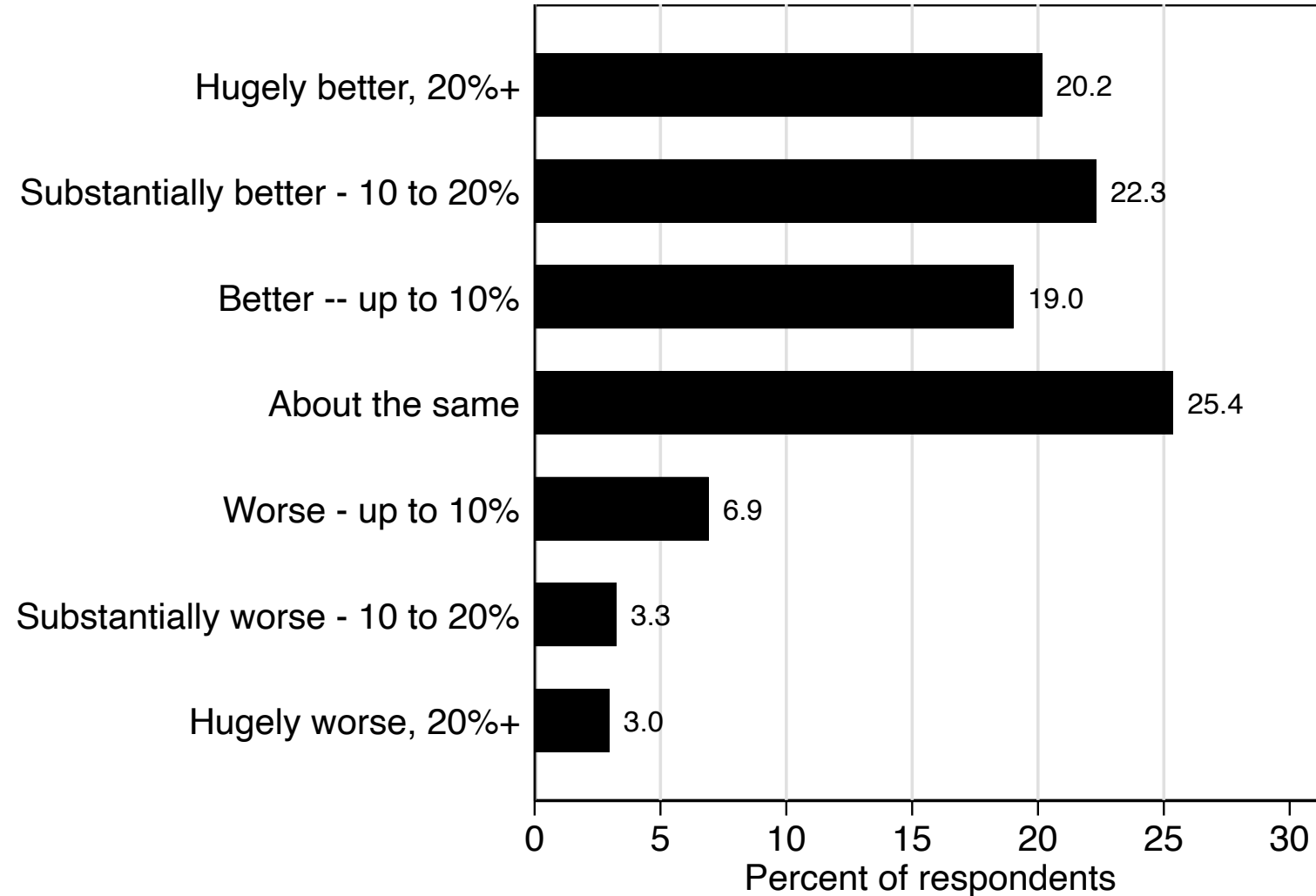


James Gorman

PHOTO: AL DRAGO/BLOOMBERG NEWS

# 1. Forced Experimentation: WFH exceeded expectations

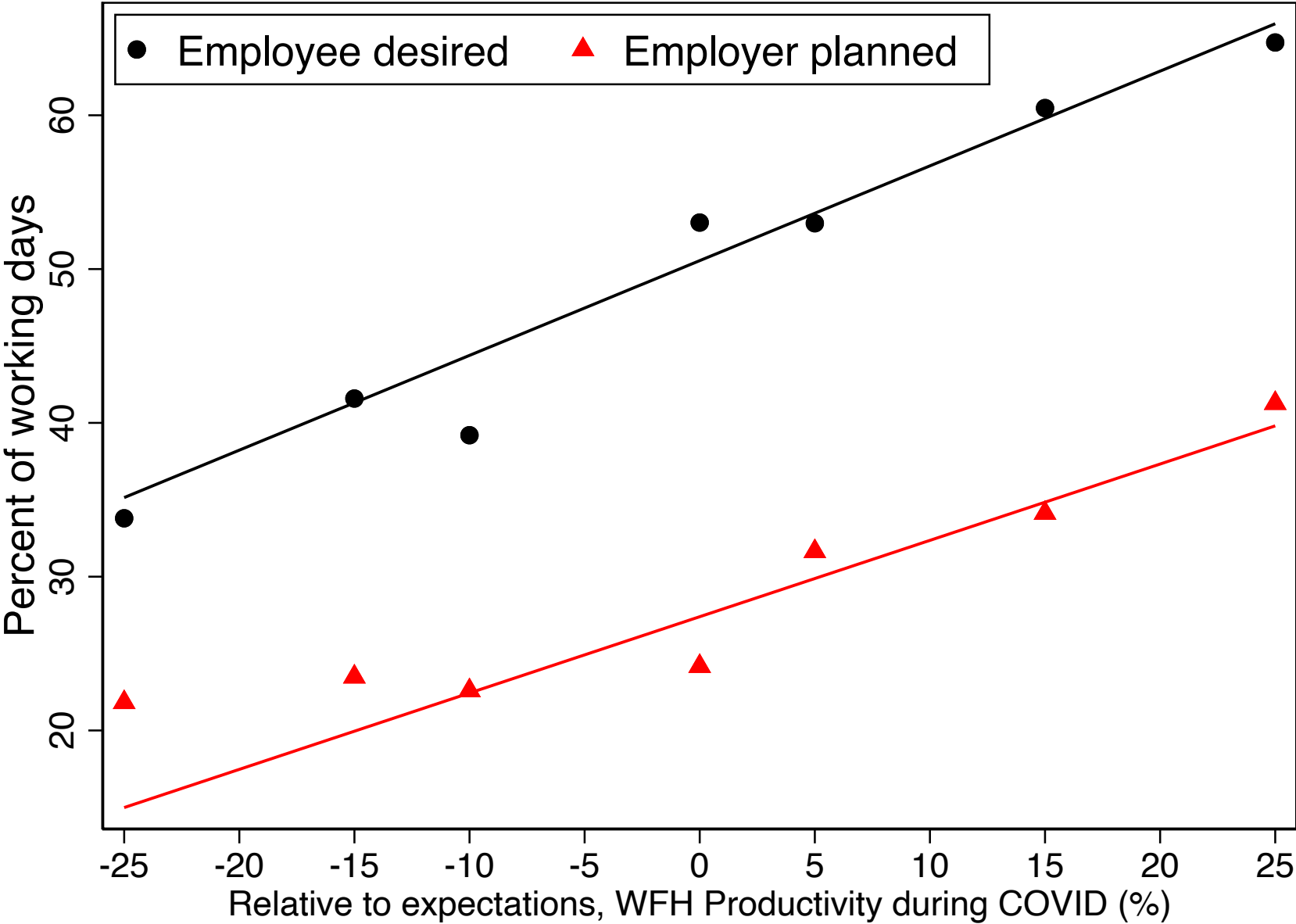
Relative to expectations, how has WFH turned out?



*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*

# Desired and Planned Levels of WFH after the Pandemic Rise with WFH Productivity Surprises during the Pandemic



## 2. Pandemic-induced investments that enable WFH

### Investments at home to enable WFH = 0.7% of annual 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 hours: 14.2 (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: \$603 (SE = 12)**

Valuing time at respondent's wage, the **mean dollar-equivalent investment** is \$1,499 (36) among those WFH in 2020.

→ 1.2% of annual labor income and 0.7% of GDP.

