

The Shift to Remote Work Lessens Wage-Growth Pressures

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Paper co-authored with Jose Maria Barrero,
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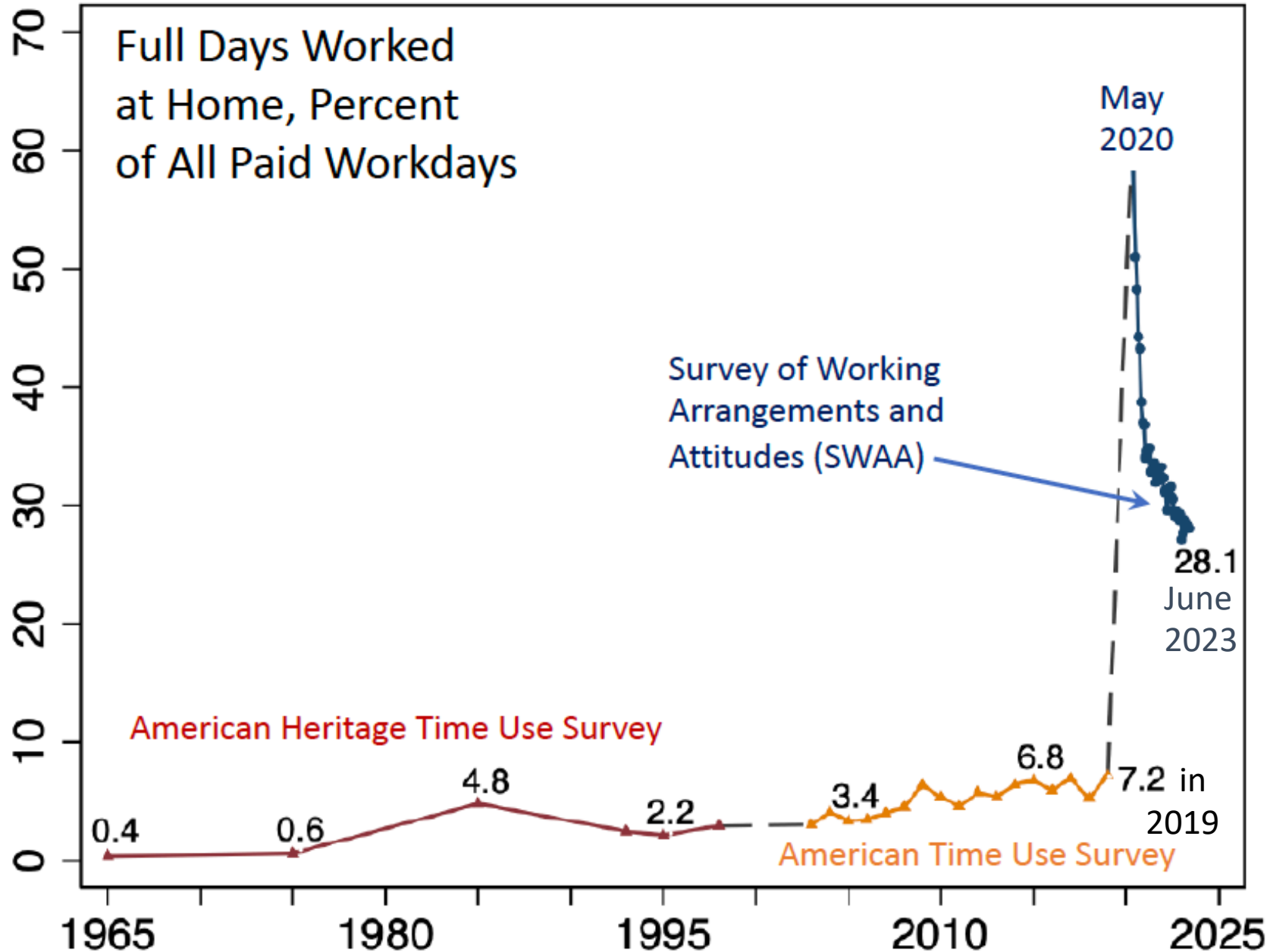
Hoover Institution Economic Policy Workshop

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Plan of the Talk

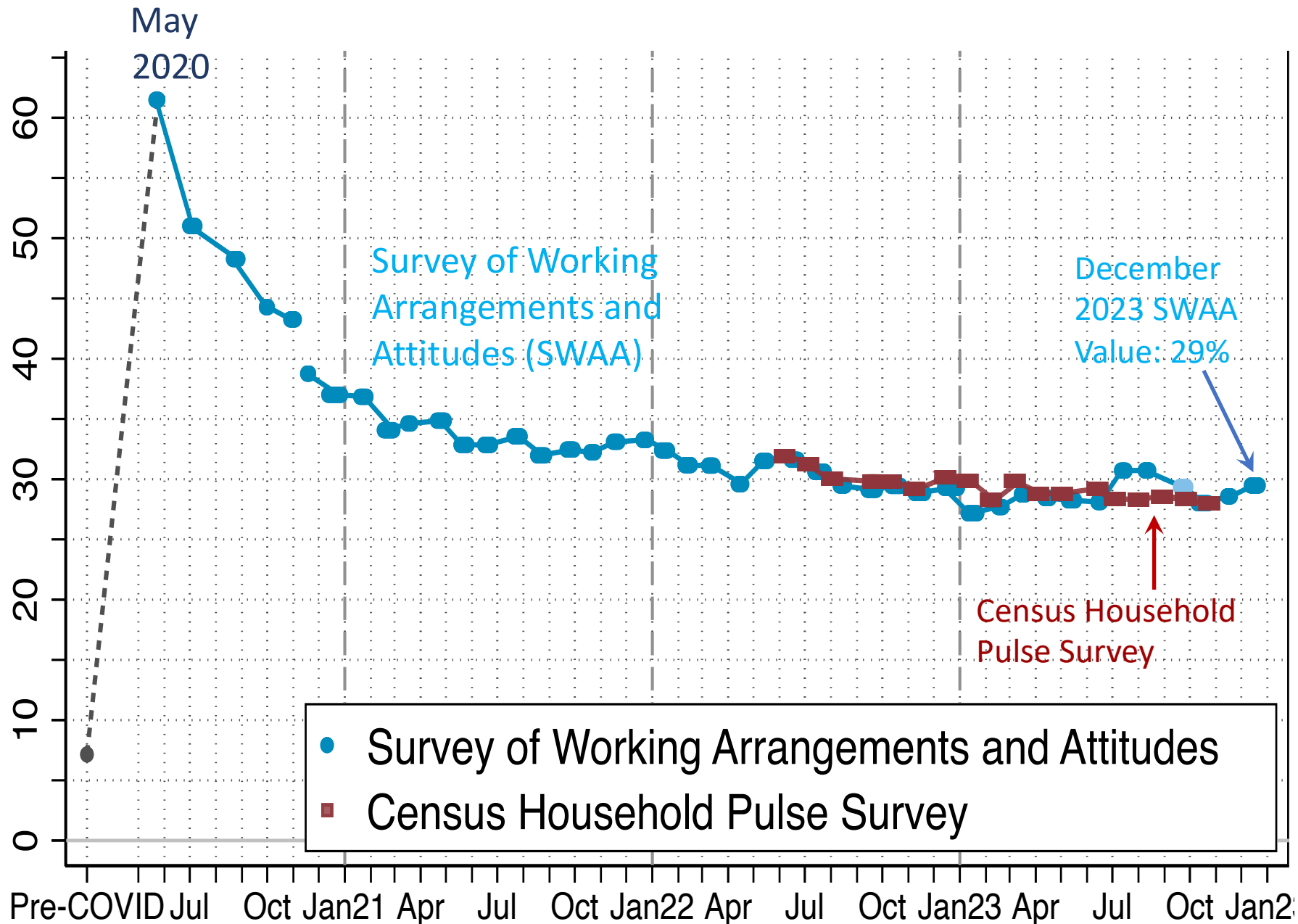
1. The big, abrupt, unforeseen shift to WFH
2. A macro shock with unusual features:
 - A. WFH relaxes the time budget constraint.
 - B. It raises the amenity value of employment.
 - C. For employers: New opportunities to source labor from low-cost places.
For workers: a relaxation of locational constraints.
3. In light of these features, economic reasoning says:
 - A. The WFH shock lowers real wages, conditional on TFP and K.
 - B. The wage-moderation effects set in gradually.
4. Evidence on wage-moderation effects:
 - A. We ask business executives whether, and how much, expanded WFH moderated wage growth at their own firms.
 - B. The (extraordinary) behavior of real wages since early 2021
5. Interpreting the recent disinflation

Work from Home over Time in the United States, 1965 to June 2023



Reproduced from "[The Evolution of Work from Home](#)" by Barrero, Bloom and Davis (JEP 2023). Samples restricted to working persons, 20-64, with annual earnings > \$10K. See the notes to Figure 1 in BBD for details.

WFH over Time in the U.S. from 2019 to December 2023

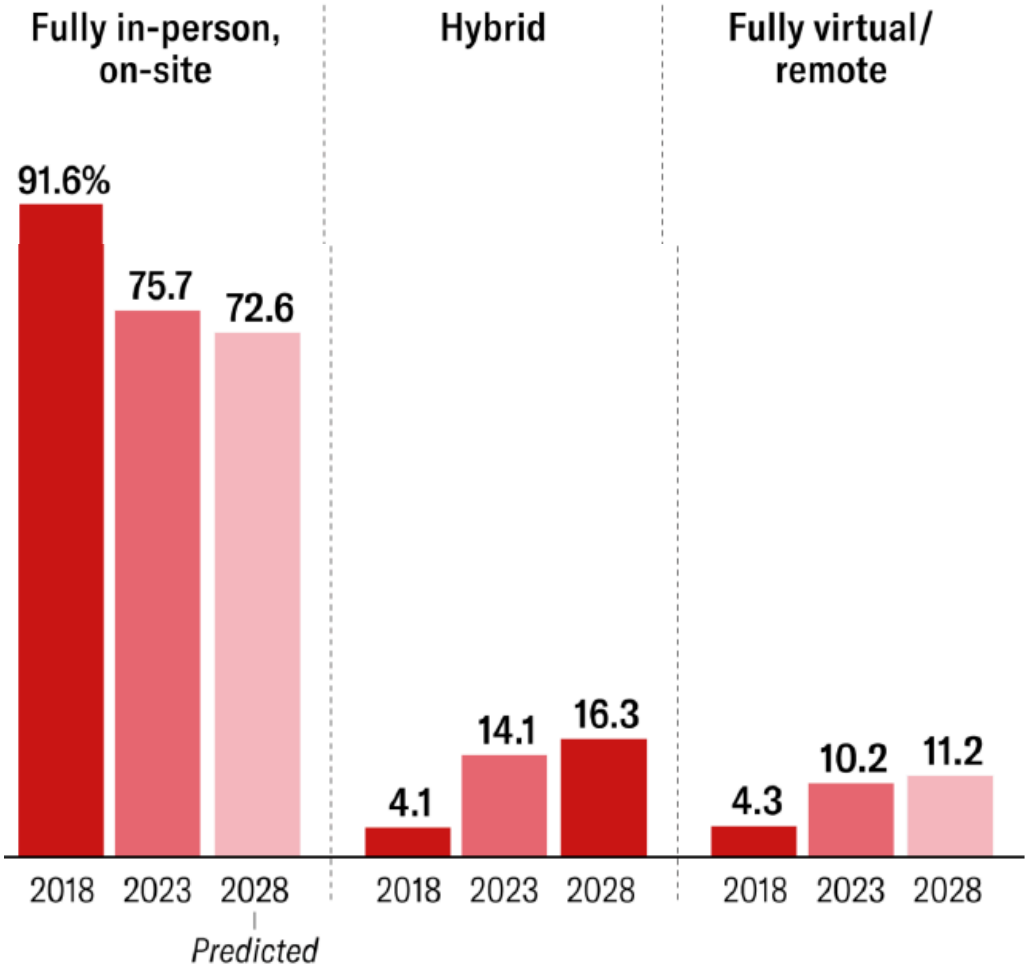


From Figure 1 in “[The Evolution of Work from Home](#)” by Barrero, Bloom and Davis (JEP 2023), as updated using data from www.WFHresearch.com.

The samples are restricted to working persons, 20-64, with annual earnings > \$10K in the SWAA and household income > \$25K in the HPS.

