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Working from Home Around the World

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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 27 countries as of mid 2021 and early 2022. Our cross-country comparisons control for age, gender, education, and industry and treat the U.S. 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 2-3 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.

Keywords: Work from home, preferences over working arrangements, commute times, COVID-19 pandemic, productivity surprises, government lockdown effects, innovation, cities

JEL Classification: J2, D22, E24, L23

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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 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 previous 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 work from home (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 27 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, aged 20-59, who finished primary school and investigate how outcomes, plans, desires and perceptions around WFH vary across persons and countries. In making comparisons across countries, we consider conditional mean outcomes that

[1] This pattern is typical in many-country online surveys. See Alsan et al. (2021), Stantcheva (2021), and Dechezleprêtre et al. (2022).

control for gender, age, education and industry at the individual level, treating the raw U.S. mean as the baseline value. These values should not be understood as estimated means for the working-age populations or overall workforces 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 U.S., 2.0 in the U.K, 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 U.S. data from the Survey of Working Arrangements and Attitudes (SWAA) also show a large gap between employer plans and worker desires in this regard.

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 www.WFHresearch.com 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 et al. (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 et al. (2021) find the same pattern through September 2021 in vacancy postings for 20 OECD countries. This pattern suggests that remote-work practices are becoming more firmly rooted, even as COVID deaths decline. Finally, the share of U.S. patent applications that advance video conferencing and other remote-interaction technologies doubled in the wake of the pandemic (Bloom, Davis and Zhestkova, 2021). This re-direction of innovation efforts suggests that remote-work technologies will continue to improve, further encouraging the use of remote-work practices.

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 over 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 U.S. We investigate how this explanation fares in our 27-country sample.

Fears of contracting COVID 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 27 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 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 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.

What does a large, lasting shift to remote work portend for workers? According to G-SWA data, employees view the option to WFH 2-3 days a week as equal in value to 5% 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 U.S. 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 men and women more highly value the option to WFH when they have children under 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-squared 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 U.S.-centric analysis of Barrero, Bloom and Davis (2021c) and borrow heavily from their SWAA questionnaire in designing our survey questions. Criscuolo et al. (2021) survey managers and employees about their experiences and expectations around WFH in 25 countries. They find "a large majority of managers and workers had a positive experience from teleworking" during the pandemic, which aligns well with our evidence and with evidence for American managers and workers in Ozimek (2020) and Barrero et al. (2021c). Criscuolo et al. (2021) also investigate how managerial experiences relate to future WFH levels in their organizations. Managers that 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 many-country survey of managers strongly aligns with our evidence from a many-country survey of workers.

Many studies examine the huge uptake in WFH in spring 2020.[2] Our surveys went to field 16 to 23 months after the pandemic's onset and reflect experiences and perceptions at that time. Previous studies also document preference heterogeneity around WFH in various settings and using a range of empirical methods.[3] 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

[2] See, for example, Adams-Prassl et al. (2020), Barrero et al. (2020b), Bartik et al. (2020), Bick et al. (2022), Brynjolfsson et al. (2020), Eurofound (2020) and Ker et al. (2021).
[3] See, for example, Bloom et al. (2015), Mas and Pallais (2017), Wiswall and Zafar (2020), He et al. (2021), Barrero et al. (2021c), and Lewandowski et al. (2022).

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.[4]

Adrjan et al. (2022) 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).

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

The G-SWA covers full-time workers, aged 20-59, who finished primary school in 27 countries.[5] 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 U.S. SWAA developed by Barrero et al. (2021c). We enlist professionals to translate our original English-language questionnaire into the major languages of each country.[6] To ensure high-quality translations, we also enlist an independent 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

[4] See Alipour, Fadinger and Schymik (2021), Bai et al. (2021), Berniel et al. (2021), Barrero, Bloom and Davis (2021b) and Eberly, Haskel and Mizen (2021).
[5] Wave 1 includes part-time workers and those who did not finish primary school, but we omit them in our analysis.
[6] 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.

research.[7] 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 panel 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.[8]

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, Stancheva and Teso (2018) for an early multi-country 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 market research."[9] Cint has "239+ m[illion] engaged respondents" across 130 countries; and it operates more than 4,600 survey panels that are tapped by more than 3,200 clients, including Zappi, SurveyMonkey, Qualtrics, Ipsos and Nielsen.[10] 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.

Thus far, the G-SWA went to field in 15 countries in late July and early August 2021 and in an overlapping set of 25 countries in late January and early February 2022. Wave 2, which covers 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 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.

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[7] 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.

[8] We do not contact respondents ourselves, do not collect personally identifiable information, and have no way to re-contact them.

[9] https://www.cint.com, accessed 3 August 2022.

[10] https://www.cint.com, accessed 3 August 2022.

Before proceeding to our analysis of the G-SWA data, we drop "speeders," defined as respondents in the bottom 5% of the completion-time distribution for each country. We also drop the roughly 15% 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 …" After these drops, our analysis sample contains 12,229 observations across 15 countries in Wave 1 and 23,849 observations across 25 countries in Wave 2. 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 10 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, smart-phone, 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.

Table A.4 compares our country-level G-SWA samples to Gallup data for 2017-18. The comparisons suggest that our samples are reasonably representative of full-time workers, 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% of G-SWA respondents completed college as compared to only 27% in the Gallup data.[11] Accordingly, 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.

[11] 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 25 and older with a college degree often differ by ten percentage points or more (in both directions) from analogous statistics obtained from the World Bank and the European Social Survey. The WB and ESS statistics also differ from each other, sometimes by ten percentage points or more (again, in both directions).

2. Working from Home in 27 Countries

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 days are you working from home this week?" Response options range from 0 to 5+ days per week.[12] The figure reports conditional mean responses, which we obtain from the coefficients on country-level dummies in an OLS regression, treating the raw U.S. mean as the baseline. The regression controls for gender, age groups (20-29, 30-39, 40-49, 50-59), education groups (Secondary, Tertiary, Graduate), 18 industry sectors, and survey wave. 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 for 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 U.S. 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 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 U.K and 1.8 in

[12] 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.

India. The U.S. 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 3. 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.[13] 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 U.S. (Barrero et al., 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.[14] 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 U.S. show an upward revision of 0.57 days per week over the 11-month period from 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.

[13] According to SWAA data at https://wfhresearch.com/wp-content/uploads/2022/07/WFHtimeseries_monthly.xlsx, American workers desire an average 2.2 WFH days per week as of February 2022. According to Gallup's State of the Workforce survey in May/June 2021, 91% 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).

[14] Monthly SWAA statistics for U.S. 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/.

B. People Like Working from Home

Figure 3 suggests that people highly value the opportunity to WFH. Indeed, when asked directly, G-SWA respondents say the option to WFH 2-3 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-19, 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 25% pay raise."[15] 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 4. On average across countries, employees value this WFH option at 5% of pay. The country-level conditional mean willingness to pay is slightly negative for Taiwan and positive for all other countries, ranging upwards to about 7-8% of pay in Brazil, Egypt, India and Turkey to 8.8% in Serbia and nearly 12% 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 (Figure 3). As shown in Figure 5, 26% of employees who currently WFH one or more days per week would quit or seek a job that allows WFH, if their employers require a return to 5+ days per week onsite. Using SWAA data for U.S. workers, Barrero et al. (2021a) find that more than 40% of those who currently WFH one or more days per week would quit or seek a new job if their employers require a full return to the company worksite. Bloom et al. (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

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

resulting data to construct an implied willingness-to-pay distribution for the option to WFH, obtaining a mean value of 8%. Bloom, Han and Liang (2022) conduct a randomized control trial of engineers, 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% and raised self-reported work satisfaction. After Spotify adopted a "work from anywhere" policy, attrition rates fell 15% 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 6, roundtrip commute times average 64 minutes per day in our sample, ranging from 48 minutes in Serbia and the U.S. 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.[16] 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 et al. (2021c) present survey evidence of what American workers like and dislike about WFH and about work on business premises. When asked "What are the top benefits of working from home?" and allowed to selected up to three options, 51% say "No commute," 44% say "Flexible work schedule," 41% say "Less time getting ready for work," "37% say "Quiet," and 18% say "Fewer meetings." When asked "What are the top benefits of working on your employer's business premises?" 49% say "Face-to-face collaboration," 49% says "Socializing," 41% say "[maintaining] Work/personal life boundaries," and 40% say "Better equipment." [17] Thus, both WFH and work 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 et al, 2022c, slide 22). Gallup's State of the Workforce survey conducted in May/June 2021 shows the

[16] See, for example, Mas and Pallais (2017), Angelici and Profeta (2020), Barrero, Bloom and Davis (2021a,c) and Saad and Wigert (2021).
[17] See slide 27 in Barrero et al. (2022c), which tabulates SWAA data from February through June 2022.

same pattern (Saad and Wigert, 2021). Barrero et al. (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.