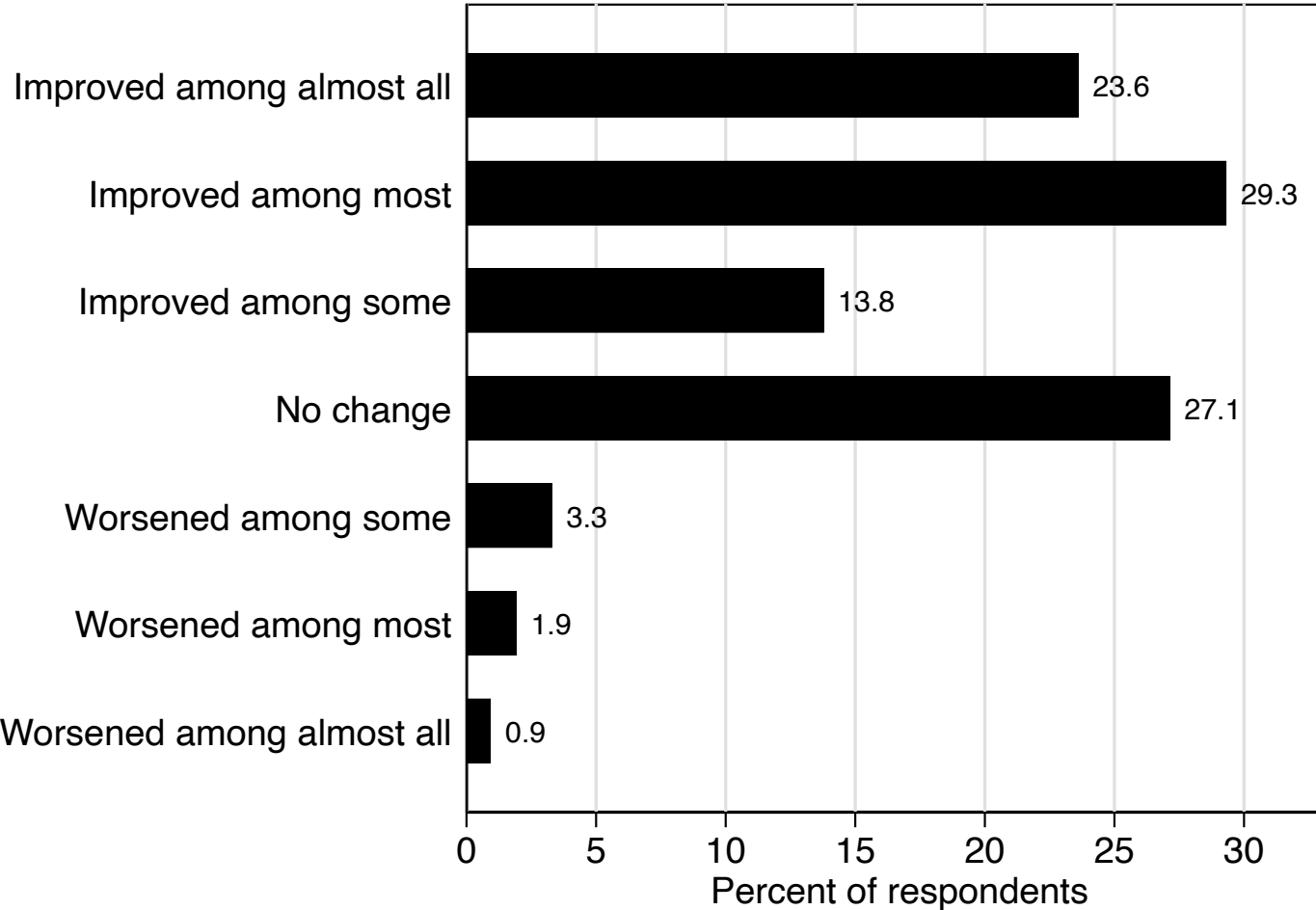
**NIPA Data: Investment in Info Processing Equipment & Software rose from 3.8% of GDP in 2019 to 4.2% in 2020Q2 and Q3, even as GDP share of other investment fell 16%.**





# 3.a Under COVID, WFH stigma has greatly diminished

Change in WFH Perceptions Among People You Know



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

- Hugely improved -- the perception of WFH has improved among almost all (90-100%) the people I know*
- Substantially improved -- the perception of WFH has improved among most but not all of the people I know*
- Slightly improved -- the perception of WFH has improved among some people I know but not most*
- No change*
- Slightly worsened -- the perception of WFH has worsened among some, but not most, people I know*
- Substantially worsened -- the perception of WFH has worsened among most, but not all, people I know*
- Hugely worsened -- the perception of WFH has worsened among almost all (90-100%) the people I know*



## 3.b. Long-Lingering Fears of Proximity to Others

If a COVID vaccine is discovered and made widely available, which of the following would best fit your views on social distancing? (N=16,655)

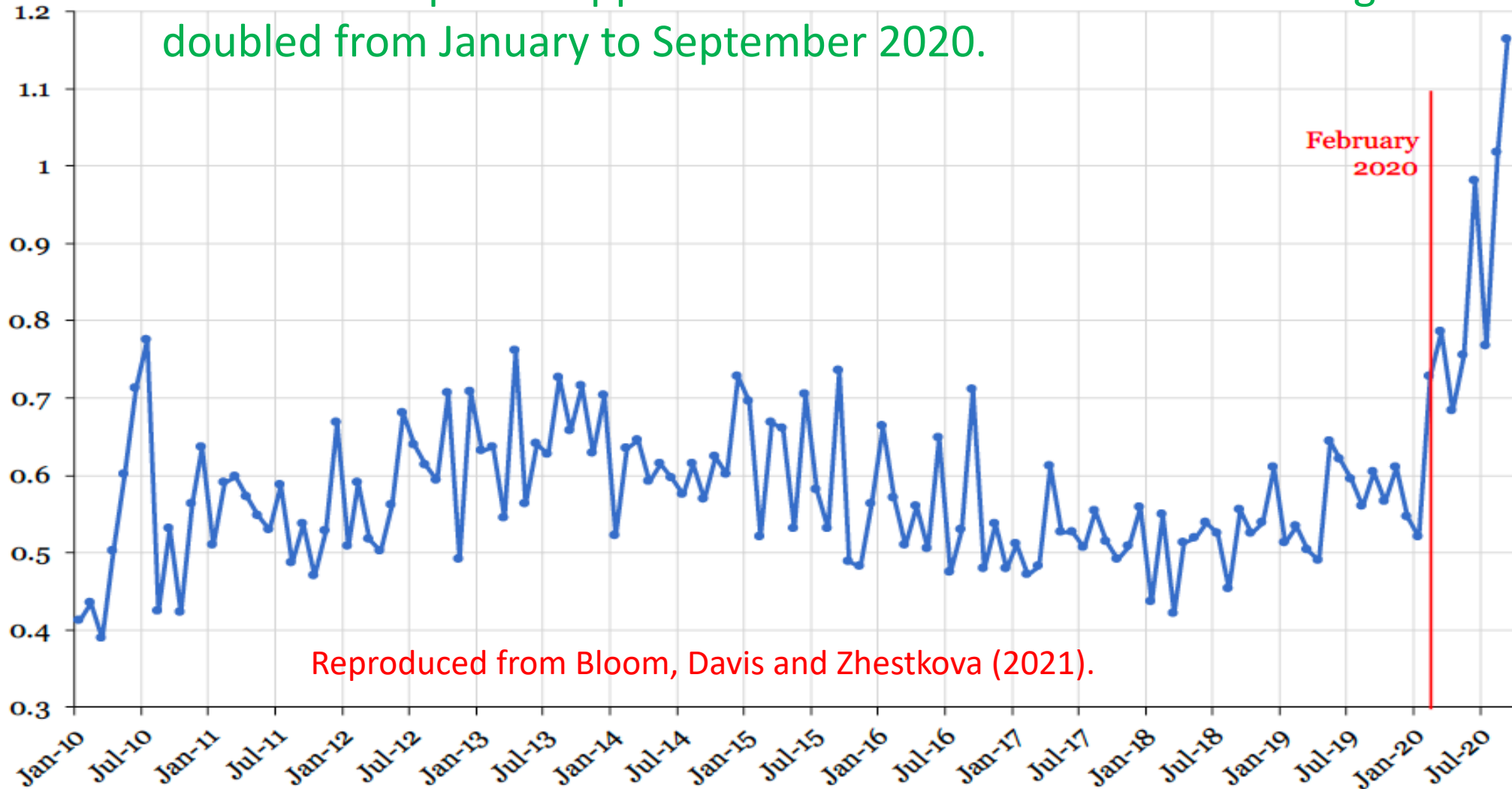
	<b>Percent of respondents</b>	<b>(SE)</b>
Complete return to pre-COVID activities	27.0	(0.3)
Substantial return to pre-COVID activities, but I would still be wary of things like riding the subway or getting into a crowded elevator	35.2	(0.4)
Partial return to pre-COVID activities, but I would be wary of many activities like eating out or using ride-share taxis	24.6	(0.3)
No return to pre-COVID activities, as I will continue to social distance	13.2	(0.3)