U.S. Business Executives Expect Work-from-Home Rates to Rise in the Next Five Years

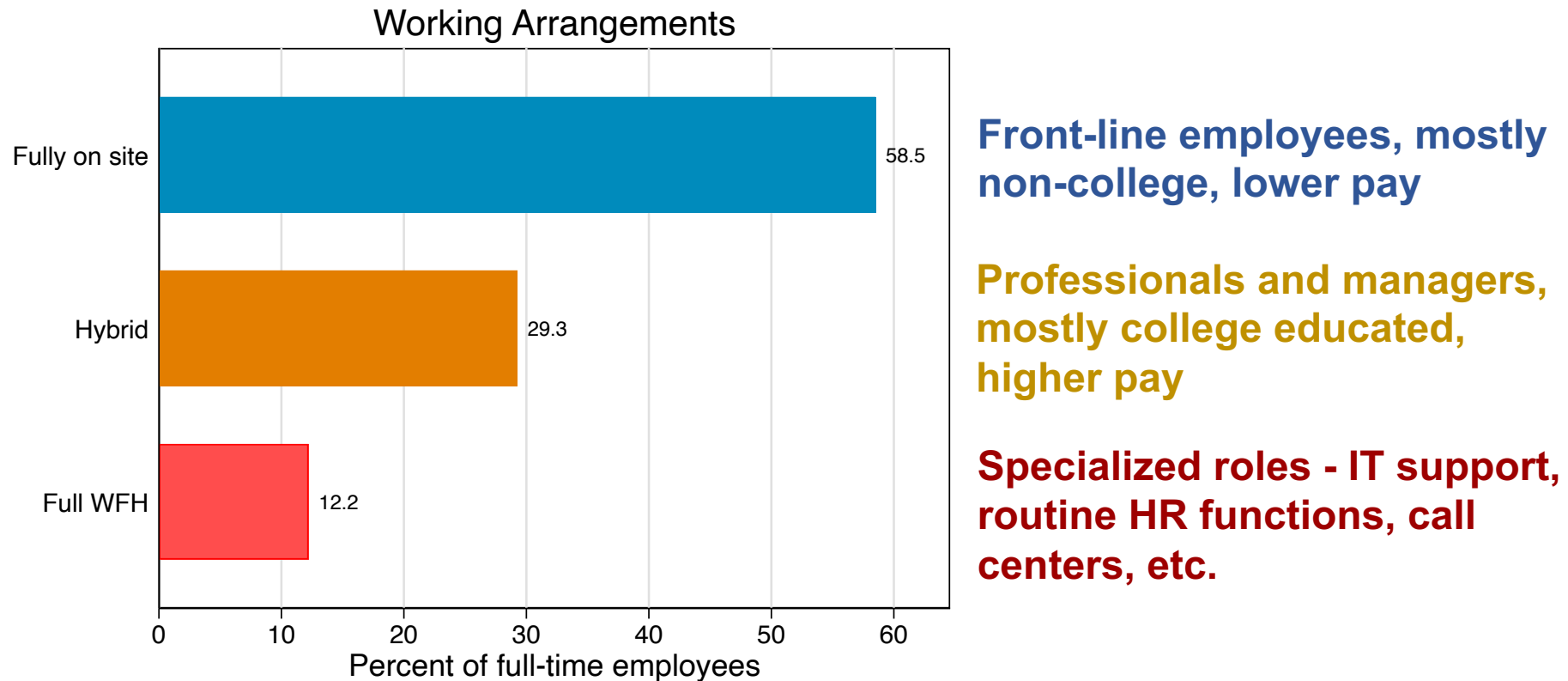
What share of your firm's full-time employees are in each category?



Data Source: Survey of Business Uncertainty, a monthly panel survey of U.S. business executives fielded by the Federal Reserve Bank of Atlanta in July 2023 in cooperation with Nick Bloom and Steve Davis.

Reproduced from "[Remote Work Isn't Going Away – And Executives Know It,](#)" Bloom, Barrero, Davis, Meyer and Mihalov, *Harvard Business Review*, 28 August 2023.

Working Arrangements Among Full-Time American Employees as of Mid 2023



Source: The Survey of Working Arrangements and Attitudes, March-July 2023 waves.
“Hybrid” means 1 to 4 full days per week of work from home

A Shock with Unusual Features

- A. The big shift relaxes the time budget constraint of many workers.
- B. It raises the amenity value of employment for many workers.
- C. It gives employers new opportunities to source labor from low-cost places, without relocating the business. It relaxes the locational constraints of workers.
- D. The big shift to WFH also had surprisingly benign (or positive) effects on productivity in many jobs and tasks. That explains why the shift persisted, and why it did not happen sooner, and more gradually, before the forcing event.

Today, I will simply assert claim D. See [“Why Working from Home Will Stick”](#) and [“Working from Home around the World”](#) for evidence and analysis.

The next few slides speak to points A to C.

How Much Time Saved by the Big Shift to WFH?

Employer plans re WFH imply the following savings in time devoted to paid work for person i (% of pre-pandemic hours):

$$(1) \quad TS_i = \frac{100(WFH_i^{Plan} - WFH_i^{Pre})(1 - f_i)C_i}{H_i + C_i(Days_i^{Pre} - WFH_i^{Pre})}, \quad \text{where}$$

C_i = daily round-trip commute time expressed in hours

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

H_i = conventional measure of weekly work hours (pre-pandemic)

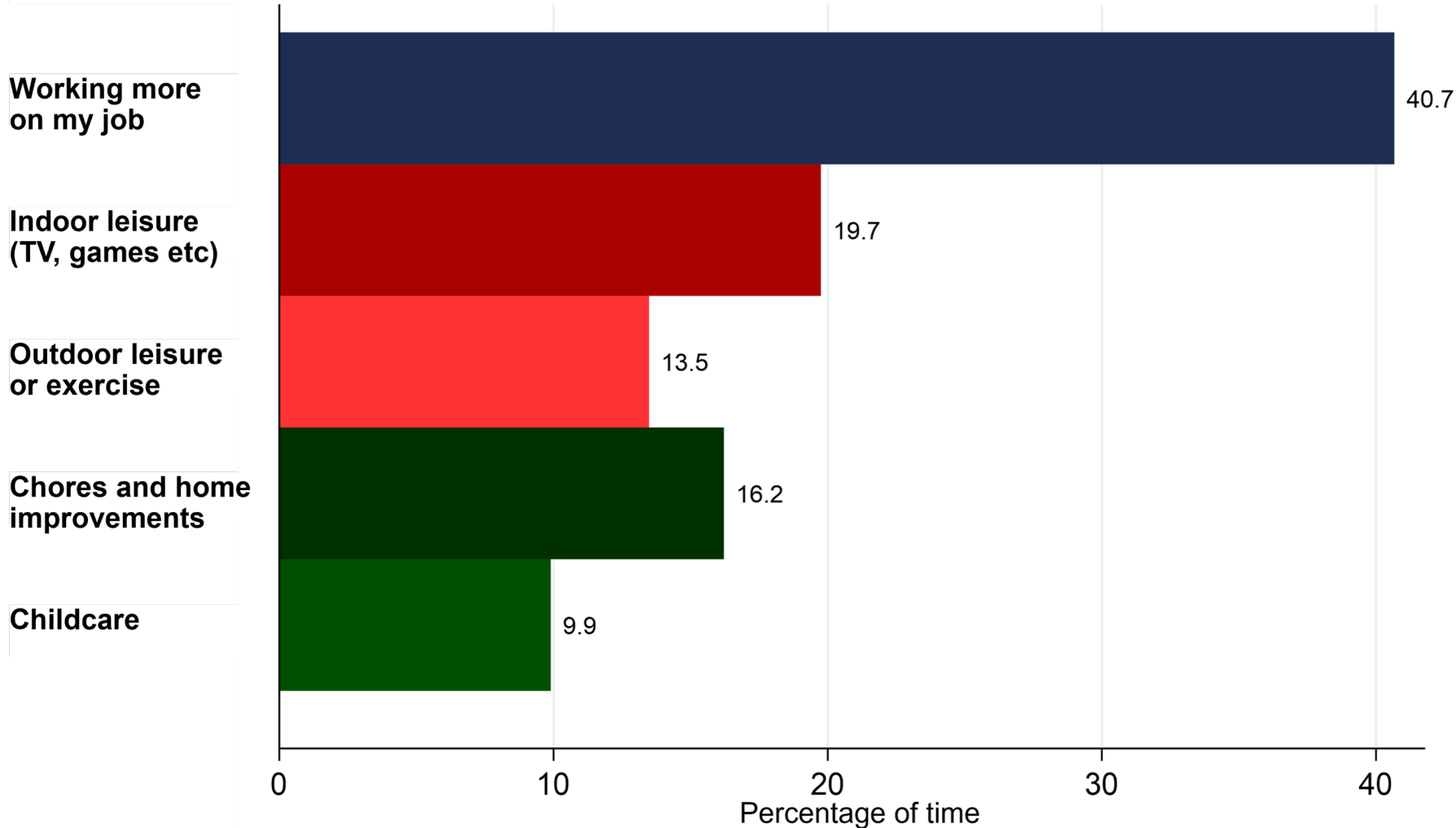
$Days_i^{Pre}$ = number of full workdays per week (pre-pandemic)

Implementing (1): 1.3% time savings on an equal-weighted basis, 1.7% on an earnings-weighted basis (SWAA data, N=31,361). Accounting for grooming time bumps up these values by 12-15 percent.

Source: "[Why Working from Home Will Stick](#)," Barrero, Bloom, and Davis

How Americans Say They Use their Time Savings

How did you use the commuting time you saved by working from home, percent



During the COVID-19 pandemic, while you have been working from home, how are you now spending the ***time you have saved by not commuting?***

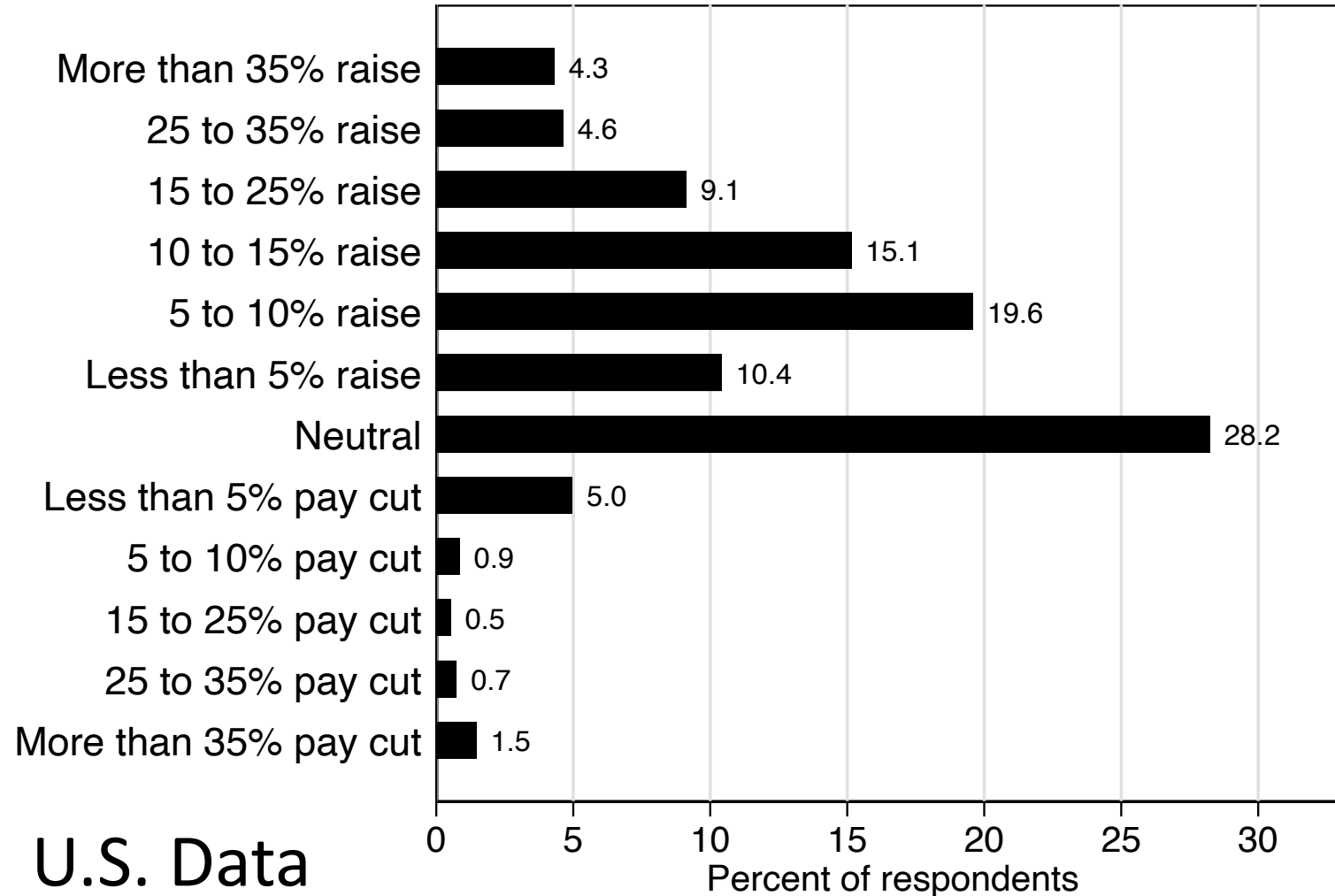
Please assign a percentage to each activity (the total should add to 100%).

