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Working from Home Around the World

ABSTRACT The pandemic triggered a large, lasting shift to work from home (WFH). To study this shift, we survey full-time workers who finished primary school in twenty-seven countries as of mid-2021 and early 2022. Our cross-country comparisons control for age, gender, education, and industry and treat the United States mean as the baseline. We find, first, that WFH averages 1.5 days per week in our sample, ranging widely across countries. Second, employers plan an average of 0.7 WFH days per week after the pandemic, but workers want 1.7 days. Third, employees value the option to WFH two to three days per week at 5 percent of pay, on average, with higher valuations for women, people with children, and those with longer commutes. Fourth, most employees were favorably surprised by their WFH productivity during the pandemic. Fifth, looking across individuals, employer plans for WFH levels after the pandemic rise strongly with WFH productivity surprises during the pandemic. Sixth, looking across countries, planned WFH levels rise with the cumulative stringency of government-mandated lockdowns during the pandemic. We draw on these results to explain the big shift to WFH and to consider some implications for workers, organization, cities, and the pace of innovation.

Conflict of Interest Disclosure: The authors' Global Survey of Working Arrangements (G-SWA) was supported by the European Bank for Reconstruction and Development, the Asociación Mexicana de Cultura AC, the Becker Friedman Institute at the University of Chicago, the ifo Institute, King's College London, the Smith Richardson Foundation, and the Templeton Foundation. Other than the aforementioned, the authors did not receive financial support from any firm or person for this paper or from any firm or person with a financial or political interest in this paper. They are not currently an officer, director, or board member of any organization with a financial or political interest in this paper.

Brookings Papers on Economic Activity, Fall 2022: 281–330

The COVID-19 pandemic triggered a huge, sudden uptake in working from home, as individuals and organizations responded to contagion fears and government restrictions on commercial and social activities. Over time, it has become evident that the big shift to work from home (WFH) will endure after the pandemic ends. No other episode in modern history involves such a pronounced and widespread shift in working arrangements in such a compressed time frame. The shift from farms and craft production to factory jobs that accompanied the Industrial Revolution played out over roughly two centuries. The later, ongoing shift from factory work and other goods production to services is many decades in the making. While these transitions brought greater changes in skill requirements and business operations, their comparatively slow unfolding afforded much more scope for gradual adjustment.

These observations prompt some questions: What explains the pandemic's role as catalyst for a lasting uptake in WFH? What does a large, lasting shift to remote work portend for workers? Specifically, how much do they like or dislike WFH? How do preferences in this regard differ between men and women and with the presence of children? How, if at all, do workers and employers act on preferences over working arrangements? When looking across countries and regions, have differences in pandemic severity and the stringency of government lockdowns had lasting effects on WFH levels? Finally, how might the big shift to remote work affect the pace of innovation and the fortunes of cities?

To tackle these and related questions, we field a new Global Survey of Working Arrangements (G-SWA) in twenty-seven countries. The survey yields individual-level data on demographics, earnings, current WFH levels, employer plans, and worker desires regarding WFH after the pandemic, perceptions related to WFH, commute times, willingness to pay for the option to WFH, and more. Thus far, we have fielded the survey online in two waves, one in late July/early August 2021 and one in late January/early February 2022. Our G-SWA samples skew to relatively well-educated persons within each country, less so in most rich countries but very strongly so in middle-income countries.[1]

We focus our analysis on full-time workers, age 20–59, who finished primary school and investigate how outcomes, plans, desires, and perceptions around WFH vary across persons and countries. In making comparisons

1. This pattern is typical in online surveys covering many countries. See Alsan and others (2020), Stantcheva (2021), and Dechezleprêtre and others (2022).

across countries, we consider conditional mean outcomes that control for gender, age, education, and industry at the individual level, treating the raw US mean as the baseline value. These values should not be understood as estimated means for the working-age population or overall workforce in each country. Rather, they are conditional sample means for relatively well-educated, full-time workers who have enough facility with smartphones, computers, tablets, and the like to take an online survey.

Conditional mean WFH values average 1.5 full paid days a week across the countries in our sample as of mid-2021 and early 2022, ranging from 0.5 days in South Korea and 0.8 in Taiwan to 1.6 in the United States, 2.0 in the United Kingdom, and 2.6 in India. We also find that employers plan an average of 0.7 WFH days per week after the pandemic, but workers want 1.7 days, considerably more. Separate US data from the Survey of Working Arrangements and Attitudes (SWAA) also show a large gap between employer plans and worker desires in this regard.[2]

There are several reasons to think that WFH levels will ultimately settle at higher values than suggested by our survey data (for the well-educated groups covered by the G-SWA). SWAA updates at the WFH Research website show a steady rise from January 2021 to June 2022 in the plans of American employers for WFH levels after the pandemic. Similarly, G-SWA data show upward revisions over time in planned WFH levels for ten of the twelve countries covered by both survey waves. This pattern suggests that employers are gradually warming to the practice of letting employees work remotely one or two days per week in many jobs and most or all of the time in some jobs. Drawing on a near-universe of online job vacancy postings in the United States and four other English-speaking countries, Hansen and others (2022) find strong upward trajectories from mid-2020 through mid-2022 in the share of new vacancy postings that say employees can work remotely one or more days per week. Adrjan and others (2021) find the same pattern through September 2021 in vacancy postings for twenty OECD countries. This pattern suggests that remote work practices are becoming more firmly rooted, even as COVID-19 deaths decline. Finally, the share of US patent applications that advance video conferencing and other remote-interaction technologies doubled in the wake of the pandemic (Bloom, Davis, and Zhestkova 2021). This redirection of innovation efforts suggests that remote work technologies will continue to improve, further encouraging the use of remote work practices.

2. WFH Research, "Working from Home before and since the Start of COVID," www.WFHresearch.com.

How did the pandemic catalyze a large, lasting shift to WFH? We find strong evidence for a three-part explanation. First, the pandemic compelled a mass social experiment in WFH. Second, that experimentation generated a tremendous flow of new information about WFH and greatly shifted perceptions about its practicality and effectiveness. The simultaneity of experimentation across suppliers, producers, customers, and commercial networks yielded experience and information that was hard to acquire before the pandemic. Third, in light of this new information and shift in perceptions, individuals and organizations re-optimized working arrangements and moved to a much greater reliance on WFH. Barrero, Bloom, and Davis (2021c) sketch a theory that formalizes this three-part explanation and find supporting evidence for the United States. We investigate how this explanation fares in our twenty-seven-country sample.

Fears of contracting COVID-19 and government-mandated lockdowns drove workers and employers to experiment at scale with WFH. Because the pandemic lingered and recurred, workers and organizations experimented intensively with WFH for many months. This much is obvious. Less apparent is how the experimentation influenced perceptions about WFH and whether any shift in perceptions had a lasting impact on working arrangements. In this regard, we find two key results: first, relative to their pre-pandemic expectations, most workers were surprised to the upside by their WFH productivity during the pandemic. That is, by their own assessments, they were more productive in WFH mode than they had anticipated. Only 13 percent of workers were surprised to the downside, and nearly a third found WFH to be about as productive as expected. Second, the extent of WFH that employers plan after the pandemic rises strongly (in the cross section) with employee assessments of WFH productivity surprises during the pandemic. This pattern holds in all twenty-seven countries in our sample. It indicates that large-scale experimentation with WFH permanently shifted views about the efficacy of remote work and, as a result, drove a major re-optimization of working arrangements.

We also investigate whether societal experiences during the pandemic had lasting effects on WFH levels. One aspect of societal experiences is the stringency and duration of government restrictions on commercial and social activity, which we summarize in a cumulative lockdown stringency (CLS) index. A second aspect is the severity of the pandemic itself, as summarized by cumulative COVID-19 deaths per capita. In this regard as well, we find two key results. First, employers plan higher post-pandemic WFH levels in countries with higher CLS values in regression models that control for worker characteristics, survey wave, cumulative COVID-19 deaths,

and log real GDP per capita. Raising the country-level CLS value by two standard deviations raises employer plans for the post-pandemic WFH level by an extra 0.27 days per week, according to the model. This effect is 38 percent as large as the cross-country mean of 0.7 planned WFH days per week. Second, and to our surprise, cumulative COVID-19 deaths per capita have no discernable impact on planned WFH levels (or actual WFH levels as of the survey).

The pandemic spurred several other developments that helped drive a large, lasting uptake in WFH: new investments in the home and inside organizations that facilitate WFH, learning by doing in the WFH mode (as distinct from learning by experimentation), advances in products and technologies that support WFH, much greater social acceptance of WFH, and lingering concerns about infection risks that lead some people to prefer remote work. The rise of the internet, the emergence of the cloud, and advances in two-way video technologies before the pandemic created the conditions that made possible a big shift to WFH. Indeed, the extent of remote work was trending slowly upward, from a low base, long before the pandemic.[3]

What does a large, lasting shift to remote work portend for workers? According to G-SWA data, employees view the option to WFH two to three days per week as equal in value to 5 percent of earnings, on average. The conditional mean willingness to pay for this option is positive for every country except Taiwan. Other survey responses tell a consistent story. For example, when we query respondents about how much they want to WFH after the pandemic, country-level conditional means range from 1.1 to 2.3 days per week. When we ask those who currently WFH one or more days per week how they would respond "if your employer announced that all employees must return to the worksite 5+ days a week," one-quarter say they would quit or seek a job that lets them WFH one or two days per week. Savings in commute time are perhaps the most obvious and important individual-level benefit of WFH. Daily round-trip commutes average 64 minutes per day in the G-SWA sample, ranging from 48 minutes in the United States and Serbia to 93 minutes in India and 96 minutes in China.

Women place a higher average value on WFH than men in all but a few countries, as do those with more education. Among married persons, both

3. Barrero, Bloom, and Davis (2022c, slide 6) draw on the American Time Use Survey and the American Community Survey to present evidence that the share of full paid days worked from home rose from 0.4 percent in 1965 to 1.0 percent in 1990, 2.8 percent in 2010, and 4.7 percent in 2019. Our discussant, Katharine Abraham, also presents evidence of an upward drift in US WFH rates from 1997 to 2018 based on data from the Survey of Income and Program Participation and the American Time Use Survey.

men and women more highly value the option to WFH when they have children under age 14. Not surprisingly, willingness to pay for WFH rises with commute time. All of these patterns emerge clearly in the data, but the heterogeneity in willingness to pay for WFH is perhaps even more noteworthy. Even when we control for education, age, gender, marital status, presence of children, commute time, current WFH days, survey wave, and country, the residual variation in willingness to pay is large, and our regression R^2 values are less than 12 percent. This preference heterogeneity has important implications for organizations and for policy, as we discuss.

We also offer several observations about how the rise of remote work could affect the pace of innovation and the fortunes of cities. With respect to innovation, we argue that there are sound reasons for optimism. With respect to cities, we highlight some major challenges—especially for urban centers that, before the pandemic, organized themselves to support high-volume inward commuting and a high spatial concentration of commercial activity. A key point is that the rise of remote work raises the sensitivity of the city-level tax base with respect to the quality of its governance and local amenities. For poorly governed cities, in particular, this greater sensitivity raises the risk of a downward spiral in local tax revenues and urban amenities.

Our study relates to many previous works. We build on the US-centric analysis of Barrero, Bloom, and Davis (2021c) and borrow heavily from their SWAA questionnaire in designing our survey questions. Criscuolo and others (2021) survey managers and employees about their experiences and expectations around WFH in twenty-five countries. They find "a large majority of managers and workers had a positive experience from teleworking" (7) during the pandemic, which aligns well with our evidence and with evidence for American managers and workers in Ozimek (2020) and Barrero, Bloom, and Davis (2021c). Criscuolo and others (2021) also investigate how managerial experiences relate to future WFH levels in their organizations. Managers who more favorably assess their company's experience with telework during the COVID-19 crisis prefer higher WFH levels for their company in the future, even when controlling for the extent of WFH at the company before and during the pandemic. Their evidence from a survey of managers covering many countries strongly aligns with our evidence from a survey of workers.

Many studies examine the huge uptake in WFH in spring 2020.[4] Our surveys went to field 16 to 23 months after the pandemic's onset and reflect

4. See, for example, Adams-Prassl and others (2020), Barrero, Bloom, and Davis (2020), Bartik and others (2020), Bick, Blandin, and Mertens (2020), Brynjolfsson and others (2020), Eurofound (2020), and Ker, Montagnier, and Spiezia (2021).

experiences and perceptions at that time. Previous studies also document preference heterogeneity around WFH in various settings and using a range of empirical methods.[5] Relative to these studies, we contribute by documenting the pervasiveness of heterogeneity in WFH preferences around the world and by showing that the structure of preferences exhibits common features across countries, including stronger desires to WFH among those with children. Other studies stress the economic resilience value of WFH during a pandemic and its role in slowing the spread of the SARS-CoV-2 virus.[6]

Adrjan and others (2021) find that differences across countries in government lockdowns during the pandemic and "digital preparedness" before the pandemic partly explain cross-country differences in the persistent shift to remote work. Baker, Davis, and Levy (2022) find that government lockdown stringency during the pandemic had persistent effects on state-level unemployment rates in the United States. These results align with our evidence that societal experiences during the pandemic have persistent effects on the extent of WFH. Our concerns about how remote work presents challenges for cities, especially poorly governed ones, overlap with concerns expressed in Glaeser (2022).

I. The Global Survey of Working Arrangements (G-SWA)

The G-SWA covers full-time workers, age 20–59, who finished primary school in twenty-seven countries.[7] In addition to basic questions on demographics, employment status, earnings, industry, occupation, marital status, and living arrangements, the survey asks about current, planned, and desired WFH levels, perceptions and experiences related to WFH, willingness to pay for the option to WFH, commute time, and more. We design the G-SWA instrument, adapting questions from the US SWAA developed by Barrero, Bloom, and Davis (2021c). We enlist professionals to translate our original English-language questionnaire into the major languages of each country.[8] To ensure high-quality translations, we also enlist an independent

5. See, for example, Bloom and others (2015), Mas and Pallais (2017), Wiswall and Zafar (2018), He, Neumark, and Weng (2021), Barrero, Bloom, and Davis (2021c), and Lewandowski, Lipowska, and Smoter (2022).

6. See Alipour, Fadinger, and Schymik (2021), Bai and others (2021), Berniell and others (2021), Barrero, Bloom, and Davis (2021b), and Eberly, Haskel, and Mizen (2021).

7. Wave 1 includes part-time workers and those who did not finish primary school, but we omit them in our analysis.

8. The G-SWA survey instruments are available at https://wfhresearch.com/wp-content/uploads/2022/07/G-SWA_Wave1.pdf and https://wfhresearch.com/wp-content/uploads/2022/07/G-SWA_Wave2.pdf.

third party with knowledge of the survey to review the translations and revise as needed.

To field the G-SWA, we contract with Respondi (a professional survey firm), which implements the survey directly and in cooperation with its external partners. The survey effort taps pre-recruited panels of people who previously expressed a willingness to take part in research.[9] Recruitment into these panels happens via partner affiliate networks, multiple advertising channels (including Facebook, Google AdWords, and other websites), address databases, and referrals. New recruits are added to the panels on a regular basis. When it is time to field a survey, Respondi or its partner issues email messages that invite panel members to participate. The message contains information about compensation and estimated completion time but not about the survey topic. Clicking on the link in the invitation message takes the recipient to the online questionnaire. Respondents who complete the survey receive cash, vouchers. or award points, which they can also donate.[10]

This survey technology meets two market tests. First, it is increasingly used in scholarly research to examine preferences, attitudes, and perceptions and to field experiments. See Alesina, Stantcheva, and Teso (2018) for an early multicountry application. Second, reliance on pre-recruited samples for online surveys has exploded in market research studies and other commercial applications. We know of no comprehensive statistics on the scale of this activity, but consider Cint Group AB, a listed firm, that describes itself as "one of the world's largest consumer networks for digital survey-based research."[11] According to its website at the time of writing, Cint had 239 million or more engaged respondents across 130 countries, and it operated more than 4,600 survey panels tapped by more than 3,200 clients, including Zappi, SurveyMonkey, Qualtrics, Ipsos, and Nielsen. Commercial use on this scale suggests that sampling from pre-recruited panels to conduct online surveys can deliver useful insights in multiple domains and on many topics.

The G-SWA went to field in fifteen countries in late July and early August 2021 and in an overlapping set of twenty-five countries in late January and early February 2022. Wave 2, which covered both Russia and Ukraine, went to field shortly before the onset of the Russian invasion but well after Russia began massing troops near the Ukrainian border. We

9. Respondi and its external partners do not engage in "river sampling," whereby people are invited to take a survey while engaging in another online activity. Relative to river sampling, the use of pre-recruited panels affords greater control over sample composition and selection.

10. We do not contact respondents ourselves, do not collect personally identifiable information, and have no way to recontact them.

11. Cint, home page, https://www.cint.com.

retain the Ukrainian and Russian data in our study but acknowledge that war concerns may affect outcomes, attitudes, and perceptions related to WFH. Some G-SWA country waves include additional survey blocks that come after the demographic, employment, and WFH blocks.

Before proceeding to our analysis of the G-SWA data, we drop "speeders," defined as respondents in the bottom 5 percent of the completion-time distribution for each country. We also drop the roughly 15 percent of respondents who fail the following attention-check question: "In how many big cities with more than 500,000 inhabitants have you lived? . . . [T]his question only serves the purpose to check your attention. Irrespective of your answer, please insert the number 33." The resulting analysis sample contains 12,229 observations across fifteen countries in wave 1 and 23,849 observations across twenty-five countries in wave 2. Online appendix table A.1 reports observation counts and dates in the field for each country and survey wave. Tables A.2 and A.3 report summary statistics for key G-SWA variables. Median survey completion times range from 7.3 to 9.5 minutes, after drops, across the ten country waves that do not have extra survey blocks.

Although Respondi aims for samples that are broadly representative by age, gender, income, and regions within countries, our G-SWA samples are not representative of country-level workforces or their working-age populations. Respondents take the survey on a computer, smartphone, iPad, or like device, so we miss persons who don't use such devices. The G-SWA samples skew toward relatively well-educated persons in each country, less so in most advanced economies but very strongly so in some advanced economies and in middle-income economies. That could influence our results, even when we condition on certain observables.

Online appendix table A.4 compares our country-level G-SWA samples to Gallup data for 2017–2018. The comparisons suggest that our samples are reasonably representative of full-time workers, age 20–59, who finished primary school, with respect to age and gender, except for an overrepresentation of women in a few countries, especially India and Turkey. Most of our country-level samples are highly skewed to college-educated persons. In China, for example, 90 percent of G-SWA respondents completed college as compared to only 27 percent in the Gallup data.[12] Accordingly,

12. Gallup data have their own oddities, greatly underrepresenting college-educated persons in Spain, for example. In unreported results, we find that Gallup-based statistics for the share of persons age 25 and older with a college degree often differ by 10 percentage points or more (in both directions) from analogous statistics obtained from the World Bank and the European Social Survey. The World Bank and European Social Survey statistics also differ from each other, sometimes by 10 percentage points or more (again, in both directions).

when we report country-level (conditional) mean values, we use "HE" to designate countries with G-SWA samples that greatly overrepresent highly educated persons. When we investigate how societal experiences during the pandemic relate to post-pandemic outcomes, we consider the sensitivity of our results to samples that restrict attention to college-educated workers.

II. Working from Home in Twenty-Seven Countries

II.A. WFH Levels, Plans, and Desires

Figure 1 highlights the global nature of WFH among well-educated workers as of mid-2021 and early 2022. It reflects responses to the G-SWA question, "How many *full paid working days* are you *working from home* this week?" Response options range from none to 5 or more days per week.[13] The figure reports conditional mean responses, which we obtain from the coefficients on country-level dummies in an ordinary least squares (OLS) regression, treating the raw US mean as the baseline. The regression controls for gender, age groups (20–29, 30–39, 40–49, 50–59), education groups (secondary, tertiary, graduate), eighteen industry sectors, and survey wave. Online appendix A explains this conditioning method in fuller detail. Here and elsewhere, we include self-employed persons except when using data on employer plans. We pool over the mid-2021 and early 2022 survey waves when available and otherwise use data from a single wave.

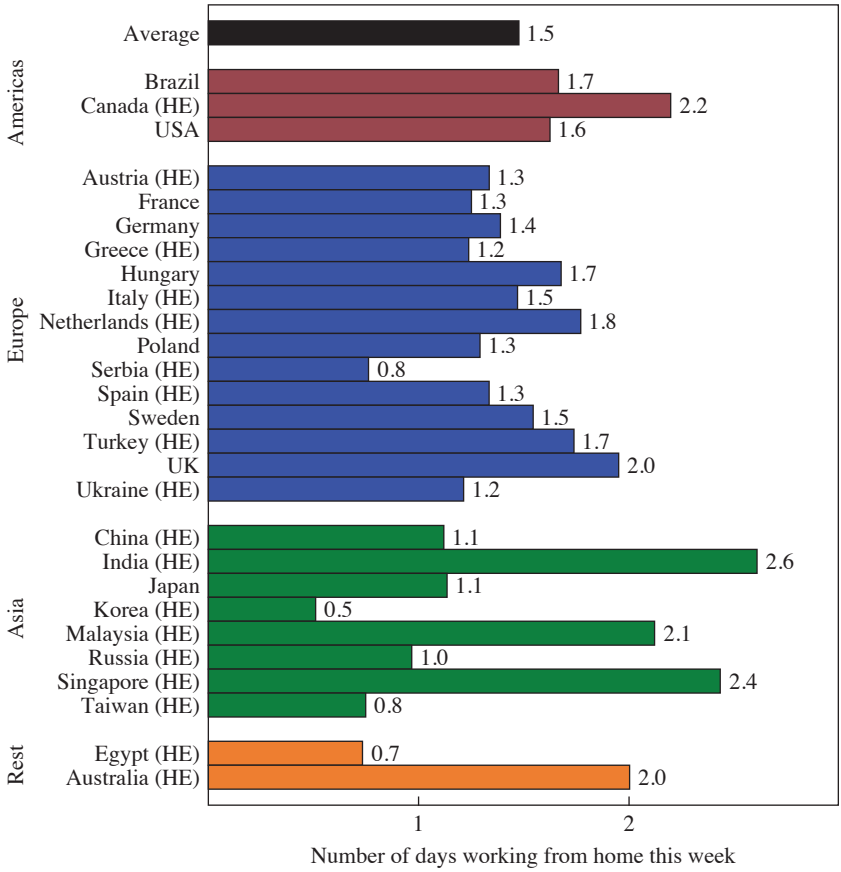
Full WFH days average 1.5 per week across the countries in our sample. We compute this average as the simple mean of the country-level conditional means. These conditional mean values range widely from 0.5 days in South Korea, 0.7 in Egypt, and 0.8 in Serbia and Taiwan at the low end to 2.4 in Singapore and 2.6 in India at the high end. The United States is in the middle at 1.6 WFH days per week. The wide dispersion in WFH levels conditional on individual characteristics, industry, and calendar time partly motivates our investigation into whether societal experiences during the pandemic had long-lasting effects on working arrangements.

Figure 2 provides direct evidence that high WFH levels will persist beyond the pandemic. The underlying question is "*After COVID, in 2022*

13. Katharine Abraham points out that our survey data could be affected by primacy bias, the tendency of respondents to pick answers that appear earlier in the list of response options. It's a good point, and we plan to randomize the ordering of response options in future G-SWA waves. That said, our practice of dropping speeders will eliminate respondents who simply click on the first option. Our short survey instrument and the omission of persons who fail the attention-check question will mitigate any tendency to pick early options that arises from survey fatigue or inattentiveness.

Figure 1. Working from Home Is Now a Global Phenomenon among the Well-Educated

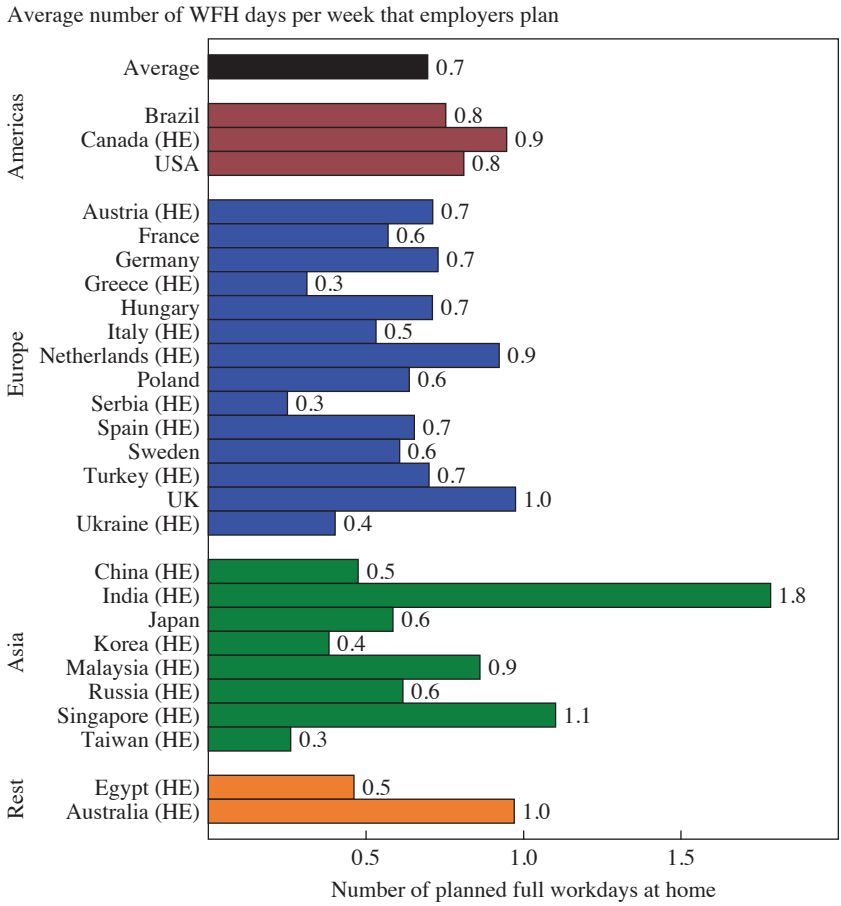
Paid full days working from home in the survey week, country-level conditional means



Source: Authors' calculations using G-SWA data.

Note: The survey question read: "How many *full paid working days* are you *working from home* this week?" The chart reports coefficients on country dummies in OLS regressions that control for gender, age (20–29, 30–39, 40–49, 50–59), education (secondary, tertiary, graduate), eighteen industry sectors, and survey wave, treating the raw US mean as the baseline value. We fit the regression to data for 33,091 G-SWA respondents surveyed in mid-2021 and early 2022. "Average" refers to the simple mean of the country-level values.