## 4. Re-Directed Technical Change: COVID-19 Shifted Patent Applications to Technologies that Support WFH

WFH Patents as % of Patent Applications

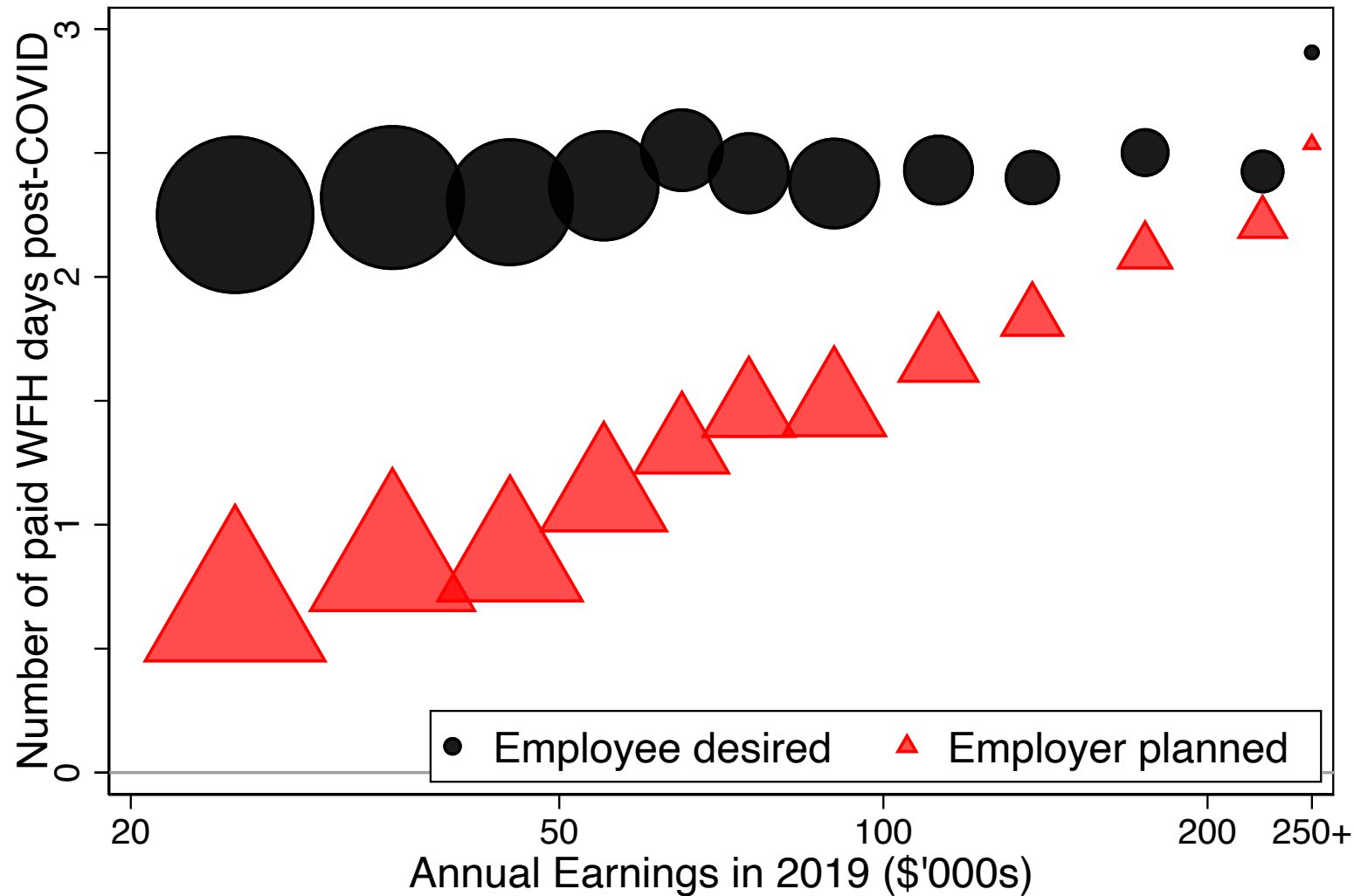
Percent

Share of new patent applications that advance WFH technologies doubled from January to September 2020.



# **Some Consequences**

# Worker Desires for WFH Are Flat with Respect to Earnings, But Employer Plans for WFH Rise with Earnings.



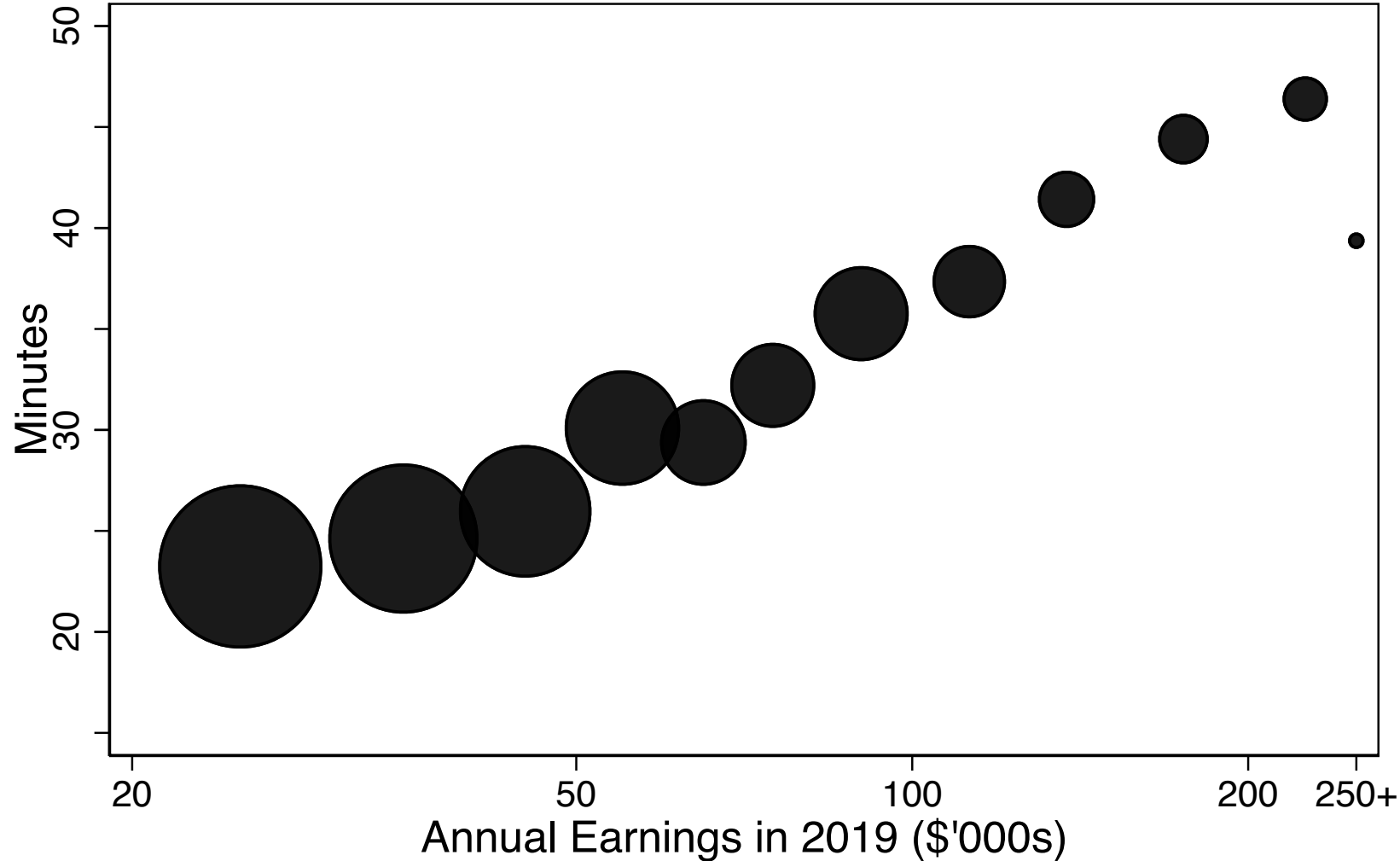
*After COVID, in 2022 and later, how often would you like to have paid workdays at home?*

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

Note: Marker size is proportional to the number of respondents per income level.