C. The Structure of Preferences over WFH

Table 1 explores the structure of preferences around the option to WFH 2-3 days a 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% of pay. People living with children under 14 more highly value WFH, again with a differential greater than 1% 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 (4) says that graduate degree holders value the option to WFH at an extra 2.5% 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 U.S. in Barrero et al. (2021b,c).

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-squared values rise by about three 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 fit. In a more flexible nonparametric specification, the willingness to pay to WFH 2-3 days per week exceeds 2% of pay for someone with a roundtrip commute of more than one hour relative to an observationally similar person who commutes less than 20 minutes per day.

Figures 7 and 8 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 4, except we now fit the regressions separately for each subsample, e.g., men and women. Figure 7 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 restrict attention to single persons with no children, as shown in Panel C of Figure 8. 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 care-giving 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 8 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.

Returning to Table 1 and Figures 4 to 8, we make two additional observations. First, the results in Table 1 and Figures 7 and 8 imply large mean differences in the willingness to pay between well-defined demographic groups. Consider two hypothetical persons: A married woman with a graduate degree, children under 14, and a 45-minute one-way commute from her suburban home; and a single, college-educated man who lives five minutes from the office. This hypothetical woman values the WFH option at an extra 4.6% of pay compared to the hypothetical man, according to Column (3) of Table 1. The differential is 5.8% of pay when we use a nonparametric specification for commute time in an otherwise identical regression We could easily construct comparisons that yield larger differences by considering worker age, for example. If Table 1 and Figures 7 and 8 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 course age bins with two-year bins and relax linearity over commute time, the R-squared values never reach 0.12. While measurement error may play a role here, we see the modest R-squared values as an important result. Along with the dispersed response distribution for the dependent variable (Figure A.1), 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.

3. How the Pandemic Catalyzed a Big Shift to WFH

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 to 10% to 19% more productive than I expected
c. Better – I am 1% to 9% more productive than I expected
d. About the same
e. Worse – I am 1% to 9% less productive than I expected
f. Substantially worse – I am to 10% to 19% less productive than I expected
g. Hugely worse – I am 20%+ less productive than I expected

Figure 9 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. Now consider the effects of dispersed WFH productivity surprises. 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 9 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. Figure 10 shows that the conditional mean WFH productivity surprise is positive in all 27 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.[18]

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 0 days, options c through g as 1 to 5 days, respectively, and drop persons with no employer from the following analysis.

Figure 11 shows the cross-sectional relationship between employer plans and productivity surprises in the pooled G-SWA data. Planned levels of WFH after the pandemic strongly increase with WFH productivity surprises during the pandemic.[19] 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. Figure A.2 shows that this strong positive relationship between WFH productivity surprises and planned WFH levels holds in all 27 countries. Barrero, Bloom and Davis (2021c) find the same strong relationship between WFH productivity surprises and WFH plans using U.S. survey data from July 2020 to March 2021.

[18] 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 et al. (2021c) obtain very similar findings in U.S. data for the period from July 2020 to March 2021, much closer to the onset of the pandemic.

[19] If primacy bias influences our survey responses, the effect is to attenuate the relationships depicted in Figures 11 and A.2 and the corresponding figure in Barrero et al. (2021c). This observation follows from the response orderings in the questions that elicit the data behind these figures.

The evidence in Figures 9, 10, 11 and A.2 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 pre-conditions for the shift were also in place: Major advances during previous decades in the technologies, infrastructure, and products that support the internet, two-way video, and other forms of remote interaction.

Our three-part explanation 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) offer a different answer to the question of why remote work was rare before the pandemic. In their study of call-center employees at a major online retailer, they find large productivity gains for employees who shifted from onsite work to remote work – either by choice before the pandemic, or of necessity during the pandemic. However, they also find that remote work attracts less-productive employees. Those who are highly productive tend to favor onsite work to improve their promotion prospects and to avoid pooling with the less productive, which supports a sorting outcome that discourages greater reliance on remote work. This negative selection effect in their call-center setting is powerful enough to more than offset the direct productivity benefits of WFH. As Emanuel and Harrington recognize, their 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.

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 bold font 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, Figure 12 reports evidence that the social acceptance of WFH has risen sharply in all countries since the pandemic.[20] 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.[21] 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 (2020) and Eberly, Haskell and Mizen (2021) present evidence that the pandemic prompted firms to invest in new workplace equipment and new digital

[20] Barrero et al. (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 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.

[21] 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.

technologies that support remote work. Barrero et al. (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 et al. (2021) and Riom and Valero (2020) present evidence that firms adopted new managerial practices to support WFH in reaction to the pandemic. Bloom, Davis and Zhestkova (2021) find that, in the wake of the pandemic, new patent applications shifted toward technologies that support WFH and remote interactions more generally. All of these various investments in equipment, skills, technologies, and managerial practices create durable forms of capital and knowledge that improve performance in the WFH mode now and in the future. In addition, Barrero et al. (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.

4. 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 death rates.

To measure lockdown stringency (LS), we draw on the widely-used Oxford data described in Hale et al. (2021).[22] 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, 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:

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

where SIPO = 1 when a shelter-in-place order is in effect, 0 otherwise; BCO = 1 when a broad-based business closure order is in effect; and SCO = 1 when schools are closed. These indicator variables take fractional values when the order is in effect part of the month or 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 deaths per capita through the end of the month before the survey wave. Our data on reported COVID deaths are from the Johns Hopkins Coronavirus Resource Center at https://coronavirus.jhu.edu. Some argue that excess mortality measures are more appropriate for many purposes than reported COVID deaths. There is merit in this argument. However, excess mortality measures of COVID 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.

Appendix Figures A.3 and A.4 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 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,

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

[22] Available at www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.

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 18 industry sectors plus wave fixed effects and the national value of log real GDP per capita.

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.[23] 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% 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 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 Table 3. 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. 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 (Appendix Table A.5). We also tried replacing our CLS index with a cumulative version of the index in Hale et al. (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

[23] Criscuolo et al. (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.

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 tradeoffs 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 (Appendix Table A.6).

Finally, we re-run 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 4, 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 Tables 3, A.5, and A.6. 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.[24] 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 adaptation. It could also arise as a pro-active 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 volunatry 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 death rates affect employer plans for post-

[24] Evidence on daily stock market reactions to government lockdown announcements supports the view that the lockdown themselves had material effects on economic activity. See Ashraf (2020) and Yang and Deng (2021).

pandemic WFH levels or current WFH levels as of the survey date.[25] We are surprised by this result, but it appears 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 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 deaths per capita but, nevertheless, highly correlated with lockdown stringency.

5. Some Implications

A. Direct Consequences for Workers and Organizations

Section 3 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 et al. (2021c) estimate that planned WFH levels in the U.S. economy deliver aggregate time savings equal to 2% of pre-pandemic work hours on an earnings-weighted basis.[26] 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, or 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 (e.g., Barrero et al., 2021c), 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 3 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 (2022) summarizes new, permanent teleworking regulations since March 2020 in 17 countries.

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

[26] The 2% time-savings figure is from Davis (2022) and reflects savings in both commuting time and grooming time. The next draft of Barrero et al. (2021c) will also account for both.

Many of the new regulations raise the costs of remote work, making it less viable.[27] Other new regulations push employers to satisfy employee desires to WFH.[28] 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 U.S. 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 et al., 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, more than 40% of firms in the U.S. Survey of Business Uncertainty allow WFH one or more days per week "to keep employees happy and to moderate wage-growth pressures" (Barrero et al., 2022b). 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 et al., 2022). Downsides of accommodation include fewer in-person communications, greater operational complexity, and greater challenges in onboarding new employees, mentoring, and sustaining company culture.

Another strategic option involves hang-tough approach that compels most or all employees to work onsite on (almost) all work days. Elon Musk famously demanded that all

[27] To pick an example not covered in Lockton (2022), 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 "Mexico Publishes NOM-037, Draft Health and Safety Conditions for Teleworking," *The National law Review,* 28 July 2022. Accessed 6 August 2022.

[28] 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).

Tesla employees work in the office at least 40 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.[29] 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."

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

[29] See "Elon Musk's Ultimatum to Tesla Execs: Return to the Office or Get Out" by Karina Nicholas and Dana Hull, *Bloomberg*, 1 June 2022; and "Elon Musk's Demand Staffers Stop 'Phone It in" May Cost Him Talent" by Matthew Boyle, 1 June 2022.

B. WFH and the Pace of Innovation

Historically, many forms of invention, innovation, and entrepreneurship were highly concentrated in space.[30] 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 – e.g., 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 (2022, Figure 3) shows that the geographic dispersal of collaborative innovations, as measured by the locations of named inventors in U.S. 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 produces articles that are 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, Section 6) such a fall in coordination costs raises the innovation rate.