Figure 2. Planned Levels of Working from Home after the Pandemic



Source: Authors' calculations using G-SWA data.

Note: The survey question read: "*After COVID, in 2022 and later*, how often *is your employer planning* for you to work full days at home?" The chart reports coefficients on country dummies in OLS regressions that control for gender, age, education, industry, and survey wave, treating the raw US mean as the baseline value. We fit the regression to data for 34,875 G-SWA respondents who were surveyed in mid-2021 and early 2022. We limit the sample to persons with an employer in the survey week. "Average" refers to the simple mean of the country-level values.

and later, how often *is your employer planning* for you to work full days at home?" If the worker says his or her employer has neither discussed the matter nor announced a policy regarding WFH, we assign a zero value. Employers plan an average of 0.7 WFH days per week after the pandemic, ranging from 0.3 days in Greece, Serbia, and Taiwan to 0.4 in South Korea and Ukraine to 1.0 in Australia and the United Kingdom and 1.8 in India. The United States is again close to the middle at 0.8 planned WFH days per week. As in figure 1, there is a wide dispersion in the country-level conditional mean values.

When we ask workers how many full days per week they would like to WFH after the pandemic, we obtain even higher levels, as shown in figure A.1 in the online appendix. On average across countries, employees want 1.7 WFH days per week after the pandemic ends. The country-level conditional mean values for desired WFH days range from 1.1 in China, 1.2 in South Korea, and 1.3 in France and Taiwan at the low end to 2.2 in Canada and 2.3 in Brazil and Singapore at the high end. For the United States, mean desired WFH days are 2.1 per week.[14] Employees want more WFH days per week than employers plan in every country, and the gap exceeds half a day per week in all countries except India.

The gap between employee desires to WFH after the pandemic and employer plans is also a striking feature of the separate SWAA data for the United States (Barrero, Bloom, and Davis 2021c). The SWAA tracks desires and plans in this regard at a monthly frequency and shows a steady fall from a peak gap of 1.4 days per week in December 2020 to 0.6 days in June 2022.[15] Upward revisions in employer plans account for 69 percent of this shrinking gap.

When we look at planned WFH levels in countries covered by both G-SWA waves, we find that ten of twelve experienced an upward revision in their conditional mean values over the six-month period from the mid-2021 wave to the early 2022 wave. The cross-country average increase over this period is 0.18 days per week. SWAA data for the United States show an upward revision of 0.57 days per week over the eleven-month period from

14. According to SWAA data, American workers desire an average 2.2 WFH days per week as of February 2022 (Barrero, Bloom, and Davis 2021c). According to Gallup's State of the Workforce survey in May/June 2021, 91 percent of American workers who worked at least some of their hours remotely hoped that they could continue to do so after the pandemic (Saad and Wigert 2021).

15. Monthly SWAA statistics for US WFH levels, plans, and desires are available at https://wfhresearch.com/wp-content/uploads/2022/07/WFHtimeseries_monthly.xlsx. The underlying micro data can be accessed at https://wfhresearch.com/data/.

July/August 2021 (timing of G-SWA wave 1) to June 2022 and 0.24 days per week over the five-month period from January/February 2022 (G-SWA wave 2) to June 2022. These observations indicate that figure 2 understates the levels to which WFH days per week will eventually settle.

II.B. People Like WFH

Figure 3 suggests that people highly value the opportunity to WFH. Indeed, when asked directly, G-SWA respondents say the option to WFH two to three days a week is worth 5 percent of earnings, on average. We elicit the willingness to pay for this option using a two-part question structure. First, we ask, "*After COVID, in 2022 and later,* how would you feel about working from home *2 or 3 days* a week?" If the response is "Neutral," we code the willingness to pay as zero. If the response is "Positive—I would view it as a benefit or extra pay," we follow up with "How much of a *pay raise* (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?" There are six bucketed response options, ranging from "Less than a 5% pay raise" to "More than a 35% pay raise."[16] If the response is "Negative—I would view it as a cost or a pay cut," we follow up with a parallel question that replaces "*pay raise*" with "*pay cut*."

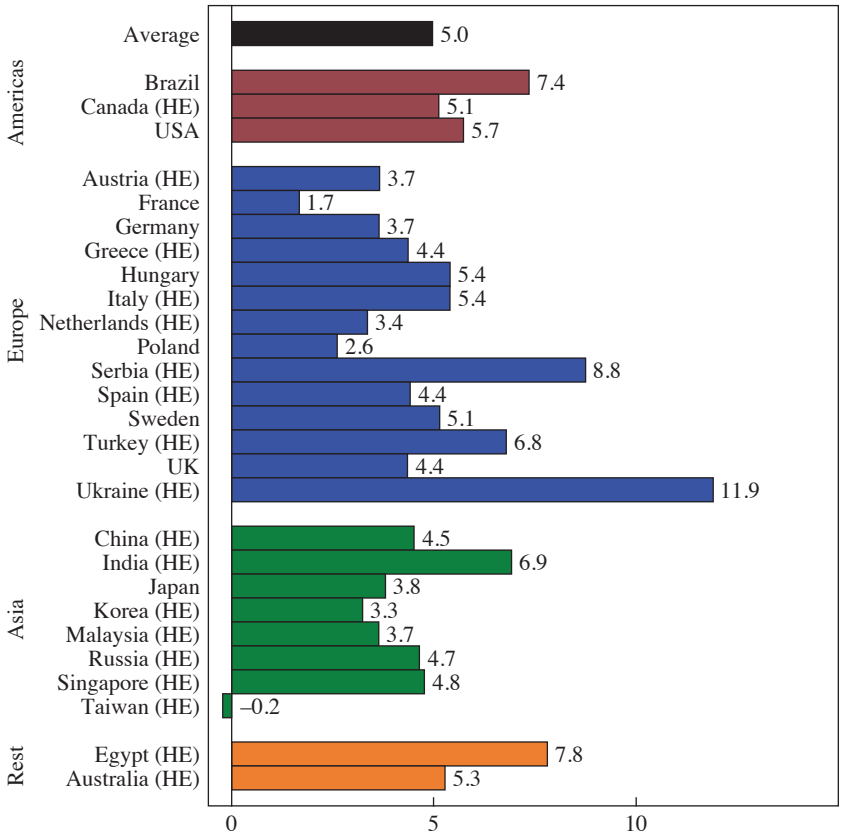
We use the two-part responses to quantify each person's willingness to pay and then construct the conditional mean values in figure 3. On average across countries, employees value this WFH option at 5 percent of pay. The country-level conditional mean willingness to pay is slightly negative for Taiwan and positive for all other countries, ranging upward to about 7–8 percent of pay in Brazil, Egypt, India, and Turkey, 8.8 percent in Serbia, and nearly 12 percent in Ukraine.

Other evidence reinforces the view that many employees like to WFH at least some of the time. The desired level of WFH averages 1.7 days per week across the countries in our sample (online appendix figure A.1). As shown in the online appendix, figure A.2, 26 percent of employees who currently WFH one or more days per week would quit or seek a job that allows WFH, if their employers were to require a return to five or more days per week on-site. Using SWAA data for US workers, Barrero, Bloom, and Davis (2021a) find that more than 40 percent of those who currently

16. The survey instrument includes both "A 25% to 35% pay raise" and "More than a 35% pay raise" options that we combine into one bucket for 25 percent or more. For persons in this top bucket, we assign a willingness-to-pay value of 25 percent. For the other buckets, we assign the midpoint value. We take the same approach for those who report a negative willingness to pay.

Figure 3. Willingness to Pay for the Option to Work from Home

Average amenity value of the option to work from home two to three days per week, as a percentage of pay



Source: Authors' calculations using G-SWA data.

Note: The survey questions read: "*After COVID-19, in 2022 and later*, how would you feel about working from home *2 or 3 days* a week?" and "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?" The chart reports coefficients on country dummies in OLS regressions that control for gender, age, education, industry, and survey wave, treating the raw US mean as the baseline value. We fit the regression to data for 36,078 G-SWA respondents who were surveyed in mid- 2021 and early 2022. "Average" refers to the simple mean of the country-level values.

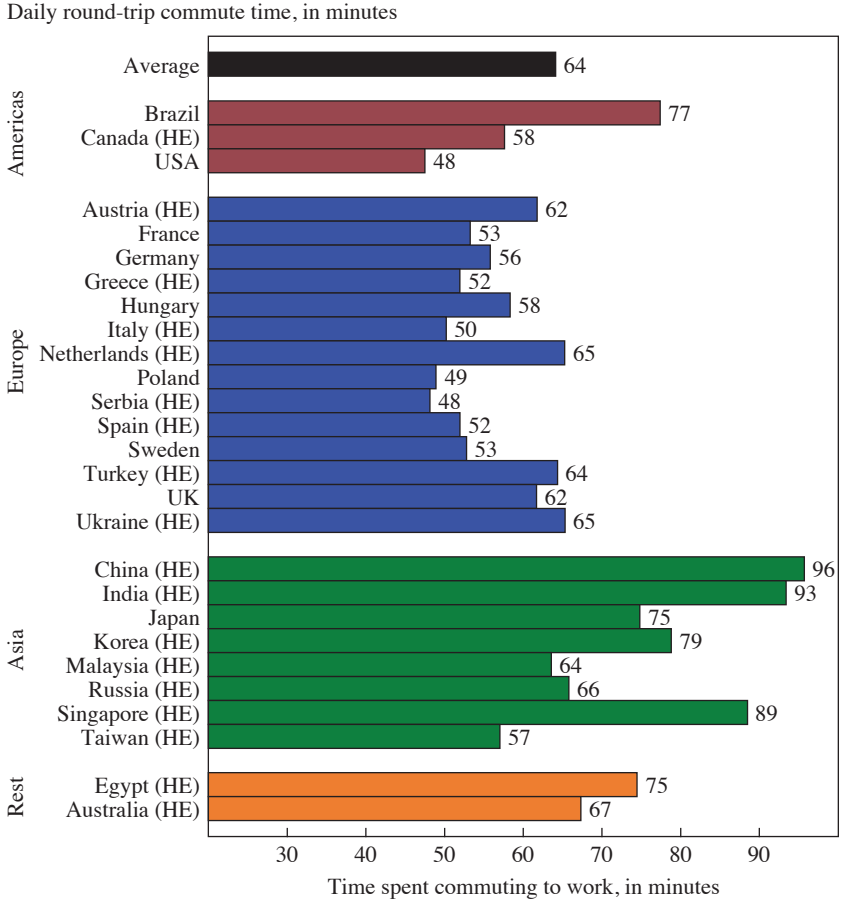
WFH one or more days per week would quit or seek a new job if their employers were to require a full return to the company work site. Bloom and others (2015) designed a WFH field experiment for a large Chinese travel agency. When offered the option to WFH four days a week for nine months, with a fifth workday in the office, half the employees wanted to do so. Mas and Pallais (2017) integrate a field experiment into the application process for call center jobs by randomizing over combinations of pay and working arrangements. They use the resulting data to construct an implied willingness-to-pay distribution for the option to WFH, obtaining a mean value of 8 percent. Bloom, Han, and Liang (2022) conduct a randomized control trial of engineers and marketing and finance employees in a large technology firm, letting some of them WFH on Wednesday and Friday. This hybrid WFH arrangement cut quits by 35 percent and raised self-reported work satisfaction. After Spotify adopted a "work from anywhere" policy, attrition rates fell 15 percent in 2022:Q2 relative to 2019:Q2 (Kidwai 2022). This fall coincided with sharply increased quit rates for the overall economy.

We see it as no surprise that (most) people place a sizable value on the option to WFH a few days per week. WFH saves on time and money costs of commuting. As shown in figure 4, round-trip commute times average 64 minutes per day in our sample, ranging from 48 minutes in Serbia and the United States to more than 90 minutes per day in China and India. WFH also economizes on grooming time and costs and affords more flexibility in time use over the day, greater personal autonomy, and less traffic-related stress.[17] Because the WFH amenity value is untaxed, it is more valuable for workers who face higher tax rates. The puzzle, if there is one, is why WFH levels were so low before the pandemic, given the now-evident practicality of much higher WFH levels than prevailed before March 2020.

Barrero, Bloom, and Davis (2021c) present survey evidence of what American workers like and dislike about WFH and about working on business premises. When asked "What are the top benefits of working from home?" and allowed to select up to three options, 51 percent say "No commute," 44 percent say "Flexible work schedule," 41 percent say "Less time getting ready for work," 37 percent say "Quiet," and 18 percent say "Fewer meetings." When asked "What are the top benefits of working on your employer's business premises?" 49 percent say "Face-to-face collaboration," 49 percent say "Socializing," 41 percent say "[Maintaining] work/personal

17. See, for example, Mas and Pallais (2017), Angelici and Profeta (2020), Barrero, Bloom, and Davis (2021a, 2021c), and Saad and Wigert (2021).

Figure 4. Commute Times Average More Than One Hour per Day



Source: Authors' calculations using G-SWA data.

Note: The survey questions read: Wave 1: "In 2019 (before COVID) how long was your typical commute to work in minutes (one-way)?" and Wave 2: "How long do you usually spend commuting to and from work (in minutes)? If you are not currently commuting to work, please answer based on your commute time in 2019 (before COVID)." The chart reports regression- adjusted conditional means, as in the previous figures. We fit the regression to data for 36,078 G-SWA respondents surveyed in mid-2021 and early 2022.

life boundaries," and 40 percent say "Better equipment." [18] Thus, both WFH and working on business premises have their attractions.

According to SWAA data from February to June 2022, most full-time American employees in jobs where remote work is feasible would like to split their workweeks between home and business, and most of the rest would like to WFH five days a week (Barrero, Bloom, and Davis 2022b, slide 22). Gallup's State of the Workforce survey conducted in May/June 2021 shows the same pattern (Saad and Wigert 2021). Barrero, Bloom, and Davis (2021c) quantify the time-saving gains for American workers from the pandemic-induced rise in WFH. Kahn (2022, chapters 2 and 3) offers an extended discussion of how WFH expands personal freedom, improves life quality, brings new employment opportunities, and builds social capital in residential communities.

II.C. The Structure of Preferences over WFH

Table 1 explores the structure of preferences around the option to WFH two to three days per week. We regress the willingness to pay for this option on individual characteristics, marital status, the presence of children, and commuting time. Several patterns emerge. Women more highly value the option to WFH than men, with an estimated differential that exceeds 1 percent of pay. People living with children under age 14 more highly value WFH, again with a differential greater than 1 percent of pay. Married women more highly value the option to WFH than single women, but the differential is modest. Not surprisingly, the WFH amenity value rises with commute time. The willingness to pay for the option to WFH also rises strongly with education. Column 3 says that graduate degree holders value the option to WFH at an extra 2.5 percent of pay relative to those with a secondary education. At least in part, this pattern probably reflects more spacious and comfortable homes and better internet quality among the more educated, in line with evidence for the United States in Barrero, Bloom, and Davis (2021b, 2021c).

When we expand the table 1 specifications to include flexible controls for the respondent's current WFH days per week, the education effect on willingness to pay shrinks by roughly a third and the R^2 values rise by about 3 percentage points. Otherwise, the same patterns continue to hold. Adding a control for self-assessed propensity to social distance and replacing coarse age bins with two-year age bins has little impact, except to improve

18. See slide 27 in Barrero, Bloom, and Davis (2022b), which tabulates SWAA data from February through June 2022.

Table 1. The Structure of Preferences over Working from Home

	Dependent variable: Amenity value of option to work from home two to three days a week				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Tertiary education	1.19***	1.06***	1.23***	1.31***	1.17***
	(0.38)	(0.37)	(0.21)	(0.24)	(0.28)
Graduate degree	3.17***	3.02***	2.47***	2.78***	2.12***
	(0.24)	(0.23)	(0.35)	(0.46)	(0.38)
Married	0.34	0.34	0.36	0.23	0.51**
	(0.22)	(0.23)	(0.21)	(0.32)	(0.21)
1 (men)	−1.11***	−1.14***	−1.17***		
	(0.22)	(0.23)	(0.25)		
1 (lives with children under 14)	1.27***	1.21***	0.92***	1.07***	0.72**
	(0.33)	(0.32)	(0.30)	(0.29)	(0.27)
1 (men) times 1 (lives with children under 14)	0.06	0.06	0.005		
	(0.50)	(0.50)	(0.48)		
Round-trip commute time in hours		0.68***	0.66***	0.60***	0.72***
		(0.19)	(0.15)	(0.11)	(0.22)
Sample	All	All	All	Men	Women
Dependent variable SD	11.293	11.293	11.293	11.313	11.234
Observations	26,689	26,689	26,689	13,605	13,084
R^2	0.035	0.039	0.074	0.070	0.078
Country FE			Y	Y	Y

Source: Authors' calculations using G-SWA data.

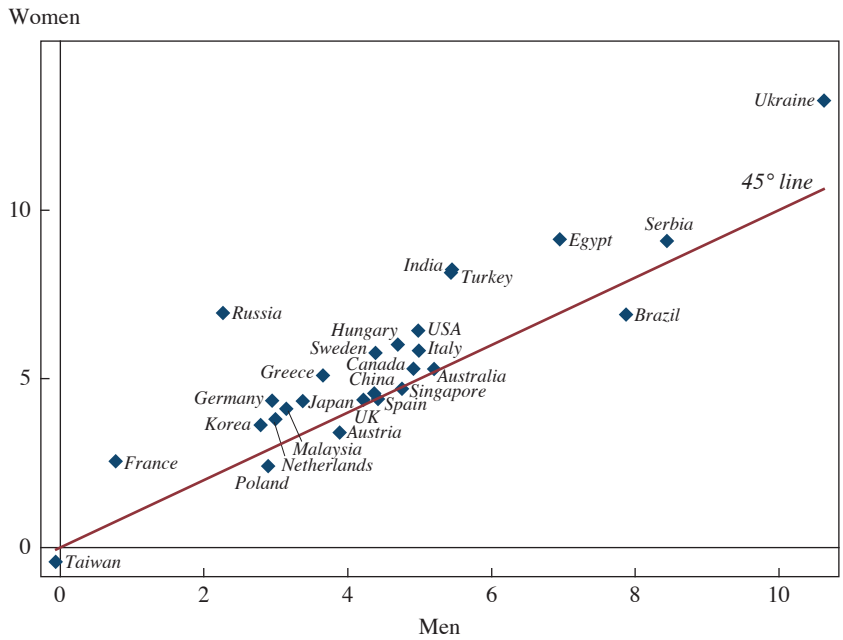
Note: The dependent variable is the willingness to pay for the option to work from home two to three days per week, computed using the two-part question structure described in the main text. The sample contains individual-level data in the twenty countries for which we have data on the number of children and marital status. All specifications include fixed effects for age groups and survey wave. We cluster errors at the country level.

**$p < .05$, ***$p < .01$.

fit. In a more flexible nonparametric specification, the willingness to pay to WFH two to three days per week exceeds 2 percent of pay for someone with a round-trip commute of more than one hour relative to an observationally similar person who commutes less than 20 minutes per day.

Figures 5 and 6 provide evidence on how the structure of preferences around WFH varies across countries. We construct these figures using the same data and specifications as in figure 3, except we now fit the regressions separately for each subsample, for example, men and women. Figure 5 shows that women more highly value the option to WFH in most countries. The same pattern holds when we constrain the covariate coefficients to be the same for women and men, as suggested by the similarity of coefficients in columns 4 and 5 of table 1. The same pattern also holds when we

Figure 5. Women More Highly Value the Option to Work from Home in Most Countries



Source: Authors' calculations using G-SWA data.

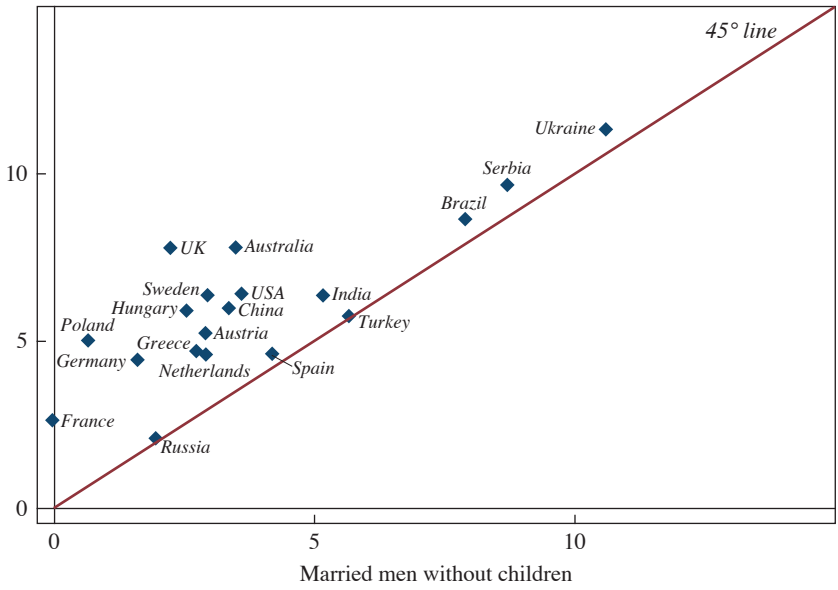
Note: This figure draws on the same questions and data as figure 4. It also uses the same specification, except that we fit the regression separately for men and women.

restrict attention to single persons with no children, as shown in panel C of figure 6. Thus, there appears to be a widespread pattern whereby women place more value on the option to WFH than men. It also appears that childcare responsibilities do not explain this pattern since we control for the presence of children, and the pattern also holds when we compare single women to single men. It may be that women, more than men, take on other caregiving and household management responsibilities that lead them to place a higher value on the flexibility and time savings afforded by the option to WFH.

Panels A and B in figure 6 highlight another commonality in the structure of preferences across countries: both men and women place a higher premium on the option to WFH when there are children in the household. We see this pattern as indicative of greater time demands and greater complexity in household management for people with children. As a result, they place greater value on the time savings and flexibility afforded by the option to WFH.

Figure 6. How the Amenity Value of Working from Home Differs by Sex and Family Circumstances, Conditional Means by Country

Panel A: Married men, comparison between those with and without children



Panel B: Married women, comparison between those with and without children

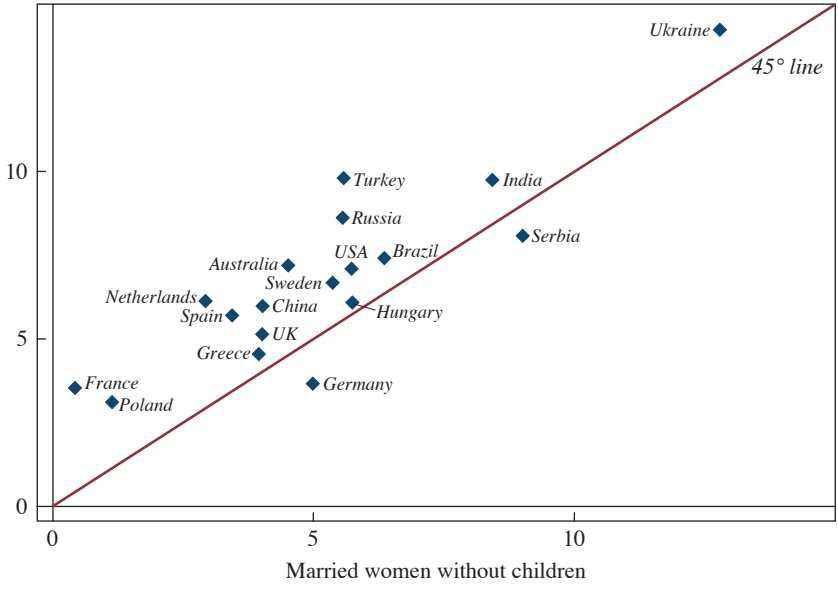
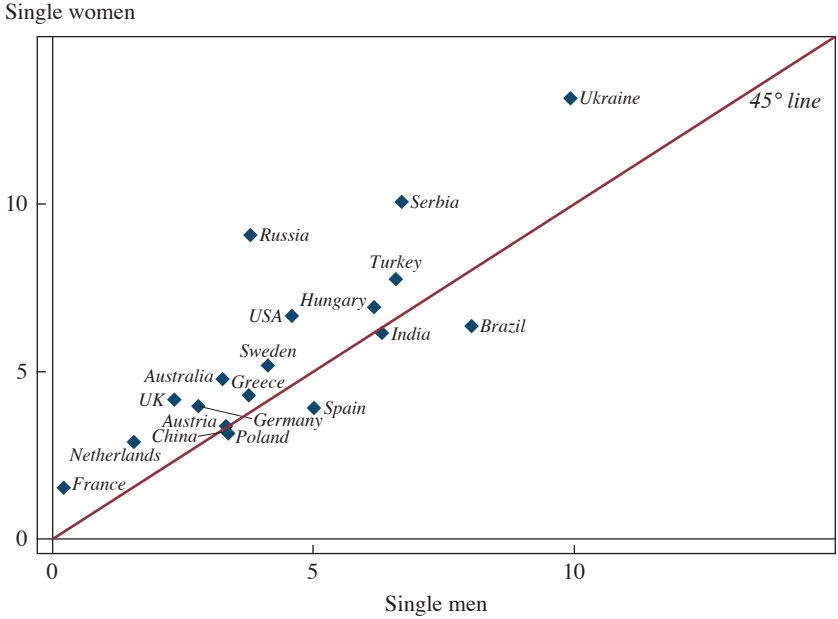


Figure 6. How the Amenity Value of Working from Home Differs by Sex and Family Circumstances, Conditional Means by Country (*Continued*)

Panel C: Unpartnered or single persons, comparison between men and women



Source: Authors' calculations using G-SWA data.

Note: The regression specification is the same as in figures 4 and 5, but we fit six separate regressions, one for each of the indicated subsamples. The charts suppress values for countries with fewer than fifty observations in the relevant sample (Egypt in all three panels, and Austria in panel B).

We make two additional observations about these results. First, table 1 and figures 5 and 6 imply large mean differences in the willingness to pay between well-defined groups. Consider two hypothetical persons: a married woman with a graduate degree, children under age 14, and a 45-minute one-way commute from her suburban home; and a single, college-educated man who lives 5 minutes from the office. This hypothetical woman values the WFH option at an extra 4.6 percent of pay compared to the hypothetical man, according to column 3 of table 1. The differential is 5.8 percent of pay with a nonparametric specification for commute time in an otherwise identical regression. We could construct comparisons that yield larger differences by considering worker age, for example. If table 1 and figures 5 and 6 provide a reasonably accurate portrayal of preferences, workers will (happily) sort across WFH levels that differ systematically between men and women, people with and without children, commuting time, and more.