# Higher earners have longer commutes (except at top)

Average one-way commute length



**Source:** Responses to the questions:

*In 2019 (before COVID) how long was your typical commute to work in minutes?*

*How much did you earn by working in 2019?*

Note: Marker size is proportional to the number of respondents by earnings level

# 1. Large Benefits, Mainly for Well Paid and Highly Educated

## As a Percent of Earnings

Value of  
planned  
Post-COVID  
WFH

Perk Value  
of option to  
WFH 2-3  
Days a Week

Ann. Earnings of \$20 to \$50K	1.5	(0.1)	6.8	(0.2)
Ann. Earnings of \$50 to \$100K	3.0	(0.1)	8.2	(0.2)
Ann. Earnings of \$100 to \$150K	4.8	(0.2)	9.6	(0.2)
Ann. Earnings over \$150K	7.3	(0.2)	12.2	(0.3)
Goods-producing sectors	2.6	(0.2)	7.1	(0.3)
Service sectors	2.4	(0.1)	7.8	(0.1)
No children	1.8	(0.1)	6.6	(0.2)
Living with children under 18	3.2	(0.1)	8.8	(0.1)

**We estimate perk value from:**

Q1: “After COVID, in 2022 and later, how would you feel about working from home 2 or 3 days a week?”

Q2: “How much of a pay raise [cut] (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?”

To obtain the “value of planned post-COVID WFH,” we also use data on employer plans.

# 1. Large Benefits, Mainly for Well Paid and Highly Educated

## As a Percent of Earnings

	Value of planned Post-COVID WFH		Perk Value of option to WFH 2-3 Days a Week	
Overall	2.5	(0.1)	7.7	(0.1)
Women	1.8	(0.1)	7.6	(0.1)
Men	3.3	(0.1)	7.8	(0.1)
Age 20 to 29	2.4	(0.1)	8.3	(0.2)
Age 30 to 39	2.9	(0.1)	8.6	(0.2)
Age 40 to 49	2.9	(0.1)	8.4	(0.2)
Age 50 to 64	1.7	(0.1)	5.4	(0.2)
Less than high school	1.9	(0.6)	3.6	(1.3)
High school	1.4	(0.1)	6.1	(0.3)
1 to 3 years of college	1.6	(0.1)	7.0	(0.2)
4year college degree	2.6	(0.1)	7.9	(0.2)
Graduate degree	4.5	(0.1)	10.0	(0.2)

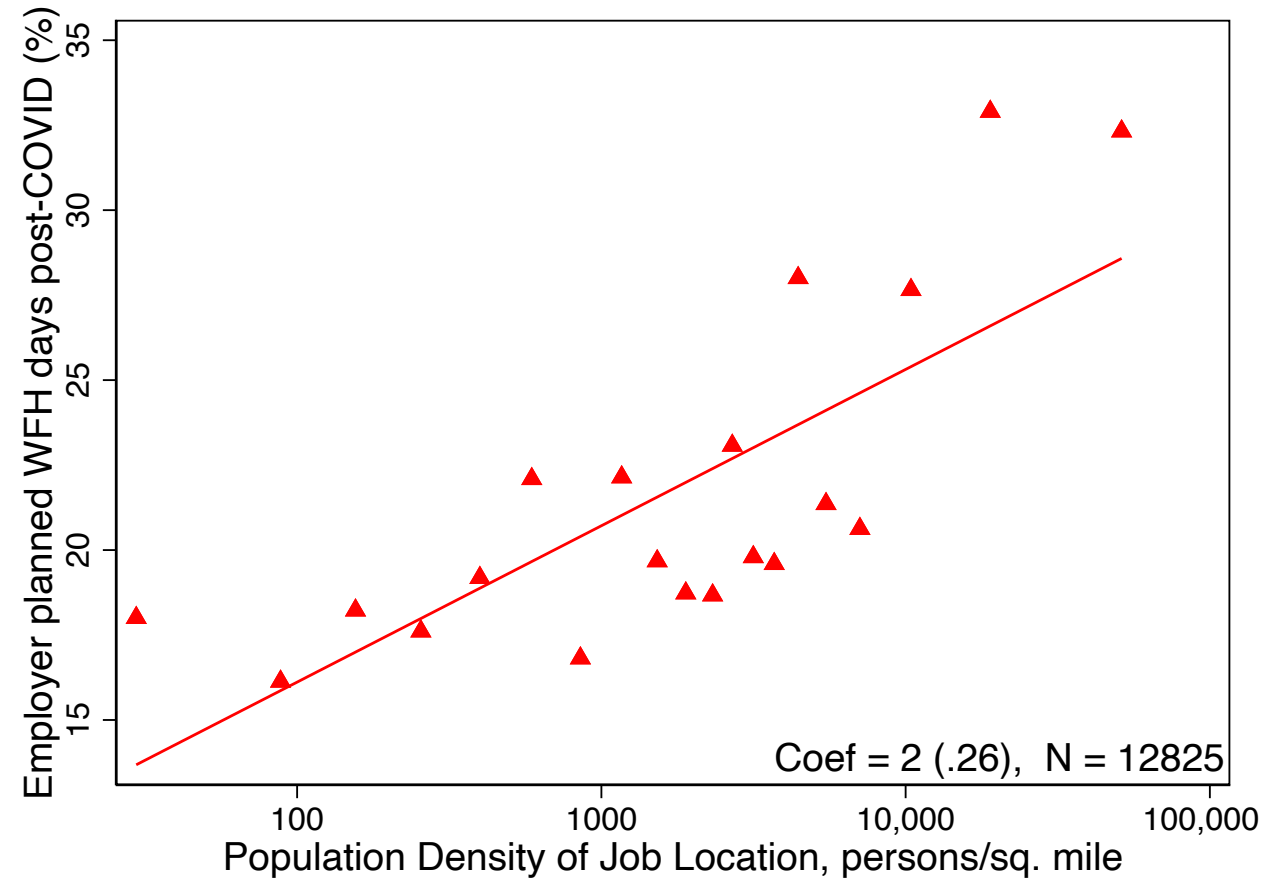
## 2. A Big Savings in Commuting Time

- 150 million Americans worked for pay as of December 2020.
  - Average commute time: 54 minutes per day.
  - WFH: 5% of workdays before COVID, 50% during the pandemic.
- Time spent commuting fell  $(0.5 \text{ minus } 0.05)(150 \text{ million})(54/60 \text{ hours}) = 61 \text{ million hours per workday during the pandemic -- **not** counting the contribution of lower employment. That amounts to } (5/7)(30)(61) = 1.3 \text{ billion hours per month.}$

Since our survey data say that 20 (not 50) percent of full workdays will be supplied from home after the pandemic, the implied reduction in commuting time is about 435 million hours per month.



# Spatial reallocation of worker spending away from dense city centers



Responses to the questions *“In 2019, before COVID, in what ZIP code was your job located?”*, *“In 2019, when you worked at your employer’s business premises, roughly how much money did you spend during a **typical day** on food and drinks (e.g., lunch, coffee, snacks, etc.)?”*, and *“In 2019, when you worked at your employer’s business premises, roughly how much money did you spend during a **typical week** in bars, restaurants, and other entertainment venues that are near to your workplace?”*

# 3. The Decline of Commuting Will Cut Spending in City Centers

Among inward commuters to urban area  $U$ , the average drop in weekly worker spending near employer premises is

$$AvgSpDrop_{IN}^U = (\sum_{i \in IN} s_i)^{-1} \sum_{i \in IN} s_i (WFH_i^{Plan} - WFH_i^{Pre}) SP_i,$$

$AvgSpGain_{OUT}^U$  is analog for outward commuters. Now compute

$$AvgSpDrop_{IN}^U (\# \text{ Inward Commuters for } U) \\ - AvgSpGain_{OUT}^U (\# \text{ Outward Commuters for } U)$$

Multiply by 50 weeks, divide by 2019 consumer spending in  $U$ , then multiply by 100 to get the projected percentage drop in consumer spending for area  $U$  associated with the persistent shift to WFH.

# A Simpler Calculation for Manhattan

- Inward commuters spent \$304 per week on services, food, shopping, & entertainment near their workplaces before COVID.
- Their employers' plans imply 34% of workdays from home after COVID.
- Manhattan had 2.3 million net inward commuters per day in 2019.  
→ Annual spending drop of \$11 Billion = 12% of 2019 taxable sales.
- Analogous calculations for San Francisco imply a 4% drop.