Notes: The sample contain 32,641 respondents who are able to work from home.

When Asked Directly, People Place a High Value on the Option to Work from Home

Mean Value = 8% of Pay, Similar to Findings in Experimental Settings with Narrower Samples

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



Source: SWAA responses to a two-part question.

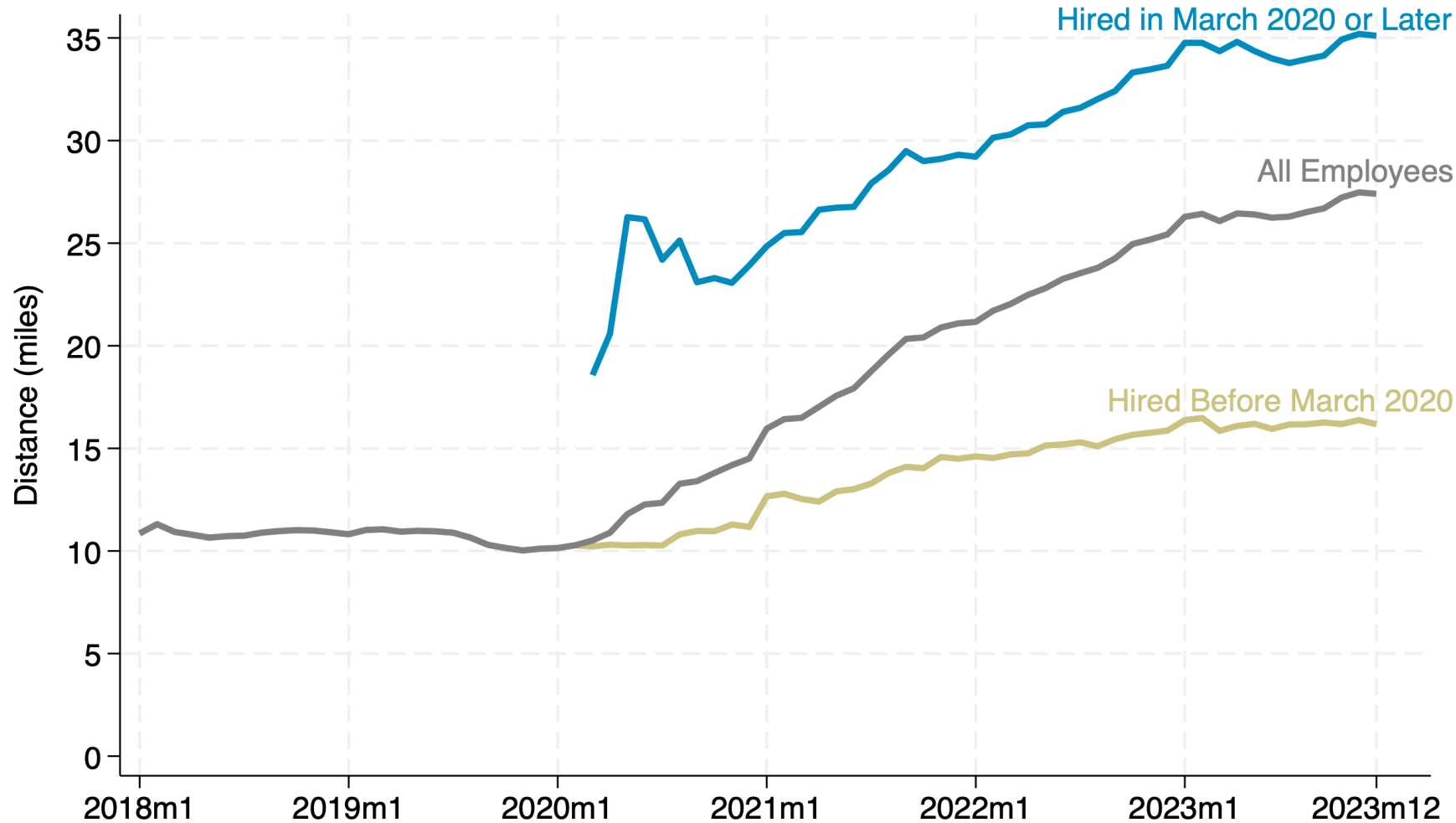
Part 1: **After COVID, in 2022 and later, how would you feel about working from home 2 or 3 days a week?**

- 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 20,750 survey responses collected from September 2020 to February 2021 by Inc-Query and QuestionPro. We asked a similar question in earlier and subsequent waves, but we focus on the above waves, which use identical questions and response options. We re-weight raw responses to match the share of working-age respondents in the 2010-2019 CPS by {age x sex x education x earnings} cells.

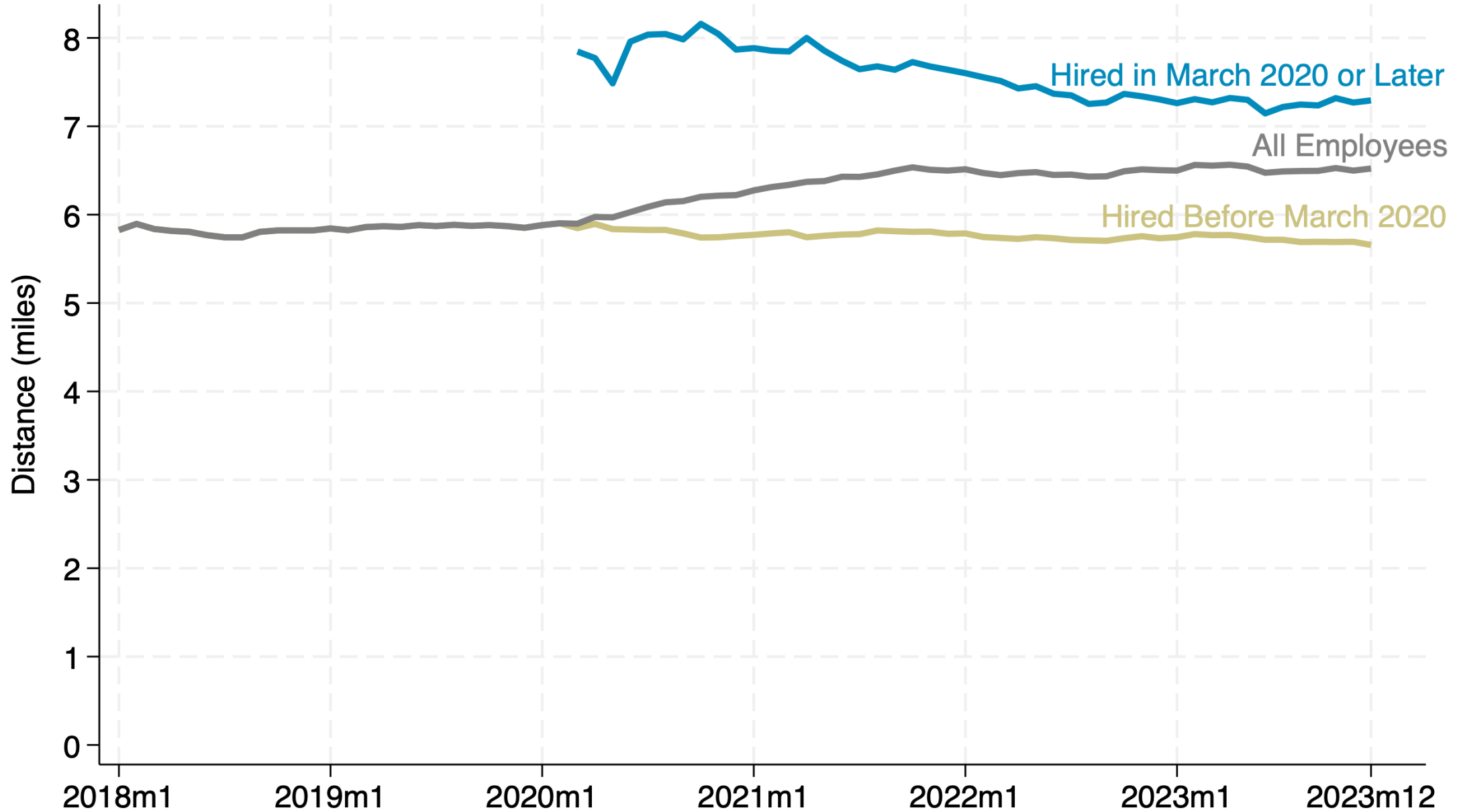
Mean Distance from Worker Residence to Employer Location



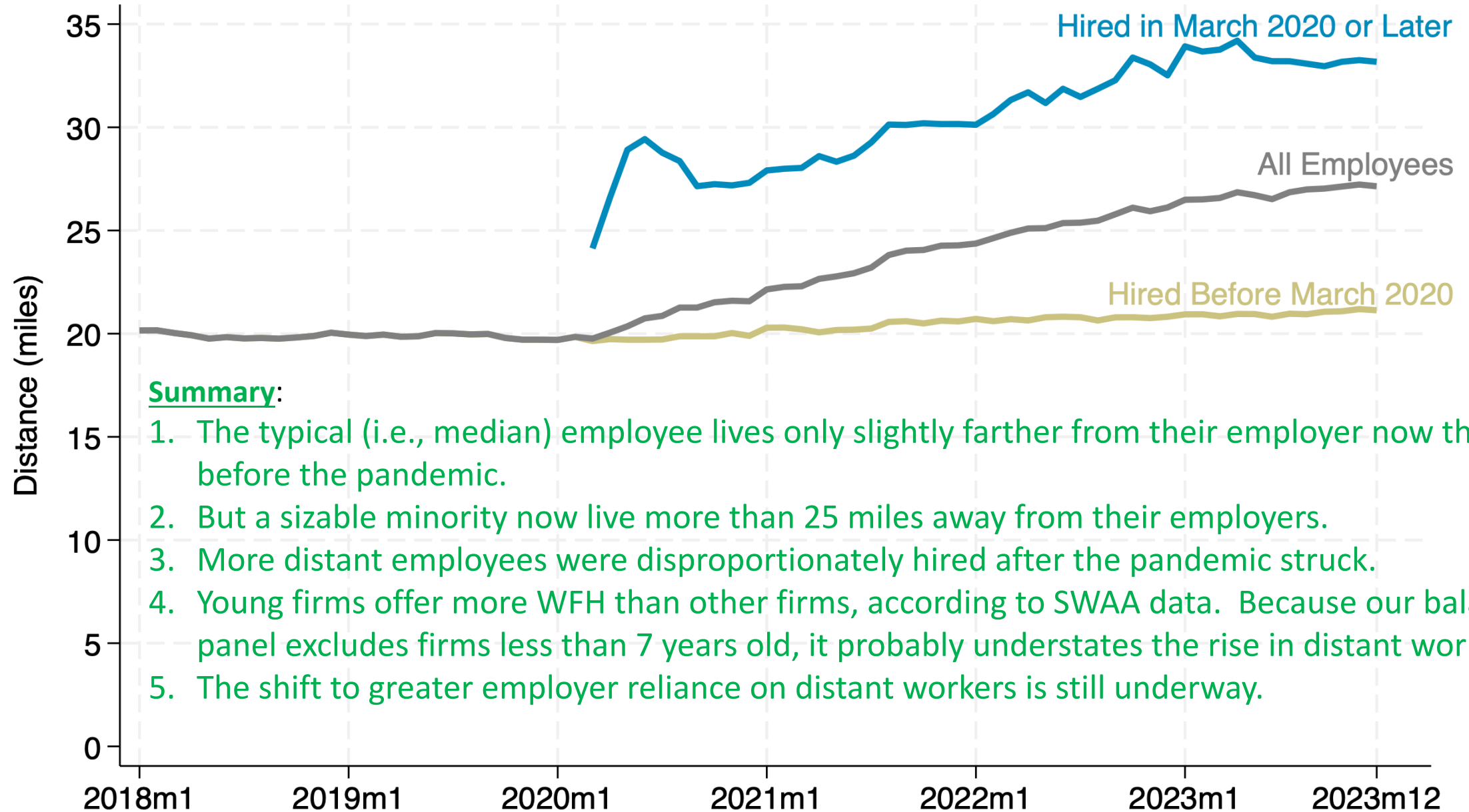
The sample contains matched employer-employee data for a balanced panel of 5,973 firms that operated from Jan. 2018 to Dec. 2023. All firms are clients of Gusto, a payroll processing and HR management firm. We winsorize at 500 miles and weight the Gusto data to match the CPS at the age-sex-industry level.