Yang et al. (2021) 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 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: One, organizations that stick with remote

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

work will adapt their practices over time to mitigate the disadvantages and exploit the advantages. Two, 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 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 requires greater managerial attention in a hybrid or fully-remote work environment than in the traditional onsite 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.

C. Challenges for Cities

There are stronger reasons for concern when it comes to the fortunes of cities.[31] 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 concentration of commercial activity. Consider a few statistics that speak to the scale of the challenge: WFH accounts for 38% of full paid workdays in the ten most populous U.S. metro areas as of June 2022, as compared to 30% in the next forty most populous areas and 27% in smaller cities and towns (Barrero et al., 2022c, slide 16). The share is nearly 45% in the San Francisco Bay area. These WFH levels are at least 20 to 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 five in urban counties fell 3.7% from 2020 to 2021, as compared to 2.4% nationwide. The most populous urban areas saw especially large drops. San Francisco lost 7.6% of its under-five population from 2020 to 2021 and more than ten percent from 2019 to 2021. In contrast, the under-five population shrank more slowly from 2010 to 2019 in urban counties than across the nation as a whole. These observations support the view that new-found 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 U.S. 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 et al. (2022) examine 68,000 newly-executed commercial leases across 89 U.S. cities from January 2019 to October 2020. They find that the elasticity of rental values with respect to employment density fell two percentage points in the wake of the pandemic. Large, dense cities that rely heavily on subway and light rail also saw a 15% 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 asset-pricing model to estimate that the pandemic-induced shift to remote work drove a 32% drop in office values in 2020 and a

[31] We focus on the challenges that the shift to WFH presents for cities in rich countries, especially the United States. Ed Glaeser raises pointed concerns about distinct challenges for cities in poorer countries.

28% 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 prices in central business districts fell 2% in nominal terms from February 2020 to April 2021, 7% relative to prices in the top decile of zip codes by population density, and 13% 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 residential and commercial 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 (2019) 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, cities that do not control crime, cities the levy high taxes, and cities that 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 hift to WFH has the potential to amplify the negative effects of poor governance, political instability, and crime on the fortunes of cities.

Glaeser (2022, pages 4 and 5) 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…. [T]he 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 business or 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."

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 U.S. 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 re-locate 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 scope 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 creates 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.

6. 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 27 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 sets 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.

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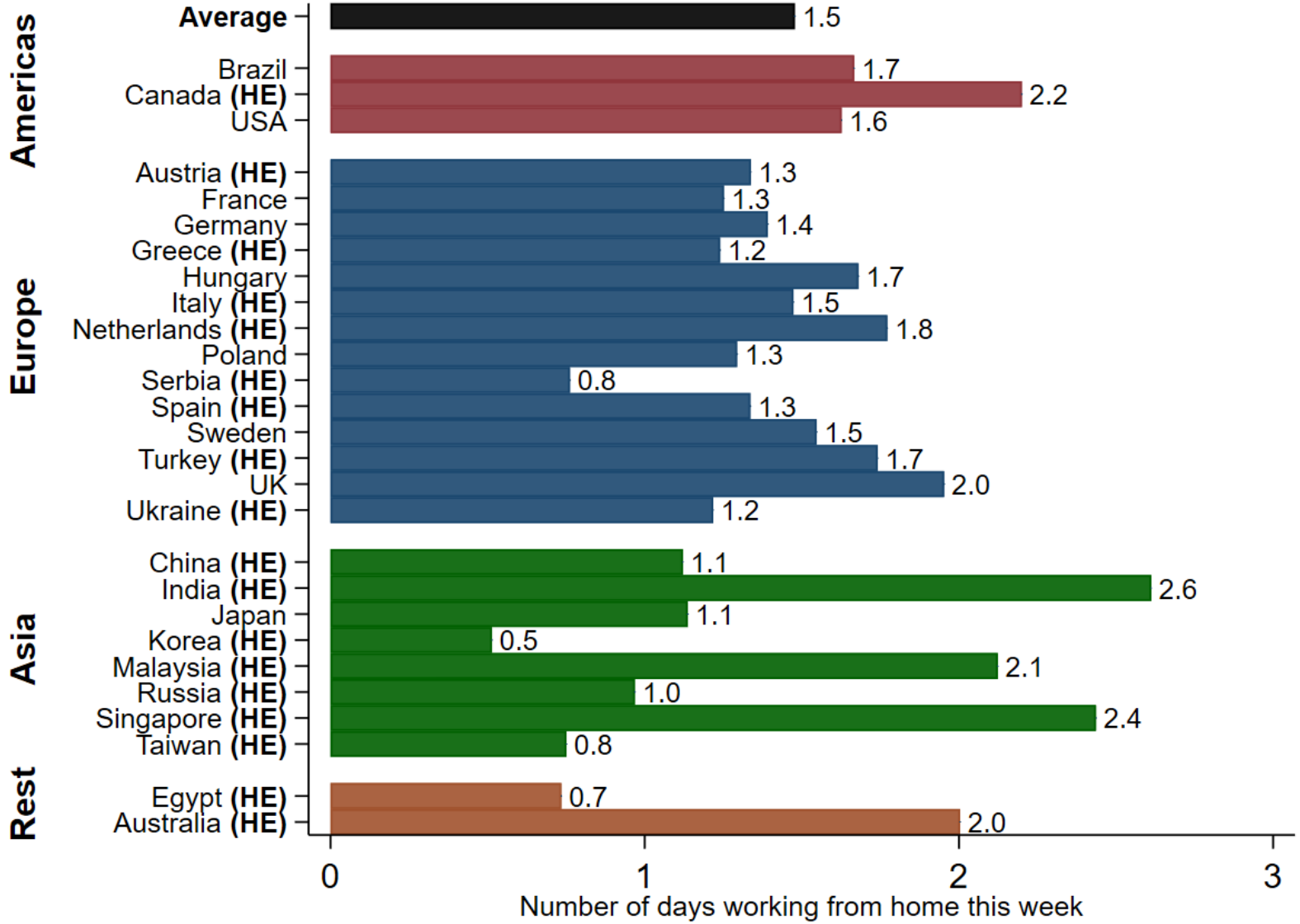
Figure 1. Working from Home Is Now a Global Phenomenon