This simplified calculation neglects the positive cross-sectional correlation between (a) spending near workplaces in 2019 and (b) the size of the shift to WFH. Also, our current approach greatly understates the drop in worker spending in and around the main commercial centers of large cities.

# Implied Gains from Less Commuting

Weekly time savings from greater WFH in post-pandemic economy:

$$TS_i = (WFH_i^{Plan} - WFH_i^{Pre})(1 - f_i)C_i,$$

$C_i$  = daily round-trip commute time expressed in hours, and

$f_i$  = fraction of commute time devoted to work-related activities.

Implied productivity gain in percentage terms:

$$Gain_i^{Imp} = 100 \frac{TS_i}{L_i} = 100 \frac{(WFH_i^{Plan} - WFH_i^{Pre})(1 - f_i)C_i}{H_i + C_i(Days_i - WFH_i)},$$

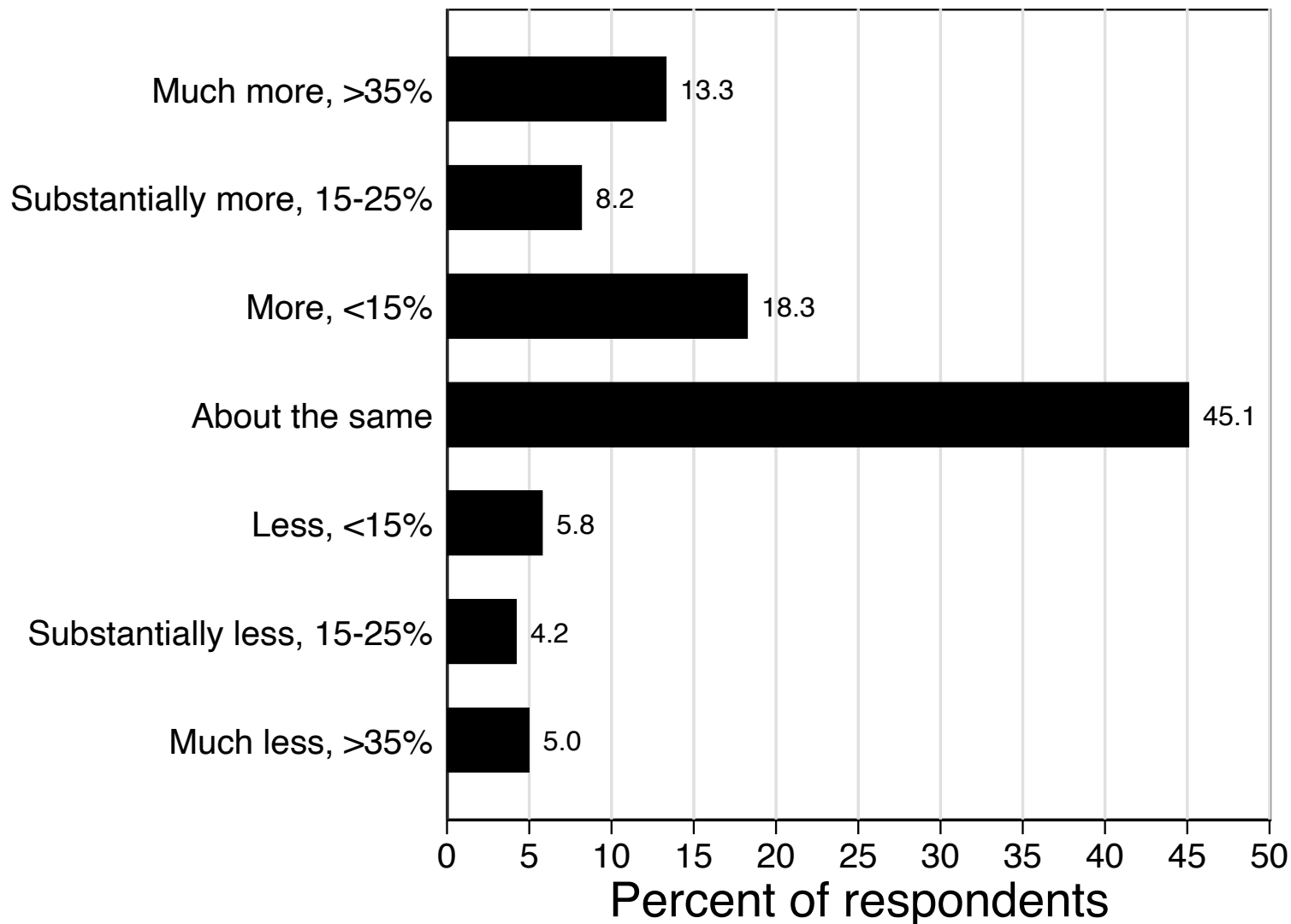
$L_i$  = total weekly hours devoted to paid work, inclusive of commuting time.

$H_i$  = is conventional measure of weekly work hours

$Days_i$  = number of full days the respondent works in the survey week

$WFH_i$  is the number of full workdays supplied from home in the survey week.

# 40% of workers say they are more efficient when working from home



Responses to the question:

*“How does your efficiency working from home **during the COVID-19 pandemic** compare to your efficiency working on business premises **before the pandemic?**”*

In follow-up questions, workers attribute most of the WFH efficiency advantage to the savings in commuting time.

## 4.a Big Boost in True Productivity from More WFH

Using SWAA micro data to implement equations above, the commuting time savings imply an average productivity gain of:

- 5.9 (0.5) percent on an equal-weighted basis
- 8.5 (0.5) percent on an earnings-weighted basis.

Alternatively, estimating the full average productivity gain using,

$$Gain_i^{True} = PrDiff_i \left( \frac{WFH_i^{Plan} - WFH_i^{Pre}}{Days_i} \right) + \chi_i Gain_i^{Imp}$$

- 4.5 (0.3) percent on an equal-weighted basis
- 6.2 (0.3) percent on an earnings-weighted basis.

## 4.b But a Small Boost, as Conventionally Measured

The conventional approach ignores commuting time and yields a measured productivity boost of

$$Gain_i^{Conv} = (1 - \delta_i) PrDiff_i \left( \frac{WFH_i^{Plan} - WFH_i^{Pre}}{Days_i} \right),$$

$\delta_i$  = fraction of the self-assessed efficiency advantage of WFH that respondent attributes to reduced commuting time.

- 0.9 (0.1) percent on an equal-weighted basis
- 1.1 (0.1) percent on an earnings-weighted basis.

Conventional measurement approaches will largely miss the productivity gains arising from the shift to WFH.

# Some Messages for Policy

1. The shift to WFH brings large benefits, but they will go largely unrecorded in standard productivity statistics.
2. Cities that enjoyed high inward commuting before COVID will see large, persistent drops in sales tax revenues, public transit toll revenues, and the property tax base.
3. The shift to WFH and fall in commuting is driving/will drive a big spatial reallocation of commercial activities
4. For effective adjustment, government authorities must facilitate an expeditious repurposing of commercial and residential space. Otherwise, the creative-destruction process triggered by COVID-19 will mainly involve “destruction” in many urban areas.



DIGITAL TRANSFORMATION  
IS **YEARS** AWAY. I DON'T  
SEE OUR COMPANY  
HAVING TO CHANGE  
ANY TIME SOON.



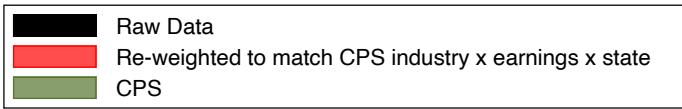
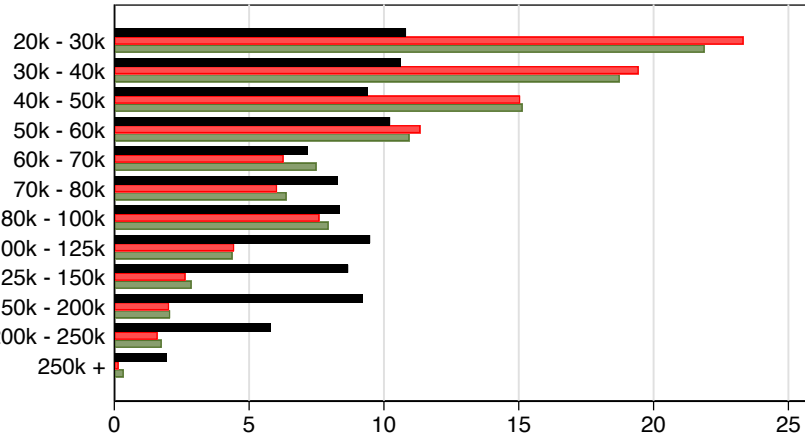
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# **Extra Slides**