Source: “Working from Home and Distance to Work,” work in progress by Acan, Barrero, Bloom, Bowen, Buckman, Davis, Pardue and Wilke.

Median Distance from Worker Residence to Employer Location



90th Percentile Distance from Worker Residence to Employer Location



Summary:

1. The typical (i.e., median) employee lives only slightly farther from their employer now than before the pandemic.
2. But a sizable minority now live more than 25 miles away from their employers.
3. More distant employees were disproportionately hired after the pandemic struck.
4. Young firms offer more WFH than other firms, according to SWAA data. Because our balanced panel excludes firms less than 7 years old, it probably understates the rise in distant workers.
5. The shift to greater employer reliance on distant workers is still underway.

Economic Reasoning, 1

A. WFH lowers real (product) wages conditional on TFP.

- The big shift yielded time savings of about 2% of pre-pandemic workhours.
- 40% of saved time went into paid work. So, a 0.8% increase in LS.
- Plug into textbook model of a competitive labor market with Cobb-Douglas production and labor share of $(2/3)$ → Real wages fall by 0.27%.
- That's a lower bound on LS and wage effects, because this calculation neglects other reasons people like to WFH: money savings, time flexibility, personal autonomy, untaxed amenity value, mobility impairments,...
- Bargaining with equal division of (new-found) surplus: $(0.5) \times (8\% \text{ pay-equivalent gain}) \times (25\% \text{ of workers who got those gains})$ → Wages fall by 1%.
- This calculation also offers a conservative assessment in that it ignores heterogeneity in preferences around WFH and the (privately optimized) selection of who works from home in equilibrium.

Economic Reasoning, 2

- In “[Job Amenity Shocks and Labor Reallocation](#)” Bagga, Mann, Sahin and Violante introduce an amenity-value shock into a dynamic equilibrium model with preference heterogeneity over WFH, search frictions, job creation costs, and bargaining (sequential auctions). Their calibrated model implies that the amenity-value shock associated with the big shift to WFH reduces average real wages by 2% after the transition dynamics play out (and after other, transitory shocks die out).
- Spatial considerations: The big shift affords new opportunities to source labor from low-cost places, without relocating the business. That lets employers reduce real product wages. Real worker wages could rise at the same time, depending on how and why wages vary over space. The magnitude of wage effects operating through this channel are hard to assess, but they seem potentially large.

Economic Reasoning, 3

B. The wage-moderation effects of the amenity-value shock set in gradually. Why?

- A largely unforeseen shock as of February 2020. Even in 2022, many business leaders and observers (including some top economists!) doubted that the big shift to WFH would endure. So, no anticipatory adjustments. Recognition lags.
- Wages were pre-determined when the shock hit. Thus, workers initially enjoyed the full measure of the time-saving and amenity-value benefits. Over time, wages fell to share the benefits with employers (bargaining perspective) or because of LS expansion (competitive perspective).
- Search and reallocation frictions imply that it takes time for workers who highly value WFH to sort into jobs that offer that amenity (and for more firms to offer WFH). Bagga et al. (2023) capture this source of sluggish wage dynamics.
- Spatial considerations: It takes time for employers to alter the locations from which they recruit and source labor. It takes time for people to re-locate their residences and sort into jobs that newly offer WFH.

Evidence on Wage Moderation Effects

- A. Survey of Business Uncertainty (SBU): We ask business executives whether, and how much, expanded WFH moderated wage growth at their own firms.
- B. The behavior of real wages since early 2021
- C. In [“Job Amenity Shocks and Labor Reallocation”](#) Bagga, Mann, Sahin and Violante show that putting an amenity-value shock into a dynamic equilibrium model with preference heterogeneity over WFH, search frictions, job creation costs and bargaining explains other unusual features of U.S. labor markets since the pandemic: a surge in quits, a lasting rise in vacancy rates and durations, and low matching efficiency.

Realized wage growth in the SBU is similar to realized wage growth in other sources.

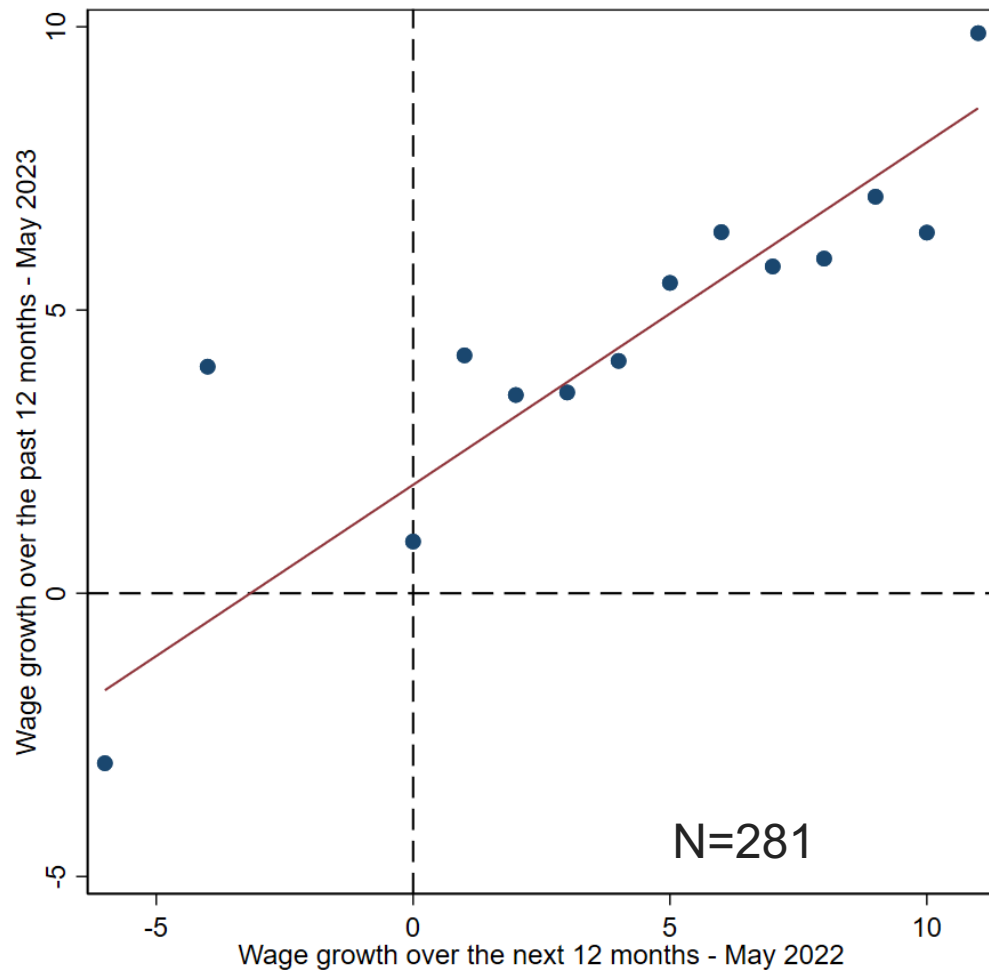
Nominal Wage Growth Rate Measures				
	May '22		May '23	
	12-month percent change	Period ending in	12-month percent change	Period ending in
Survey of Business Uncertainty	5.4	May '22	5.2	May '23
Average Hourly Earnings (total private)	5.5	May '22	4.3	May '23
Average Hourly Earnings (private, production and nonsupervisory workers)	6.7	May '22	5.0	May '23
Atlanta Wage Growth Tracker (smoothed)	6.1	May '22	6.0	May '23
Employment Cost Index (private industry workers)	5.1	Q1 '22	5.1	Q1 '23

Note: The table shows results from the April '22, May '22, and May '23 survey waves of the SBU. The results are weighted by firm size.

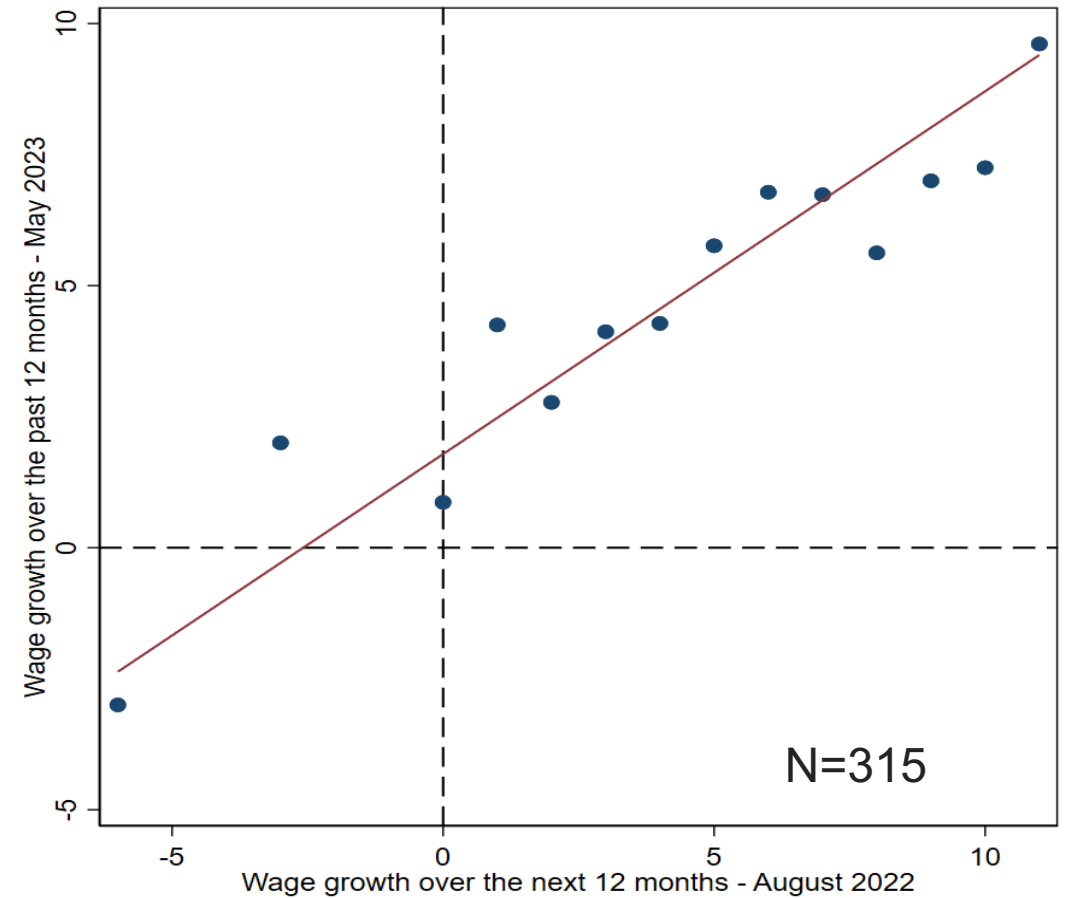
Sources: U.S. Bureau of Labor Statistics; Federal Reserve Bank of Atlanta; *Survey of Business Uncertainty* (Federal Reserve Bank of Atlanta, Chicago Booth, Stanford);

Expected Wage Growth over the Next Twelve Months Compared to Realized Wage Growth, Firm-Level Data in the SBU