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

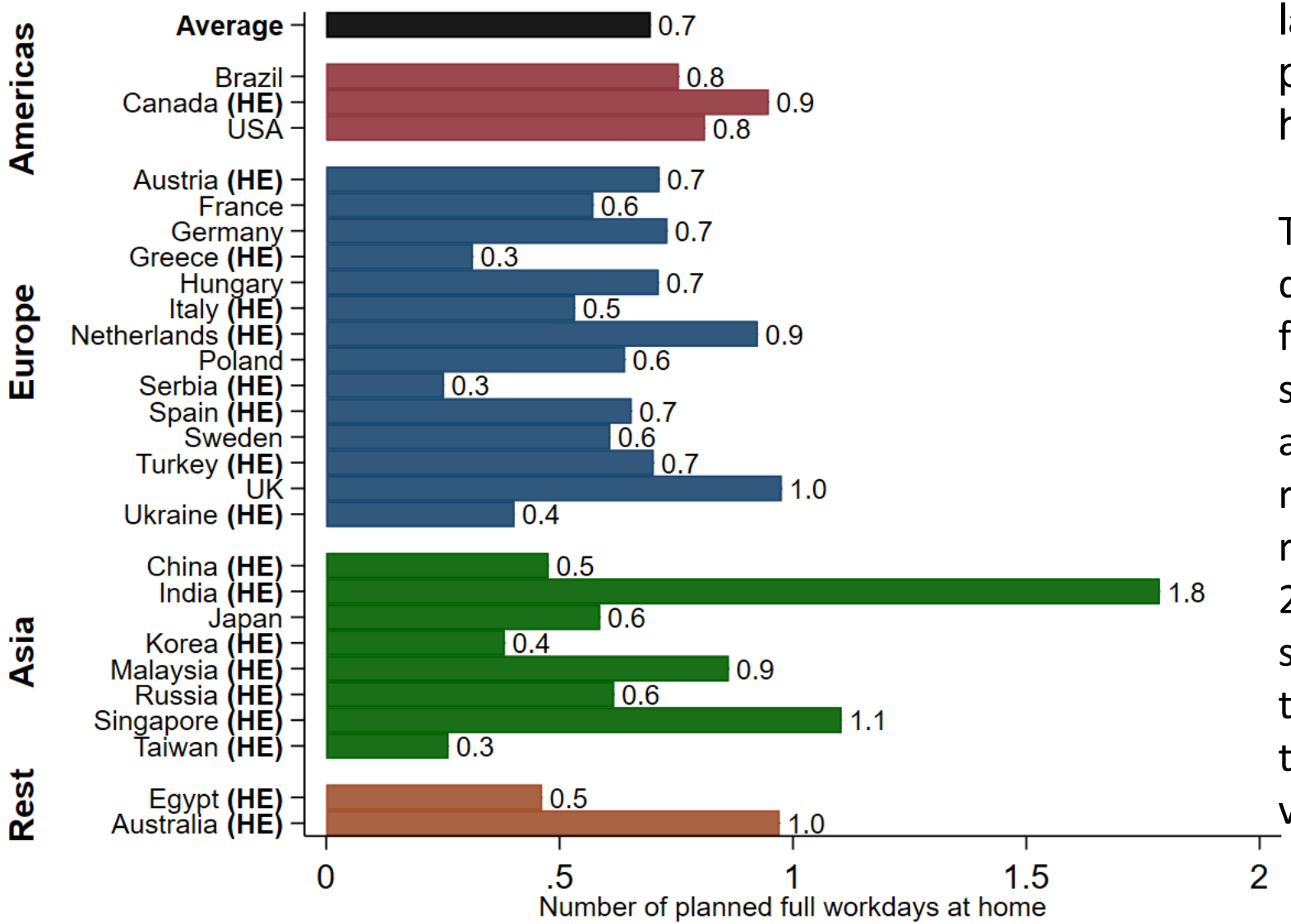


Question: "How many full paid days are you working from home this week?"

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), 18 industry sectors and survey wave, treating the raw U.S. mean as the baseline value. We fit the regression to data for 33,091 G-SWA respondents surveyed in mid 2021 and early 2022. The "Average" value is the simple mean of the country-level values.

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

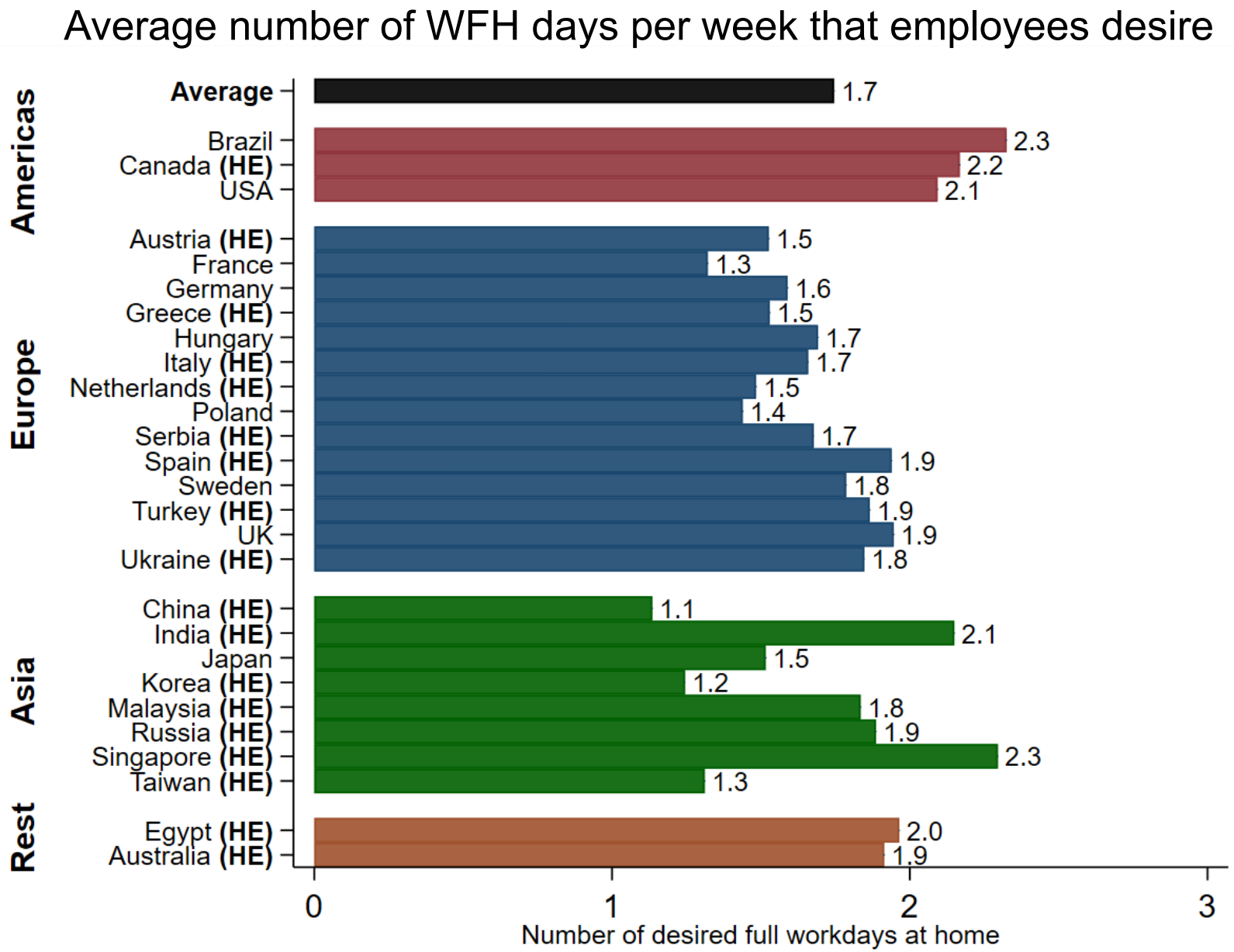
Average number of WFH days per week that employers plan



Question: '"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 U.S. 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. The "Average" value is the simple mean of the the country-level values.

Figure 3. Desired Levels of Working from Home after the Pandemic

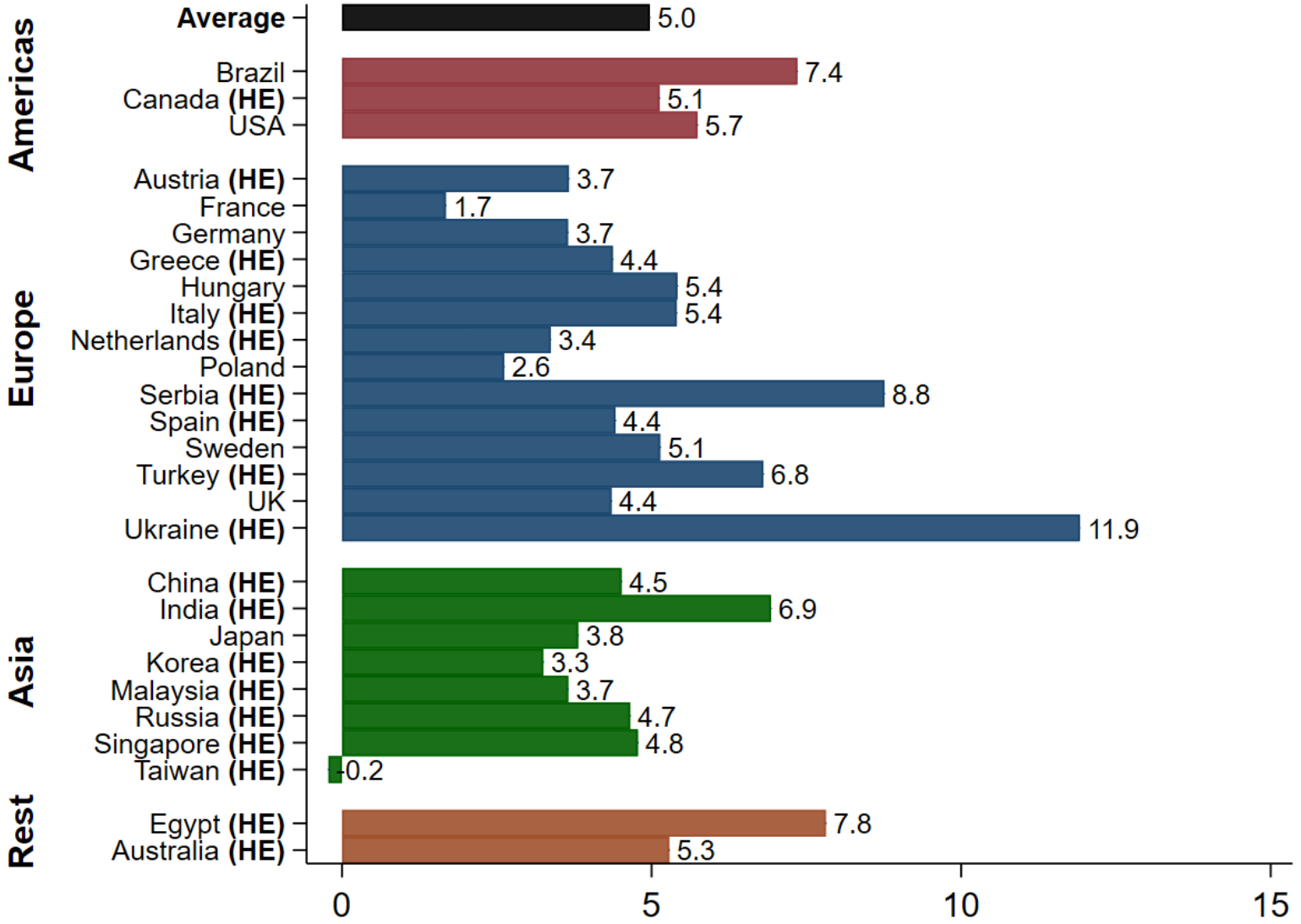


Question: "After COVID, in 2022 and later, how often would you like to work from home?"