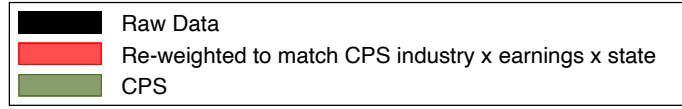
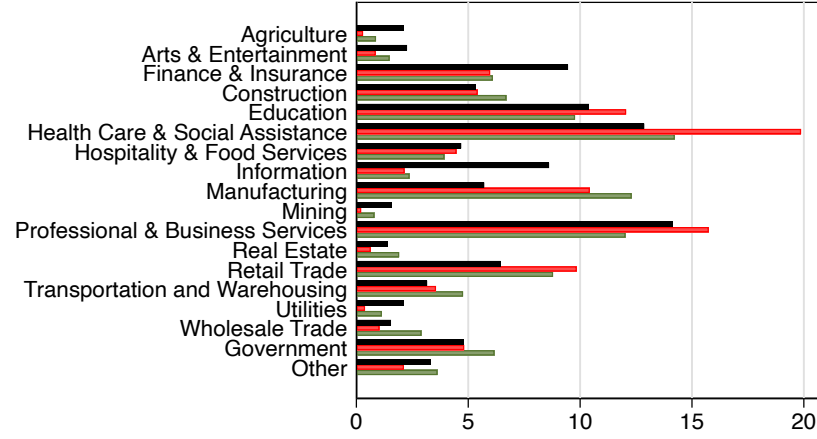
# Figure 2: Survey Responses Compared to the CPS

Reweighted

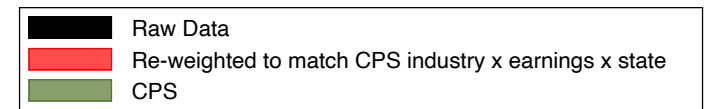
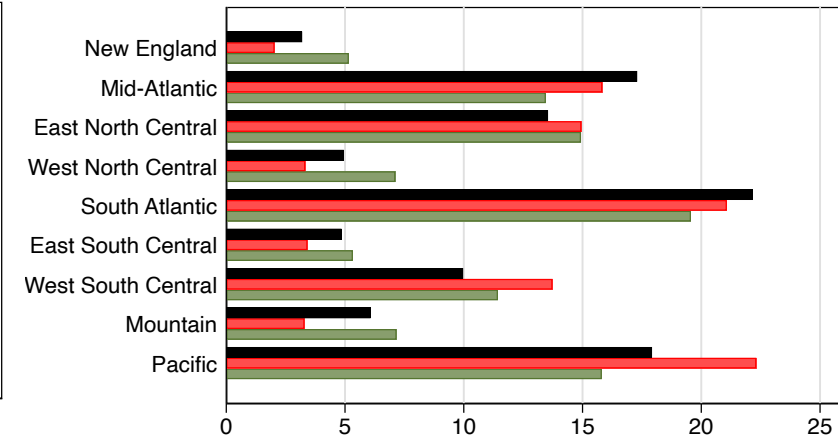
### Earnings



### Industry of current (or most recent) job

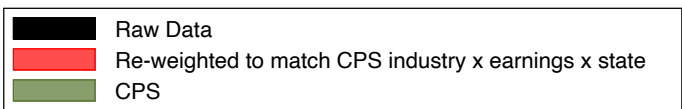
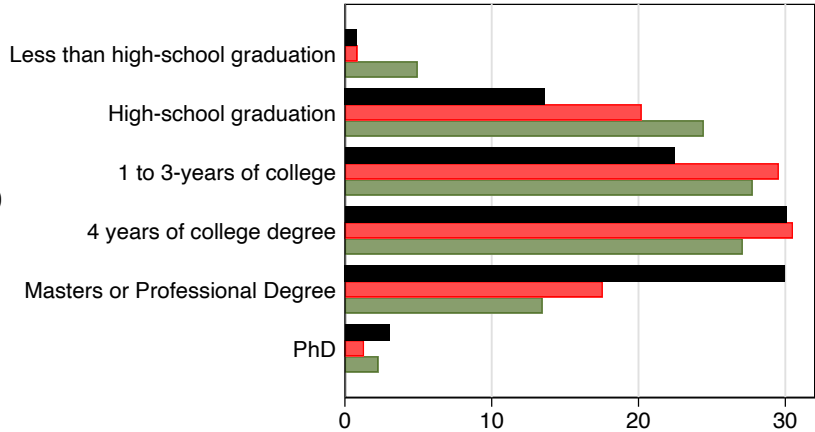


### Census Division

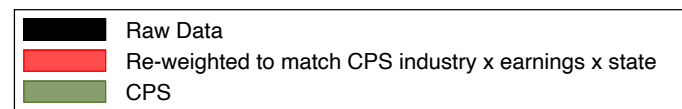
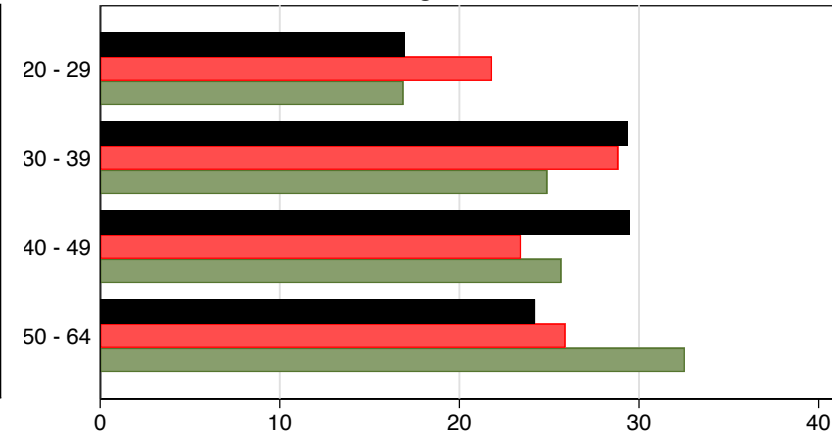


Not reweighted

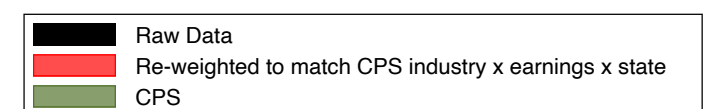
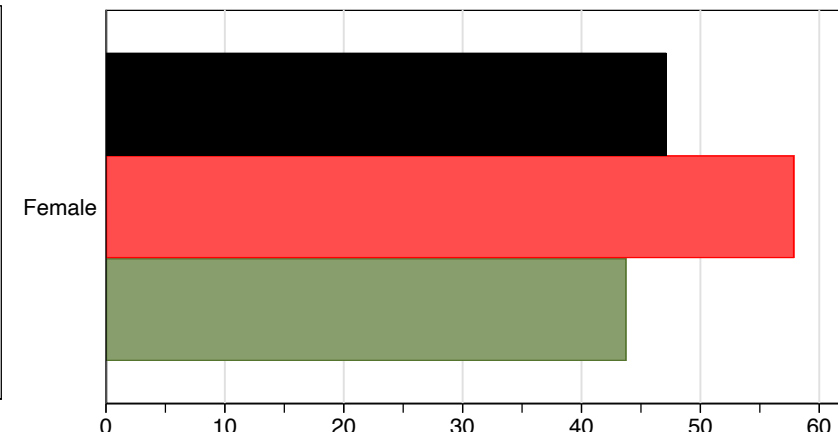
### Education