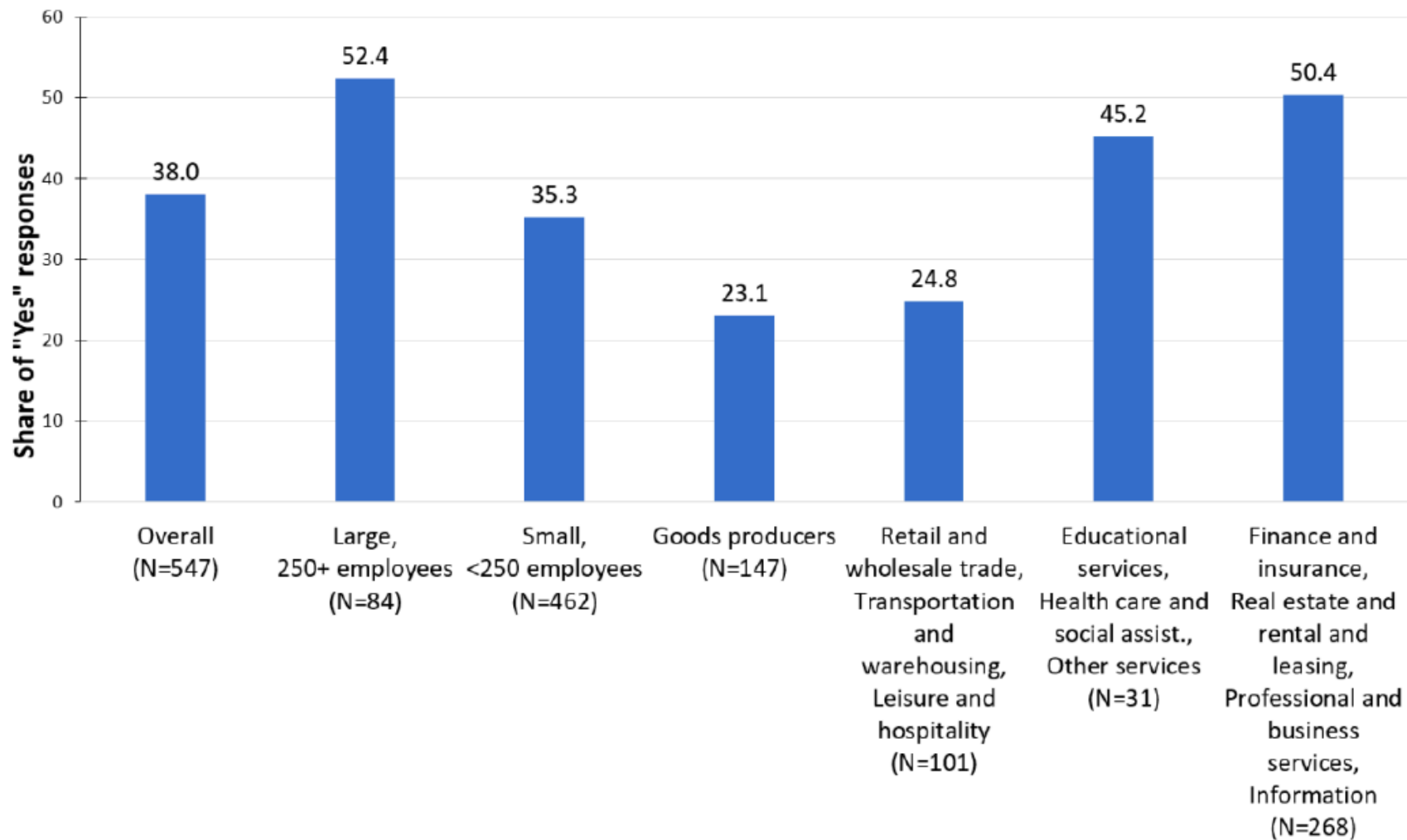
May 2022 Expectations vs. May 2023 Realizations



August 2022 Expectations vs. May 2023 Realizations



Over the past 12 months, has your firm expanded the opportunities to work from home (or other remote location) as a way to keep employees happy and to moderate wage-growth pressures?



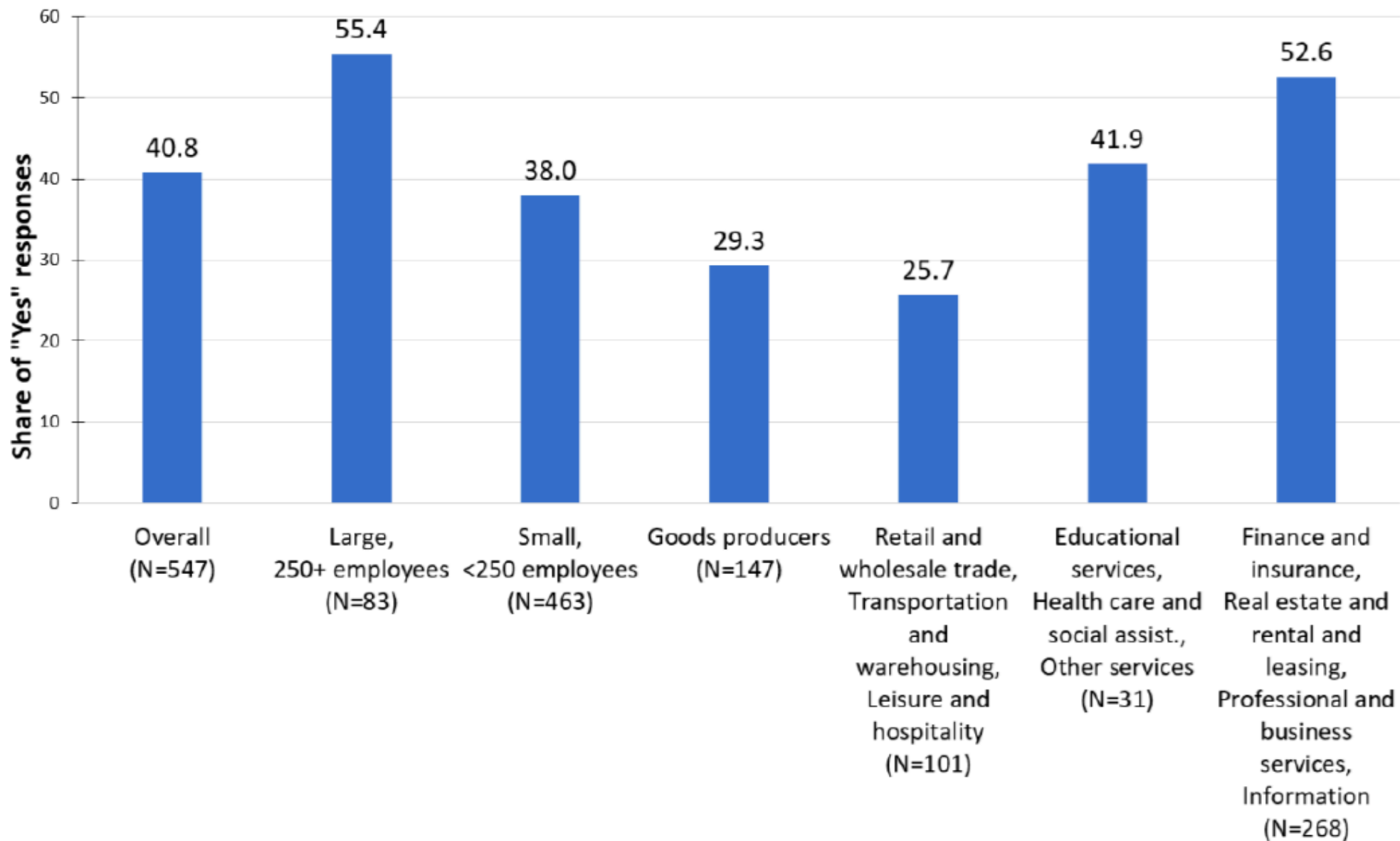
Source: Survey of Business Uncertainty conducted by the Federal Reserve Bank of Atlanta, Stanford University, and the University of Chicago Booth School of Business. Using data from the April and May 2022 survey waves.

When a business executive responds “yes” to the previous question, we follow up with:

“What is your best estimate for how much expanded remote-work opportunities have moderated wage-growth pressures at your firm in the past 12 months?”

Response options are 0, 1, 2, ..., 19, 20 % and more than 20%.

Over the next 12 months, will your firm let employees work from home (or other remote location) at least one day per week to restrain wage-growth pressures?



When a business executive responds “yes” to the previous question, we follow up with:

“What is your best estimate for how much your firm can restrain wage-growth pressures in the next 12 months by letting employees work remotely part of the week?”

Response options are 0, 1, 2, ..., 19, 20 % and more than 20%.

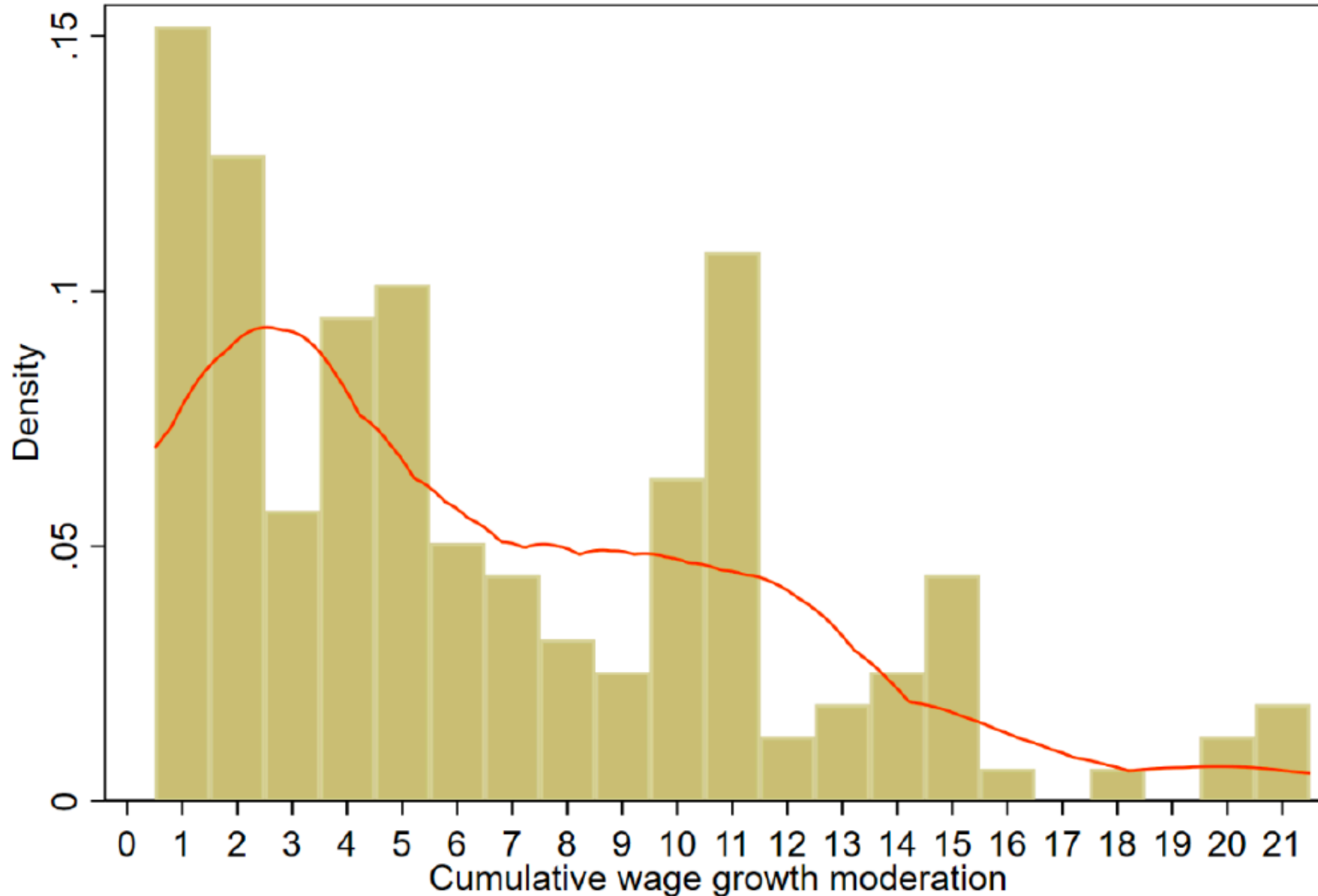
Nominal Wage-Growth Moderation Due to the Rise of Remote Work Over a Two-Year Period Centered in April/May 2022 Percentage Points

We assign a zero value to wage-growth restraint (in the look-back or look-ahead direction) if (a) the executive says "No" to the first question, and if (b) the executive says "Yes" to the first question and responds with 0 to the follow-up question.

64% of sampled firms have a cumulative wage-growth moderation value of 0.