Second, although the G-SWA data exhibit strong regularities in the structure of preferences around WFH, none of our statistical models account for a large share of willingness-to-pay variation. Even when we expand the table 1 specifications to include controls for current WFH days, replace coarse age bins with two-year bins, and relax linearity over commute time, the R^2 values never reach 0.12. While measurement error may play a role here, we see the modest R^2 values as an important result. Along with the dispersed response distribution for the dependent variable (online appendix figure A.3), the modest goodness of fit in these regressions says that people differ greatly in how much they value WFH. Moreover, readily observable attributes of persons account for only a modest share of this heterogeneity.

III. How the Pandemic Catalyzed a Big Shift to WFH

III.A. Pandemic-Induced Experimentation and Re-optimization of Working Arrangements

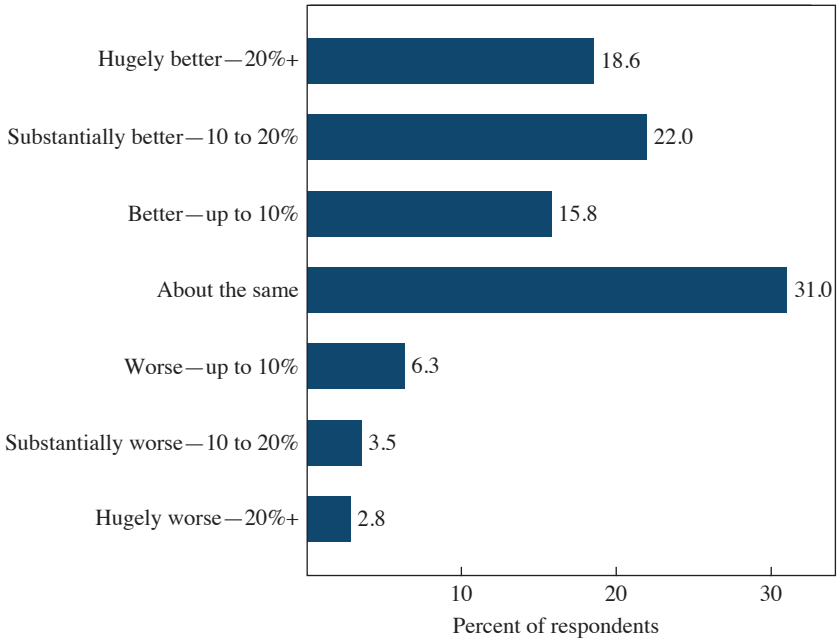
To explore the impact of pandemic-induced experimentation on perceptions about WFH productivity, we put the following question to G-SWA participants who mainly worked from home at some point during the pandemic: "Compared to your expectations *before COVID (in 2019)* how has working from home turned out for you?" Response options are as follows:

a) Hugely better—I am 20%+ more productive than I expected
b) Substantially better—I am 10% to 20% more productive than I expected
c) Better—I am 1% to 10% more productive than I expected
d) About the same
e) Worse—I am 1% to 10% less productive than I expected
f) Substantially worse—I am 10% to 20% less productive than I expected
g) Hugely worse—I am 20%+ less productive than I expected

Figure 7 shows the raw response distribution in the pooled G-SWA data.

This response distribution has two important features. First, it is highly dispersed. Since WFH levels were quite low before the pandemic—about 0.25 full days per week, according to the American Time Use Survey—wide dispersion in productivity surprises leads to persistently higher WFH levels. To see the logic, suppose for the moment that employer assessments of WFH productivity surprises align with employee assessments,

Figure 7. The Distribution of WFH Productivity Relative to Expectations



Source: Authors' calculations using G-SWA data.

Note: The survey question read: "Compared to your expectations *before COVID (in 2019)* how has working from home turned out for you?

a) Hugely better—I am 20%+ more productive than I expected

b) Substantially better—I am 10% to 20% more productive than I expected

c) Better—I am 1% to 10% more productive than I expected

d) About the same

e) Worse—I am 1% to 10% less productive than I expected

f) Substantially worse—I am 10% to 20% less productive than I expected

g) Hugely worse—I am 20%+ less productive than I expected"

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

and consider the effects of dispersed WFH productivity surprises. For ease of exposition, assume for now that the willingness to pay to WFH is zero. In jobs and tasks perceived before the pandemic to be marginally less productive when performed remotely, positive WFH productivity surprises trigger a lasting shift to WFH mode. In contrast, zero and negative WFH productivity surprises lead to no re-optimization in jobs and tasks that were already perceived to be less productive in remote mode. Thus, given the low WFH levels that prevailed before the pandemic, widely dispersed WFH productivity surprises drive a lasting shift to WFH. This statement

holds even when pre-pandemic expectations about WFH productivity are correct on average.

Second, figure 7 says that pre-pandemic WFH expectations were overly negative for most workers before the pandemic. That is, pandemic-induced experimentation caused most workers to upwardly revise their self-assessed WFH productivity. Online appendix figure A.4 shows that the conditional mean WFH productivity surprise is positive in all twenty-seven countries—ranging up to 8 percent or more in Brazil, India, Italy, Spain, Sweden, Turkey, and the United States. Supposing again that employer and worker assessments are aligned, these revisions in average perceived WFH productivity drive a re-optimization of working arrangements in jobs and tasks on the margin, contributing to a lasting increase in WFH levels. Unlike the "dispersion-of-surprises" effect described in the preceding paragraph, this "average-surprise" effect does not rest on low WFH levels before the pandemic.[19]

To assess whether WFH productivity surprises actually affect WFH levels, we also put the following question to G-SWA participants: "*After COVID, in 2022 and later,* how often *is your employer planning* for you to work full days at home?" The response options are:

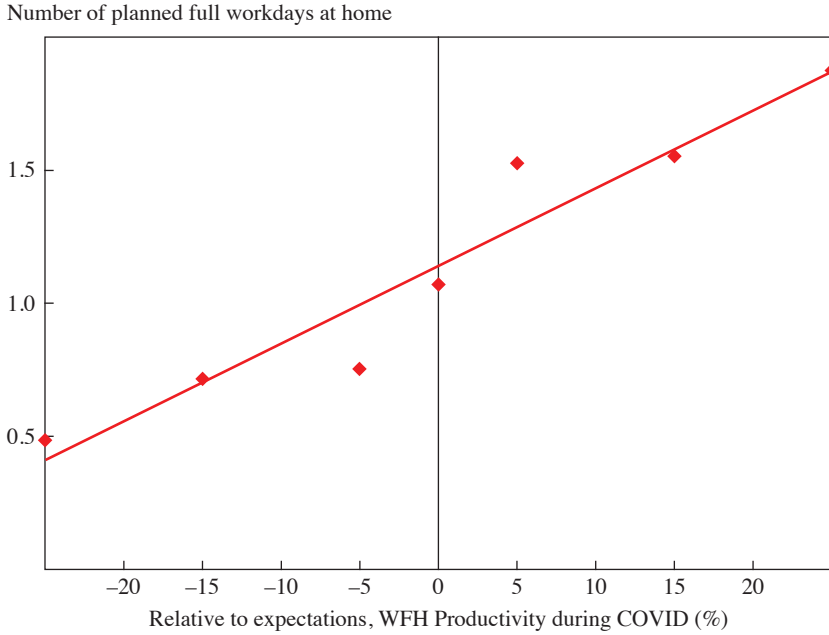
a) Never
b) About once or twice per month
c) 1 day per week
d) 2 days per week
e) 3 days per week
f) 4 days per week
g) 5+ days per week
h) My employer has not discussed this matter with me or announced a policy about it
i) I have no employer

We code response options a, b, and h as zero days and options c through g as one to five days, respectively; we drop persons with no employer from the following analysis.

Figure 8 shows the cross-sectional relationship between employer plans and productivity surprises in the pooled G-SWA data. Planned levels of

19. Because we fielded our surveys 16–23 months after the pandemic's onset, one might worry that worker perceptions of how WFH productivity relates to pre-pandemic expectations are distorted by some form of recall bias. In this regard, we note that Barrero, Bloom, and Davis (2021c) obtain very similar findings in US data for the period from July 2020 to March 2021, much closer to the onset of the pandemic.

Figure 8. Planned Levels of Working from Home after the Pandemic Increase with WFH Productivity Surprises during the Pandemic



Source: Authors' calculations using G-SWA data.

Note: The survey questions read: "Compared to your expectations *before COVID (in 2019)* how has working from home turned out for you?" and "*After COVID, in 2022 and later*, how often *is your employer planning* for you to work full days at home?" The sample consists of 19,027 G-SWA respondents in early 2021 and mid-2022 who worked mainly from home at some point during the COVID-19 pandemic.

WFH *after* the pandemic strongly increase with WFH productivity surprises *during* the pandemic.[20] Moving from the bottom to the top of the surprise distribution involves an increase of about 1.3 days per week in the planned WFH level. Online appendix figure A.5 shows that this strong positive relationship between WFH productivity surprises and planned WFH levels holds in all twenty-seven countries. Barrero, Bloom, and Davis (2021c) find the same strong relationship between WFH productivity surprises and WFH plans using US survey data from July 2020 to March 2021.

20. If primacy bias influences our survey responses, the effect is to attenuate the relationships depicted in figure 8 here, figure A.5 in the online appendix, and the corresponding figure in Barrero, Bloom, and Davis (2021c). This observation follows from the response orderings in the questions that elicit the data behind these figures.

The evidence in figures 7 and 8, and online appendix figure A.5, provides powerful support for our three-part explanation of how and why the pandemic catalyzed a large, lasting uptake in WFH. First, the pandemic drove a mass, compulsory experiment in WFH. Second, mass experimentation generated new information and shifted perceptions about the feasibility and productivity of WFH. Third, the shift in perceptions caused a re-optimization of working arrangements, which included a large, lasting shift to much higher WFH levels. The preconditions for the shift were also in place: major advances during previous decades in the technologies, infrastructure, and products that support the internet, two-way video, and other forms of remote interaction.

This explanation and the supporting evidence do not imply that the big shift to WFH raised productivity. To see this point, consider a simple example of how a shift in perceptions alters the extent of WFH and productivity. Before the pandemic, suppose all workers and their employers perceive WFH to be 10 percent less productive than on-site work. Suppose, as well, that all workers are willing to accept a 5 percent pay discount to WFH. No one works from home in these circumstances, because the perceived productivity loss exceeds the willingness to pay. Now consider what happens in reaction to a pandemic that forces employers and workers to WFH for weeks or months. Based on their experiences during the pandemic, suppose half of workers (and their employers) learn that WFH is about as (un)productive as expected, while the other half learns that it is Δ percent more productive than expected.

There are three interesting cases: (1) When $0 < \Delta < 5$, WFH levels return to zero after the pandemic ends. In this case, the positive productivity surprise is too small to trigger a lasting change in working arrangements. (2) When $5 < \Delta < 10$, half of workers stick with WFH after the pandemic ends, because they now face a productivity discount of only $10 - \Delta$ percent, which is smaller than their willingness to pay to WFH. In this case, the productivity surprise triggers a lasting shift to WFH and a productivity fall of $0.5\ (10 - \Delta)$ percent. For example, if the pandemic leads half of workers to conclude that WFH is only 2 percent less productive than on-site work ($\Delta = 8$), then economy-wide productivity falls 1 percent. (3) When $\Delta > 10$, the productivity surprise drives a lasting shift to WFH and a productivity rise of $0.5\ (\Delta - 10)$ percent. Thus, when forced experimentation leads to a lasting shift to WFH, it can bring higher or lower productivity.

Drawing on additional data for the United States, Barrero, Bloom, and Davis (2021c) estimate that the lasting shift to WFH raised the economy-wide level of labor productivity by about 1 percent. The productivity effect could be larger or smaller in other countries, and it could well be negative

in some countries. Indeed, it could be negative in some industries and regions within the United States, even if it's positive on average.

Our three-part explanation for the big shift also addresses another question: If WFH is now attractive for many employees and organizations, why did the shift not happen sooner and more gradually? Our answer is that the full benefits of WFH went unrecognized and unrealized before the pandemic drove a sudden, huge surge in experimentation that led to major revisions in perceptions about the feasibility and productivity of WFH. The simultaneity of large-scale experimentation is important in this regard. A law firm, for example, could have experimented with WFH before the pandemic. What it could not have done was experiment with WFH when the courts and other firms—including clients, rival law firms, consultants, and suppliers—also worked remotely. Had the COVID-19 pandemic not occurred, our evidence suggests that the big shift to WFH would have taken place much more slowly over many years.

Emanuel and Harrington (2021) highlight a different explanation for why remote work was rare before the pandemic: employers were reluctant to offer remote-work jobs because those jobs attracted less able employees. To assess the empirical relevance of this selection effect, Emanuel and Harrington (2021) study call center employees of a major online retailer. They find that more able people tend to favor on-site work to improve their promotion prospects and to avoid pooling with less productive coworkers. This type of selection effect in the relationship between worker ability and work mode (remote or on-site) can deter employers from offering remote work, even when remote work does not hurt productivity for any given worker. As Emanuel and Harrington (2021) recognize, this explanation for the rarity of remote work before the pandemic does not explain the pandemic's role in catalyzing a lasting uptake in WFH. In the context of their sorting model, explaining the lasting uptake in WFH also requires an improvement in the capacity of employers to screen workers or an increase in preference heterogeneity over WFH.

III.B. Other Forces That Helped Propel a Lasting Shift to WFH

Several other forces helped propel a lasting shift to WFH. One such force is the change in social attitudes regarding WFH. To investigate this matter, we asked G-SWA respondents the following: "Since the COVID pandemic began, *how have perceptions about working from home (WFH) changed among people you know?*" The response options are:

a) Hugely improved—the perception of WFH has improved among almost all (90–100%) the people I know (95%)

b) Substantially improved—the perception of WFH has improved among most, but not all, of the people I know (70%)
c) Slightly improved—the perception of WFH has improved among some people I know but not most (25%)
d) No change (0%)
e) Slightly worsened—the perception of WFH has worsened among some, but not most, people I know (–25%)
f) Substantially worsened—the perception of WFH has worsened among most, but not all, people I know (–70%)
g) Hugely worsened—the perception of WFH has worsened among almost all (90–100%) the people I know (–95%)

We use the percentage values in parentheses to assign a numerical score to each response; these percentage values did not appear in the questionnaire.

Applying the same regression approach as before to these numerical scores, online appendix figure A.6 reports evidence that the social acceptance of WFH has risen sharply in all countries since the pandemic.[21] Thus, those who WFH are much less likely to be seen as shirkers and slackers now than before the pandemic. As a result, managers have become more willing to offer WFH to retain and recruit employees.[22] Employees who value WFH are now less hesitant to work remotely when given the chance. In this way, the dramatic improvement in the social acceptance of WFH contributes to the size and stickiness of the big shift to WFH.

Several studies provide evidence of other forces that helped drive and entrench the big shift to WFH. Riom and Valero (2021) and Eberly, Haskell, and Mizen (2021) present evidence that the pandemic prompted firms to invest in new workplace equipment and new digital technologies that support remote work. Barrero, Bloom, and Davis (2021c) use SWAA data to quantify capital investments at home in response to the pandemic and worker time devoted to learning how to WFH. They estimate the value of these pandemic-induced investments at 0.7 percent of annual GDP. Criscuolo and others (2021) and Riom and Valero (2021) present evidence

21. Barrero, Bloom, and Davis (2021c) find the same strong result for the United States in SWAA data. Moreover, the result has persisted for more than two years since the onset of the pandemic in repeated cross sections of SWAA data. See the updates at WFH Research, "Working from Home before and since the Start of COVID," http://www.wfhresearch.com/. Thus, there's little reason to think that the increase in the social acceptance of WFH will reverse anytime soon, if ever.

22. Davis, Macaluso, and Waddell (2022) provide direct evidence that many employers now offer remote work to retain and recruit employees based on a survey conducted by the Federal Reserve Bank of Richmond in late 2021.

that firms adopted new managerial practices to support WFH in reaction to the pandemic. Bloom, Davis, and Zhestkova (2021) find that, in the wake of the pandemic, new patent applications shifted toward technologies that support WFH and remote interactions more generally. All of these various investments in equipment, skills, technologies, and managerial practices create durable forms of capital and knowledge that improve performance in the WFH mode now and in the future. In addition, Barrero, Bloom, and Davis (2022a) present SWAA-based evidence that the pandemic created long-lingering concerns about infection risks among some workers and that these concerns, in turn, led some workers to prefer jobs that allow WFH.

There is another force—a strategic complementarity—that amplifies the direct effects of all the other forces discussed above, including the effects of experimentation, learning, and re-optimization. Specifically, WFH becomes more attractive relative to work in the office when a larger share of coworkers also works remotely. This force operates most clearly in the extreme: when no one else works in the office, there's no point in commuting to reap the benefits of face-to-face interactions. This type of strategic complementarity also operates at the level of organizations. As an example, it makes more sense for a law firm to allow or encourage partners, associates, and other staff to WFH when clients also work remotely. In short, WFH makes more sense when others WFH than when everyone works on business premises.

IV. Societal Experiences and Post-pandemic WFH Levels

We now investigate how societal experiences during the pandemic have affected employer plans regarding WFH in the post-pandemic economy and other outcomes. We consider two aspects of societal experience. First, the cumulative stringency of government-mandated restrictions on commercial and social activities during the pandemic, or cumulative lockdown stringency as a shorthand. Second, the severity of the pandemic itself, as measured by cumulative COVID-19 death rates.

To measure lockdown stringency, *LS*, we draw on the widely used Oxford data described in Hale and others (2021).[23] For each country (or region within a country), we construct an index that combines the extent and duration of government restrictions on commercial and social activity,

23. The data are available at University of Oxford, Blavatnik School of Government, "COVID-19 Government Response Tracker," www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.

following the approach in Baker, Davis, and Levy (2022). As a first step, we compute the monthly lockdown stringency value for country *c* in month *t* as:

$$(1) \qquad LS_{ct} = \text{Max}\left\{\text{SIPO}, \left(\frac{3}{4}\right)\text{BCO} + \left(\frac{1}{4}\right)\text{SCO}\right\},$$

where SIPO = 1 when a shelter-in-place order is in effect, zero otherwise; BCO = 1 when a broad-based business closure order is in effect; and SCO = 1 when schools are closed. These indicator variables take fractional values when the order is in effect part of the month or in part of the country. In a second step, we cumulate the *LS* values from March 2020 through the month before the survey wave for the country in question to obtain our cumulative lockdown stringency (CLS) index. This index summarizes the extent and duration of government restrictions on economic and social activity through the month before the survey wave.

We measure cumulative COVID-19 deaths per capita through the end of the month before the survey wave. Our data on reported COVID-19 deaths are from the Johns Hopkins Coronavirus Resource Center.[24] Some argue that excess mortality measures are more appropriate for many purposes than reported COVID-19 deaths. There is merit in this argument. However, excess mortality measures of COVID-19 fatalities are unavailable for some countries, and they can be sensitive to the statistical procedure used to define the excess concept. In light of these facts, we use reported deaths from an authoritative source.

Online appendix figures A.7 and A.8 show the country-level values of our CLS index and cumulative COVID-19 death rates per capita. There is a great deal of cross-country variation in these measures, which is useful in our efforts to assess how cumulative lockdown stringency and cumulative COVID-19 deaths relate to planned WFH levels and other outcomes.

To assess whether pandemic severity and lockdown stringency help explain country-level differences, we fit unweighted least squares regressions of the following form to individual-level G-SWA outcomes:

$$(2) \qquad Y_{icw} = \gamma^{PS} PS_{icw} + \gamma^{LS} CLS_{icw} + X_{icw}\beta + \varepsilon_{icw},$$

where PS_{icw} and CLS_{icw} are the cumulative pandemic severity and lockdown stringency measures, respectively, for person *i* in country *c* and survey wave *w*. The X_{icw} vector contains our individual-level controls for gender, four age groups, three education groups, and eighteen industry sectors plus wave fixed effects and the national value of log real GDP per capita.

24. Johns Hopkins University Coronavirus Resource Center, https://coronavirus.jhu.edu.

Table 2. Current and Planned Levels of Working from Home Rise with the Cumulative Stringency of Government-Mandated Lockdowns

	Outcome			
	Current WFH days per week	*Desired WFH days per week*	*Planned WFH days per week*	*Amenity value of option to WFH two to three days per week*
	(1)	*(2)*	*(3)*	*(4)*
Cumulative lockdown stringency	0.204**	0.085	0.136***	0.363
	(0.078)	(0.057)	(0.047)	(0.418)
Cumulative COVID-19 deaths per capita	–0.005	0.044	–0.039	0.263
	(0.086)	(0.059)	(0.056)	(0.299)
Observations	33,091	36,078	34,875	36,078
R^2	0.098	0.069	0.086	0.057

Source: Authors' calculations using G-SWA data.

Note: All regressions include controls for log real GDP per capita, gender, four age groups, three education groups, eighteen industry sectors, and wave fixed effects. The reported COVID-19 deaths and lockdown stringency measures are standardized to zero mean and unit standard deviation across countries. Errors clustered at the country level.

**$p < .05$, ***$p < .01$.

Table 2 reports our first set of regression results. Greater levels of the CLS index are associated with positive and statistically significant effects on current WFH levels (as of the survey) and post-pandemic planned levels of WFH.[25] Column 3 implies that an increase in the CLS index value equal to two standard deviations (across countries) raises the number of planned WFH days by 0.27 days per week. That amounts to about 38 percent of the cross-country mean WFH plan reported in figure 2. We find no statistically significant effect of CLS on desired WFH levels or on the WFH amenity value. We find no statistically significant effect of cumulative COVID-19 death rates on *any* of the outcome variables in table 2.

Expanding the specifications to include a measure of cumulative mask mandates has no impact on the estimated CLS effect on planned WFH days, as reported in online appendix table A.5. Whether mask mandates should be seen as a milder form of social restrictions or as conceptually different from the other restrictions covered by our CLS index is unclear.

25. Criscuolo and others (2021) find that firms in countries with stricter lockdown measures in spring 2020 had higher WFH levels at the time conditional on sector and firm-size fixed effects and each firm's pre-pandemic WFH level; see their table A.3 and related discussion. This result is consistent with our results but quite distinct. Whereas they find that WFH levels in the early stages of the pandemic rose with contemporaneous lockdown stringency, we find that future WFH levels rise with cumulative lockdown stringency during the pandemic in surveys conducted 16–23 months after the pandemic's onset.

The table also provides evidence that mask mandates, unlike lockdowns, raise desired WFH days and the amenity value of the option to WFH. These results are consistent with the two-part idea that first, (many) people dislike wearing masks on the job, and second, compelling them to do so leaves a residue of distaste for working on business premises.

Adapting the specifications to encompass regional variation where available yields somewhat larger effects of the CLS index on current WFH days and somewhat smaller effects on planned WFH days (online appendix table A.6). We also tried replacing our CLS index with a cumulative version of the index in Hale and others (2021). Relative to our index, theirs uses additional inputs that pertain to the cancellation of public events, restrictions on gathering size, public transport closures, restrictions on internal movements and international travel, and public information campaigns. These additional inputs are hard to measure in some countries, and public information campaigns are conceptually distinct from activity restrictions. So there are trade-offs between using our CLS index and our cumulative version of their broader index. As it turns out, results are very similar when using their index in place of ours.

Finally, we rerun the regression specifications in table 2 on samples limited to (a) all college-educated persons and (b) all persons with a post-graduate degree. As reported in table 3, the estimated lockdown effects on current and planned WFH levels are larger when we limit the sample to college-educated persons. They are larger yet when we focus on graduate-degree holders. Specifically, relative to the full-sample results in table 2, the estimated effects of the CLS index on current and planned WFH levels are twice as large for graduate-degree holders. In unreported results, we find the same pattern in limited-sample analogs to online appendix tables A.5, A.6, and A.7. Greater sensitivity to lockdown stringency among workers with more education is perhaps no surprise because they are more likely to hold jobs for which remote work is feasible.

To summarize, employers plan higher post-pandemic WFH levels in countries and regions with greater cumulative restrictions on commercial and social activities during the pandemic, conditional on a battery of controls.[26] This result suggests that employers more fully adapted their business models and personnel practices to remote work in countries that imposed more stringent lockdowns. Such a response could arise via learning-by-doing effects, whereby more experience with strict lockdowns leads to fuller

26. Evidence on daily stock market reactions to government lockdown announcements supports the view that the lockdowns themselves had material effects on economic activity; see Ashraf (2020) and Yang and Deng (2021).

Table 3. Lockdown Effects Are Stronger for the More Educated

	Outcome			
	Current WFH days per week	*Desired WFH days per week*	*Planned WFH days per week*	*Amenity value of option to WFH two to three days per week*
	(1)	*(2)*	*(3)*	*(4)*
A. Restricting the sample to persons with a college degree				
Cumulative lockdown stringency	0.282***	0.092	0.170**	0.503
	(0.097)	(0.067)	(0.064)	(0.433)
Cumulative COVID-19 deaths per capita	–0.037	0.035	–0.059	0.337
	(0.106)	(0.075)	(0.066)	(0.347)
Observations	22,210	24,054	23,317	24,054
R^2	0.085	0.058	0.075	0.049
B. Restricting the sample to persons with a graduate degree				
Cumulative lockdown stringency	0.410***	0.144**	0.266***	0.380
	(0.139)	(0.059)	(0.086)	(0.401)
Cumulative COVID-19 deaths per capita	–0.113	–0.025	–0.105	0.180
	(0.118)	(0.055)	(0.075)	(0.335)
Observations	10,954	11,826	11,468	11,826
R^2	0.082	0.056	0.088	0.036

Source: Authors' calculations using G-SWA data.

Note: This table uses the same specifications and measures as table 2. Errors clustered at the country level. **$p < .05$, ***$p < .01$.

adaptation. It could also arise as a proactive response by employers that see a history of lockdown stringency as predictive of more stringent lockdowns during future infectious disease outbreaks. Another possible interpretation is that more fearful reactions to the pandemic drove more voluntary adoption of remote work practices in some countries *and* more stringent lockdown policies. Here as well, learning-by-doing effects would lead naturally to higher future WFH levels in the more fearful countries that accumulated more WFH experience during the pandemic.

In contrast to the lasting effects of lockdown stringency on current and future WFH levels, we find no evidence that cumulative COVID-19 death rates affect employer plans for post-pandemic WFH levels or current WFH levels as of the survey date.[27] We are surprised by this result, but it appears

27. WFH levels covary positively with the incidence of COVID-19 across US states in April and May 2020 (Brynjolfsson and others 2020), but this pattern is not at odds with our evidence, since it pertains to the relationship of WFH levels to contemporaneous COVID-19 death rates rather than the long-term effects of cumulative COVID-19 deaths.

to be a robust feature of our data. It also points to a puzzle for the fear-based interpretation of our findings with respect to lockdown stringency: if fearfulness drives country-level differences in lockdown stringency, why do cumulative COVID-19 deaths per capita have no explanatory power for current (as of the survey) and planned WFH levels? The answer, if there is one, must involve some manifestation of fearfulness that is uncorrelated with COVID-19 deaths per capita but, nevertheless, highly correlated with lockdown stringency.