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 4. Willingness to Pay for the Option to Work from Home

Average amenity value of the option to WFH 2-3 days per week, as a percent of pay

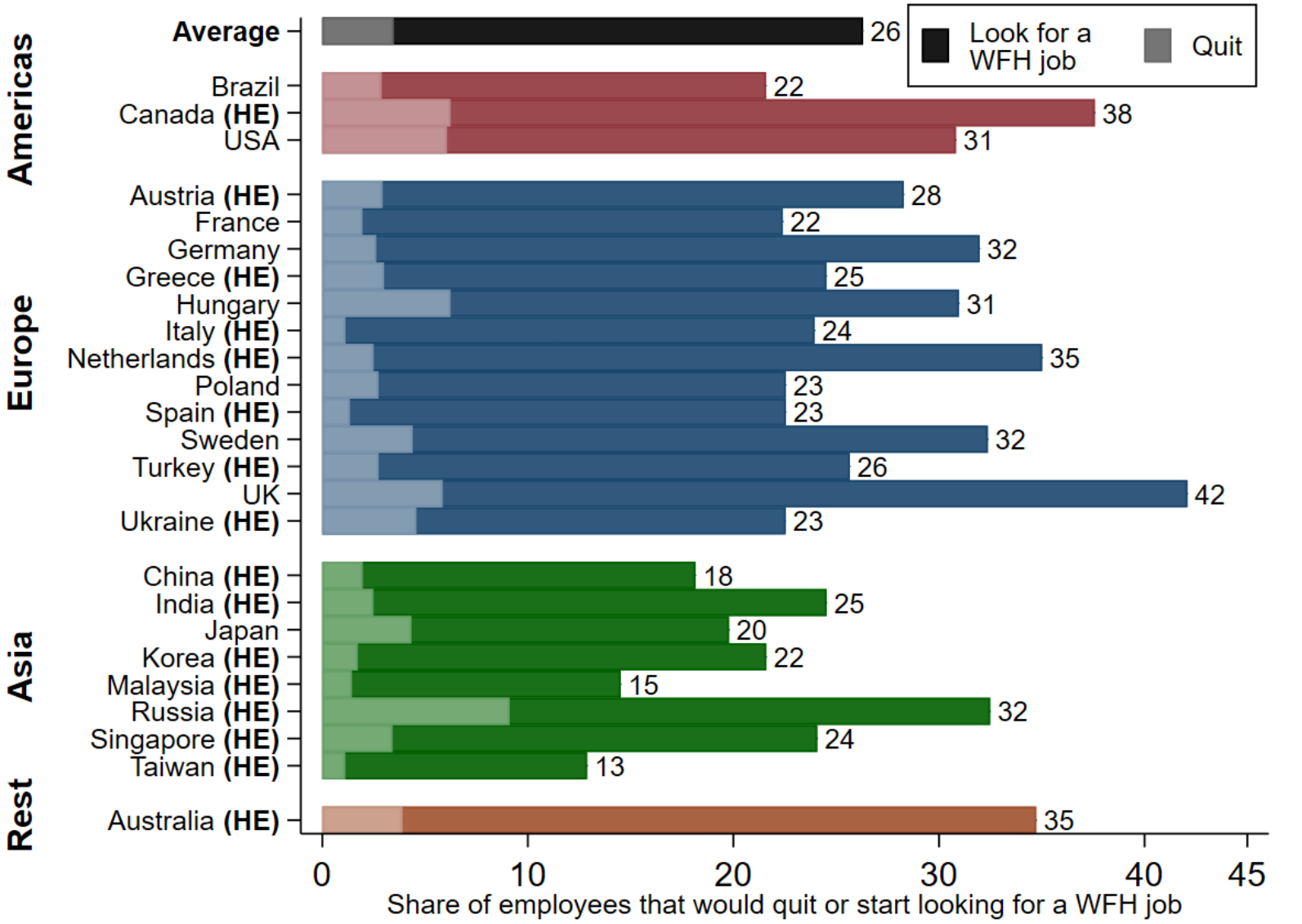


Questions: "After COVID-19, in 2022 and later, how would you feel about working from home 2 or 3 days a week?" and "How much of a pay raise [cut] (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?"

The chart reports coefficients on country dummies in OLS regressions that control for gender, age, education, industry and survey wave, treating the raw 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 5. Many Workers Will Quit Or Seek a New Job If Required to Return to the Employer's Worksite 5+ days Days Per Week

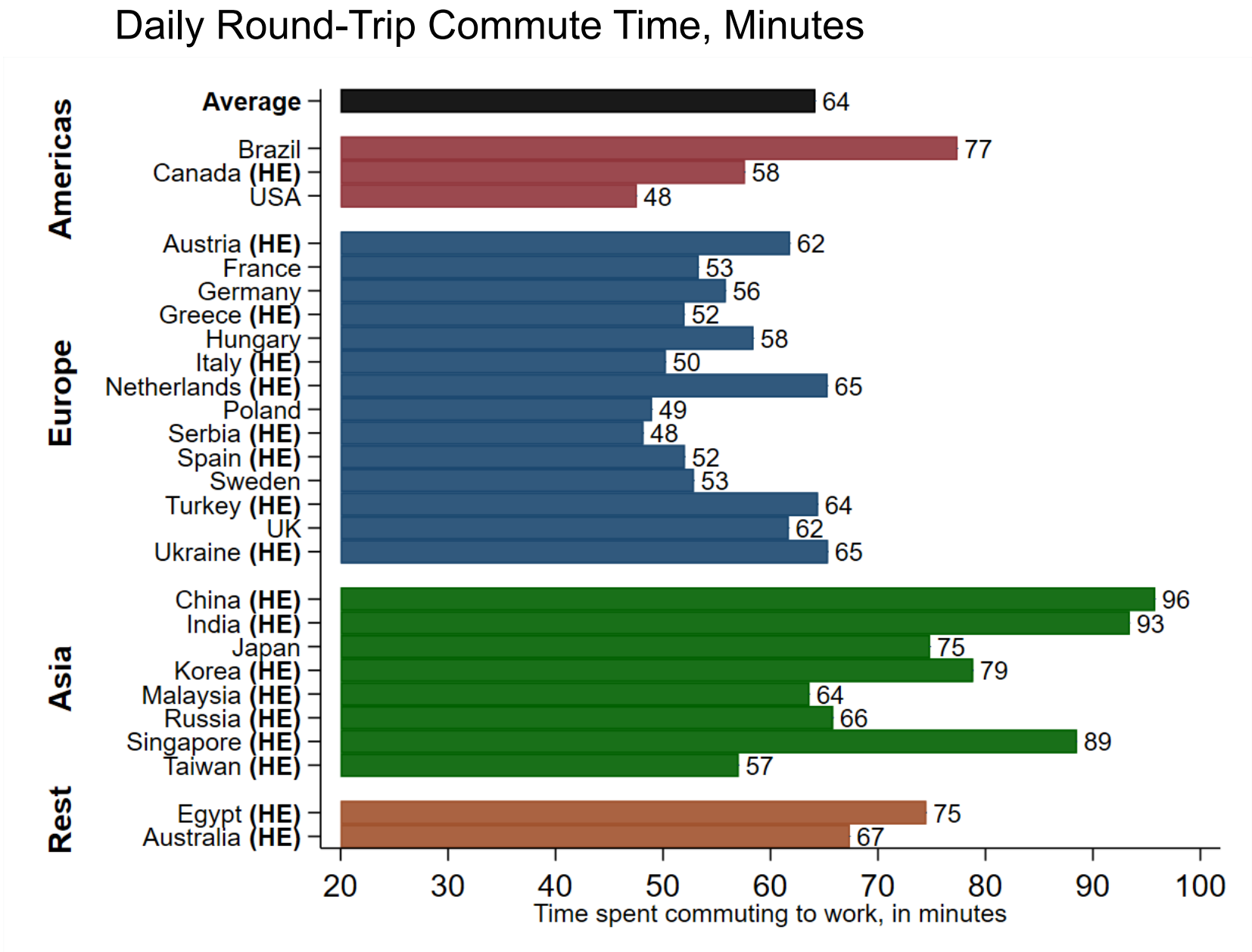
Percent of employees that would quit immediately or seek a new job that allows WFH