	Mean Cumulative Wage-Growth Moderation Over Two Years	
	Unweighted	Weighted by Firm Size
Overall	2.2	2.0
Small Firms (fewer than 250 employees)	2.2	2.0
Large Firms (250 or more employees)	2.1	2.0
Goods Producers	1.3	1.3
Retail and Wholesale Trade, Transportation and Warehousing, Leisure and Hospitality	1.4	1.8
Education, Healthcare, Social Assistance, Other services	2.7	3.8
FIRE, Professional and Business Services, Information	3.0	2.3

Figure A.1. The Firm-Level Distribution of Wage-Growth Moderation Values over the Two-Year Period Centered on April/May 2022 (Percentage points)

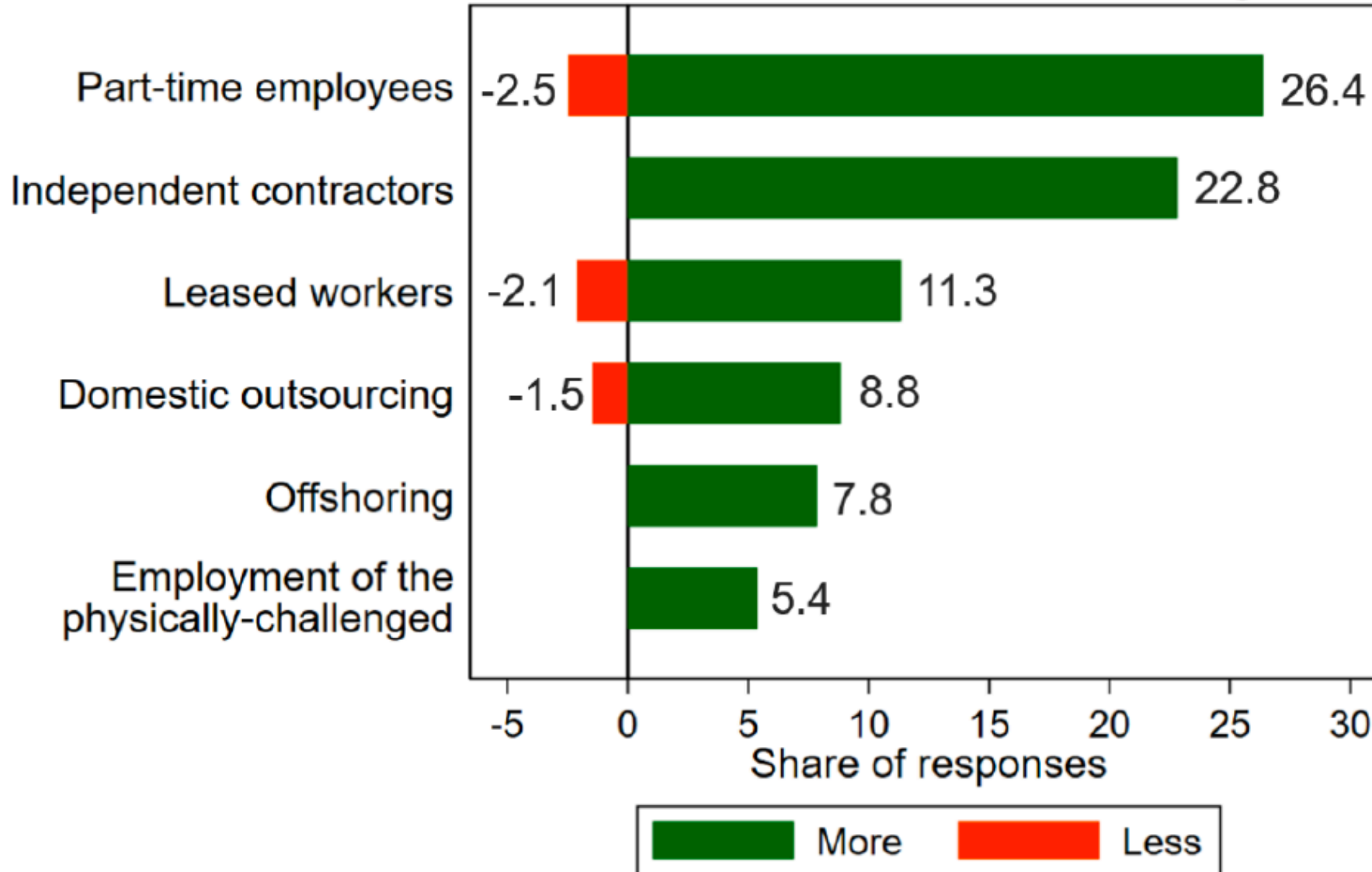


We have 470 firm-level observations with both backward-looking and forward-looking wage-growth moderation values. (Half of firms in the April 2022 wave got a different follow-up question.) 239 of these 470 firms say they expanded and/or will expand remote-work opportunities to keep employees happy and moderate wage growth. 71 of the 239 report zero wage-growth moderation in both directions. The histogram and kernel density in the chart above use the observations for the other 168 firms.

Figure 3: Other Workforce Changes Associated with the Shift to Remote Work

Has this increase in remote work brought other changes at your firm?
Please answer for each of the following:

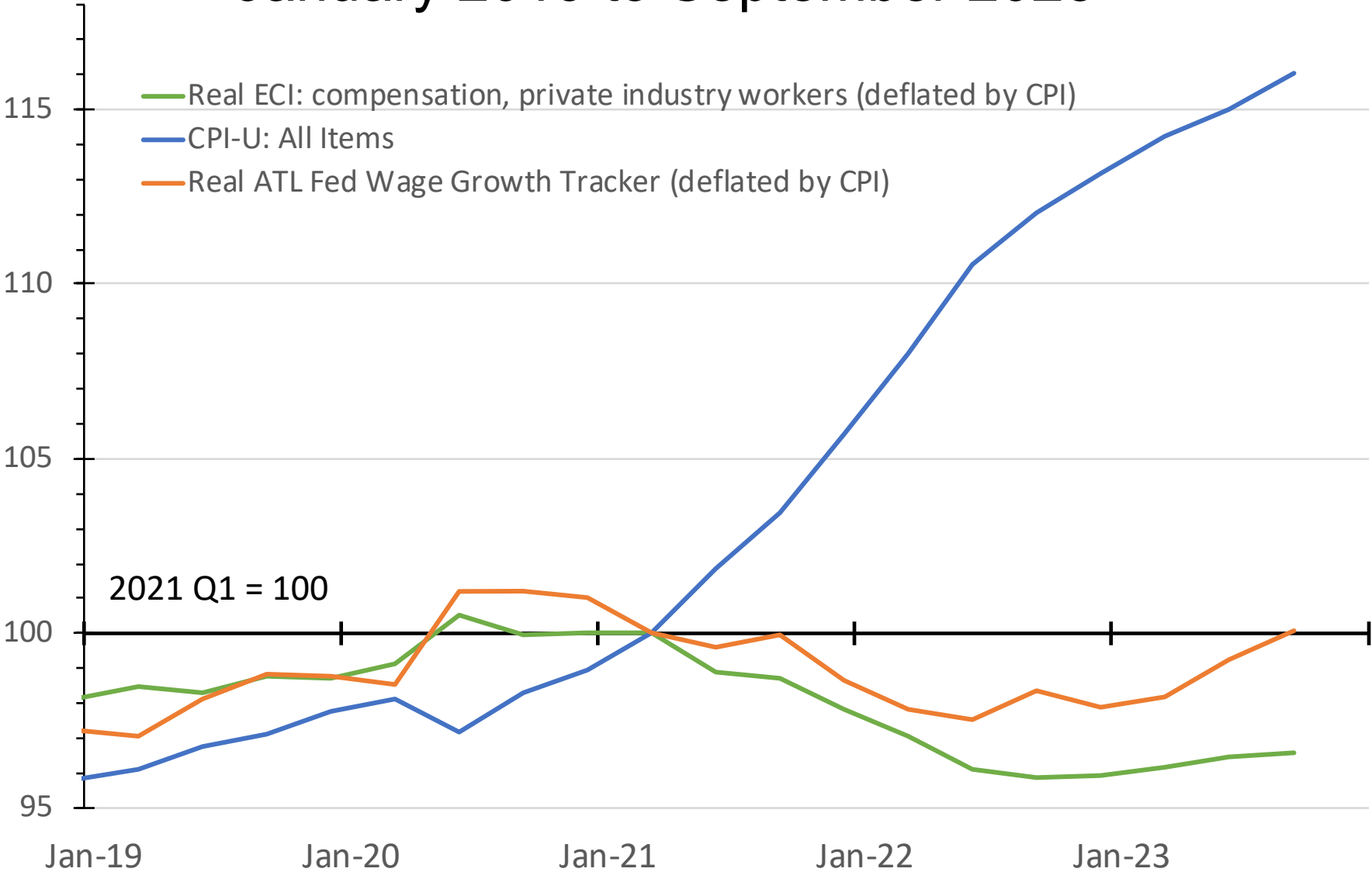
Please answer for each of the following:



Source: Survey of Business Uncertainty and authors' calculations.

Other studies find evidence that offering remote-work options lowers employee quit rates, reducing turnover costs. See Barrero, Bloom and Davis (2021a) and Bloom, Han and Liang (2022).

U.S. Real Wage Behavior and the CPI, January 2019 to September 2023



Sources: Bureau of Labor Statistics, Atlanta Fed, and authors' calculations.

Recent U.S. Episodes with Falling Real Wages

A. Using the Atlanta Fed Wage Tracker, Deflated by the CPI-U

Economic Episode	Percentage Real Wage Change		Unemployment Rate, Percent		Ratio of Vacancies to Unemployed Persons		Mean Vacancy Duration, Days	
	Annualized	Cumulative	Episode Average	Prior 12 Months	Episode Average	Prior 12 Months	Episode Average	Prior 12 Months
August 2007 to September 2008	-1.9	-1.7	5.1	4.5	0.56	0.68	22.4	22.9
August 2009 to December 2009	-2.8	-1.2	9.8	7.9	0.16	0.25	16.1	18.3
August 2010 to February 2012	-1.6	-2.6	9.0	9.8	0.24	0.18	20.4	17.2
April 2021 to October 2022	-2.2	-4.5	4.6	7.8	1.50	0.66	42.2	27.7

B. Using the Employer Cost Index of Total Compensation for Private Sector Workers, Deflated by the CPI-U

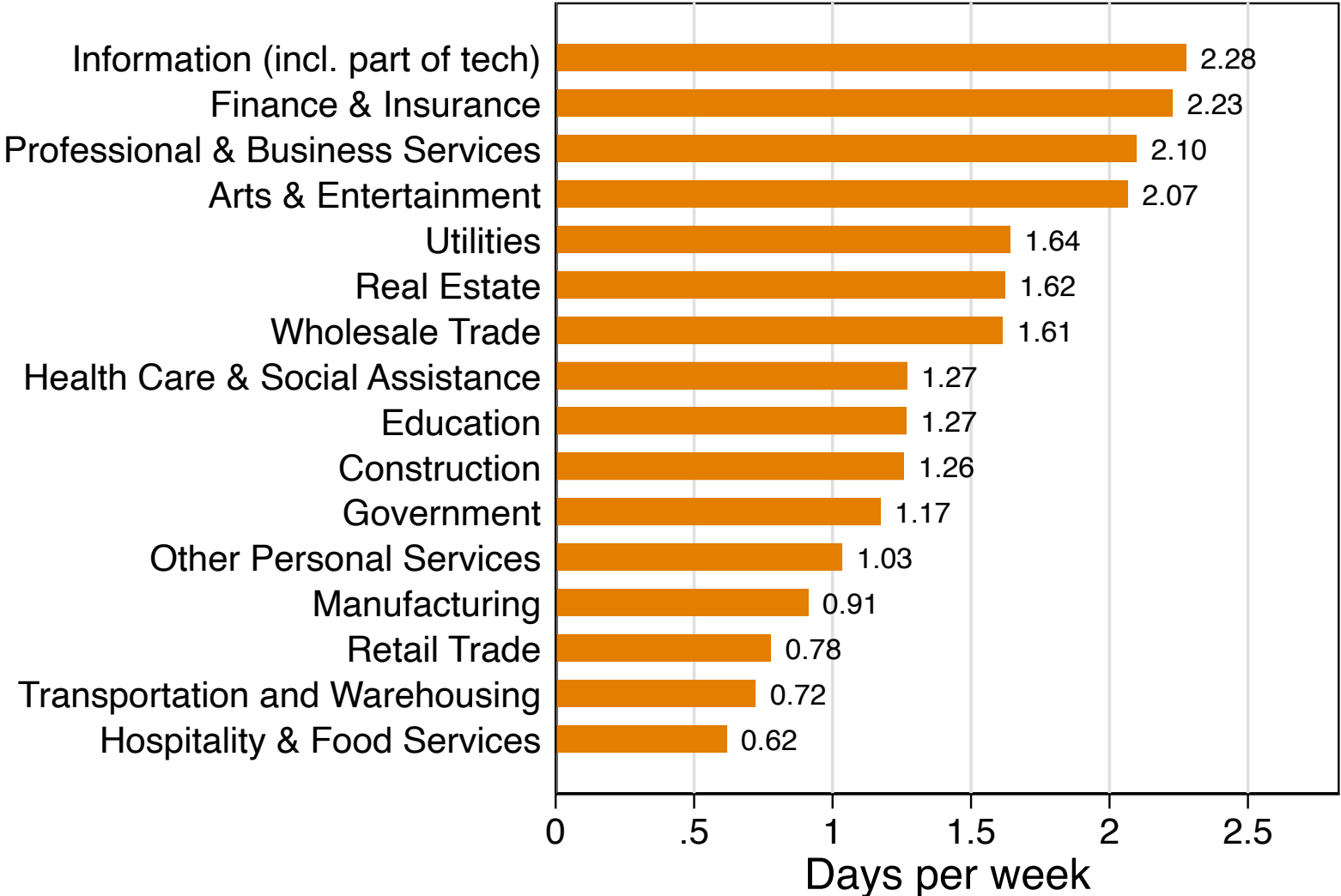
Economic Episode	Percentage Real Wage Change		Unemployment Rate, Percent		Ratio of Vacancies to Unemployed Persons		Mean Vacancy Duration, Days	
	Annualized	Cumulative	Episode Average	Prior 4 Quarters	Episode Average	Prior 4 Quarters	Episode Average	Prior 4 Quarters
Q4 2007 to Q3 2008	-2.3	-2.3	5.3	4.5	0.50	0.69	22.1	22.8
Q2 2009 to Q4 2009	-1.5	-1.2	9.6	8.5	0.17	0.21	16.4	17.6
Q4 2010 to Q1 2012	-1.0	-1.5	8.9	9.7	0.26	0.18	20.6	17.8
Q1 2021 to Q4 2022	-2.8	-4.1	4.4	8.7	1.62	0.56	43.8	28.5