V. Some Implications

V.A. Direct Consequences for Workers and Organizations

Section III presents and reviews several pieces of evidence that people like to WFH. This evidence suggests that the big shift to WFH yields large benefits, on average, for workers and their families. Barrero, Bloom, and Davis (2021c) estimate that planned WFH levels in the US economy deliver aggregate time savings equal to 2 percent of pre-pandemic work hours on an earnings-weighted basis.[28] They find even larger gains in worker welfare using individual-level data on commute times, pre-pandemic WFH days, employer plans for post-pandemic WFH days, and willingness to pay to WFH. Their results do not say that all workers benefit from the shift to WFH, only that the direct effects are large and positive on average. Individuals who highly value daily in-person encounters with work colleagues and those who lose valuable learning and networking opportunities may be worse off. The shift to WFH also has direct effects on the level of productivity, and it can affect the well-being of workers and their families through equilibrium effects on wages and prices, the pace of innovation, and the quality of local public goods.

Section III also presents evidence that preferences around WFH vary greatly across individuals and demographic groups. Regulations that raise WFH costs or restrict the set of WFH options limit the capacity of markets to satisfy these preferences. In this regard, Lockton Global Compliance summarizes new, permanent teleworking regulations since March 2020 in seventeen countries; many of the new regulations raise the costs of remote

28. The 2 percent time savings figure is from Davis (2022) and reflects savings in both commuting time and grooming time. The next draft of Barrero, Bloom, and Davis (2021c) will also account for both.

work, making it less viable.[29] Other new regulations push employers to satisfy employee desires to WFH.[30] That approach raises the societal costs of WFH by forcing it onto employers, even when remote work is poorly suited for their businesses. Especially in economies with fluid labor markets, it is more efficient to accommodate WFH preference heterogeneity via the sorting of workers to employers.

Pre-pandemic laws and regulations also matter. In the European context, for example, visa policies can facilitate or constrict remote work across national borders. In the US context, an employee who works remotely from another state can subject the employer to new state-level payroll taxes, trigger legal obligations to collect taxes on sales into the state, and subject the employer to business income taxes in the state (Jacobs and others 2022). These tax consequences and attendant compliance burdens make it costlier to let employees work from other states, especially when the employer does not already operate there.

For employers, WFH preference heterogeneity presents major strategic choices in personnel management and operations. One possibility is to accommodate preference heterogeneity to maximize the available talent pool, reduce employee turnover, and moderate out-of-pocket compensation costs. As of April/May 2022, about 40 percent of firms in the Survey of Business Uncertainty allow WFH one or more days per week "to keep employees happy and to moderate wage-growth pressures" (Barrero and others 2022, figure 1). Roughly half of American firms in another recent survey offer remote or hybrid working arrangements to help recruit new employees and retain current ones (Davis, Macaluso, and Waddell 2022). Downsides of accommodation include fewer in-person communications, greater operational complexity, and greater challenges in onboarding new employees, mentoring, and sustaining company culture.

29. Lockton Global Compliance, "New Remote Working Legislation around the World [Updated]," June 1; https://globalnews.lockton.com/new-remote-working-legislation-around-the-world/. To pick an example not covered by Lockton, the Ministry of Labor and Social Welfare in Mexico recently issued a draft amendment to its Federal Labor Law that would require employers to ensure and verify that the remote site has "reliable electricity, lighting, ventilation, and ergonomic conditions," provides "a safe workplace that allows for an employee's development and continuity," and meets other conditions; see Palma, Villanueva, and Díaz (2022).

30. Perhaps the most prominent example is legislation that would make WFH a legal right in the Netherlands. The legislation, recently passed by the lower house of the Dutch parliament, would force employers to consider employee requests to WFH and to explain why if the request is denied; see Papachristou (2022).

Another strategic option involves a hang-tough approach that compels most or all employees to work on-site on (almost) all workdays. Elon Musk famously demanded that all Tesla employees work in the office at least forty hours a week or "pretend to work somewhere else." Musk sees particular value in the visible, physical presence of senior employees and questions whether companies with flexible working arrangements can develop new products (Nicholas and Hull 2022; Boyle 2022). The hang-tough approach retains a high intensity of in-person communications and can have important operational advantages, but it also narrows the talent pool, requires a larger physical footprint, raises out-of-pocket compensation costs, and lowers retention rates.

CEO Jeremy Stoppelman makes the case for a fully remote workforce: "At Yelp we made the decision to go remote-first in mid 2020. A big part of our calculus was that employees would strongly prefer cutting their commutes"; "How's it going? Quite well! Internal surveys show high satisfaction and continued productivity from our sales, product and engineering teams. We've hired two remote C-level executives both in geographies with no offices and we've got great access to a diverse talent pool"; "So why does hybrid suck? It forces employees to live near an office (high cost areas) and doesn't get rid of the commute. Also hiring is constrained by geography and you have to maintain underutilized office space."[31]

As the foregoing remarks indicate, the trade-offs associated with these three broad strategies—accommodation, hang tough, and fully remote—differ across organizations and workforces and, of course, across industries and occupations. Put another way, there is much heterogeneity on the labor demand side in the capacity to efficiently supply the WFH options that many employees value. Given this demand-side heterogeneity and the supply-side heterogeneity in preferences, a market-based approach to the determination of working arrangements is likely to yield much diversity in WFH outcomes—including many people who never WFH, some who WFH much of the time, others who WFH almost all the time, and employers that adopt a range of accommodation, hang-tough, and fully remote personnel practices. This type of market diversity satisfies heterogeneous WFH preferences in a cost-effective manner. It also lets employers and workers adjust over time in response to their own experiences, learning

31. Twitter, Jeremy Stoppelman, May 24, 2022, https://twitter.com/jeremys/status/1529164087547944960.

from others, and new conditions. Prescriptive regulatory approaches are unlikely to satisfy a broad range of WFH preferences in an equally cost-effective manner.

V.B. WFH and the Pace of Innovation

Historically, many forms of invention, innovation, and entrepreneurship were highly concentrated in space.[32] This empirical regularity gives rise to concerns that the big shift to WFH will slow the pace of innovation. On this front, we see good reasons for optimism. As a first observation, many of the most productive and innovative firms in the world operate across multiple locations, cities, and countries. So, workforce dispersal per se is an unlikely killer of innovation and productivity growth. Stronger grounds for concern rest, instead, on the potential loss of the innovation benefits that flow from gathering a critical mass of creative people in a single location or set of locations in close physical proximity.

Second, key developments that facilitated the big shift to WFH—for example, the rise of the internet, better broadband infrastructure, improved video technologies, and the emergence of the cloud—create greater reach and higher quality in one-way and two-way communications at a distance. In this regard, Pearce (2020, fig. 3) shows that the geographic dispersal of collaborative innovations, as measured by the locations of named inventors in US patent filings, has been rising for decades. Chen, Frey, and Presidente (2022) use author locations to document a similar pattern in scientific publications. They also study the relationship of remote collaboration to the quality of scientific articles, as reflected in citations. Before 2010, remote collaboration produced articles that were more incremental and less likely to yield "disruptive" advances. This quality discount on remote-collaboration articles shrinks over time, vanishes around 2010, and then becomes a premium. A plausible explanation is that advances in remote-collaboration technologies have made it easier and cheaper to coordinate a broader range of specialized and geographically scattered complementary inputs. In the model of Becker and Murphy (1992, sect. 6) such a fall in coordination costs raises the innovation rate.

Yang and others (2022) investigate how the pandemic-induced shift to remote work altered communications among 61,182 Microsoft employees from December 2019 to June 2020. They find that communications became

32. See Carlino and Kerr (2015) and Combes and Gobillon (2015) for reviews of the extensive literature on this topic.

more asynchronous after the shift to remote work and collaborations became more static and siloed. These types of changes can impede the diffusion of knowledge within an organization and slow the pace of innovation. However, the larger implications of their study are unclear for two reasons: organizations that stick with remote work will adapt their practices over time to mitigate the disadvantages and exploit the advantages, and as the pandemic recedes, organizations have strong incentives to revert to in-person collaboration in situations where remote work is ineffective. For both reasons, the near-term impact of a surprise, compelled, and pervasive shift to remote work is a doubtful guide to the longer-term innovation effects of voluntary remote-work adoption.

Third, the big shift to WFH stimulates advances in technologies that facilitate productive interactions at a distance, as suggested by the analysis of new patent applications in Bloom, Davis and Zhestkova (2021). Fourth, and related, the rise of remote work and professional interactions at a distance during the pandemic have overturned customs and practices that, before the pandemic, impeded the flow of ideas and prevented a fuller realization of agglomeration benefits. To take an example that *BPEA* conference participants will readily appreciate, many scientific and professional conferences that once operated in a closed, in-person, invitation-only manner are now partly or fully open to virtual participants. While fewer (or different) people may choose to participate in person, and virtual participation may be less rewarding, opening the door to virtual participation can greatly expand the reach of participation and accelerate the diffusion of ideas.

Fifth, business and managerial practices will adapt to a world of remote work and better technologies for communication at a distance. Tu and Li (2021) offer practical ideas for how organizations can foster mentorship and professional networking and improve rapport between managers and employees in a virtual work setting. Larson, Vroman, and Makarius (2020) stress the need for clear "rules of engagement" in remote work to set ground rules and manage employee expectations. Both articles highlight the need to consciously facilitate social interactions among employees, which surely warrants greater managerial attention in a hybrid or fully remote work environment than in the traditional on-site environment.

We summarize as follows: the scope for positive agglomeration spillovers in virtual space is expanding, even as the shift to WFH diminishes agglomeration spillovers in physical space. A full picture of how these countervailing forces affect the pace of innovation is not yet available, but there are good reasons for optimism.

V.C. Challenges for Cities

There are stronger reasons for concern when it comes to the fortunes of cities.[33] The big shift to WFH presents especially acute challenges for dense urban centers that are organized to support a large volume of inward commuters and a high spatial concentration of commercial activity. Consider a few statistics that speak to the scale of the challenge: WFH accounts for 38 percent of full paid workdays in the ten most populous US metro areas as of June 2022, as compared to 30 percent in the next forty most populous areas, and 27 percent in smaller cities and towns (Barrero, Bloom, and Davis 2022b, slide 15). The share is nearly 45 percent in the San Francisco Bay area. These WFH levels are at least 20–30 percentage points above pre-pandemic levels. They have also stabilized in recent months, which suggests they are here to stay.

Ozimek and O'Brien (2022) document some sobering developments regarding population flows. From 2020 to 2021, population fell in 68 percent of urban counties that intersect an urban area with at least 250,000 people. Children under age 5 in urban counties fell 3.7 percent from 2020 to 2021, as compared to 2.4 percent nationwide. The most populous urban areas saw especially large drops. San Francisco lost 7.6 percent of its under-5 population from 2020 to 2021 and more than 10 percent from 2019 to 2021. In contrast, the under-5 population shrank more slowly from 2010 to 2019 in urban counties than across the nation as a whole. These observations support the view that newfound opportunities to WFH raise the attractiveness of suburban and exurban living, especially for families with young children that seek lower housing costs and better schooling options. Rising murder rates in many US cities (Elinson 2022) are another factor contributing to urban outmigration, again facilitated by the rise of WFH.

Real estate markets tell a consistent story. Rosenthal, Strange, and Urrego (2022) examine 68,000 newly executed commercial leases across eighty-nine US cities from January 2019 to October 2020. They find that the elasticity of rental values with respect to employment density fell 2 percentage points in the wake of the pandemic. Large, dense cities that rely heavily on subway and light rail also saw a 15 percent fall in the commercial rent gradient (distance from city center) and a decline in the transit rent premium. Gupta, Mittal, and Van Nieuwerburgh (2022) combine data on commercial lease revenues, office occupancy rates, and market rents with an

33. We focus here on challenges to cities in rich countries, especially the United States. As Edward Glaeser points out in his comment on this paper, cities in poor countries face a somewhat different set of challenges.

asset-pricing model to estimate that the pandemic-induced shift to remote work drove a 45 percent drop in office values in 2020 and a 39 percent drop in the longer run. Ramani and Bloom (2021) use Zillow home value indexes to examine residential real estate prices. Their figure 1 shows that home values in central business districts fell 2 percent in nominal terms from February 2020 to April 2021, 7 percent relative to prices in the top decile of zip codes by population density, and 13 percent relative to prices in the next four deciles.

One important implication of these developments is that the big shift to WFH drove a large, persistent negative shock to the local tax base in many cities. Fewer inward commuters means a smaller sales tax base, as does residential outmigration. Fewer inward commuters lowers transit revenues. The incomplete recovery of business travel means lower hotel occupancy tax revenues. The fall in real estate values erodes the local property tax base. All of these fiscal effects tend to be more intense in denser urban areas.

Glaeser, Kolko, and Saiz (2001) and Florida (2012) argue that cities become, and remain, successful by offering lifestyle and consumption opportunities that people value. The big shift to WFH makes urban amenities even more important for city success, because the ability to WFH two or three days a week lowers the cost of residing far from a job that, nominally, is located in the city. For those who can WFH four or five days a week, the pressure to live close to work is weaker still. Cities that do not provide good schools, do not control crime, levy high taxes, and do not provide attractive places for people to live, work, and play are now more exposed to residential outmigration and big drops in inward commuting. They now face greater risks of a downward spiral in local tax revenues and urban amenities. (By a similar logic, attracting good jobs will do less to boost urban fortunes when those jobs can be performed elsewhere much of the time.) The flip side of these observations is that cities and suburbs that offer good schools, low crime, and pleasant places to live, work, and play are even more attractive now than before the pandemic.

That brings us to the second important implication for cities: the rise of remote work raises the elasticity of the local tax base with respect to the quality of local governance—more so in cities like San Francisco where so many well-paying jobs are amenable to remote work. This increase in the tax-base elasticity creates sharper incentives for sensible, efficient local governance, which could well yield better management and outcomes in many cities. At the same time, it creates greater scope for a downward spiral in city fortunes, whereby poor governance amplifies outmigration

and the loss of inward commuters, eroding the local tax base and undercutting the fiscal capacity to supply local public goods, which then leads to more outmigration and less inward commuting, and so on. In this way, the big shift to WFH has the potential to amplify the negative effects of poor governance, political instability, and crime on the fortunes of cities.

Glaeser (2022) expresses similar concerns, arguing that the COVID-19 pandemic endangers cities because it exacerbates "existing challenges, including adapting to virtual life and the political instability associated with growing urban discontent. . . . The pandemic has also hit cities during a period of discontent over gentrification, racial disparities in policing and inequality more generally, and that creates political risks. . . . If cities try to target their wealthier residents and businesses or if those cities allow urban crime levels to soar, then those taxpayers could easily leave, which in turn could generate a downward spiral, reminiscent of many American cities during the 1970s" (4–5).

Another, related implication: the fallout from the big shift to WFH will differ greatly across cities for multiple reasons. First, the extent of the initial pandemic-induced shift to WFH and hence the size of the negative fiscal shock, differs greatly. Second, property prices and rents will adjust to preserve full use of structures and space in cities with intrinsically strong fundamentals and good governance, even as marginal cities experience a long-term rise in vacancy rates and empty spaces. Third, cities differ in their political capacity to adjust to the WFH shift and the now-greater mobility of well-educated, highly paid workers and the companies that employ them. A larger elasticity of the local tax base with respect to urban amenities and local governance quality may foster better governance in some cities and a downward spiral in others. Fourth, cities that are well endowed with consumer amenities are now in an even better position to attract high-income workers.

The risk that city-level fortunes will diverge is more acute in the United States than in most other rich countries, in part because political decisions about the provision of local public goods are more decentralized in the United States and local fiscal resources are more closely tied to local economic prosperity. These aspects of federalism give rise to more scope for a downward spiral in city-level fiscal resources and urban amenities. Compared to most other countries, the United States also offers more location options with the same language, similar cultures, a similar legal system, and so on. Thus, if governance fails in one city, it is easier to relocate to a better-performing but otherwise similar city. In addition, urban crime levels are higher in the United States than in most other rich countries. Thus, the

potential for high or rising crime rates to accelerate a downward spiral in urban fortunes looms larger in the American context.

In short, the big shift to WFH and the now greater sensitivity of local fiscal resources to the quality of local amenities create major challenges for large cities. A failure to meet these challenges would lead to much economic and social harm and at least partly offset the large, direct benefits of WFH discussed above. Moreover, the harms that arise from a failure of (some) cities to adapt to the big shift would be concentrated among poorer households, who have less capacity to move away from urban problems and who also reap smaller direct benefits from the big shift to WFH.

VI. Concluding Remarks

The COVID-19 pandemic catalyzed a large and enduring uptake in work from home bringing major lifestyle changes to millions of workers, a scramble to adapt managerial and personnel practices, major operational challenges for organizations that embrace hybrid or fully remote working arrangements, the redirection of worker spending away from city centers, declines in urban real estate values, and outmigration from some cities. The broader economic and social consequences will unfold for many years to come.

As for how the pandemic catalyzed the big shift to WFH, and why it did not happen sooner and more gradually, we advance a three-part explanation: First, the pandemic compelled a mass social experiment in WFH. Second, that experimentation generated a tremendous flow of new information about WFH and greatly altered perceptions about its practicality and effectiveness. Third, in light of this new information and shift in perceptions, individuals and organizations re-optimized, choosing much more WFH than before the pandemic. We find strong support for this three-part explanation when looking across individuals in the twenty-seven countries covered by our survey. Specifically, the number of full WFH days per week that employers plan after the pandemic rises strongly with employee assessments of WFH productivity surprises during the pandemic. Exploiting cross-country variation, we also find evidence that longer, stricter government lockdowns during the pandemic led to higher WFH levels as of mid-2021 and early 2022 and higher planned WFH levels after the pandemic ends.

Though scattered across many papers (including this one), there is now much evidence that the pandemic also spurred other developments that helped drive a lasting shift to WFH: new investments in the home and inside organizations that facilitate WFH, learning by doing in the WFH

mode, advances in products and technologies that support WFH, much greater social acceptance of WFH, and lingering infection concerns that lead some people to prefer remote work. The rise of the internet, emergence of the cloud, and advances in two-way video before the pandemic created the conditions that made possible a big shift to WFH. Thus, the full story of how the pandemic led to a large, lasting shift to remote work has many elements.

We also develop evidence that the shift to WFH benefits workers. The reason is simple: most workers value the opportunity to WFH part of the week, and some value it a lot. It's easy to see why. WFH saves on time and money costs of commuting and grooming, offers greater flexibility in time management, and expands personal freedom. Few people could WFH before the pandemic. Many can do so now. This dramatic expansion in choice benefits millions of workers and their families. Women, people living with children, workers with longer commutes, and highly educated workers tend to put higher values on the opportunity to WFH.

That does not mean everyone benefits. Some people dislike remote work and miss the daily interactions with coworkers. Over time, people who feel that way will gravitate to organizations that stick with pre-pandemic working arrangements. Another concern is that younger workers, in particular, will lose out on valuable mentoring, networking, and on-the-job learning opportunities. We regard this concern as a serious one but have diffuse priors over whether, and how fully, it will materialize. Firms have strong incentives to develop practices that facilitate human capital investments. Individual workers who value those investment opportunities have strong incentives to seek out firms that provide them. If older and richer workers decamp for suburbs, exurbs, and amenity-rich consumer cities, the resulting fall in urban land rents will make it easier for young workers to live in and benefit from the networking opportunities offered by major cities.

Many observers also express concerns about what the rise of remote work means for the pace of innovation. In this regard, we stress that the scope for positive agglomeration spillovers in virtual space is expanding, even as the shift to WFH diminishes agglomeration spillovers in physical space. How these countervailing forces will affect the overall pace of innovation remains to be seen, but we set forth several reasons for optimism.

The implications for cities are more worrisome. The shift to WFH reduces the tax base in dense urban areas and raises the elasticity of the local tax base with respect to the quality of urban amenities and local governance. These developments warrant both hope and apprehension. On the hopeful side, they intensify incentives for cities to offer an attractive mix of taxes

and local public goods. Cities that respond with efficient management and sound policies will benefit—more so now than before the pandemic. On the apprehensive side, the economic and social downsides of poor city-level governance are also greater now than before the pandemic. For poorly governed cities, in particular, the larger tax-base elasticity raises the risk of a downward spiral in tax revenues, urban amenities, workers, and residents.

ACKNOWLEDGMENTS A special thanks to Katharine Abraham and Edward Glaeser for many helpful comments. Thanks also to our editor Jim Stock and the *BPEA* conference participants for their remarks. For the financial assistance that made it possible to conduct our Global Survey of Working Arrangements (G-SWA), we gratefully acknowledge the European Bank for Reconstruction and Development, the Asociación Mexicana de Cultura AC, the Becker Friedman Institute at the University of Chicago, the ifo Institute, King's College London, the Smith Richardson Foundation, and the Templeton Foundation.

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Comments and Discussion

COMMENT BY

KATHARINE G. ABRAHAM This paper is one of several written by Jose Barrero, Nicholas Bloom, and Steven Davis, alone or in collaboration with other coauthors, about the post-pandemic growth in work from home (WFH), the factors that have contributed to this growth, and the economic implications of WFH. They were among the first to recognize the potentially transformative effects of the substantial shift to WFH that has occurred since the spring of 2020. My discussion will focus on questions about the paper's findings and conclusions, but I would like first to express my appreciation for the authors' contributions to our understanding of this important phenomenon.

Prior to the pandemic, WFH was relatively uncommon, but it rose rapidly in the spring of 2020. Based on data from the Global Survey of Working Arrangements (G-SWA), the authors estimate that one to two years after the pandemic's onset WFH averaged 1.5 days per week among workers surveyed in the twenty-seven countries where the G-SWA was fielded. Interestingly, the paper reports higher WFH days in countries that initially implemented more severe COVID-19 lockdowns, suggestive of lasting effects attributable tothe experience with WFH that the lockdowns forced on workers and employers. In many cases, the survey results suggest, the experience of WFH has turned out better than participants would have anticipated. The authors argue that WFH can be expected to persist and grow.

My comments will touch on three issues: (1) how confident we should feel about the survey estimates from the G-SWA, (2) what path WFH might have followed absent the pandemic, and (3) whether WFH ultimately will settle at as high a level as the authors appear to believe.

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HOW MUCH CONFIDENCE SHOULD WE PLACE IN THE G-SWA ESTIMATES? As described in the paper, the G-SWA was fielded by Respondi, an international survey company, to members of an online panel in each country. The country samples are not probability samples; rather, Respondi makes use of panels assembled using methods described rather opaquely on their website, aiming for samples that, in the authors' words, are "broadly representative by age, gender, income, and regions within countries." Highly educated individuals are overrepresented in the G-SWA, and the paper is clear that the reported WFH estimates for many countries, though not for the United States, apply only to the highly educated population. Even beyond their relatively high education level, however, the people willing to participate in an online panel could differ from others with the same educational attainment in ways that may affect the survey estimates. The authors cite the robust demand for online surveys administered to pre-recruited online panels in marketing and other commercial applications as evidence supporting their use, but it does not follow from the fact that commercial customers see value in data collected from such panels that they are suitable for producing population estimates.

In addition to concerns about the representativeness of the survey sample, I also have concerns about potential measurement biases in the answers to some of the survey questions. The survey questions that ask for straightforward factual information—how many days per week a person works from home or what their employers have said about future plans for WFH—should be relatively easy for respondents to answer. In contrast, the answers to survey questions that require respondents to make judgments about things they haven't previously considered are more likely to be affected by how the questions are presented.

One potential issue with some of the G-SWA questions is what survey methodologists refer to as primacy bias, the tendency of respondents in self-administered surveys to select answers that appear earlier in a list of possible response options (Groves and others 2009). Consider the key G-SWA question about WFH productivity relative to expectations:

> Compared to your expectations *before COVID (in 2019)* how has working from home turned out for you?
>
> a) Hugely better—I am 20%+ more productive than I expected
> b) Substantially better—I am 10% to 20% more productive than I expected
> c) Better—I am 1% to 10% more productive than I expected
> d) About the same
> e) Worse—I am 1% to 10% less productive than I expected
> f) Substantially worse—I am 10% to 20% less productive than I expected
> g) Hugely worse—I am 20%+ less productive than I expected

The response options for this question are ordered so that positive productivity surprises appear first on the list. Primacy bias could make respondents more likely to select those answers. The G-SWA question about how perceptions of WFH have changed has a similar structure, creating a possible bias toward saying perceptions have improved. Whether primacy bias is a problem for these questions could be tested in future survey waves by varying the response option order.

In addition to the order of the response options, the range of choices provided also can affect how respondents' views or behavior are characterized. When asked a question to which they do not have a ready answer, respondents are likely to look at the range of the response options for clues about a reasonable response. To illustrate with an example from the survey methodology literature, Schwarz and others (1985) asked a sample of people how much time they spent watching television each day. Half of the respondents were randomly assigned to a version of the question with six response options and a top category of two and a half hours or more per day; the other half were given a set of six response options with a top category of four and a half hours or more per day. The latter group was more than twice as likely to say they watched more than two and a half hours of television per day (37.5 percent versus 16.2 percent).

In answering the G-SWA question about how their WFH productivity compared to what they had expected, a majority of survey respondents with WFH experience indicated that they had experienced a positive productivity surprise and most of the remainder said their WFH productivity was about the same as they had expected. The response options available to respondents who viewed their productivity as higher than expected were more than 20 percent higher, 10 to 20 percent higher, and 1 to 10 percent higher. By giving respondents different cues about what might constitute a large, medium, or small surprise, a different set of groupings could have generated a very different estimate for the average productivity surprise. A similar comment applies to the answers about how large of a pay cut the respondents who view WFH as a benefit (a majority of all respondents) would be willing to accept on a job where they could work from home two or three days a week. The options provided on the existing questionnaire are less than 5 percent, 5 to 10 percent, 10 to 15 percent, 15 to 25 percent, 25 to 35 percent, and 35 percent or more, choices that could lead respondents who might not otherwise have done so to contemplate very large pay cuts as something they might accept. Experimenting with different response categories for these questions in future survey waves could be helpful for

understanding the sensitivity of the findings to the set of response options offered to respondents.

COMPARISONS WITH OTHER ESTIMATES AND EVIDENCE Given these questions about the representativeness of the G-SWA sample and potential measurement error in the responses to some of the survey questions, I would like to know how estimates from probability-based surveys and evidence from well-identified research studies line up with the G-SWA numbers. As an exploratory exercise, I sought to identify relevant information on WFH for the United States that could help with benchmarking the G-SWA results.