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 6. Daily Commute Times Average More than One Hour Per Day

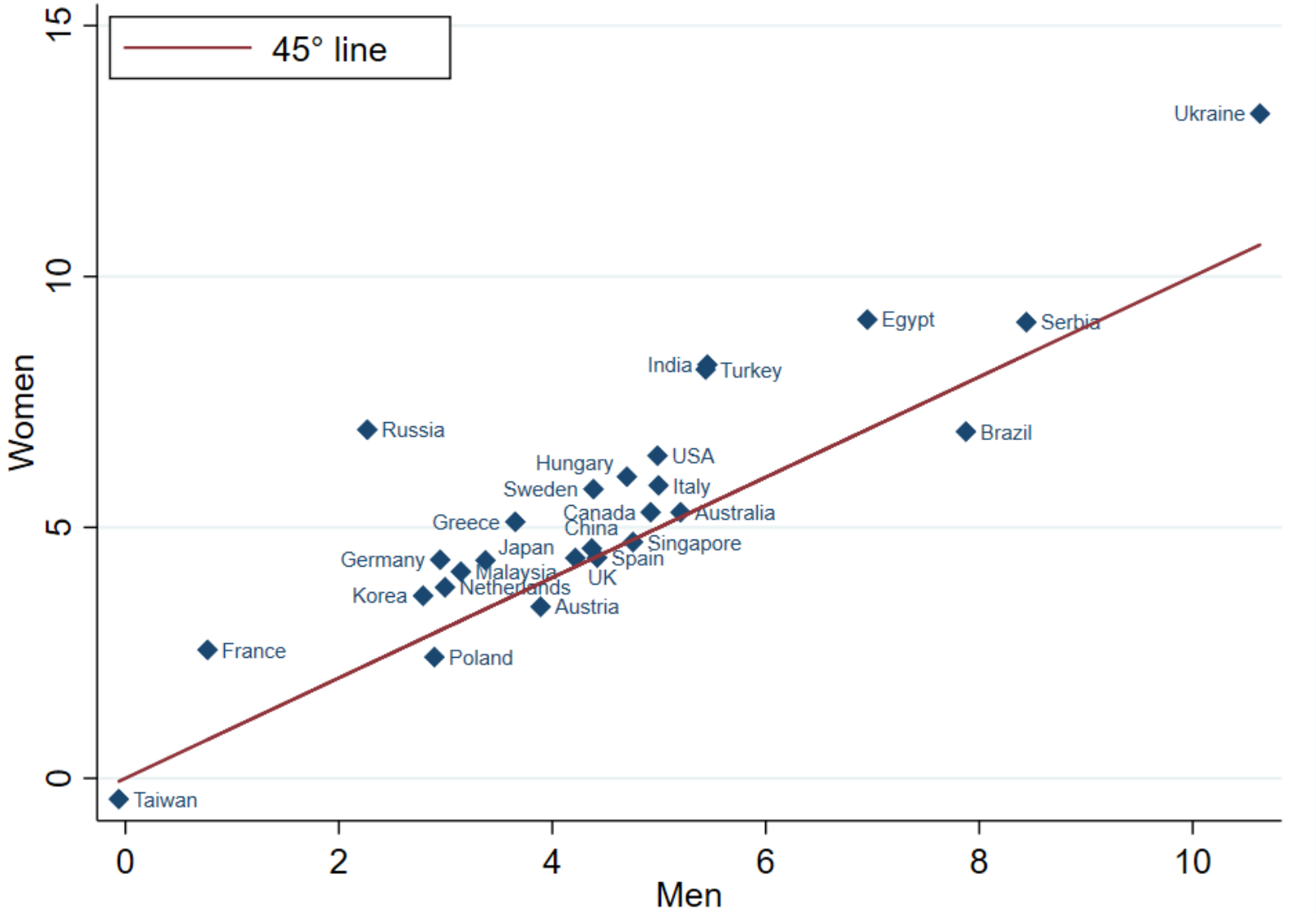


Questions:
Wave 1: “In 2019 (before COVID) how long was your typical commute to work in minutes (one-way)?”
Wave 2: “How long do you usually spend commuting to and from work (in minutes). If you are not currently commuting to work, please answer based on your commute time in 2019 (before COVID)”.

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.

Figure 7. Women More Highly Value the Option to WFH in Most Countries

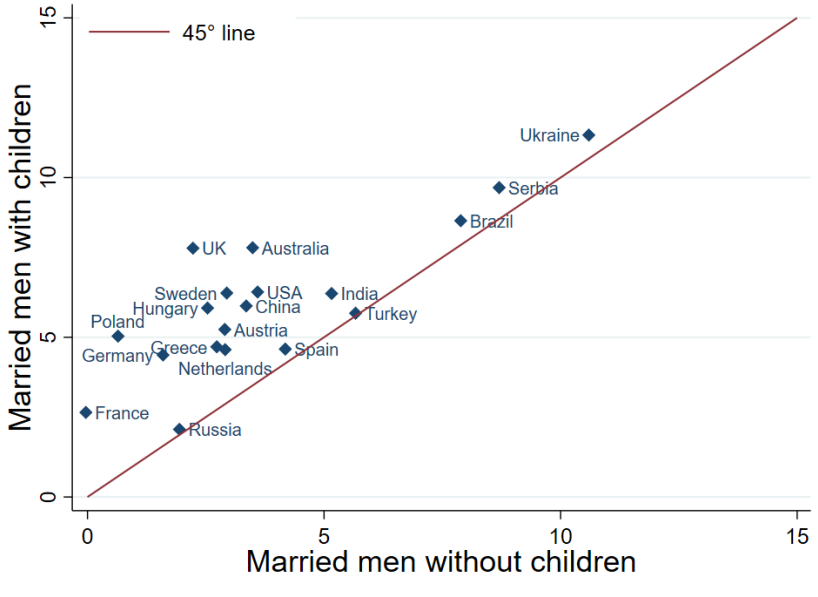
Average amenity value of the option to WFH 2-3 days per week, as a percent of pay.



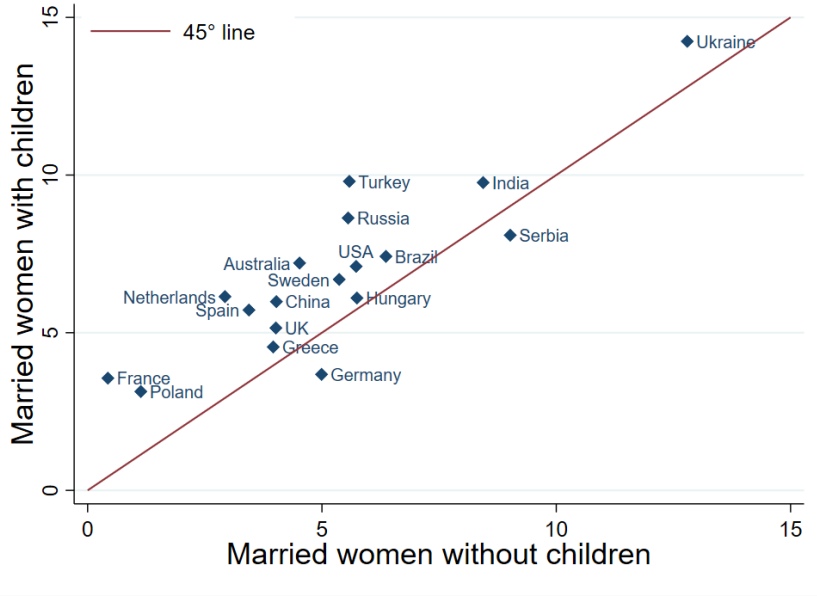
Notes: This figure draws on the same questions and data as Figure 4. It also uses the same regression, except that we fit the regression separately for men and women.