Source: “The Shift to Remote Work Lessens Wage-Growth Pressures” by Barrero, Bloom, Davis, Meyer and Mihaylov, NBER WP 30197. Revision in progress.

Working from Home is Most Prevalent in the Tech, Finance, and Professional and Business Services Sectors



Current working from home: All wage and salary employees



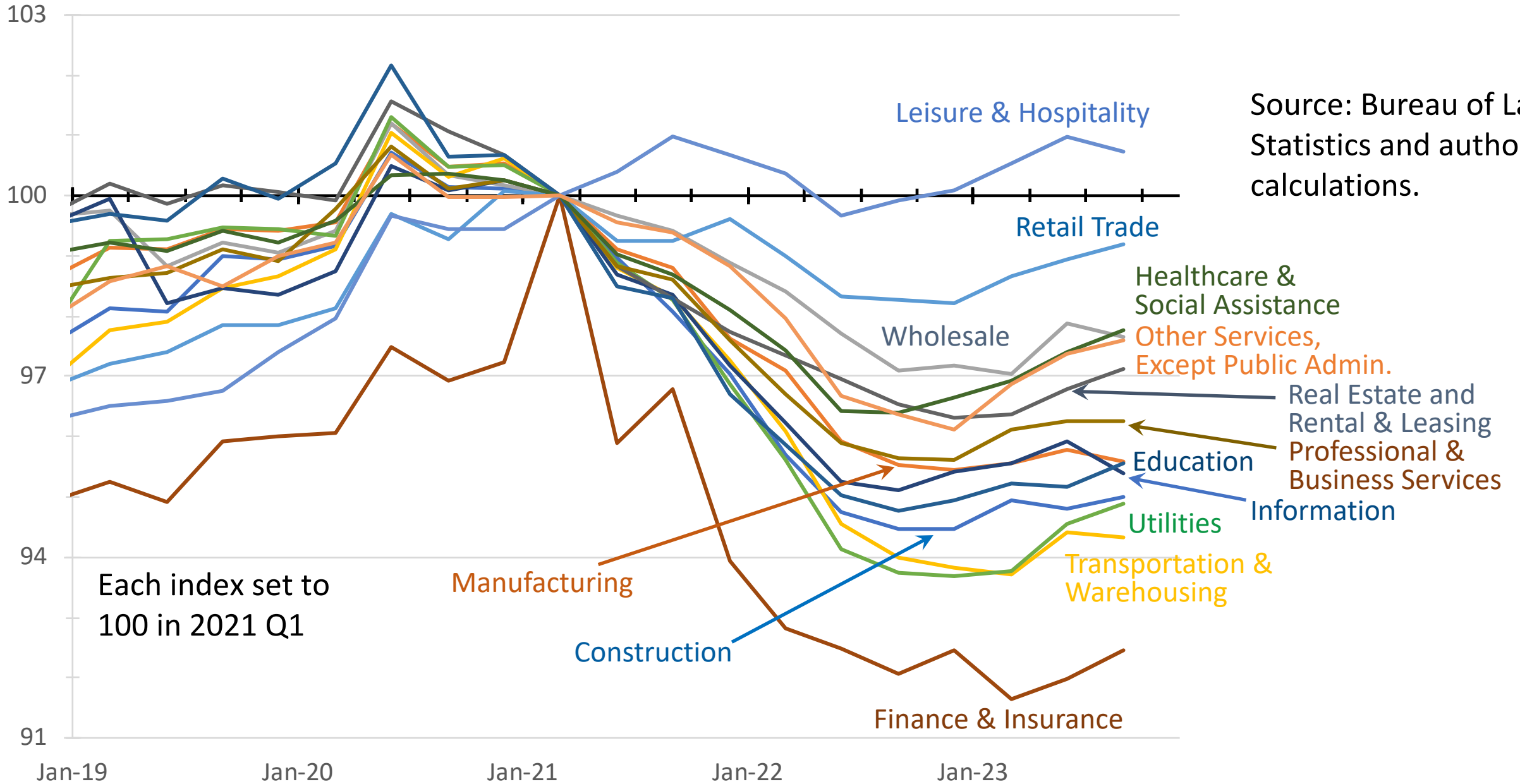
Responses to the question:

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

Sample: Data are from the July to December 2023 SWAA waves. The sample includes all wage and salary employees who pass the attention-check questions. We exclude mining due to insufficient observations and agriculture to focus on non-farm jobs. We re-weight the sample of US residents aged 20 to 64 earning \$10,000 or more in a prior year to match Current Population Survey on age, sex, education, and earnings.

N = 16,633

ECI By Industry, Deflated by the CPI, 2019 Q1 through to 2023 Q3



Interpreting the Recent Disinflation, 1

- The recent inflation surge came as a surprise to businesses, policymakers, and most economists.
- U.S. consumer prices rose 8.6 percent over the 12 months ending May 2022, a jump of several percentage points relative to previous years.
- Nominal wage growth failed to keep pace.
- After adjusting for the CPI, *real* average hourly earnings in the U.S. private sector fell 3.0 percent over the 12-month period ending May 2022.

Interpreting the Recent Disinflation, 2

- From 2007 to 2019, nominal wage growth outstripped CPI inflation by 0.7 ppts per year. This figure offers a reasonable estimate for the real-wage growth that firms and workers expected before the surprise inflation surge.
- Thus, we take 3.7 ppts as an estimate for the real wage drop associated with the inflation surge.
- We interpret this figure as the magnitude of a potential real-wage catchup effect on near-term inflation pressures.

Interpreting the Recent Disinflation, 3

- Prominent economists argued that pressures for a “catchup” in real wages would make it harder for monetary policy makers to engineer a soft landing.
- The argument: Workers, having experienced a material drop in purchasing power, will bargain for a bigger boost in wages. Employers will accommodate the desire for wage catchup, especially in the face of tight labor markets. In effect, the surprise component of recent price inflation raises future wage inflation. Higher wage inflation, in turn, raises production costs and feeds into higher price inflation.

Interpreting the Recent Disinflation, 4

- As it turns out, no real-wage catchup effect has materialized and the economy has, thus far, avoided a recession. The Fed tightened monetary policy but less so (and later) than prescribed by a Taylor Rule.
- These outcomes are puzzling from the perspective of standard New Keynesian models.
- The fall in real wages (and the absence of catch up) amidst extremely tight labor markets is puzzling for a broader class of macro models.
- Our evidence and analysis say that these developments reflect the big, abrupt shift to WFH and the unusual macro features of the WFH shock.

Extra Slides

Survey of Working Arrangements and Attitudes (SWAA)

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

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

Note: We weight the individual-level SWAA data to match the corresponding CPS shares by age-sex-education-earnings cells. See “Why Working from Home Will Stick” by Barrero, Bloom and Davis for details on how we construct the weights.

Census Household Pulse Survey (HPS)

- In the last 7 days, have any of the people in your household teleworked or worked from home?

- Yes, for 1-2 days
- Yes, for 3-4 days
- Yes, for 5 or more days
- No

Notes:

1. We use HPS sample weights in computing our tabulations.
2. We treat “Yes, for 1-2 days” as 30% of days worked from home, “3-4” as 70% of days, “5 or more” as 100%, and “No” as 0%.

Current Population Survey (CPS)

- *I now have some questions related to how the COVID-19 pandemic affected where people work.*
- *At any time **last week**, did you telework or **work at home** for pay?*
- *Last week, you worked [x] hours How many of these hours did you telework or work at home for pay?*

Notes:

1. We use CPS sample weights when computing our tabulations.
2. The CPS uses the above question design from October 2022 to November 2023. As of December 2023, the CPS modified the introductory sentence to read “I now have some questions about where people worked.” See www.bls.gov/cps/telework.htm#q1. As of this writing (January 2024), the BLS has yet to release the CPS data for December 2023.

American Community Survey (ACS)

How did this person usually get to work LAST WEEK? *Mark (X) ONE box for the method of transportation used for most of the distance.*

<input type="checkbox"/> Car, truck, or van	<input type="checkbox"/> Taxicab
<input type="checkbox"/> Bus	<input type="checkbox"/> Motorcycle
<input type="checkbox"/> Subway or elevated rail	<input type="checkbox"/> Bicycle
<input type="checkbox"/> Long-distance train or commuter rail	<input type="checkbox"/> Walked
<input type="checkbox"/> Light rail, streetcar, or trolley	<input type="checkbox"/> Worked from home → <i>SKIP to question 40a</i>
<input type="checkbox"/> Ferryboat	<input type="checkbox"/> Other method

Notes:

1. We use ACS sample weights in computing our tabulations.
2. We treat someone as working in a fully remote capacity if the response to this question is “Worked from home.”

American Time Use Survey (ATUS)

The ATUS elicits time-use diaries that cover a 24-hour period for each respondent. The diary records each activity over the course of the 24 hours, its duration (or start and stop times), where the activity took place, and with whom (if relevant). The granular nature of the time-use data lets us estimate the percent of full workdays performed at home or other remote location, the percent of workhours performed remotely, and the percent of workers who engaged in any remote work in a typical day. The ATUS data also let us investigate how the estimated percent of full workdays performed remotely varies with the definition of “full.

Notes:

1. We use ATUS sample weights in computing our tabulations.
2. We treat “working at main job” and “working at other job” in the ATUS data as work. We treat that work as work from home or other remote location, if it took place at “home or yard,” “someone else’s home,” “school,” “outdoors away from home,” “other store/mall,” or “library.”