One key estimate from the G-SWA is that, at the time respondents were surveyed in mid-2021 and early 2022, WFH in the United States averaged 1.6 days per week. In June 2022, a question about working from home asking, "In the last 7 days, have you *or any of the people in your household* teleworked or worked from home?" (emphasis added) was added to the Household Pulse Survey fielded by the Census Bureau. Because respondents were answering both for themselves and for others in their household, simply tabulating these responses would yield an upward biased estimate of the extent of WFH. In September 2022, a new question about respondents' own WFH experience was added to the Household Pulse Survey. Respondents could say they worked from home one to two days per week, three to four days per week, or five or more days per week. Under the assumption that the days-per-week categories in the survey question correspond to 1.5 days, 3.5 days, and 5 days per week, respectively, the new Household Pulse Survey data imply that during the September 14–26, 2022, period employed respondents worked from home an average of 1.1 days per week.[1] This is somewhat below but of the same rough order of magnitude as the G-SWA estimate.

The question about telework introduced in the Current Population Survey (CPS) at the start of the pandemic has asked, "At any time in the last 4 weeks, did you telework or work at home for pay because of the coronavirus pandemic?" This question has become increasingly problematic. In June 2020, 31.3 percent of employed persons answered yes, but by September 2022, that had fallen to 5.2 percent.[2] More than two years out from the pandemic's onset, many teleworking respondents likely answered

1. US Census Bureau, "Week 49 Household Pulse Survey: September 14–September 26," tables 7a and 7b, https://www.census.gov/data/tables/2022/demo/hhp/hhp49.html.

2. US Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey," table 1, https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm#table1.

no because they did not view their telework as related specifically to the pandemic. Happily, new CPS questions about teleworking are to be introduced in October 2022. Respondents will be asked, "At any time LAST WEEK did you telework or work at home for pay?" If a person answers yes, they will be asked how many of their work hours were telework or work at home hours. These questions are not quite the same as the G-SWA questions, but the resulting data should provide another useful point of comparison.

Another G-SWA finding is that US workers expected their employers to reduce WFH from current levels; on average, employed G-SWA respondents in the United States were working at home an average of 1.6 days, but they expected their employers to reduce this to an average of 0.8 WFH days after the pandemic. This is qualitatively consistent with the finding from the Bureau of Labor Statistics' Business Response Survey, fielded from July 27 to September 30, 2021, that 60.2 percent of private sector establishments that had increased telework during the pandemic planned to make the increase permanent (US Bureau of Labor Statistics 2022).

At least for the United States, the G-SWA estimates related to adoption of WFH seem broadly in line with other currently available information. Other G-SWA results will be harder to benchmark. These include the findings on the effects of WFH on workers' productivity, the productivity surprise associated with WFH, and the amount of their pay that workers would be willing to give up to work from home two to three days per week. The paper cites a number of research studies that have produced results consistent with some of these findings, but further research on all of this is needed.[3]

Although beyond the scope of what I was able to do, there would be value in a systematic compilation of the available evidence on WFH, not only for the United States but also for other countries. I suspect, however, that such an exercise would reveal the paucity of information from sources other than the G-SWA regarding even the basic facts on the prevalence of WFH. If nothing else, I hope that readers of the paper will be convinced that WFH is a topic to which both national statistical offices and academic researchers should be paying attention.

WOULD THE WORK FROM HOME TRANSITION HAVE OCCURRED WITHOUT THE PANDEMIC? An important piece of the paper's argument is that the pandemic and resulting lockdowns were key drivers of the jump in WFH that occurred in the spring of 2020 and the subsequent persistence in WFH. It seems

3. Studies cited include, for example, Bloom and others (2015) on the productivity effects of working from home and Mas and Pallais (2017) on workers' willingness to pay for working from home.

clear that the experience with WFH these events have forced on employers have accelerated its adoption. I would not necessarily conclude, though, that absent the pandemic we would have been stuck in a low WFH equilibrium.

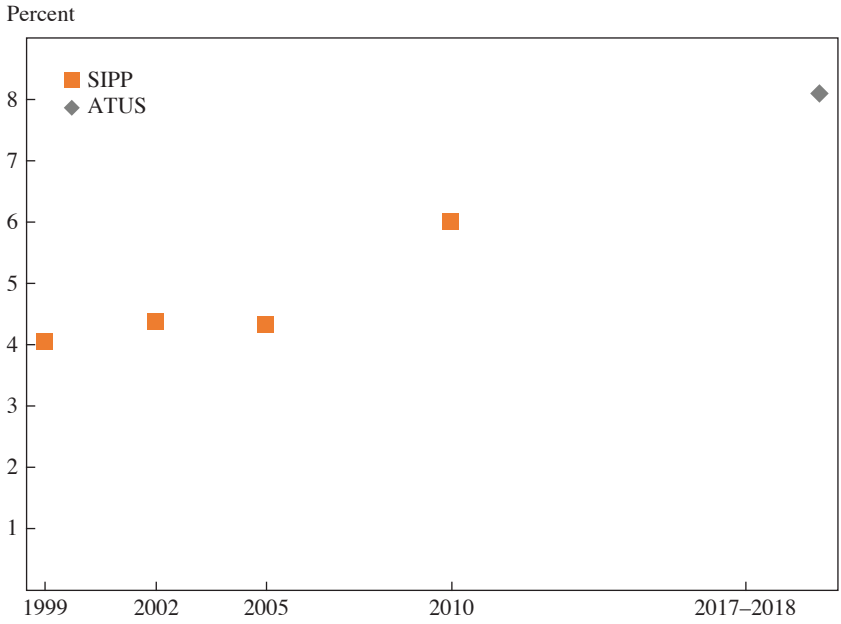
Evidence on the diffusion of technological innovations shows that the spread of new technologies often follows an *S*-shaped pattern, with long periods of very gradual adoption followed by a period of rapid diffusion and then a slowing in growth as adoption approaches its ceiling. Early on, the returns to adoption of a new technology are typically uncertain and diffusion proceeds slowly. At some point, perhaps years or even decades after the introduction of an invention, the value of adoption becomes sufficiently certain that the pace of diffusion accelerates. The classic study of this process is Zvi Griliches's (1957) paper on farmers' adoption of hybrid corn, but there are a multitude of examples in the literature (Hall and Kahn 2003).

The existing data on pre-pandemic WFH unfortunately are sparse but suggest that, at least in the United States, WFH had begun to grow even prior to the pandemic. The Survey of Income and Program Participation (SIPP) collected data on WFH on several occasions between 1995 and 2010, and the American Time Use Survey (ATUS), Leave and Job Flexibilities module, collected data on WFH in 2017–2018. Although one should be cautious about combining data from different sources to track changes over time, the two surveys asked similar questions and both were designed to be nationally representative.[4] Using published data, I was able to construct estimates of the share of wage and salary employees working exclusively from home one day or more a week on their primary job beginning in 1999.[5] As can be seen in figure 1, the SIPP data show this share growing from 4.1 percent in 1999 to 6.0 percent in 2010, with almost all of the

4. In the SIPP, respondents were asked, "As part of the work schedule for [a typical work week during the last month], were there any days when you worked only at home for your job?" If they answered yes, they were asked, "Which days of the week were these?" In the ATUS, Leave and Job Flexibilities module, respondents were asked, "Are there days when you work only at home?" If they answered yes, they were asked, "How often do you work only at home?" The response categories for this second question were five or more days a week, three to four days a week, one to two days a week, at least once a week, once every two weeks, once a month, and less than once a month.

5. The SIPP also included questions about working from home in 1995 and 1997. Because of differences in the way that primary jobs were identified, the 1995 numbers are not comparable to the numbers for later years (Kuenzi and Reschovsky 2001). The estimates published for 1997 did not break wage and salary workers out separately. The overall prevalence of working from home one day a week or more on the primary job as measured in the SIPP was higher than the prevalence for wage and salary workers, but also grew, from 7 percent in both 1997 and 1999 to 9.5 percent in 2010.

Figure 1. Percent of Wage and Salary Employees Working Only at Home at Least One Day per Week, Selected Years, 1999–2018



Sources: Survey of Income and Program Participation; American Time Use Survey, Leave and Job Flexibilities Module.

growth occurring between 2005 and 2010 (Mateyka, Rapino, and Landivar 2012). By 2017–2018, according to the ATUS estimates, the share of wage and salary employees working from home a day or more per week on their primary job had grown to 8.1 percent (US Bureau of Labor Statistics 2019).

Much of the technology that facilitates remote work was developed relatively recently; the World Wide Web, for example, was not invented until 1989, and the software needed for its implementation did not enter the public domain until 1993 (Greenemeier 2009). The timing of the apparent pickup in the pace of growth in WFH suggested by the estimates shown in figure 1 is consistent with the interval between invention and the beginning of widespread adoption for other innovations documented in the literature. To the extent that WFH has real benefits, the history of technological change makes it plausible that, even absent the pandemic, we might have ended up with similar levels of WFH in the not-too-distant future.

HOW SHOULD WE EVALUATE THE PROS AND CONS OF WORKING FROM HOME?

The final issue I would like to raise is whether, taking everything into

account, the ceiling on the adoption of WFH is as high as the authors suggest. The day-to-day advantages of WFH for workers are highly visible—less time spent getting ready for work, less time spent commuting, and greater flexibility to accomplish other personal and household tasks. What may be less visible are the potential longer-term career costs of WFH. Better technology can help to make remote workers less isolated, but remote work is inherently ill-suited for the informal exchanges of information that are easy when a colleague sits at the next desk or just down the hall. This is likely to be a bigger issue for workers who are new to a firm and especially for those who are just entering the labor market. WFH may prove costly for workers who are unable to develop the professional skills and relationships important to their long-term labor market success. In addition, the appealing flexibility of WFH may be a two-edged sword. The blurring of the distinction between the workday and personal time has undoubted advantages, such as allowing someone to take a few minutes out of their workday to turn over the laundry or meet a contractor at the front door. In the long run, though, WFH may impose costs on workers by leading them to work longer hours and making it more difficult to shut work off outside of normal working hours (Grant, Wallace, and Spurgeon 2013; Felstead and Henseke 2017).

The authors' own work provides one small piece of evidence that some workers may be rethinking their desire for WFH. As noted in the paper, respondents to the separate Survey of Working Arrangements and Attitudes (SWAA) that the authors have been conducting monthly in the United States report a steady rise between January 2021 and June 2022 in the number of WFH days planned by their employers. Over approximately the same period, the SWAA data also show a decline in the number of WFH days workers say they want. Although smaller in magnitude than the increase in WFH days that employers plan, the worker decline accounts for nearly a third of the closing of the gap between employers' plans and workers' desires over that year and a half period.

Like the potential benefits for workers, the potential benefits of WFH for employers also are very visible—being able to recruit from a larger pool of potential workers and, if WFH allows the firm to reduce its physical footprint, saving money on operating expenses. WFH also may increase the productivity of workers performing routine tasks (Bloom and others 2015). My concern is that the loss of informal exchanges of information already mentioned as potentially harmful for workers' careers also may have negative consequences for firms. If WFH impedes collaboration, as I fear is likely to be the case, productivity in the performance of more complex tasks may suffer and innovation may slow.

It is possible that new tools will be developed that can address the challenges to effective remote collaboration. I suspect, however, that remote exchanges will always be an imperfect substitute for in-person interactions. For that reason, I suspect that the ceiling on WFH is not as high as the authors appear to believe. Time will tell which of us is right.

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COMMENT BY

EDWARD L. GLAESER In mid-October 2022, workplace visits were down by 22 percent across the United States relative to the start of 2020, according to Google Community Mobility, which produces cell phone–based data. Trips to workplaces had fallen by 39 percent in Manhattan (New York County) and 45 percent in San Francisco. How much time will be spent working from home in the future? Does the persistent emptiness of big city offices today augur a new age in which homes, rather than cubicles, provide the workspaces of the future?

The authors argue that working from home, at least for a few days each week, is likely to become the new normal for large numbers of workers, both in the United States and abroad. They argue that "no other episode in modern history involves such a pronounced and widespread shift in working arrangements in such a compressed time frame." This paper contains a valuable survey that details the spread of working from home in twenty-seven countries. The data in these surveys support the authors' core hypothesis that the relatively low levels of working from home before 2020 reflected a coordination failure. As that failure was remedied by the pandemic, we can look forward to a future where working from home is vastly more common.

I admire both this paper and the authors' broader research enterprise which has tracked working from home since the start of the pandemic, but I am skeptical that this moment in time will ultimately be seen as a watershed that marks the end of the office and factory, especially among less elite workers and especially in the developing world. There is a longer-term trend toward working at home, especially for elite knowledge workers, and that certainly sped up during the pandemic. Moreover, the authors are right to emphasize the "big push" nature of the pandemic event, which unquestionably gave working from home a jolt, and that some of that jolt is permanent.

There are five distinct reasons to be skeptical about any maximalist view of the shift to working from home. First, both electronic surveys and data generated by cell phones are likely to overrepresent technologically connected individuals, and those tech-savvy respondents surely experienced far more working from home than average workers, especially in poorer countries. For example, while the authors' surveys suggest that one-third of American workers were working from home in 2021, the nationally representative American Community Survey finds that only 17.9 percent of work was at home during that year (US Census Bureau 2022). Second, at this moment labor seems scarce and employers are particularly prone

to produce perquisites, including the option to work from home. Working from home makes a particularly tempting temporary perquisite because it can be readily removed as the labor market cools down and the preferences of employers become more important.

Third, basic economics implies that the owners of commercial property will cut rents rather than letting office space remain vacant for long periods of time. This equilibrium response should attract scruffier firms to formerly expensive real estate in cities like New York and San Francisco. Fourth, many of the advantages from collocated work remain, including the ability to share common infrastructure, the ability of employers to reduce distractions, and the ability to connect face-to-face. Many of these advantages are likely to become more, not less, important over time. Fifth, there appear to be dynamic losses from working from home that seem likely to become more apparent to both workers and firms over time, and this will bring people back to the office.

I am not confident about my more minimalist stance on working from home. There remains tremendous uncertainty, both about the course of technology and about the path of future pandemics. I am, however, quite confident that face-to-face contact is tremendously powerful and that it will play a central role in more of human productivity for the foreseeable future.

MEASURING WORKING FROM HOME IN THE UNITED STATES AND ACROSS THE WORLD Broad international evidence on the prevalence of, demand for, and expectations about the future of work from home is a fantastic contribution of this paper. Instead of extrapolating from the US experience, we can actually see how at least some part of the population is working from home everywhere. Moreover, the results seem broadly sensible and many of the findings seem in line with the predictions of a simple price-theoretic model of working from home.

Yet the most obvious limitation of this work, and indeed any internet-based survey, is the representativeness of the sample. As connecting in cyberspace is almost the defining feature of working from home today, we would be surprised if a survey delivered in cyberspace doesn't overstate the amount of working from home. Even Google mobility data, which seem far more likely to be representative in the developing world than the authors' surveys, surely suffer from some bias because of its dependence on internet-linked devices.

Following decades of (occasionally erroneous) practice, I am going to treat the surveys produced by the US Census Bureau and Bureau of Labor Statistics as ground truth. These public agencies have worked to generate representative samples for many decades. Their surveys are administered

by phone and in face-to-face contact, and so they seem far less likely to miss the computer illiterate.[1] Unfortunately, these data sources do not give us anything like the regular updates on working from home provided by the authors' work or by the Google mobility data.

The Census Bureau began providing monthly data on working from home in May 2020, when supplemental questions on telework were added, and in particular respondents were asked "at any time in the LAST 4 WEEKS, did you telework or work at home for pay BECAUSE OF THE CORONAVIRUS PANDEMIC?"[2] This question became progressively less useful over time. In May 2020, it seems safe to assume that pretty much everyone who was working from home accepted that this was "because of the pandemic." Two years later, most of those who were working from home may have thought that the pandemic had little to do with the matter and that convenience or productivity caused them to work from home.

The Current Population Survey (CPS) reports that in May 2020, 35.4 percent of employed individuals were working from home "because of the pandemic." The educational skew in telework was enormous: whereas only 13.3 percent of employed Americans with a high school degree or less worked remotely, 59.6 percent of those with a college degree or more worked remotely.[3] According to this data source, the share working remotely (because of COVID-19) dropped to 21.2 percent of the employed population by October 2020, 11.6 percent by October 2021, and 5.6 percent by September 2022. Unfortunately, the only "fact" documented by this sharp downward trend is that people were no longer connecting working from home with the pandemic.

These monthly reports are the only time series made available by the government, but there are two other, presumably representative, samples available for the year 2021. Most importantly, the Census Bureau collected its standard American Community Survey (ACS), which attempts to provide representative data both for the United States as a whole and for larger geographic areas of the country (US Census Bureau 2022). The most relevant question is "How did this person usually get to work LAST WEEK?"

1. The Current Population Survey did stop face-to-face interviews during the pandemic, which may have altered the representativeness of the sample despite the best efforts of the Census Bureau (Ward and Edwards 2021).

2. US Bureau of Labor Statistics, "Measuring the Effects of the Coronavirus (COVID-19) Pandemic Using the Current Population Survey," https://www.bls.gov/covid19/measuring-the-effects-of-the-coronavirus-covid-19-pandemic-using-the-current-population-survey.htm.

3. US Bureau of Labor Statistics, "Effects of the Coronavirus COVID-19 Pandemic," table 1, https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm.

Working from home is one of the options, which provides a measure of the share of the population who work from home more often than they go out to work. This survey question is, unfortunately, not well designed to measure the number of people who work from home one or two days per week.

According to this measure, 27.6 million Americans, or 17.9 percent of the employed workforce, typically worked from home in 2021 (US Census Bureau 2022). The same survey reported that 9 million Americans, or 5.7 percent of the employed, worked from home in 2019, and 5.9 million, or 4.3 percent of the employed, worked from home in 2010.[4] The 50 percent growth in the number of people working from home between 2010 and 2019 supports the view that this phenomenon had been growing significantly, if slowly, even before the pandemic.

The third public product which purports to provide a representative picture is the Bureau of Labor Statistics' Business Response Survey (BRS). This data source represents a supposedly "nationally representative survey of U.S. private sector businesses," but (like the ACS), this source only provides annual data on telework (Dalton and Groen 2022). The survey is taken between July and the end of September, and consequently there are results only for 2020 and 2021 at the time of writing.

In 2020, businesses were asked only if they offered telework or increased telework during the pandemic. The survey reported, for example, that 52.3 percent of all private sector establishments did not offer telework, and that 54 percent of all workers labored in establishments that had increased their level of telework since the pandemic.[5] Unfortunately, these numbers tell us little about the actual prevalence of teleworking across workers. More helpfully, the 2021 survey asked what share of the establishment's workers were remote either some or all of the time. As the survey also asks for the total number of employees, these data could be used to estimate the share of the American labor force that was either fully or partially remote between July and September of 2021 (Dalton and Groen 2022).

This survey finds that 12.6 percent of workers were fully remote, and another 9.2 percent were partially remote during that period. In some industries, like professional and business services and information, remote work

4. US Census Bureau, "American Community Survey: B08301, Means of Transportation," https://data.census.gov/table?q=B08&d=ACS+1-Year+Estimates+Detailed+Tables&tid=ACSDT1Y2010.B08301.

5. US Bureau of Labor Statistics, "Business Response Survey: BRS Tables," https://www.bls.gov/brs/data/tables/.

was ubiquitous, with 46.3 percent and 68 percent of workers, respectively, who are fully or partially remote. In other industries, such as manufacturing and accommodation and food services, remote work was rare with only 12.2 percent and 1.8 percent of workers fully or partially remote.

How do these numbers compare with the US Survey of Working Arrangements and Attitudes (SWAA), which is the model for the Global Survey of Work Arrangements (G-SWA) used in this paper? The SWAA asks, "Currently (this week) what is your work status?" and "working from home" is one of the available answers to this question. This question seems closest in spirit to the ACS's question about "usually" getting to work last week.[6]

We would certainly expect the number of people answering yes to this question to be smaller than the share answering yes to CPS's question about teleworking at any time in the last four weeks. However, 61.5 percent of the respondents to the SWAA reported working from home in May 2020, as opposed to 35.4 percent in the May 2020 CPS. In July, the SWAA working from home share had declined modestly to 51 percent, but the CPS share dropped to 26.4 percent. It is possible that some share of the discrepancy between the two measures reflects the "because of the pandemic" clause in the CPS question even during these early days. The alternative interpretation is that these data significantly overstated the share of Americans working from home during these months.

The Google mobility data create a third possible measure of working from home that is available at daily frequencies and fine spatial resolution. These data measure the change in the number of devices visiting particular locations, such as workplaces, relative to a comparable day of the week before the pandemic. These data will be biased if a nonrandom sample of the population use such devices, or if the prevalence of devices in the population is changing over time, which is particularly plausible in the poorer parts of the world. The data will capture declines in workplace visits, both because of telework and because of reductions in total employment.

During the week of April 27, 2020 (which includes May 1), the average number of workplace visits had declined by 47 percent relative to before the pandemic. This decline is substantially higher than the 35.4 percent CPS figure but lower than the 61 percent reported in the SWAA. However, the CPS also reports the 19.2 percent of workers in May 2020 who had lost their

6. The SWAA survey data and questionnaires can be accessed at WFH Research, www.WFHresearch.com.

jobs because of the pandemic.[7] If that number is added to the 35.4 percent, then the match to Google Community Mobility looks quite good. If that number is added to the 61 percent that the SWAA reports as working from home, then the decline in workplace visits should presumably be closer to 80 percent than 45 percent.

By the first week of July 2020, the Google mobility data report a workplace decline of 37 percent. The CPS reports 12 percent of the population having lost their job because of the pandemic, which suggests a total decline in workplace visits because of joblessness and telework of 38 percent. The CPS and Google Community Mobility again seem quite compatible with one another. The SWAA report of 51 percent working remotely continues to differ dramatically from the other two sources.

What about the results from the ACS and BRS? Over the year 2021, the SWAA reports that an average of 33.6 percent of respondents worked from home and that 32.7 percent of respondents worked from home over the July–September period. By contrast, the ACS reports that 17.9 percent of respondents worked from home during 2021. If one-half of the partially remote employees in the BRS would report themselves as primarily remote, then the equivalent figure for that survey is 17.2 percent. While both of these figures are quite similar, they each come to 52.3 percent of the SWAA figures.

In this case, the Google mobility data, which suggest roughly 30 percent declines in workplace visits during 2021, are much closer to the SWAA. Some of the gap with the ACS and BRS can be explained by lower employment, but for 2021, we are left with the disturbing possibility that the official products could both be wrong and both be underestimating the level of working from home. One possibility is that a large number of the 82.1 percent of ACS respondents are telecommuting one or two days per week. While that seems compatible with the experience many of us have in our own offices, it seems more difficult to reconcile with the BRS, which reported that only 9.2 percent of employees were working from home part of the time. It is also fails to reconcile the SWAA and the ACS, since both surveys focus on the predominant work experience "last week."

An alternative possibility is that Google Community Mobility may be overestimating the decline in workplace visits, either because of its sample of users or because of its definition of workplaces. It is possible that the set

7. US Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey," https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm; table 3, https://www.bls.gov/cps/covid19/covid19-table3-2020-05.xlsx.

of people who allow Google to track their location are disproportionately technology-oriented and so the data set is also disproportionately capturing technology-savvy, younger workers. A second possibility is that workplaces disproportionately mean offices, rather than restaurants, retail shops, and other places of work that involve face-to-face contact. Restaurants and retail have their own place category, and these show little evidence of any permanent decline in visits.

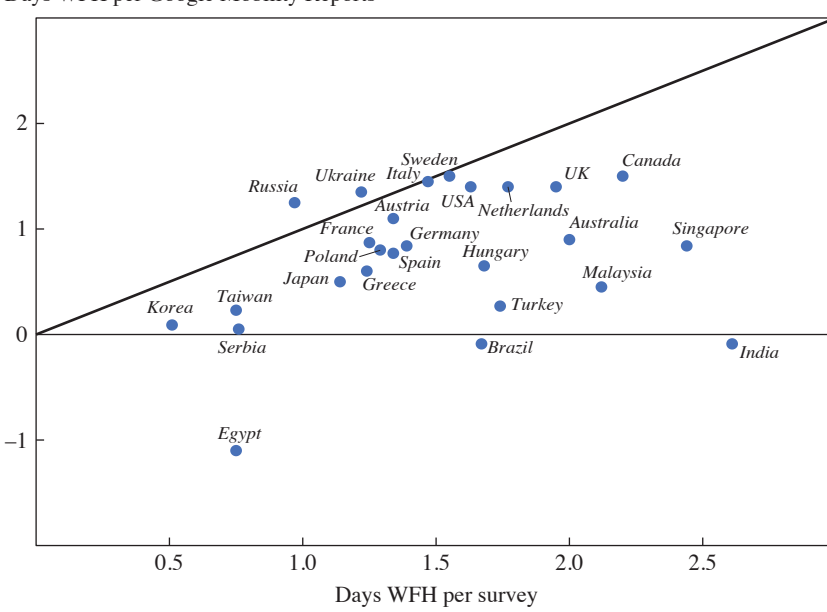
If the SWAA significantly overrepresents those who are comfortable with technology, then this may bias the estimated number of people working from home, but also other metrics, such as the estimated productivity impact of working from home. It seems quite possible that those people who like computers and are good at using the internet are more likely to answer internet-based surveys, work from home, and find working from home pleasant and productive. Consequently, it is difficult to know the representativeness of their results on the productivity benefits and desirability of working from home, although I have no doubt that millions were able to do their jobs well remotely and that almost all people like the option of working from home.

The problem seems potentially more severe in the G-SWA when the authors look at poorer countries. A simple way of examining the representativeness of their data is to compare the gender and education composition of their populations with the average education in the country, reported by Barro and Lee (2013), and the gender composition of the labor force. The share of men among their respondents ranges from 46 percent in Serbia to 53.6 percent in Russia, with Egypt as an extreme outlier with a male share of 76.2 percent (online appendix table A.3). Respondi is clearly aiming for gender balance. By contrast, the proportion of the labor force that is male, according to International Labor Organization data, ranges across these countries from 54.5 percent to 88.5 percent.[8] On average, the authors' sample is slightly more female than the countries as a whole, and excluding Egypt, there is little correlation between the gender balance of their samples and the gender balance of the labor force in the country as a whole.

An astounding 78 percent of the Indian respondents to the G-SWA have received graduate education; Barro and Lee (2013) report that in 2015 only 7.3 percent of Indians between age 25 and 64 have completed tertiary education. In Egypt, 86 percent of the surveyed population has tertiary or

8. World Bank, "Labor Force Participation Rate (% of Population)," https://genderdata.worldbank.org/indicators/sl-tlf-acti-zs/.