Figure 8. How the Amenity Value of WFH Differs by Sex and Family Circumstances, Conditional Means by Country

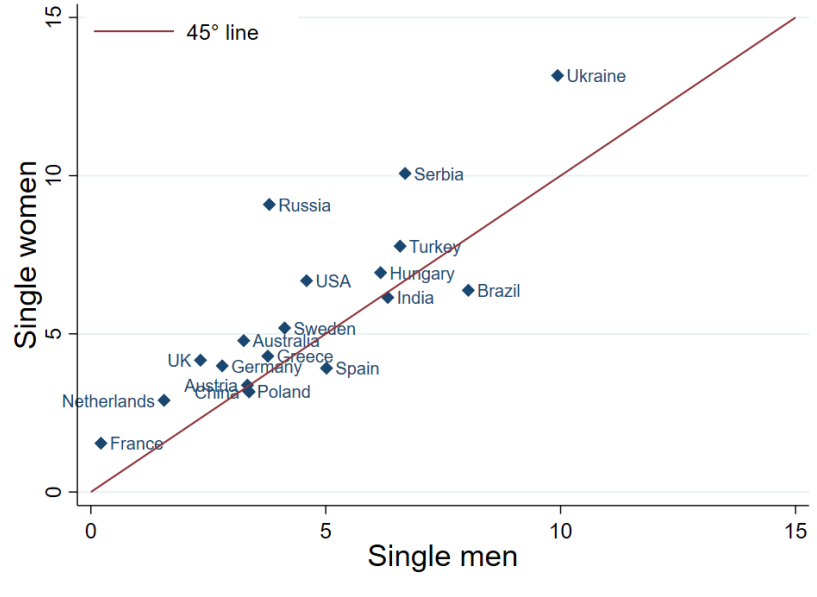
Panel A: Married men, comparison between with and without children



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

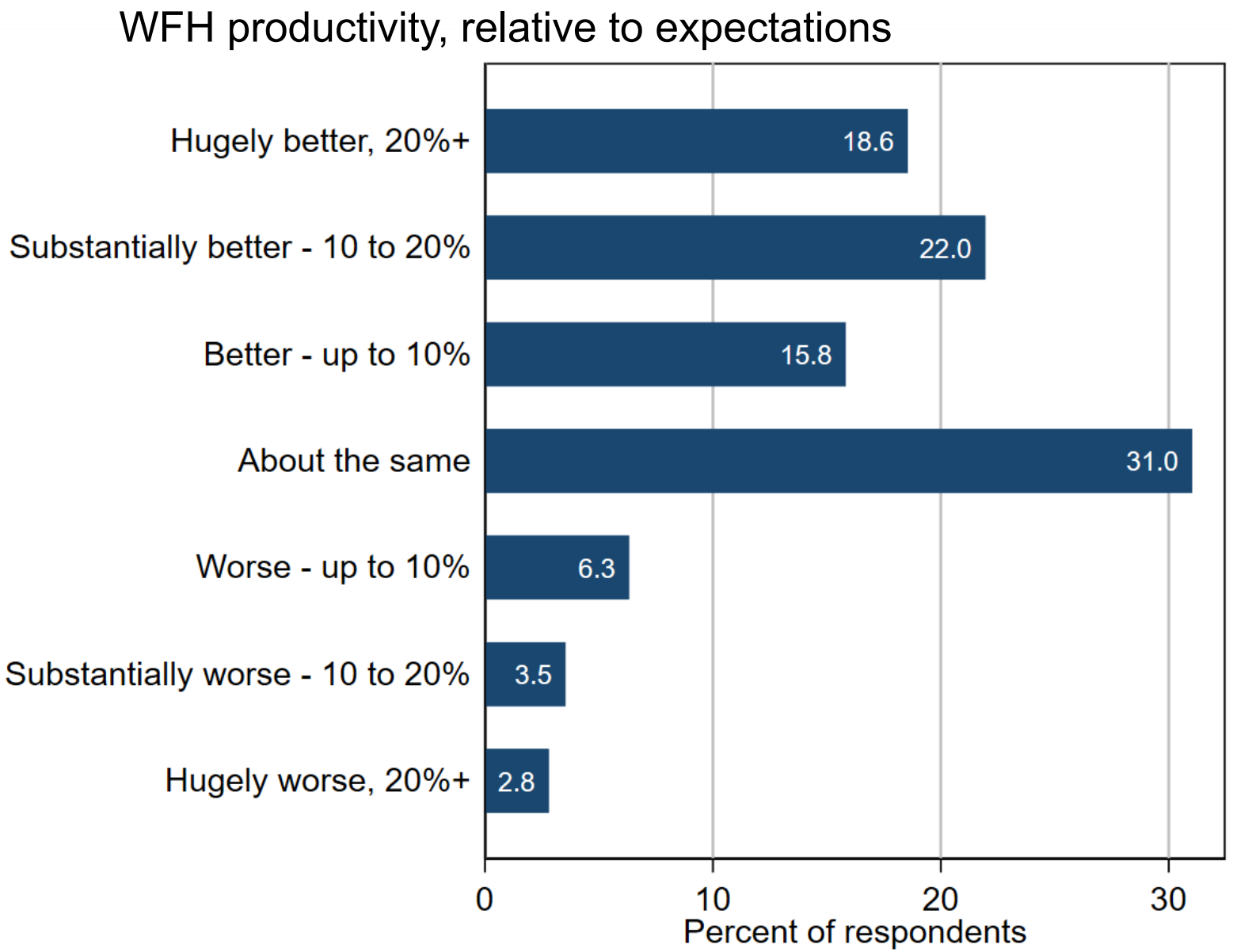


Panel C: Unpartnered/single persons, comparison between men and women



Note: These charts report country-level conditional means as follows: Panel A, married men with and without children; Panel B, married women with and without children; and Panel C, single men and single women, without children in both cases. The regression specification is the same as in Figures 4 and 7, but we fit six separate regressions, one for each of indicated subsamples. The charts suppress values for countries with fewer than 50 observations in the relevant sample (Egypt in all three panels, and Austria in Panel B).

Figure 9. The Distribution of WFH Productivity Relative to Expectations



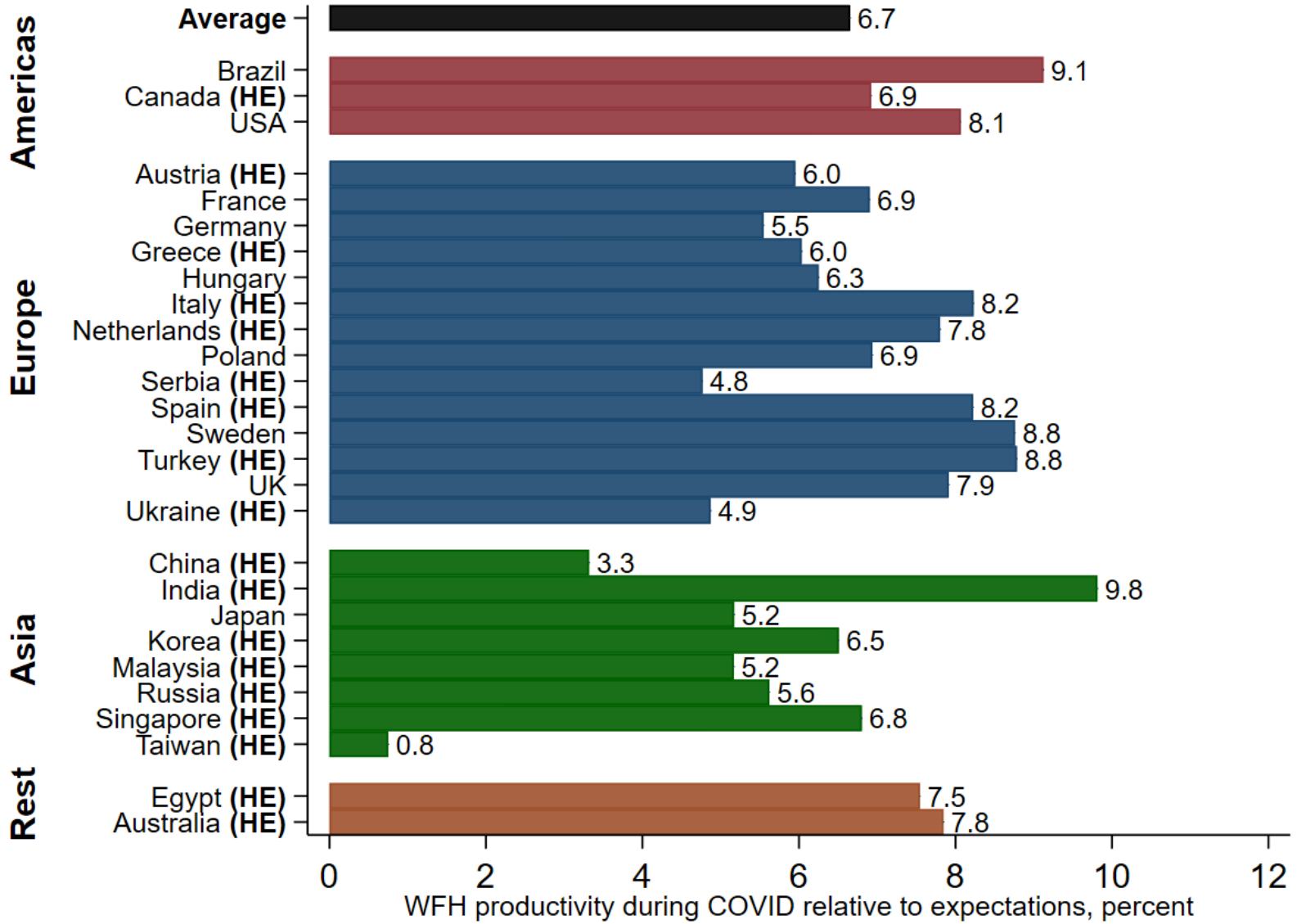
Question: Compared to your expectations **before COVID (in 2019)** how has working from home turned out for you?'