### Age

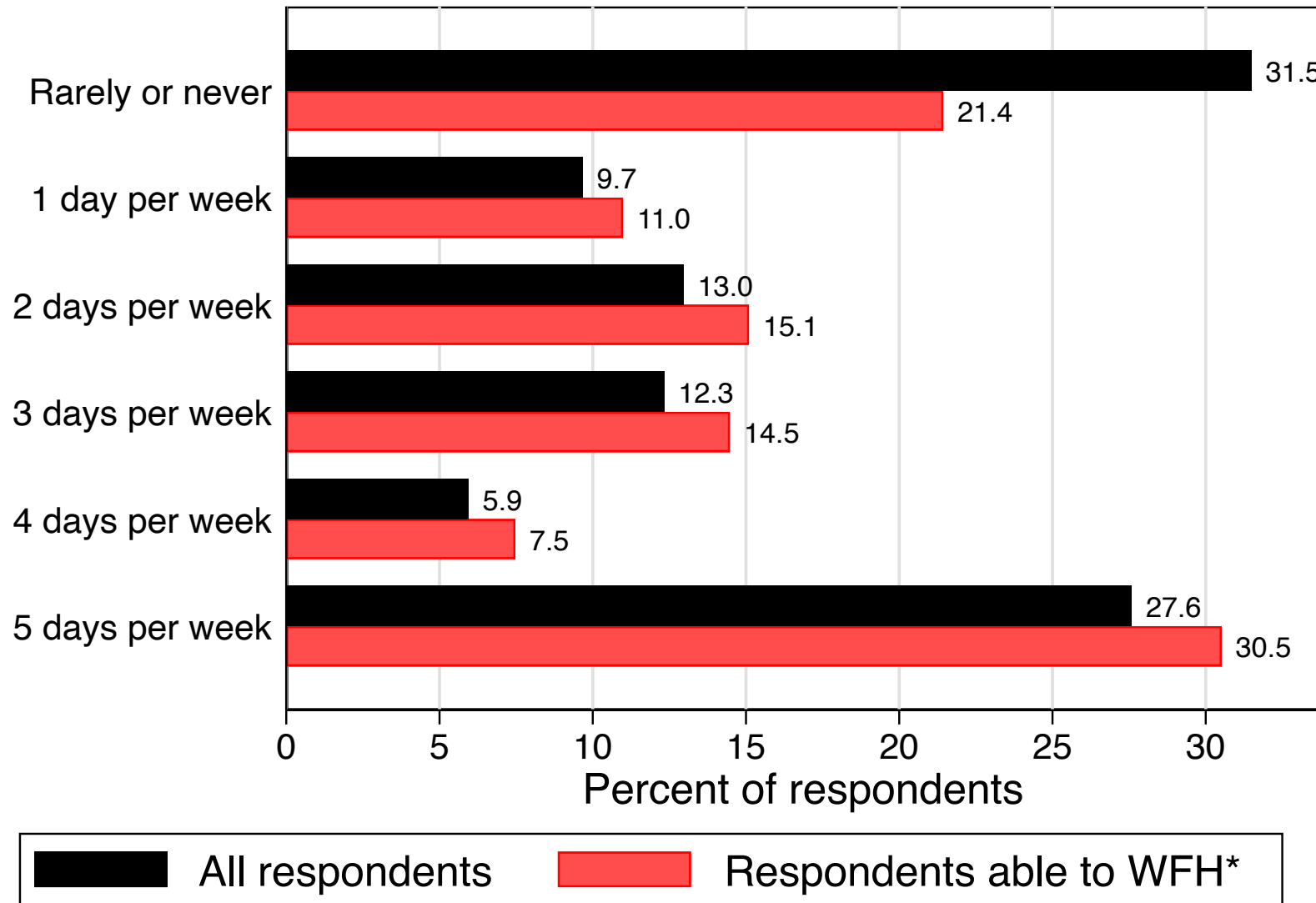


### Share of females



**Notes:** Each figure shows the distribution of raw survey responses, survey responses reweighted to match the share of persons in a given {earnings x industry x state} cell in the 2010 – 2019 CPS, and the distribution among persons earning more than \$20,000 per year in the 2010 – 2019 CPS. Data are from 22,500 survey responses collected in May, July, August, September, October, November, and December 2020 by Inc-Query and QuestionPro. Each wave collected 2,500 responses, except the August and December waves, which collected 5,000.

### Figure 3: Most Workers Want to Work from Home Two or More Days Per Week



**Source:** Responses to the question:

*In 2022+ (after COVID) how often would you like to have paid work days at home?*

**Notes:** Data are from 22,500 survey responses collected in May, July, August, September, October, November, and December 2020 by Inc-Query and QuestionPro. Each wave collected 2,500 responses, except the August and December waves, which collected 5,000. Respondents who are able to work from home include any who report being able to do so at least partially and any who report having mainly worked from home at some point during COVID-19.

\*65.6% of the full sample of N = 20317 meets this criterion

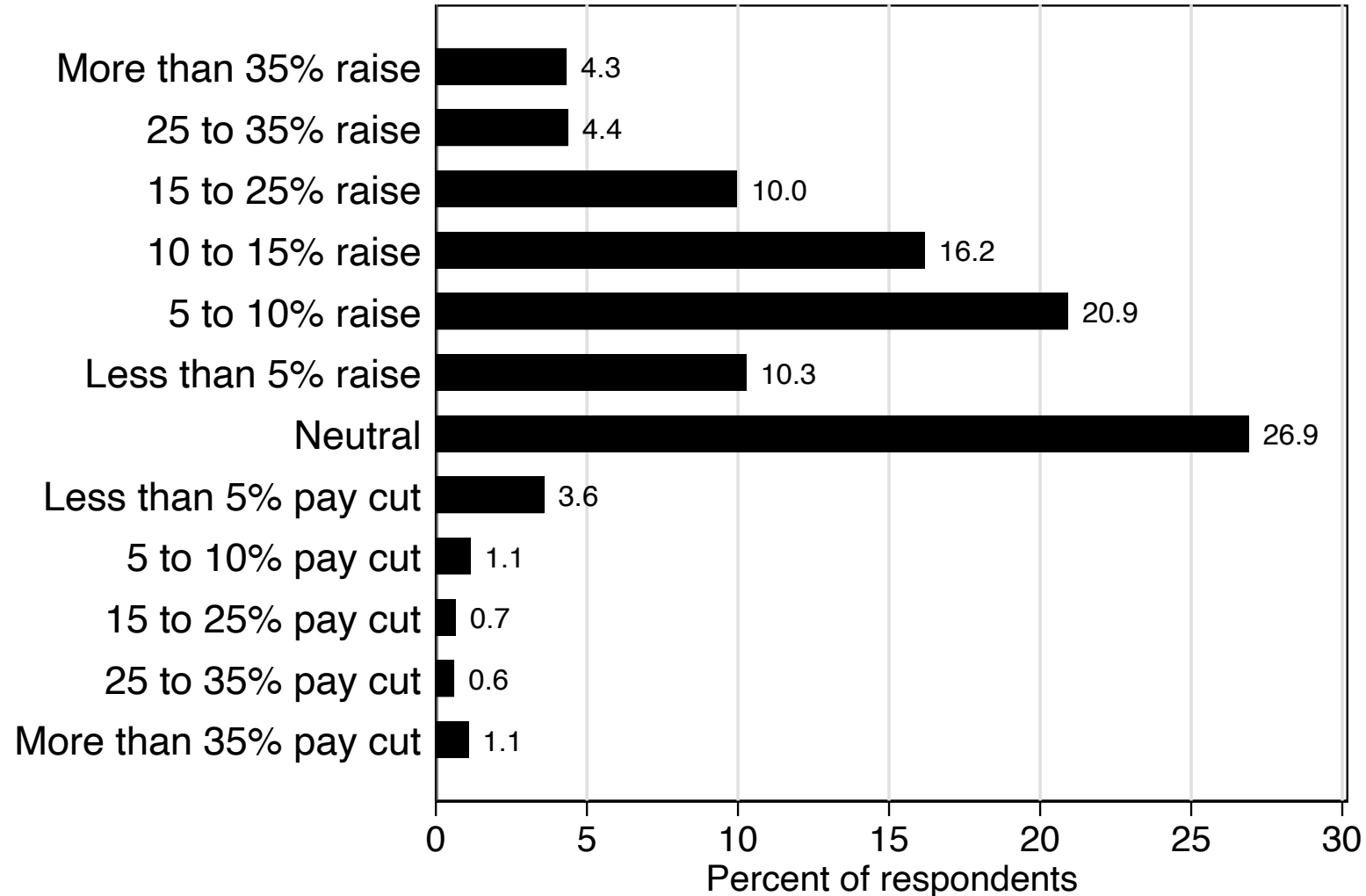
**Table 4: Worker desires for WFH are fairly uniform. Employer plans are not.**