Figure 1. Working from Home according to Google's Community Mobility Reports



Sources: COVID-19 Community Mobility Reports, https://www.google.com/covid19/mobility/; and Bloom and others (2015).

graduate education in the survey; Barro and Lee (2013) report that 11 percent of Egyptians have completed tertiary schooling. The mismatch for education is less severe in the wealthy world.

The authors' quite reasonable procedure for dealing with this is to control for demographics and produce a country fixed effect, relative to the United States. They then add their country fixed effect to the US mean to produce their corrected measure. This procedure, for example, reduces India's reported current days working from home figure from 3.3 to 2.6 (online appendix table A.2 and figure 1). Ideally, this procedure tells us what India's number would look like if Indian education matched the US education levels reported in the sample, which includes 49 percent of individuals with tertiary or graduate education. Yet this thought experiment tells us little about what the actual Indian experience is likely to be going forward.

To compare these data with another source of information about working from home, I downloaded the Google mobility data for twenty-six countries (China is not covered) and calculated the average reduction in the number

of workplace visits for the week of February 7, 2022.[9] To transform Google's estimated reduction in workplace visits into an estimated number of days working from home, I multiplied the Google change times −5, which would represent the number of average days working from home required to generate the reduction in workplace visits observed by Google.

The correlation between this measure and the authors' raw survey measure of working from home is shown in figure 1. The distance from the 45-degree line represents the discrepancy between their data and the Google mobility data.

In only two countries do the authors' data seem to underrepresent working from home relative to Google mobility: Russia and Ukraine. It seems possible that the war imminent at the time may explain the large reduction in workplace mobility in those countries.

In a number of countries, the authors' data match Google mobility quite well. Sweden and Italy, for example, show an almost perfect fit. The match in the United States is also quite good, which corresponds to my previous discussion of the congruence of the SWAA data and the Google mobility data. For most of the wealthier, Western countries, the results are quite similar.

Nonetheless, there are substantial discrepancies between the authors' data and much of the data outside the West. For example, in Brazil, Egypt, and India, Google workplace visits were actually higher in February 2022 than they were before the pandemic. This growth may reflect an increasing prevalence of cell phone ownership rather than the elimination of working from home; nonetheless, it does suggest that in these places working from home is an extremely elite phenomenon.

In most of the non-Western countries, including Australia, Korea, Japan, Malaysia, Singapore, and Turkey, the gap between the authors' data and the Google mobility data is significant. Most of these countries typically had fewer disruptions and fewer deaths from COVID-19. If we accept that the Google mobility data are more representative of the situation on the ground than the G-SWA, then this can be interpreted as providing support for the authors' core hypothesis: as these countries were shocked less by the disease, they remain trapped in the unfortunate equilibrium where people largely go to work. An alternative view is that Western countries were still working from home in February 2021 because of fear of the disease, which had largely disappeared from non-Western countries.

9. Google, "Covid-19 Community Mobility Reports," https://www.google.com/covid19/mobility/.

In table 1 in the paper, most of the basic facts on the gender gap, the role of children, and the complementarity between working from home and graduate education seem reasonable and seem likely to hold even for a broader sample. One way to interpret the negative effect of national income is that working from home is particularly appealing for people who are much richer than the society that they inhabit, partially because public services are so much worse than their private consumption levels. I don't know what to make of the impact of COVID-19 death rates, given that elite populations in poorer countries experienced COVID-19 in a very different way than the average resident of those countries. For example, Sheng and others (2022) report that "55% of Mumbai slums residents had antibodies to COVID-19, 3.2 times the seroprevalence in non-slum areas of the city according to a sero-survey done in July 2020" (abstract).

The G-SWA data are interesting and important, and no doubt show that many people have really liked working from home. Yet the selection of the samples bears closely on the question of whether the work-from-home revolution is likely to be permanent. If we think that the ACS and BSR figures of around 17.5 percent working from home in 2021 are more likely to be accurate than the SWAA figure of 33 percent working from home, then the empirical picture seems more ambiguous. For example, if that 17.5 percent were likely to move downward to 12.5 in a year or two, then the growth in working from home would seem far less like a permanent revolution than a continuation of the gradual increase in working from home that was already occurring prior to 2019.

MOVING TOWARD STEADY STATES IN COMMERCIAL REAL ESTATE AND LABOR MARKETS The authors write that "there are several reasons to think that WFH levels will ultimately settle at higher values than suggested by our survey data," including the "steady rise from January 2021 to June 2022 in the plans of American employers for WFH levels after the pandemic." In this section, I will argue that there are least two reasons why changes in the labor market and real estate market equilibria will push in the opposite direction. It is also worth noting that the SWAA-measured employers' post-pandemic plans for working from home have actually declined since June 2022. Moreover, we might wonder whether the employees who answer these questions actually know their employers' plans, especially since employers eager to retain their employees might be encouraging them to think that they will continue to have the option to work from home in perpetuity.

The authors estimate that "employees view the option to WFH two to three days per week as equal in value to 5 percent of earnings, on average,"

and some value the option for more than that amount. In many countries, employers have struggled to retain and attract workers since the start of the pandemic. In the United States, the pandemic in many ways seems to have been more of an adverse labor supply shock, sometimes called the "great resignation," than an adverse labor demand shock. Between October 2021 and October 2022, the US unemployment rate has been below 4.6 percent.[10] Basic economics suggests that firms will be more willing to offer perquisites when labor is difficult to retain and hire. As the US labor market reverts to more normal conditions, the labor market will slacken, and firms will presumably see less need to accommodate worker preferences for working from home.

Why would working from home be a particularly attractive tool for retaining and attracting labor during the current tight market? Increasing wage levels are hard to reverse. Bonuses are an alternative option, but even they create more of a precedent than simply continuing with a practice that was ubiquitous when the pandemic still raged. If a recession leads firms to have more bargaining leverage, then they will be able to change work-from-home conditions far more easily than they could change financial terms or conditions surrounding physical infrastructure. In many ways, working from home may be the easiest means of providing temporary benefits to workers during a tight labor market.

This argument means that current work-from-home levels could easily overstate, and perhaps significantly overstate, the longer-term level of working from home, but it does not suggest that working from home will disappear, even in a recession. In the longer term, workers will be richer and they will choose to take some of their earnings in the form of perquisites. One of those perquisites is likely to be working from home, which suggests that the pre-2019 trend away from the office will continue, even if there is an immediate decline in working from home in the aftermath of a recession.

The second equilibrium phenomenon related to working from home will occur in real estate markets. Over the course of the pandemic, Kastle has provided data on workplace occupancy across ten large metropolitan areas.[11] The data come from the use of security systems, which Kastle operates, and so change in occupancy reflects the change in the number of

10. US Bureau of Labor Statistics, "Databases, Tables and Calculators by Subject," https://data.bls.gov/timeseries/LNS14000000.

11. Kastle, "Kastle Back to Work Barometer," https://www.kastle.com/safety-wellness/getting-america-back-to-work/#workplace-barometer.

people swiping cards or fobs to enter large office buildings. Kastle reported an overall ten-city occupancy rate of 47.9 percent for October 19, 2022. The occupancy rate was higher in Houston (58.4 percent) and lower in San Francisco (41.2 percent). As the buildings that use a Kastle security system are unlikely to be representative, even in large downtown office markets, these data cannot inform us about the overall level of working from home. They do, however, imply that a lot of expensive commercial real estate is currently being underutilized relative to pre-pandemic norms. The standard logic of economics suggests that this should lead to a reduction in commercial rents, which should encourage occupancy by new tenants.

It is possible that some firms may reduce their usage of space without reducing their total consumption of commercial space even at existing prices. If a firm wants all of its employees in together on Tuesday, Wednesday, and Thursday, then it must continue to rent the same space even if everyone is working remotely on Monday and Friday. Yet it seems likely that many firms will try to reduce their physical footprint because of working from home. That reduction in demand strikes a relatively fixed supply of office space, and commercial rents should decline. The limited data that are available suggest that this is already starting to happen in some markets.

Firms that had been priced out of high-end office markets in 2019 and earlier may now think about moving into these markets. Lower commercial rents may encourage some entrepreneurship. If there is a substantial price effect, then any existing expectations about working from home will likely overstate the market-wide level of working from home. Almost assuredly, when individuals answer the G-SWA or SWAA surveys on plans for post-pandemic working from home, they are not thinking about how changes in commercial real estate costs may cause other firms to consider moving into downtown space.

The larger point of this section has been that there are good reasons to think that working from home may decline as the labor and office markets equilibrate. Firms will face less pressure to offer working from home as an option as workers become less scarce. Office rents will decline and induce more firms to opt to use those offices.

THE STATIC AND DYNAMIC COSTS OF WORKING FROM HOME In this penultimate section, I discuss the static and dynamic costs of working from home. I mention the static costs to suggest that it is not hard to figure out why many employers don't particularly like having a remote workforce, despite employees' preferences for at least having the option to go remote. I then discuss the dynamic costs of telecommuting that I suspect are less likely to be internalized, at least so far, by workers and firms.

Working in a common space has significant advantages historically: (1) workers can share fixed infrastructure, such as a textile loom; (2) managers can address worker incentives by monitoring behavior and limiting distractions; (3) workers and customers can meet in common spaces, such as a dining room; and (4) workers can collaborate in the short run and learn from one another in the long run. Of these four advantages, the first two are relatively untouched by advances in telecommuting. The last two advantages should be eroded by telecommuting technology, but it is unclear by how much.

Almost 18 million workers labor in the goods-producing sector of the US economy, and work from home seems likely to be limited in that sector because of the need to access factories, mines, and construction sites.[12] The BRS reported only 12.2 percent of manufacturing workers were doing at least some remote work in 2021, and the figure is lower for mining and construction (Dalton and Groen 2022). Similarly, working from home is ill-suited for wholesale and retail trade, leisure and hospitality, transportation and warehousing, and agriculture, although there will surely be back-office elements in these industries that can work from home. In the 2021 BRS, only wholesale trade had a significant amount of remote work (26.4 percent of jobs). Most of health care and social assistance also needs to be face-to-face, which is also corroborated by the BRS.

The key industries where working from home has been massive and which drive downtown office markets are financial services, professional and business services, and information, which collectively contained about one-fifth of America's labor force in 2021.[13] In these industries, there are no common infrastructure needs, and many elite workers are internally motivated and capable of using technology. It is less clear if secondary workers, such as lower-level administrators, in these industries will work hard when they are remote, but there is no question that many workers in these industries can do their jobs remotely. These three clusters, along with educational services, had levels of working from home that were substantially higher than the national average in the 2021 BRS. These are the industries in which the electronic innovations have had the largest impact.

Information technology has been available in these industries for decades, and yet these clusters are famous for their physical agglomerations. Information clustered in Silicon Valley; financial services clustered on Wall

12. FRED Economic Data, "All Employees, Goods-Producing," https://fred.stlouisfed.org/series/USGOOD.

13. US Bureau of Labor Statistics, "Employment Projections: Employment by Major Industry Sector," https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm.

Street (or midtown Manhattan). Despite the supposed death of distance, face-to-face contact remained a major part of life, whether for workers on trading floors or in the Googleplex.

One narrative for the surprising resilience of face-to-face contact in these industries is that technological change has done two things, which work in opposite directions. First and most obviously, information technology reduces the cost of long-range communication. Second and less obviously, the combination of technological change and globalization have significantly increased the returns to knowledge, information, and skill. If proximity enables the spread of knowledge, then the second force can outweigh the first, and that is one explanation for why high human capital cities have done well over the past forty years (Glaeser and others 2004).

According to this view, we should expect remote work to have risen significantly over the past two years, because innovation in long-distance connection has moved more quickly than any increase in the return to skill. Yet in the longer run, the old pattern may well reassert itself. In finance, much of the most important knowledge transfers occur at very high frequencies and so hybrid work (going in three days a week) is less plausible on a trading floor. In information services, the knowledge learned has a far lower frequency, which may well be compatible with working from home 40 percent of the time.

The dynamic benefits of face-to-face contact for knowledge creation are supported by the classic work-from-home paper by Bloom and others (2015) and by more recent work from Emanuel and Harrington (2021). Both papers find that the productivity of call center workers either rises or remains unchanged when those workers go remote. Both papers also find that the probability of being promoted drops by over 50 percent for the remote workers. These findings are compatible with the view that going remote shuts off part of the learning channel for both workers and their supervisors. Workers who disappear from the office completely will have little chance to learn from their colleagues or to shine in front of their supervisors. Workers who spend one day at home will still have plenty of chances to learn and to shine.

Other recent work supporting the learning-in-person channel comes from Morales-Arilla and Daboín (2021) and Yang and others (2022). Morales-Arilla and Daboín document the substantial and enduring decline in postings for jobs that could be done remotely during 2020 and 2021. This decline was not accompanied by a drop in employment. By contrast, both employment and job postings jumped back up in the summer of 2020 for jobs that had to be done in person. These findings are compatible with the

view that companies did not want to onboard new workers who would be remote. This supports the hypothesis that working in person can be important for learning.

Yang and others (2022) examine the communications network within Microsoft after the firm went remote. They find that "firm-wide remote work caused the collaboration network of workers to become more static and siloed, with fewer bridges between disparate parts" and that "there was a decrease in synchronous communication and an increase in asynchronous communication." To the authors, these changes suggest that "these effects may make it harder for employees to acquire and share new information across the network" (abstract). Even if they are correct, however, these losses can probably be offset with workers coming back only 60 percent of the time.

I suspect that the dynamic losses from working from home will only appear over time, just like the losses that have already come from remote schooling. Many of the older workers will be fine with less learning, especially since they are the ones doing the teaching. The key question is whether employers will be willing to pay more to get the older workers to come to the office and enable the younger workers to learn from them. Classic human capital theory suggests that this will be the case if the young workers are learning firm-specific, not general, human capital. If the young workers are learning general human capital, then firms will only push the older workers to return if younger workers are willing to take a pay cut to have them around.

The social consequences of increased working from home. Increased working from home brings many benefits, especially for workers with small children. If the firm stays put, the primary impact of WFH will be to make longer commutes more tolerable, since the worker only needs to commute 80 percent of the time. The standard Alonso-Muth-Mills model of urban economics then predicts that successful metropolitan areas, like San Francisco, will get even larger and housing prices will drop more slowly with distance.

The new technologies will also make it easier for firms to relocate entirely even when there is no working from home. Moreover, the connection to downtowns will shrink further if WFH means that there are fewer providers of business services physically in those locations. This added mobility will make the fight to attract firms even more competitive and will punish cities that are not business friendly. Recent high-profile defections, such as the movement of Citadel from Chicago to Miami, suggest that the risks to older, colder cities are real, especially if crime rates begin to rise.

The cities of the developing world face many challenges, which may include high crime rates and contagious diseases, and always include terrible traffic congestion. Historically, these urban problems require the attention of urban elites who use their political clout to push for infrastructure, including aqueducts and sewers, that make cities healthier. The software engineers of Bengaluru are the best hope for an effective voting and lobbying bloc that can fight to improve that city's public services.

Yet when urban elites retreat, whether into suburbs or into their homes, they have less interest in fixing the city's larger problems. If the wealthy buy their own security teams, as they do in many Latin American cities, they have less interest in fighting for better policing for all. If WFH means that traffic becomes less of a problem for well-educated urban elites, then those elites have less interest in improving the roads of India's cities or in imposing congestion pricing. A reasonable guess is that technologies that enable rich urbanites in the developing world to rely less on common public services will only lead those services to become more problematic.

CONCLUSION This paper has significantly added to our stock of knowledge about working from home across the world. Even if the results in the poor world are highly nonrepresentative, they still suggest that WFH will remain the norm for a select group of privileged knowledge workers. In the wealthy world, Google mobility data largely confirm the authors' view that working from home is persisting. Even the minimalist view of working from home, articulated in this comment, accepts that millions of workers will labor at home a couple of days per week.

For most workers, the ability to work from home is an advantage, and I see few costs for the firms or their workers in the one day at home per week model. Yet that switch may have larger social costs which are not addressed by either this paper or my comment. Will working from home, or a related decline in business travel, significantly harm poorer workers who had provided services for downtown offices? Will working from home lead to even more of a disconnect between elite knowledge workers and the less fortunate, less educated workers who work in retail trade, leisure, and hospitality? The welfare consequences of working from home remain an important topic for future research, but it will be easier to assess those consequences in later years when we have more data.

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GENERAL DISCUSSION John Abowd proposed that the authors subscribe to the American Association for Public Opinion Research Transparency Initiative so that the research community could benefit and better understand the team's survey methodologies.[1] Abowd argued that joining the initiative would set up meta-standards that guide key survey components such as sample recruitment, response rates, and sample comparability.

1. American Association for Public Opinion Research, "What Is the TI?," https://www-archive.aapor.org/Standards-Ethics/Transparency-Initiative/FAQs.aspx.

Robert Gordon seconded Katharine Abraham's discussion of how ambiguous it is to ask survey respondents how productive they were compared to their expectations. Gordon further argued that expectations can become even more ambiguous when confounded by the difficulty of knowing how long respondents work for. He cited a paper by Barrero, Bloom, and Davis, who found that roughly one-third of the time previously spent commuting was now spent at work.[2] This means that the total productivity measured in the survey may be a mix between actual higher productivity per hour and more hours of work in time that workers had previously spent commuting.

Gordon offered a more direct method of measuring productivity, which was to construct quarterly productivity data from the National Income and Product Accounts and the Bureau of Labor Statistics for particular industries. He reported that for service industries where people primarily work from home, such as finance and information, productivity went up at an annual rate of 3 percent in 2020. In the five quarters of 2021 and 2022, productivity increased even faster at an annual rate of 4 percent. Contact services decreased in productivity at an annual rate of about 2 percent in the same time period.[3]

Caroline Hoxby suggested more straightforward survey questions instead of the current question that asked about the worker's productivity relative to their pre-pandemic expectations. One question would ask for the number of hours spent working, including commuting; a separate question would ask about the productivity per hour prior to the pandemic and after.

Jonathan Wright echoed a similar sentiment when he asked the panel if there were studies that showed how work from home and productivity varies in jobs where output can be directly measured at high frequency, such as how many calls a worker takes in a call center, compared to jobs where it is harder to say what the day-to-day output has been.

Steven Davis pushed back on these comments by clarifying that the reason to include the question about productivity relative to expectations was to get at the particular mechanism of learning and revising priors that leads to re-optimizing work plans. He maintained that identifying that mechanism is difficult to do in other ways. With such a strong relationship

2. Jose Maria Barrero, Nicholas Bloom, and Steven J. Davis, "Why Working from Home Will Stick," working paper 28731 (Cambridge, Mass.: National Bureau of Economic Research, 2021), https://www.nber.org/system/files/working_papers/w28731/w28731.pdf.

3. Robert J. Gordon and Hassan Sayed, "A New Interpretation of Productivity Growth Dynamics in the Pre-pandemic and Pandemic Era U.S. Economy, 1950–2022," working paper 30267 (Cambridge, Mass.: National Bureau of Economic Research, 2022).

between the worker's assessment of their productivity surprise and the employer's plan for what the worker will do, Davis asserted that there is, in fact, a lot of information in those productivity surprises.

Davis acknowledged Abraham's discussion about primacy bias in the survey by noting that if it were present in the relationship between productivity surprises and planned work-from-home (WFH) days, it would attenuate the relationship, given the current response ordering for those questions. Davis claimed that there is mild evidence of primacy bias in their survey responses, but that the authors take the point and are moving to more use of randomized response options in future survey waves. To Abraham's point about survey responses being potentially biased because they reflect socially desirable outcomes, Davis said he was less worried and would leave it to the audience to judge whether their survey instrument tilts the responses one way or another.

Elaine Buckberg added to the social desirability issue by noting that responses might also vary across the business cycle. Responses during the current tight labor market with ample jobs may reflect this, and workers may become more willing to come to work in person or make location adjustments once the labor market softens. Buckberg also referred to a joint study by the Manufacturing Institute and Deloitte to highlight the point that the desire for flexibility is not just concentrated among white-collar workers but also among those who work hands-on in manufacturing jobs.[4]

Justin Wolfers emphasized that remote working has also allowed for more inclusivity. He reflected on past conferences of *Brookings Papers for Economic Activity* and the National Bureau of Economic Research being invitation-only and in-person events, while the transition to online screening has made them more accessible to others. Wolfers wondered if the same is also true among workplaces, with the expected primary beneficiaries being parents. He then questioned how confident we can be of current macroeconomic indicators with the immense shift to remote work.

Frederic Mishkin addressed the concern that working from home will decrease collaboration and innovation by referencing how workers in academia have been able to balance their remote work and flexibility with collaboration. Mishkin argued that one has less reason to be concerned if firms can learn how to accommodate individual schedules and coordinate particular on-site and off-site days. Hoxby also challenged the notion that firms need five days a week in the office in order to do spontaneous

4. Deloitte Insights, *Creating Pathways for Tomorrow's Workforce Today* (London: Deloitte Development LLC, 2021), https://www.themanufacturinginstitute.org/wp-content/uploads/2021/05/DI_ER-I-Beyond-reskilling-in-manufacturing-1.pdf.

collaboration. She argued that it is actually important to have a day or two away from other workers in order to finish projects and to spend the remaining days collaborating.

John Haltiwanger commented on how the spatial structure of the economy within a city might change when it comes to applications for new businesses. While applications for new businesses surged dramatically overall in 2020 and remained high throughout 2021 and 2022, the growth rate of new businesses during the pandemic was relatively low in areas such as Manhattan, relative to the surrounding counties in the New York metropolitan area.[5]

Gordon predicted that the cons of working from home would show up in the long run on downtown commercial real estate. He believed that as leases eventually come up for renewal, firms will decide to use less space, causing a collapse of commercial office construction and leading to a devastating effect on surrounding service businesses. Stijn Van Nieuwerburgh corroborated Gordon and stated that the number of newly signed leases for offices in some markets has fallen from 250 million per year to less than 100 million per year. Van Nieuwerburgh thought this impact would occur gradually: among all in-force leases as of the end of December 2019, only 38 percent came up for renewal in 2020 and 2021 combined, meaning there are still many firms that have yet to make decisions of whether to clear their office spaces.[6] Van Nieuwerburgh believed that the decline in property tax revenues from offices could potentially lead to an underfunding of mass transit and other public amenities. He then pondered how local decision makers can balance the tension between the local negative externalities created by remote work and the overall boost to productivity.

Hoxby pointed out that residential real estate and gentrification might also be affected if the extra day or two working remotely makes the home property further away from the city seem more appealing. Furthermore, stores in downtown areas might be adversely affected because, aside from more online shopping, individuals may now shop closer to home rather than coordinate it with going into the office.

Jason Furman was perplexed that his personal conversations with managers and business executives revealed completely opposite, negative opinions of working from home from what the authors presented. In trying

5. US Census Bureau, "Business Formation Statistics," https://www.census.gov/econ/bfs/index.html.

6. Arpit Gupta, Vrinda Mittal, and Stijn Van Nieuwerburgh, "Work from Home and the Office Real Estate Apocalypse," working paper, Social Science Research Network, November 26, 2022, figures 5 and 4, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4124698; data are from Compstak.

to understand the disconnect, he imagined that these managers might not see the same productivity gains or that they do not see the same willingness to take compensating differential pay cuts. Davis acknowledged that there is heterogeneity in how business people think about remote work, but he referenced evidence based on data from Lightcast (formerly Burning Glass) that show a sharp upward trend in job postings that allow for remote work since the summer of 2020.[7] Moreover, Davis said that SWAA data for the United States show that the initial employer resistance to working from home has gradually eroded and employer plans for work from home levels post-pandemic have drifted up since late 2020.

Betsey Stevenson remarked that while she was skeptical of the actual magnitudes in the willingness to pay to work from home estimate, she thought the paper did a better job at capturing differences between groups. She noted that understanding differentials is just as important because it could show how workers sort across communities and jobs and how that might have an impact on the gender wage gap. She appreciated the finding that people with the biggest productivity surprises are the most likely to keep working from home and claimed that it is evidence that businesses do experience learning shocks and correct their priors. To Gordon's point on directly measuring productivity, Stevenson added that another useful exercise is to compare the authors' productivity estimates to those by Fernald and Li, who examine the impact of COVID-19 on productivity and potential output.[8]

Gerald Cohen raised two questions. First, he asked whether the domestic outsourcing of workers—for instance, people living in Boise, Idaho, but working in San Francisco, California—would facilitate a trend to more international outsourcing, such as hiring workers who live in Bengaluru, India, but work for a San Francisco company. Second, Cohen inquired whether statistical agencies were collecting this information.

Davis concluded by encouraging researchers to access their data at the WFH Research website.

7. See Stephen Hansen, Peter John Lambert, Nick Bloom, Steven J. Davis, Raffaella Sadun, and Bledi Taska, "Remote Work across Jobs, Cities, and Countries" [slides], https://fbe.unimelb.edu.au/__data/assets/pdf_file/0020/4182320/remote_work_presentation_2.pdf; and Ethan Oldham and others, *Talent Playbook* (Boston: Lightcast, 2022), https://www.datocms-assets.com/62658/1663086344-lightcast-talent-playbook.pdf.

8. John Fernald and Huiyu Li, "The Impact of COVID on Productivity and Potential Output," in *Economic Policy Symposium Proceedings: Reassessing Constraints on the Economy and Policy* (Jackson Hole, Wyo.: Federal Reserve Bank of Kansas City, 2022).

Appendix Materials

A. Computing Country-Level Conditional Mean Outcomes

We compare outcomes of interest across countries after conditioning on demographics, education, industry and other observables. To do so, we fit an unweighted least-squares regression of the following form to the individual-level observations:

$$Y_{icw} = I_c + X_{icw}\beta + \varepsilon_{icw}, \qquad \text{(A.1)}$$

where Y_{icw} is the outcome of interest for person i in country c and survey wave w, I_c is a country-specific intercept term, X_{icw} is a vector of controls, and β is a conformable coefficient vector. For example, if we condition on a common set of fixed effects for age groups, gender, education categories, and industry sectors, then $X_{icw}\beta$ is a collection of fixed effects that are uniform across countries and survey waves.

After fitting the regression, we recover the estimated $\hat{I}_c$. Using the U.S. as our reference country, we compute $\bar{Y}_{c=US}$ as the raw U.S. mean outcome in the data pooled over Waves 1 and 2 and obtain the adjusted country-specific intercepts as $\tilde{I}_c = \hat{I}_c + \bar{Y}_{c=US}$. In words, the $\tilde{I}_c$ are country-level mean outcomes, conditional on the observables in X. This approach is easily adapted to obtain conditional means at the country-wave level or to fit the regression separately for various subsamples, as in Figures 5, 6 and A.2.