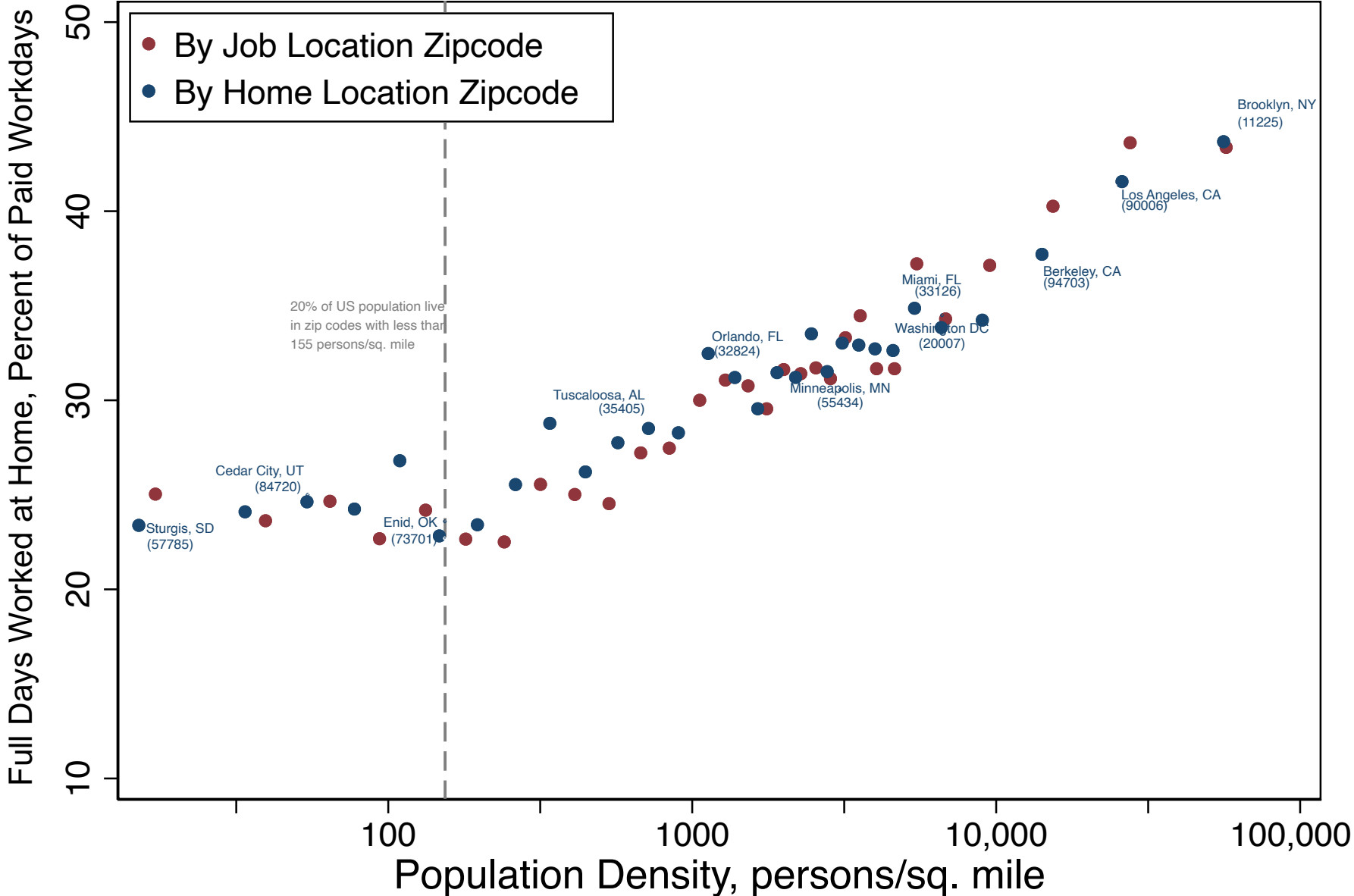
What If Statistical Authorities Miss a Reallocation of Time from Commuting and Personal Grooming to Work Activity?

To assess the potential impact on measured productivity, suppose that all of the reallocated time goes unmeasured by the statistical agencies – e.g., suppose that a full-time worker records 8 hours per day regardless of actual work time.

1. 40% of the 2 percentage point time savings estimated above equals 0.8 percentage points.
2. So if all of the reallocated time goes unmeasured, it would boost measured labor productivity by 0.8%.

More broadly, the shift to remote work and flexible work schedules makes it harder to accurately measure labor time inputs and, hence, to accurately measure labor productivity.

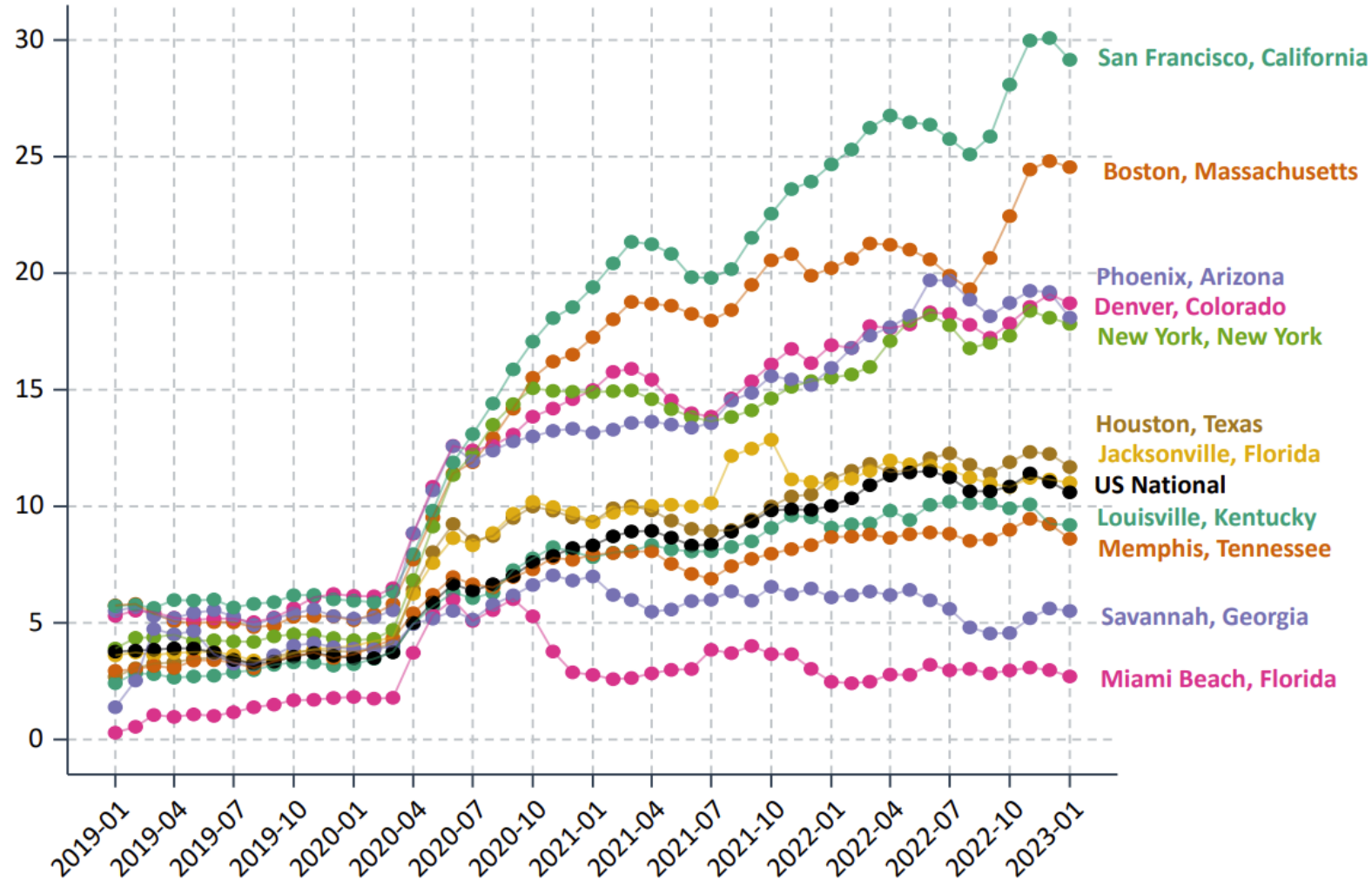
Work from Home Rises with Population Density, U.S. Data



Reproduced from [“The Evolution of Work from Home”](#) by Barrero, Bloom and Davis.

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

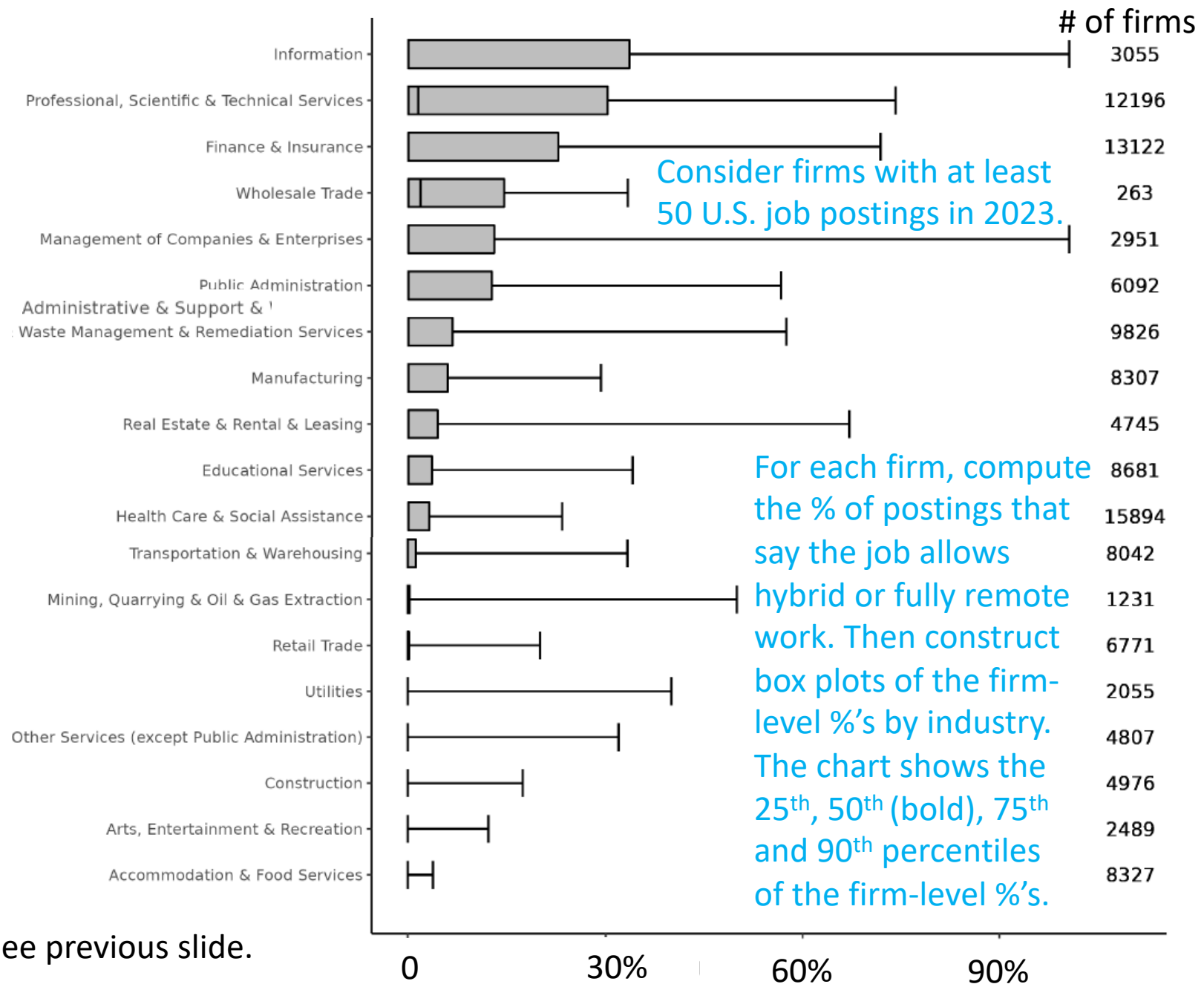
Work-from-Home Adoption Rates Vary Greatly Across U.S. Cities



Notes: We develop and apply a large language model to all online job vacancy postings in the US (from Lightcast) to create these data. Updates at www.wfhmap.com.

Reproduced from “Remote Work across Jobs, Companies, and Space,”
By Hansen, Lambert, Bloom, Davis, Sadun and Taska.

WFH Adoption Rates Vary Greatly Across Same-Industry Firms



Source: See previous slide.

Comparing Average Own-Firm Wage Growth Forecasts and Realizations

	May 2022 Survey	May 2023 Survey
	Over the next 12 months, what do you expect the average growth rate of wages to be at your firm?	What was the average growth rate of wages at your firm in the past 12 months?
Overall	5.0	5.2
Small Firms	4.8	5.2
Large Firms	5.2	5.2
Goods Producers	4.7	5.2
Retail and wholesale trade, Transportation and warehousing, Leisure and hospitality	5.7	5.8
Educational services, Health care and social assist., Other services	5.0	5.1
Finance and insurance, Real estate and rental and leasing, Professional and business services, Information	4.8	4.9

Note: The table shows results from the May '22 and May '23 survey waves. Results are weighted by firm size.