<b>Percent share of paid WFH days post-COVID</b>	<b>Employee desired</b>	<b>(SE)</b>	<b>Employer planned</b>	<b>(SE)</b>	<b>Percent share of paid WFH days post-COVID</b>	<b>Employee desired</b>	<b>(SE)</b>	<b>Employer planned</b>	<b>(SE)</b>
Overall	46.5	(0.3)	21.6	(0.3)					
Women	48.7	(0.5)	18.2	(0.4)	Ann. Earnings of \$20 to \$50K	44.6	(0.6)	15.6	(0.5)
Men	43.8	(0.4)	26.1	(0.4)	Ann. Earnings of \$50 to \$100K	48.6	(0.5)	26.3	(0.5)
					Ann. Earnings of \$100 to \$150K	49.5	(0.7)	34.6	(0.7)
Age 20 to 29	45.9	(0.7)	22.4	(0.7)	Ann. Earnings over \$150K	50.5	(0.7)	43.3	(0.8)
Age 30 to 39	48.9	(0.6)	25.4	(0.5)					
Age 40 to 49	47.6	(0.6)	22.6	(0.5)	Goods-producing sectors	41.6	(0.8)	19.3	(0.7)
Age 50 to 64	43.2	(0.7)	15.2	(0.5)	Service sectors	47.5	(0.3)	22.1	(0.3)
Less than high school	43.4	(3.9)	13.6	(2.8)	No children	46.1	(0.5)	17.5	(0.4)
High school	41.3	(0.9)	14.9	(0.7)	Living with children under 18	47.2	(0.4)	25.9	(0.4)
1 to 3 years of college	46.3	(0.7)	16.7	(0.6)					
4year college degree	49.1	(0.6)	24.0	(0.5)	Red (Republican) State	46.5	(0.5)	20.7	(0.4)
Graduate degree	48.1	(0.5)	31.7	(0.5)	Blue (Democratic) State	46.6	(0.4)	22.4	(0.4)

**Notes:** Percent share of respondents who are working from home ("this week") during the COVID19 pandemic, except the top right which estimates the share who "ever" worked from home during the pandemic. Data are from 20,000 survey responses collected in July, August, September, October, November, and December 2020 by Inc-Query and QuestionPro. Each wave collected 2,500 responses, except the August and December waves, which collected 5,000. We re-weight raw responses to match the share of working age respondents in the 2010-2019 CPS in each {industry x state x earnings} cell. This table excludes data from the May wave because we didn't ask about post-COVID employer plans that month.

## Figure 4: Most Workers Value the Option to Work from Home

Value of the option to WFH 2 - 3 days/wk, % of current pay?



**Source:** Responses to a two-part question.

Part 1: **After COVID, in 2022 and later, how would you feel about working from home 2 or 3 days a week?"**

- *Positive: I would view it as a benefit or extra pay*
- *Neutral*
- *Negative: I would view it as a cost or a pay cut*

Part 2: **How much of a *pay raise [cut]* (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?**

Data are from 12,500 survey responses collected in September, October, November, and December 2020 by Inc-Query and QuestionPro. Each wave collected 2,500 responses, except the December waves which collected 5,000. We focus on the above survey waves where we kept the same question and response options. We re-weight raw responses to match the share of working age respondents in the 2010-2019 CPS in each {industry x state x earnings} cell.

## Table A.6: Residual fear of proximity to other people (reasons cited)

You have stated that you *would not return completely to pre-COVID activities*, if a COVID vaccine is discovered and made widely available. What *reasons* are behind your answer? Please check all that apply

	Percent of respondents	(SE)
I am concerned about the effectiveness/safety/that not enough people will take the COVID vaccine	85.22	(0.546)
I am concerned about other potential diseases	23.24	(0.649)
I have gotten used to social distancing, using e-commerce, and avoiding in-person goods and services	19.18	(0.605)
Observations	4,233	

**Notes:** Data are from 7,500 survey responses collected in September, October, and November 2020 by Inc-Query and QuestionPro. Each wave collected 2,500 responses, but we only asked this question if the respondent stated they would not return "completely" to pre-COVID activities in the event a vaccine was discovered and made widely available. We re-weight raw responses to match the share of working age respondents in the 2010-2019 CPS in each {industry x state x earnings} cell.

# Why WFH Will Stick: Summary of Mechanisms

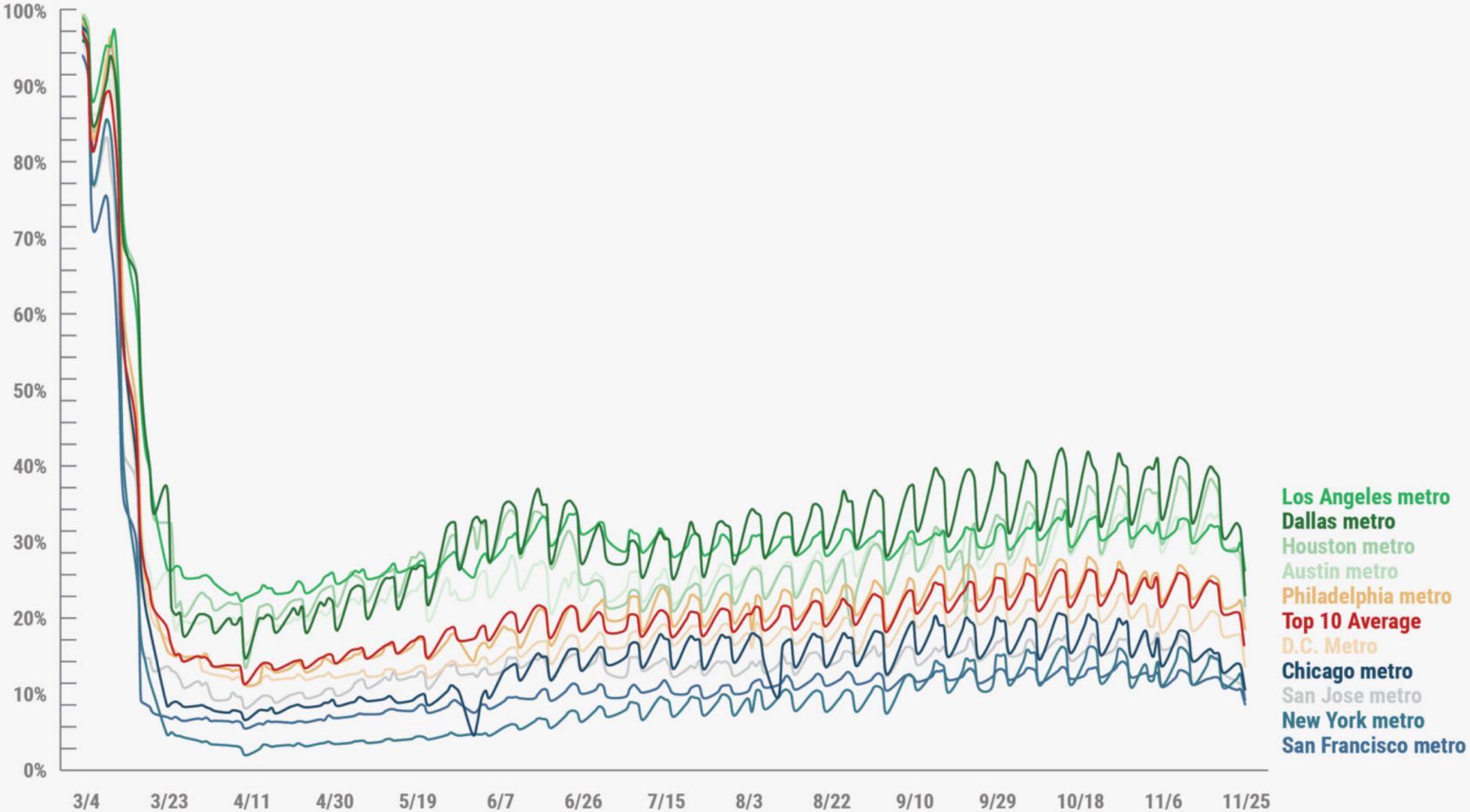
1. Forced experimentation revealed information that alters optimal working arrangements through a tail effect and a bias-elimination effect.
2. COVID-19 spurred investments that enable more effective WFH:
  - At-home investments to enable WFH during COVID = 0.7% of annual GDP.
  - Plus WFH-enabling investments on business premises and in the cloud.
3. A massive drop in stigma associated with WFH.
4. Lingering concerns about infection risk:
5. COVID-19 shifted the direction of innovation toward technologies that support WFH, as reflected in the flow of new patent applications
6. COVID knocked down regulations that had blocked virtual service delivery, especially in the healthcare sector.

Strategic complementarities across firms in the choice of working arrangements amplify the direct impact of the pandemic experience on WFH – e.g., it's easier for law firm staff to WFH when their clients WFH. Uncertainty about how well WFH works also gives rise to strategic complementarities across firms in experimentation with WFH.



# Since COVID, commercial buildings are semi-deserted in U.S. cities

OCCUPANCY OVER TIME — MARCH 4 TO NOVEMBER 25



Notes: Kastle security index of swipe card access relative to pre-COVID average

<https://www.kastle.com>