B. Additional Results and Information

Table A.1 reports G-SWA timing and observation counts by country-wave. Tables A.2 and A.3 report country-level summary statistics. Table A.4 compares G-SWA data with Gallup World Poll Data for 2017-2018 with respect to age, gender and educational attainment. (We do not yet have access to more recent Gallup data.) Gallup aims for nationally representative samples with exceptions for islands with small populations and areas that are unsafe to visit or accessible only by foot, animal or small boat. It relies on telephone surveys in countries with high phone penetration rates or where phone surveys are the customary method. Otherwise, it relies on an area frame design and face-to-face interviews. After restricting attention to full-time workers, 20-59, who finished primary school, we typically have 400-600 Gallup observations per country. We use Gallup sample weights in calculating the statistics reported in Table A.4. Tables A.5 through A.7 and figures A.1 through A.8 report additional results referenced in the main text.

Table A.1. G-SWA Country-Level Survey Waves: Timing and Observation Counts

		Observations			Observations	
Country	**Wave 1 (Mid 2021)**	**Raw Count**	**After Drops**	**Wave 2 (Early 2022)**	**Raw Count**	**After Drops**
Australia	July 27 - Aug. 6	709	574	Jan. 27 - Feb. 7	1117	881
Austria				Jan. 27 - Feb. 4	904	657
Brazil				Jan. 25 - Jan. 31	1001	734
Canada				Jan. 27 - Feb. 5	1137	895
China	July 29 - Aug. 7	994	875	Jan. 27 - Feb. 4	1162	1021
Egypt	July 23 - Aug. 3	606	504			
France	July 27 - Aug. 4	899	609	Jan. 27 - Feb. 4	1090	739
Germany	July 29 - Aug. 5	1505	1213	Jan. 27 - Feb. 3	1660	1313
Greece	July 23 - July 31	968	716	Jan. 26 - Feb. 8	1090	802
Hungary	July 23 - July 29	943	760	Jan. 26 - Feb. 4	1103	861
India				Jan. 27 - Feb. 4	1111	970
Italy				Jan. 27- Feb. 10	1111	930
Japan				Jan. 27 - Feb. 4	1075	924
S. Korea				Jan. 27 - Feb. 4	1150	1087
Malaysia				Jan. 27 - Feb. 7	1123	1012
Netherlands	July 29 - Aug. 9	1168	923	Feb. 1 - Feb. 10	1626	1314
Poland	July 23 - July 27	964	782	Jan. 26 - Feb. 2	1103	887
Russia				Jan. 25 - Feb. 4	1110	944
Serbia	July 23 - July 31	1040	913			
Singapore				Jan. 27 - Feb. 4	1153	1002
Spain				Jan. 27 - Feb. 8	1120	757
Sweden	July 30 - Aug. 9	1344	1279	Jan. 28 - Feb.11	1560	1073
Taiwan				Jan. 27 - Feb. 4	1156	1055
Turkey	July 23 - Aug. 1	972	807	Jan. 26 - Feb. 5	1127	960
UK	July 28 - Aug. 6	793	635	Jan. 27 - Feb. 9	1110	866
Ukraine	July 23 - Aug. 2	917	804	Jan. 26 - Feb. 7	1097	921
USA	July 27 - Aug. 4	1043	835	Jan. 28 - Feb. 6	1594	1244
Total		14,865	12,229		29,590	23,849

Notes: We drop part-time employees and those who did not finish primary school before computing the Wave-1 counts. We did not sample part-time employees and those who did not finish primary school in Wave 2.

Table A.2. Country-Level Summary Statistics, Raw Sample Means after Drops

		WFH Days Per Week						
		Actual,	Post-Pandemic		WFH	Roundtrip	Willingness to	Change in
Country	Age	Survey Week	Employer Plans	Worker Desires	Productivity Surprises	Commute Time	Pay for WFH Option	Social Acceptance
Australia	41	2.4	1.2	2.2	8.3	71	6.4	46
Austria	41	1.4	0.8	1.5	6.3	60	3.8	39
Brazil	38	1.6	0.7	2.3	9.4	74	7.3	50
Canada	41	2.4	1.1	2.3	7.2	57	5.6	39
China	36	1.4	0.7	1.4	4.1	99	5.7	37
Egypt	38	1.0	0.6	2.2	7.4	81	8.6	45
France	41	1.3	0.6	1.3	7.3	54	1.9	32
Germany	42	1.4	0.7	1.6	5.9	56	3.5	33
Greece	41	1.6	0.5	1.7	6.2	55	5.3	33
Hungary	41	1.7	0.7	1.7	6.4	59	5.5	32
India	35	3.3	2.3	2.6	11.0	98	9.2	60
Italy	41	1.7	0.6	1.8	8.6	50	5.9	35
Japan	41	1.2	0.6	1.5	5.2	72	3.8	26
S. Korea	41	0.8	0.6	1.4	6.5	80	4.1	44
Malaysia	37	2.5	1.1	2.1	5.7	64	4.8	36
Netherlands	40	2.0	1.1	1.7	8.4	68	4.2	37
Poland	39	1.3	0.7	1.5	7.4	50	3.0	25
Russia	40	1.4	0.9	2.2	6.4	68	6.0	25
Serbia	42	1.0	0.3	1.8	4.6	54	9.5	27
Singapore	40	2.9	1.4	2.6	7.3	91	6.1	46
Spain	39	1.6	0.8	2.1	8.8	53	5.4	45
Sweden	41	1.6	0.6	1.8	9.0	54	5.4	42
Taiwan	40	1.0	0.4	1.5	1.2	57	0.6	22
Turkey	38	2.2	1.0	2.1	9.3	69	8.5	49
UK	42	2.2	1.1	2.1	8.4	64	4.9	39
Ukraine	38	1.5	0.6	2.0	5.4	68	13.0	32
USA	41	1.6	0.8	2.1	8.1	48	5.7	39

Notes: See Table A.1 for observation counts. We pool data over G-SWA Waves 1 and 2 when data from both waves are available.

Table A.3. Country-Level Summary Statistics, Percentages

		Highest Educational Attainment			Children	Roundtrip Commute Times	
	Women	**Secondary**	**Tertiary**	**Graduate**	**Under 14**	**< 20 minutes**	**>60 minutes**
Australia	49	21	34	46	45	15	57
Austria	50	55	22	23	25	18	44
Brazil	51	74	19	7	43	24	50
Canada	49	37	34	29	.	25	42
China	49	10	77	13	59	8	68
Egypt	24	14	68	18	73	13	61
France	48	47	34	19	41	26	37
Germany	49	70	9	21	22	21	40
Greece	47	24	30	46	40	26	41
Hungary	51	60	16	24	32	25	44
India	48	9	13	78	64	12	71
Italy	51	34	41	25	.	28	32
Japan	48	43	49	8	.	21	57
S. Korea	47	5	61	34	.	11	68
Malaysia	51	17	49	34	.	13	53
Netherlands	45	19	53	28	33	17	52
Poland	51	59	15	26	50	26	37
Russia	51	6	28	66	56	15	57
Serbia	54	35	23	42	40	23	39
Singapore	48	10	37	53	.	3	82
Spain	50	21	44	35	37	23	36
Sweden	57	51	27	22	39	24	40
Taiwan	50	10	73	17	.	20	46
Turkey	48	3	21	76	63	12	58
UK	47	35	29	36	33	21	48
Ukraine	46	27	23	50	50	13	56
USA	50	51	28	21	32	29	32

Notes: See Table A.1 for observation counts. We pool data over G-SWA Waves 1 and 2 when data from both waves are available.

Table A.4: Comparisons of G-SWA Data with Gallup World Poll Data,

	Share of women		Average age		Secondary education, %		Tertiary or More, %	
Country	**Gallup**	**G-SWA**	**Gallup**	**G-SWA**	**Gallup**	**G-SWA**	**Gallup**	**G-SWA**
Australia	39.36	48.93	42.62	40.71	60.78	20.62	39.22	79.38
Austria	46.81	50.08	40.92	40.75	83.26	54.95	16.74	45.05
Brazil	42.58	51.23	35.32	37.71	83.52	74.39	16.48	25.61
Canada	44.03	48.94	40.4	41.04	65.99	37.32	34.01	62.68
China	42.86	48.63	33.43	35.52	72.89	10.39	27.11	89.61
Egypt	18.06	23.81	37.64	38.22	72.02	14.48	27.98	85.52
France	42.79	47.63	40.86	40.93	71.69	46.74	28.31	53.26
Germany	49.47	49.49	42.64	41.64	68.95	70.03	31.05	29.97
Greece	42.1	46.97	39.37	41.19	66.83	24.04	33.17	75.96
Hungary	47.8	50.83	41.1	40.71	73.06	60.15	26.94	39.85
India	14.8	48.35	33.36	34.82	88.93	9.07	11.07	90.93
Italy	37.11	50.97	41.13	41.4	79.8	33.66	20.2	66.34
Japan	39.67	48.48	41.45	40.93	64.99	42.75	35.01	57.25
S. Korea	37.89	47.29	40.58	41.31	39.22	4.88	60.78	95.12
Malaysia	37.28	50.99	35.51	37.32	73.07	17.39	26.93	82.61
Netherlands	32.07	45.24	39.79	40.42	54.26	18.69	45.74	81.31
Poland	48.95	51.23	39.73	39.22	68.94	58.72	31.06	41.28
Russia	49.27	50.95	39.62	39.8	62.68	5.72	37.32	94.28
Serbia	46.43	53.67	41.02	41.87	70.96	34.94	29.04	65.06
Singapore	47.54	48.3	40.22	40.32	59.89	10.18	40.11	89.82
Spain	40.84	50.33	38.88	39.41	90.39	20.61	9.61	79.39
Sweden	45.6	56.72	40.2	41.44	67.3	51.11	32.7	48.89
Taiwan	48.86	50.24	38.72	40.08	47.15	10.14	52.85	89.86
Turkey	29.78	48.27	34.98	38.09	73.6	3	26.4	97
UK	48.56	46.9	40.28	42.04	58.07	35.38	41.93	64.62
USA	46.57	49.59	38.79	40.98	57.23	51.23	42.77	48.77
Ukraine	48.75	46.38	39.4	38.21	69.89	26.78	30.11	73.22

Note: We use Gallup data from 2017 and 2018 for full-time workers aged 20-59 who finished primary school. Among those who have a college degree or at least four years of post-secondary education, Gallup does not identify persons with a graduate degree.

Table A.5. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns, adding controls for cumulative mask mandates

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

Note: The measure of Cumulative Mask Mandates is standardized to zero mean and unit standard deviation across countries. Specifications and samples are otherwise identical to the ones in Table 2. Errors clustered at the country level.

Table A.6. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns, Using subnational variation where available

Outcome →	(1) Days WFH this week	(2) Desired days WFH per Week	(3) Planned days WFH per Week	(4) Amenity value of WFH option
Cumulative Lockdown Stringency	0.155**	0.060	0.103**	0.103
	(0.066)	(0.057)	(0.038)	(0.355)
Cumulative COVID-19 deaths per capita	-0.010	0.041	-0.041	0.237
	(0.082)	(0.058)	(0.048)	(0.309)
Observations	33091	36078	34875	36078
R^2	0.095	0.069	0.083	0.056

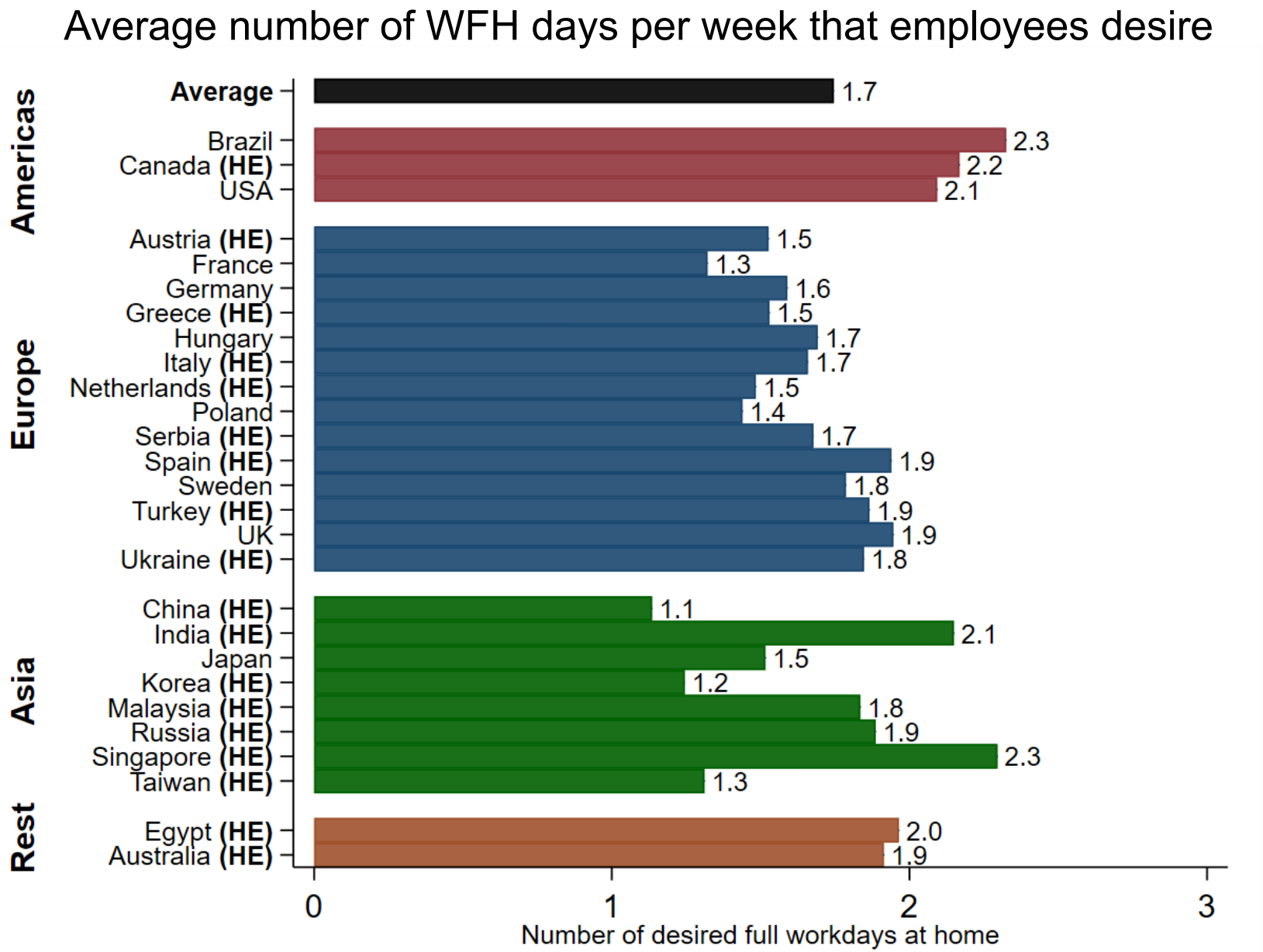
Note: The regressions in this table use subnational values for reported COVID deaths and lockdown stringency for Australia, Brazil, Canada, China, India and the United States and national values for the other countries. The specifications and samples are otherwise identical to the ones used in Table 2.

Table A.7. Current and planned levels of WFH rise with cumulative lockdown stringency, using the Oxford stringency index

Outcome →	(1) Actual Days WFH per week	(2) Desired days WFH per Week	(3) Planned days WFH per Week	(4) Amenity value of option to WFH 2-3 days a week
Cumulative Lockdown Stringency	0.251***	0.0496	0.133*	0.489
	(0.0890)	(0.0674)	(0.0681)	(0.466)
Cumulative COVID-19 deaths per capita	0.00498	0.0520	-0.0289	0.281
	(0.0862)	(0.0607)	(0.0546)	(0.300)
Observations	33091	36078	34875	36078
R^2	0.099	0.068	0.084	0.057

Note: Specifications and samples follow Table 2, except for replacing our CLS index with a cumulative version of the Hale et al. (2021) stringency index. Relative to our index, theirs uses additional inputs that pertain to the cancellation of public events, restrictions on gathering size, public transport closures, restrictions on internal movements, restrictions on international travel, and public information campaigns.

Figure A.1. Desired Levels of Working from Home after the Pandemic

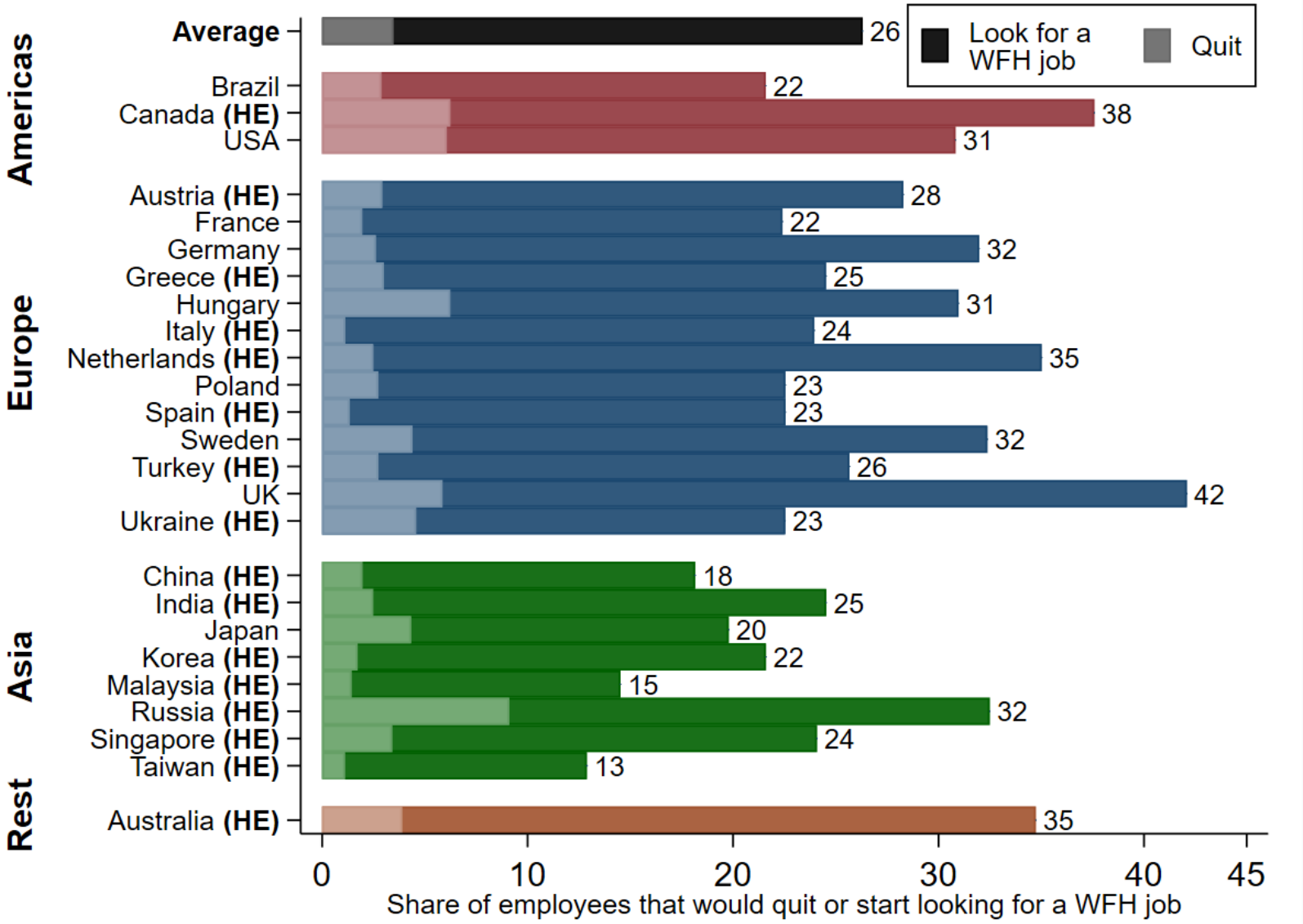


Question: "After COVID, in 2022 and later, how often would you like to work from home?"

The chart reports coefficients on country dummies in OLS regressions that control for gender, age, education, industry and survey wave, treating the raw U.S. mean as the baseline value. We fit the regression to data for 36,078 G-SWA respondents who were surveyed in mid 2021 and early 2022. The "Average" value is the simple mean of the the country-level values.

Figure A.2. Many Workers Will Quit Or Seek a New Job If Required to Return to the Employer's Worksite 5+ Days Per Week

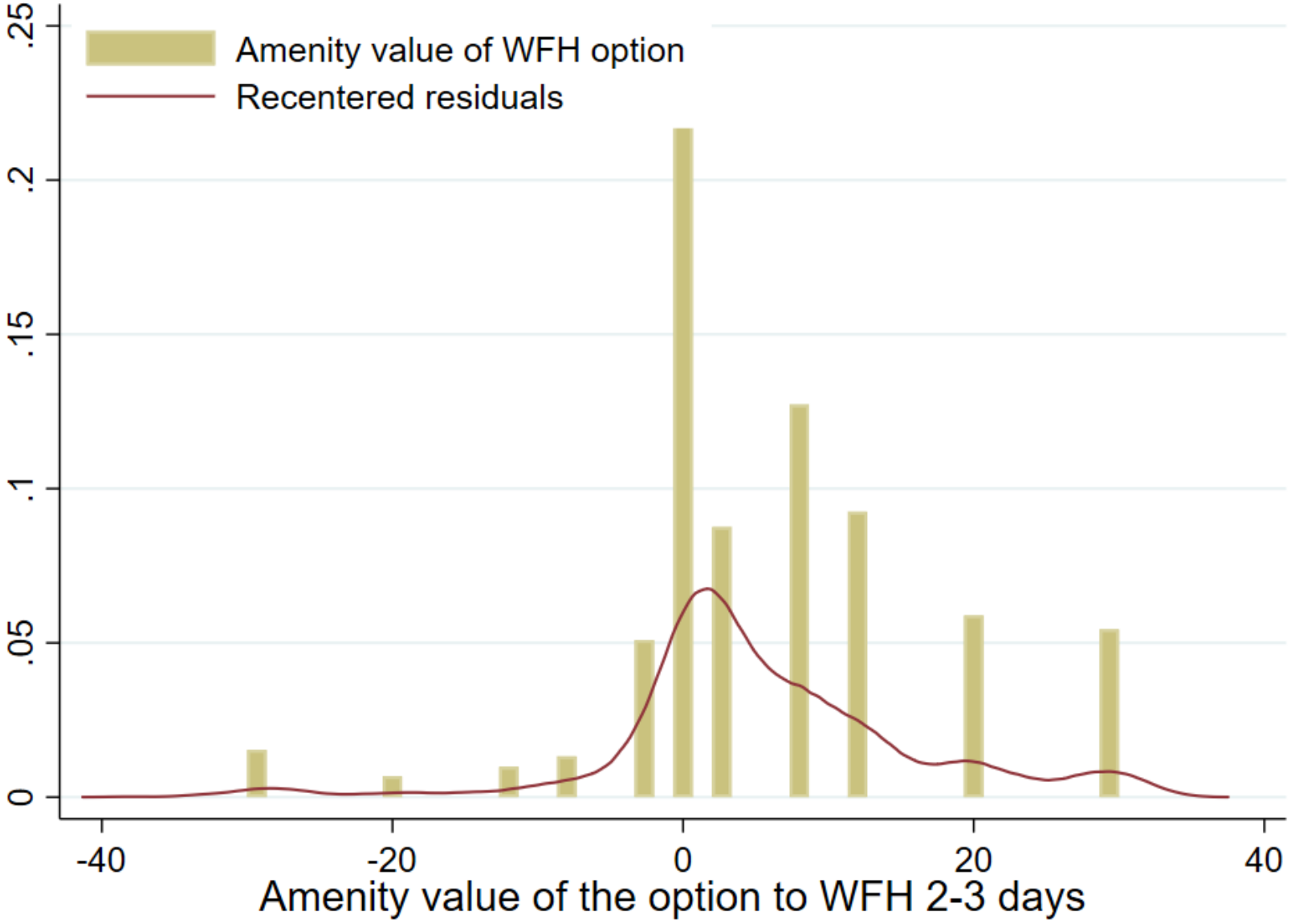
Percent of employees that would quit immediately or seek a new job that allows WFH



Question: "How would you respond if your employer announced that all employees must return to the worksite 5+ days a week, starting on February 1, 2022?" Options:
- Comply and return.
- Seek job that lets me WFH 1-2 days
- I would quit the job

The chart reports regression-adjusted conditional means, as in the previous figures. We fit the regression data for 9,975 G-SWA respondents in early 2022 who worked from home at least one day in the survey week.

Figure A.3. Histogram of the Willingness to Pay for the Option to Work from Home 2-3 Days per Week

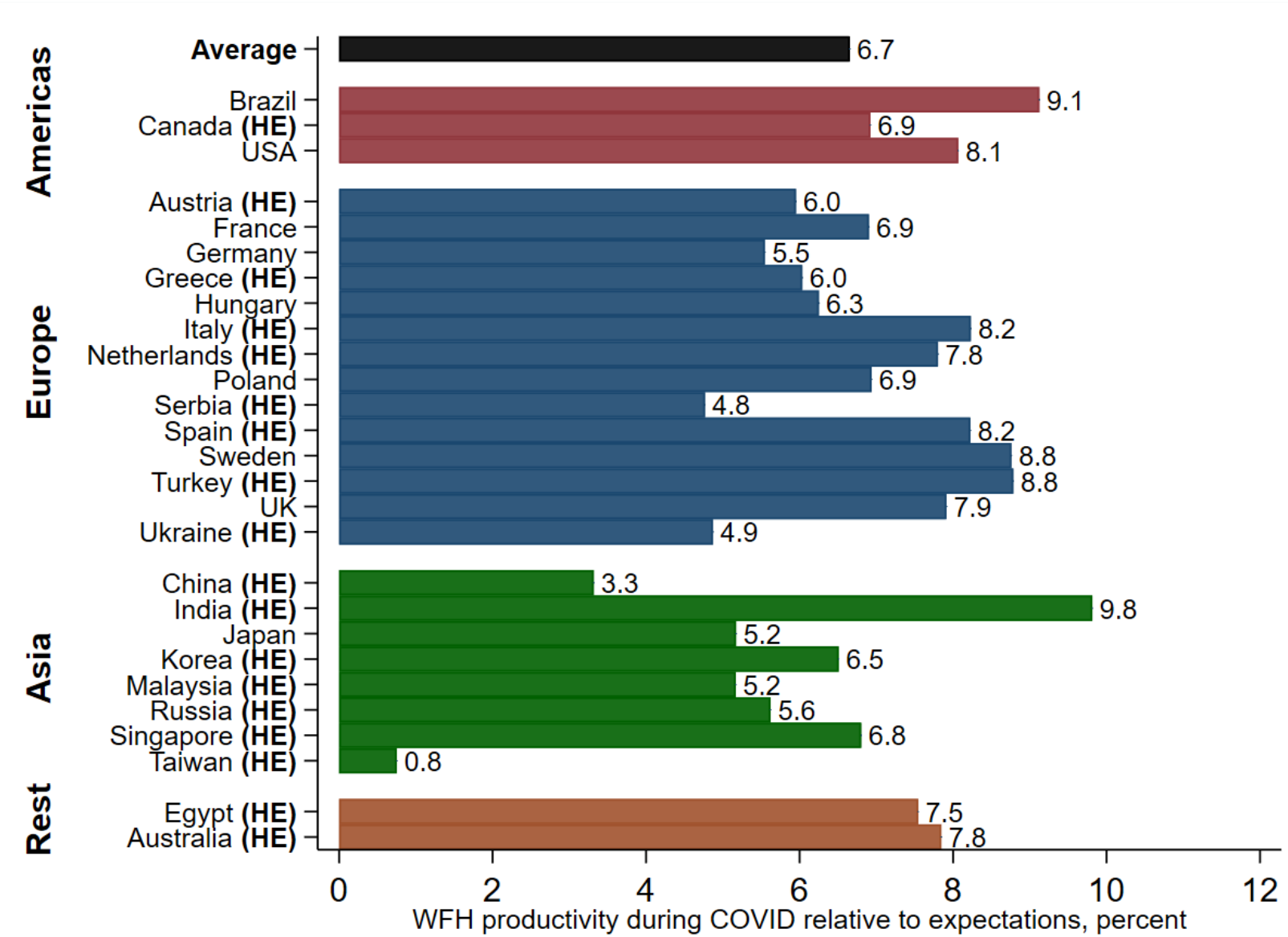


Question: "After COVID-19, in 2022 and later, how would you feel about working from home 2 or 3 days a week?" and "How much of a pay raise [cut] (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?"

The bar chart shows the histogram of responses. The kernel density is fit to residuals from a regression that controls for gender, age groups, education groups, 18 industry sectors, survey wave and country fixed effects. We recenter the residuals by adding back the raw mean amenity value.

The standard deviation (SD) of the amenity value is 10.97 and the SD of the residuals is 10.51.

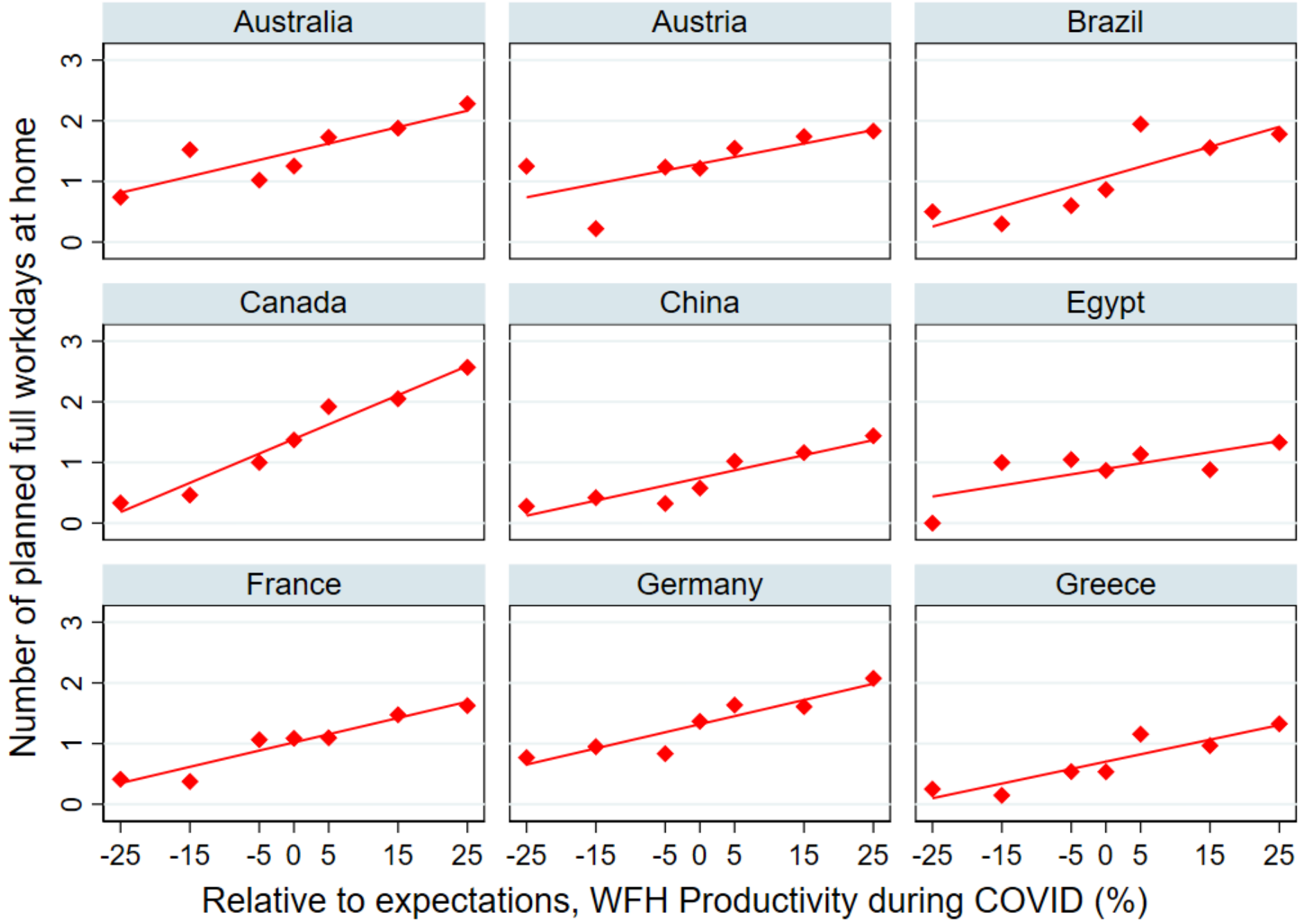
Figure A.4. Working from Home Productivity Surprises Are Positive, on Average, in All Countries

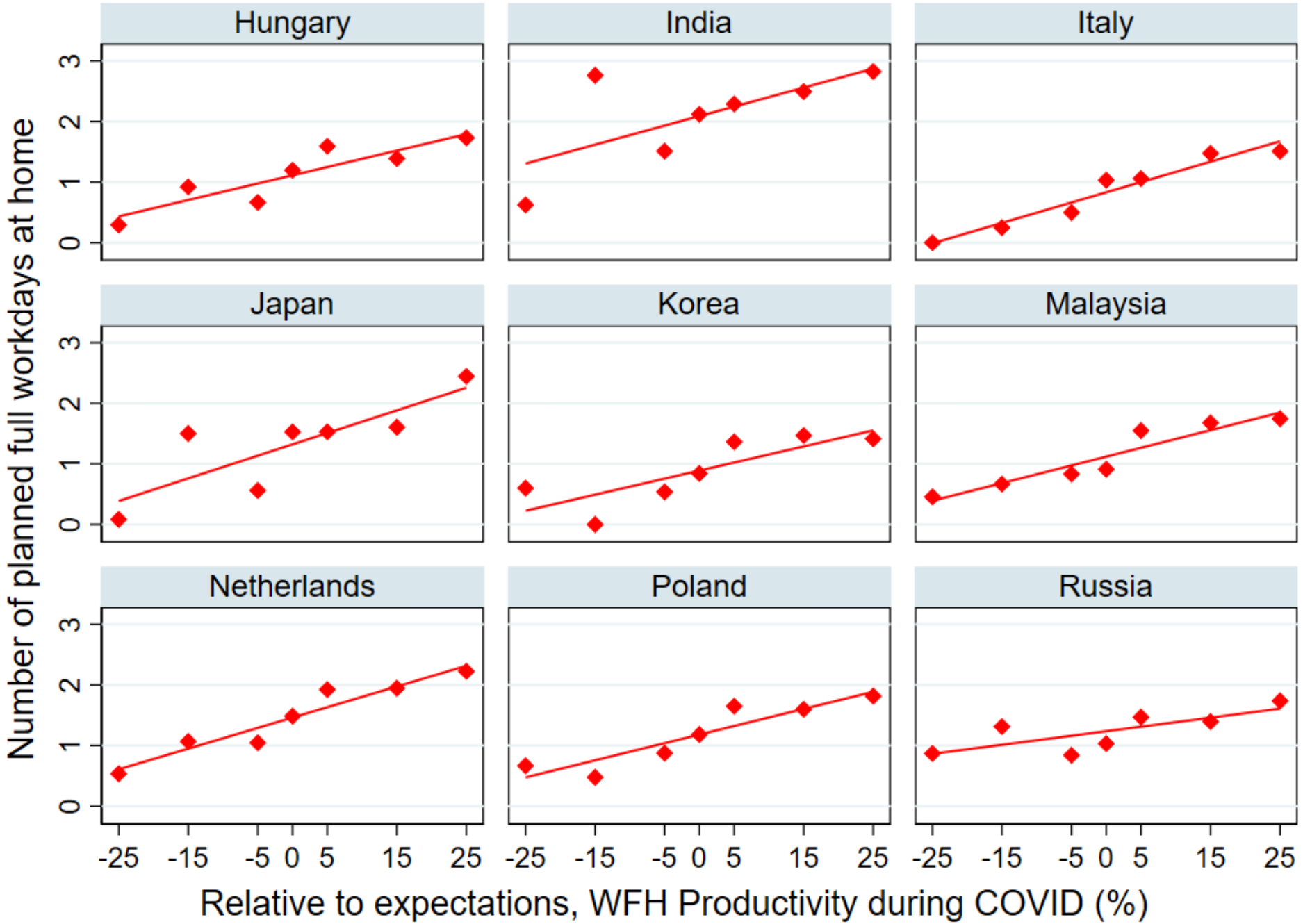


Question: ‘’Compared to your expectations before COVID how has working from home turned out for you?’’ See previous slides for response options. Country-level values are conditional means. The “Average” value is the unweighted average of the the country-level conditional means. Gross productivity surprise in parentheses.

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

Figure A.5. Planned WFH Levels Rise with the WFH Productivity Surprise in All Countries




Hungary
India
Italy
Japan
Korea
Malaysia
Netherlands
Poland
Russia
Number of planned full workdays at home
0
1
2
3
-25
-15
-5
0
5
15
25
Relative to expectations, WFH Productivity during COVID (%)

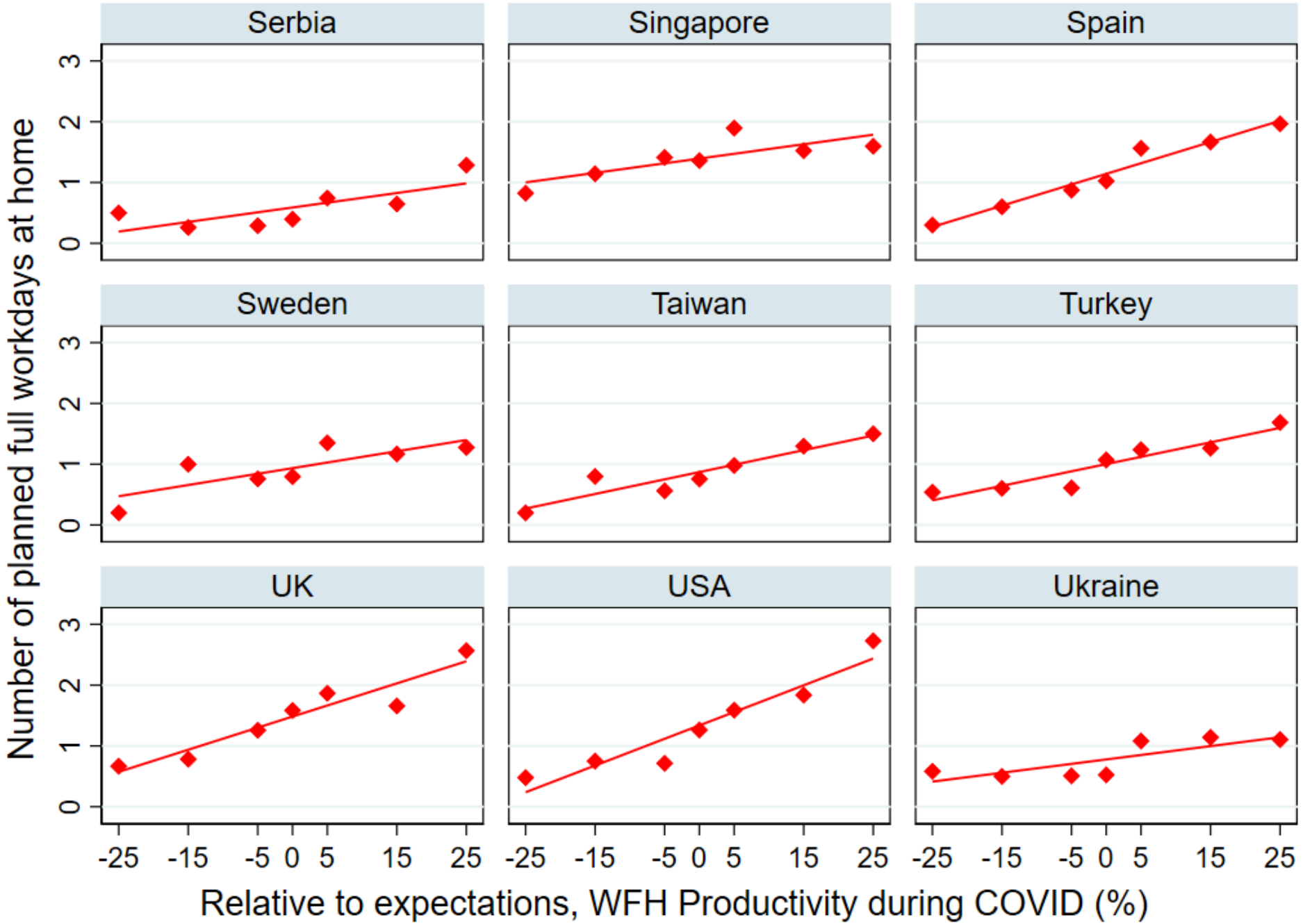
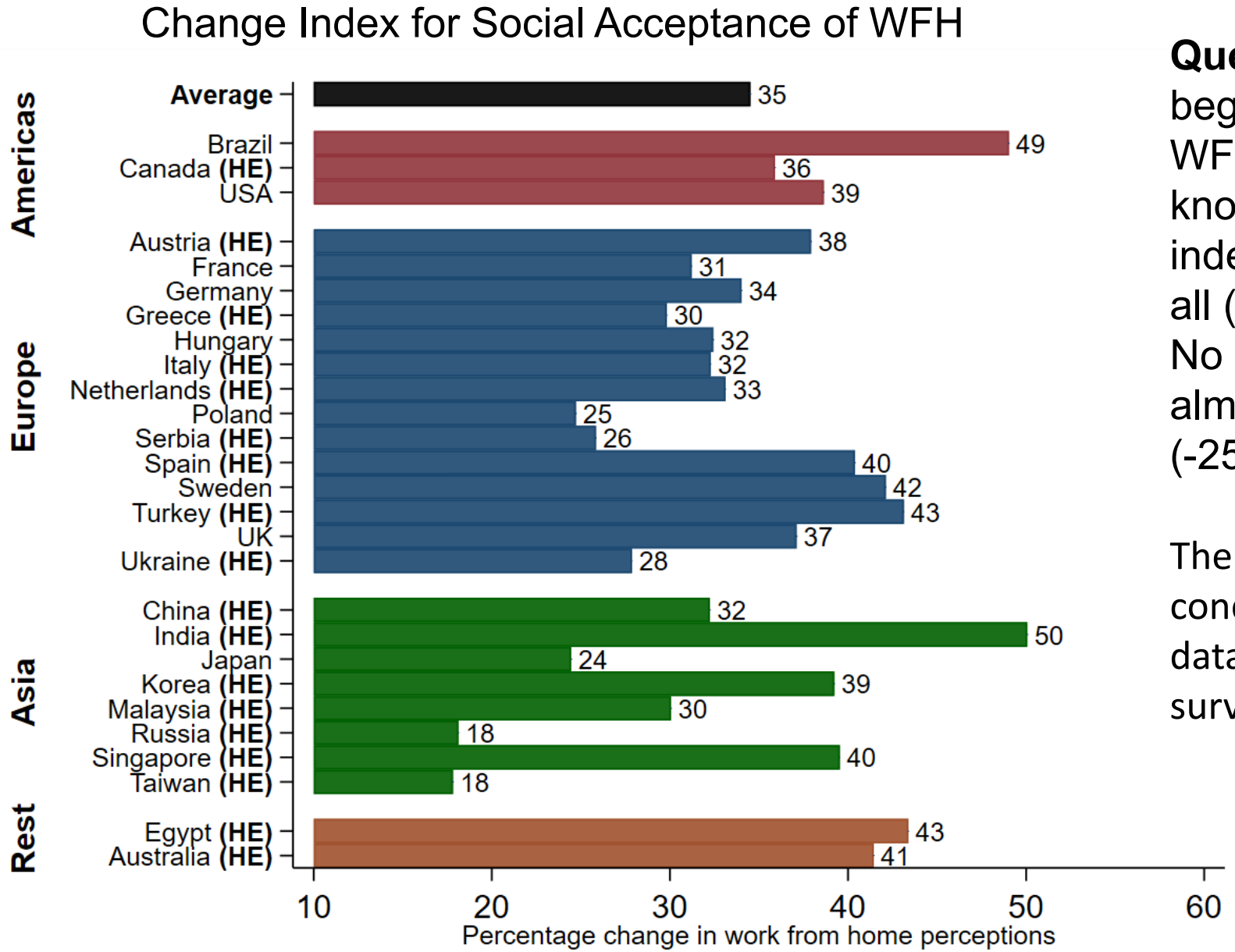

Serbia
Singapore
Spain
Sweden
Taiwan
Turkey
UK
USA
Ukraine
Number of planned full workdays at home
0
1
2
3
-25
-15
-5
0
5
15
25
Relative to expectations, WFH Productivity during COVID (%)

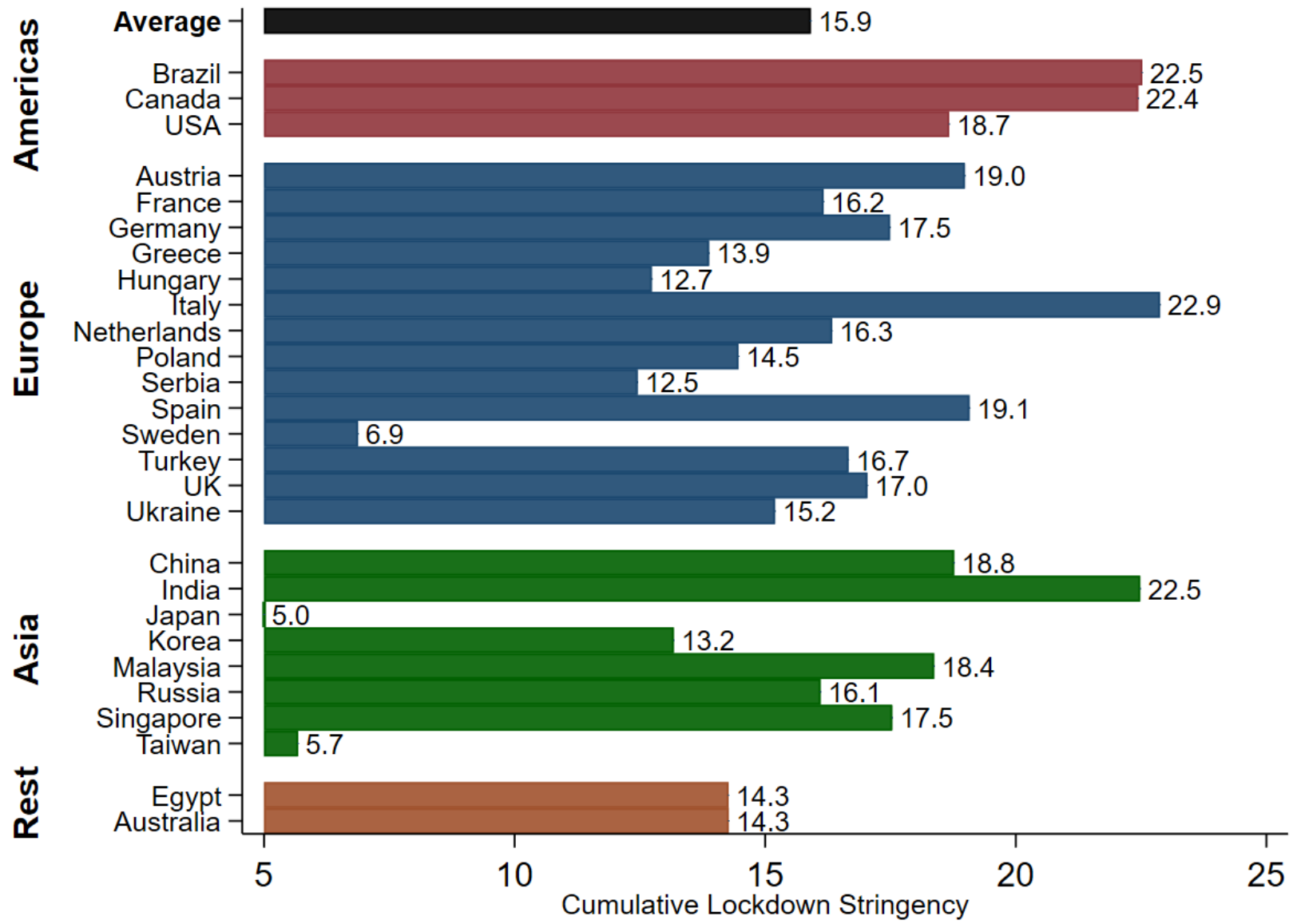
Figure A.6. The Social Acceptance of Work from Home Is Much Greater Now than before the Pandemic



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

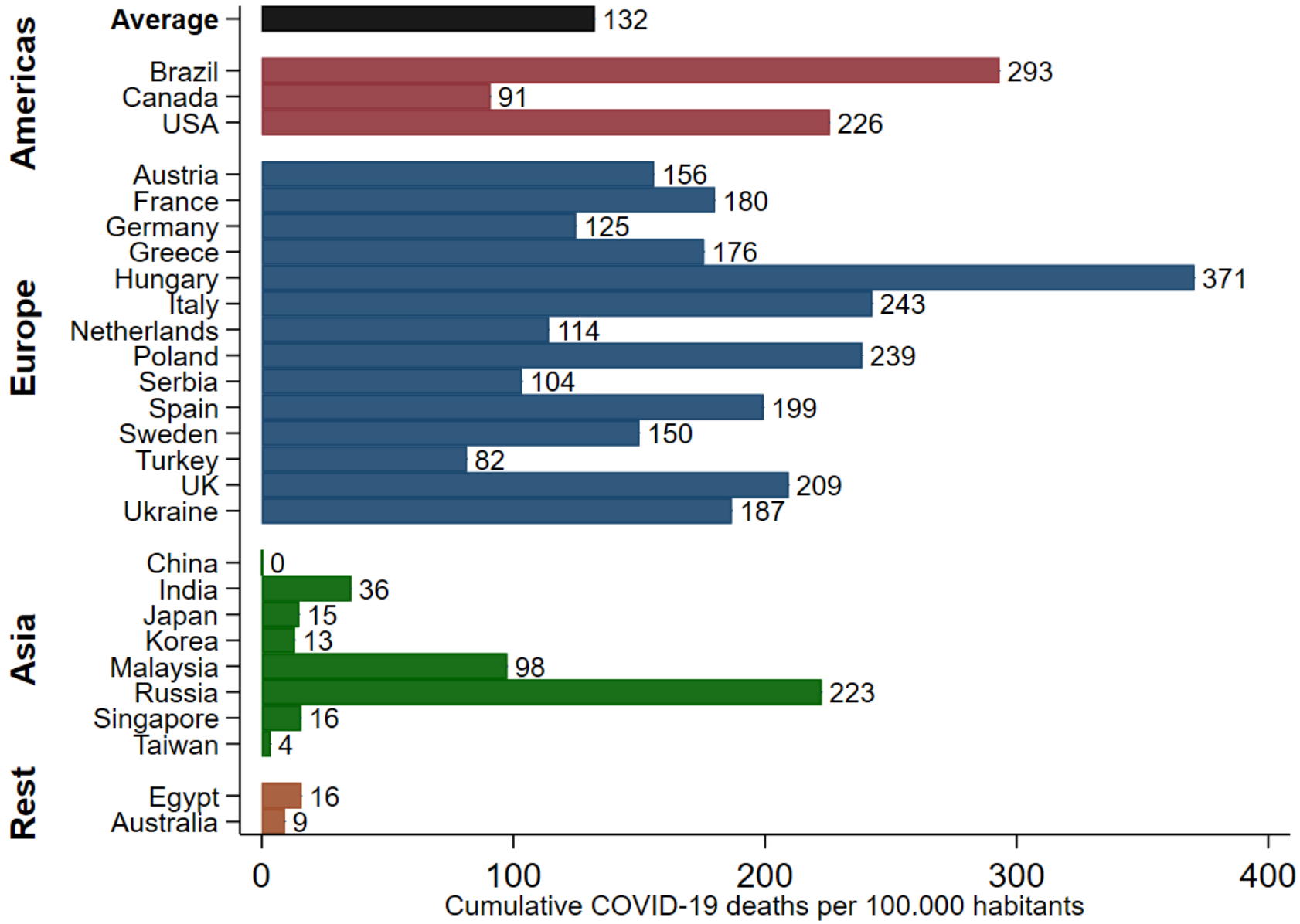
The chart reports regression-adjusted conditional means. We fit the regression to data for 36,078 G-SWA respondents surveyed in mid 2021 and early 2022.

Figure A.7. Cumulative Lockdown Stringency by Country



Note: This chart reports each country's Cumulative Lockdown Stringency (CLS) value based on data from March 2020 through the month before the survey month. For countries covered in both waves, we report the two-wave average value.

Figure A.8. Cumulative reported COVID-19 Deaths per Capita by Country



Note: This chart reports each country's cumulative COVID-19 deaths per 100,000 persons based on data from March 2020 through the month before the survey month. For countries covered in both survey waves, we report the two-wave average value.