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

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

Figure 10. Working from Home Productivity Surprises Are Positive, on Average, in All Countries

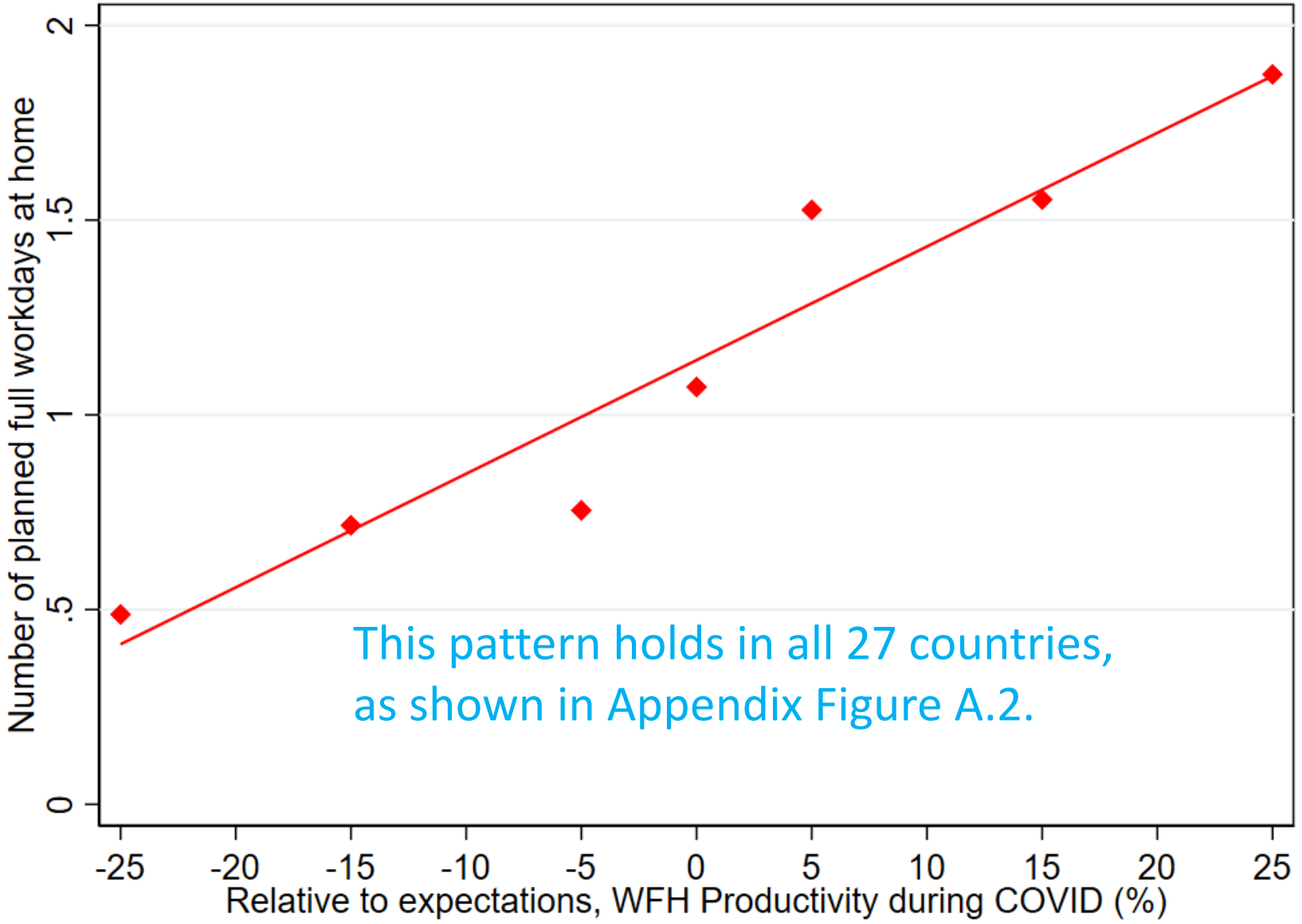
WFH productivity, relative to expectations



Question: ‘’Compared to your expectations before COVID how has working from home turned out for you?’’ 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.

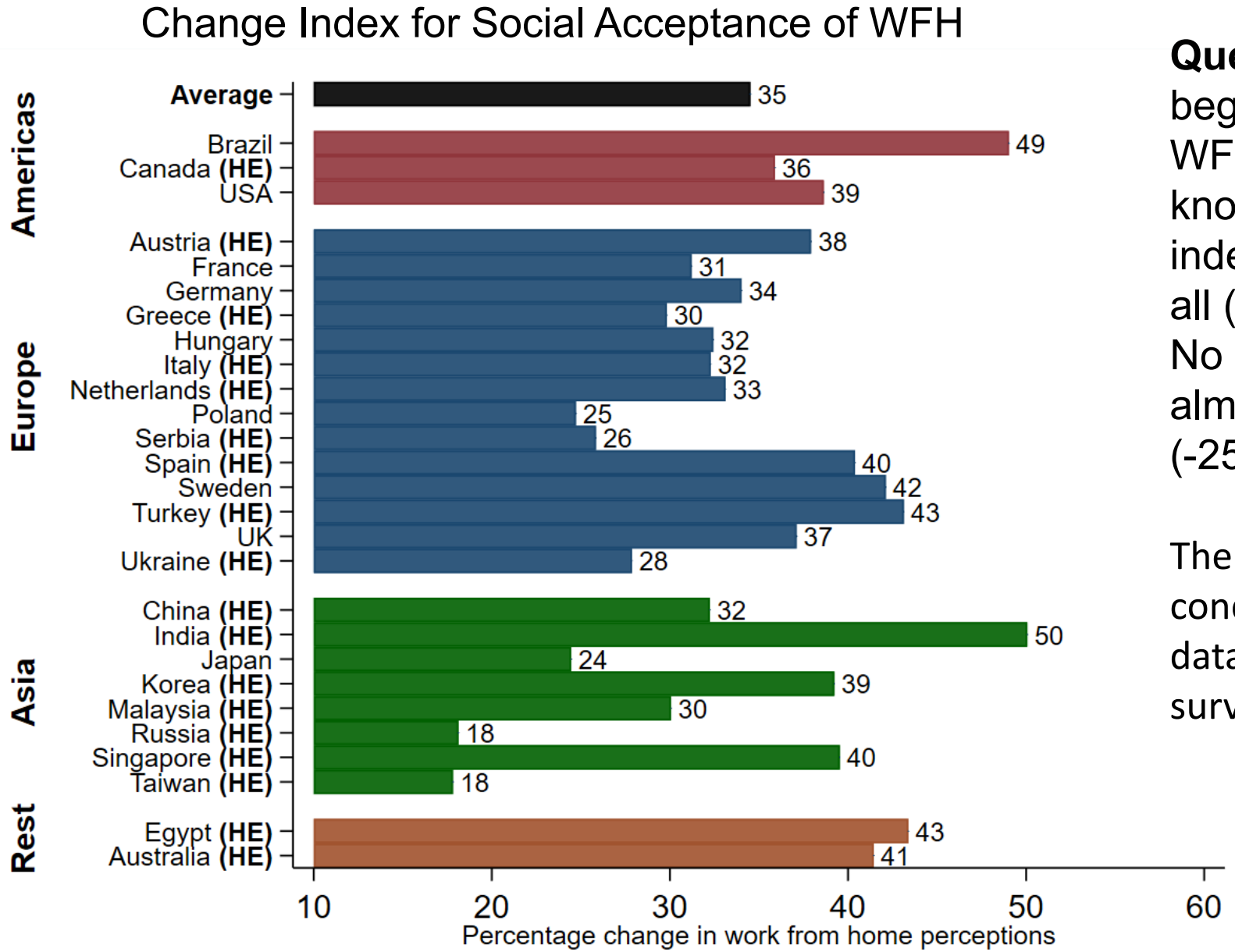
Figure 11. Planned levels of WFH after the pandemic increase with WFH productivity surprises during the pandemic



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

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 12. 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.

Table 1. The Structure of Preferences over WFH

	Amenity value of option to WFH 2-3 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) x 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 S.D.:	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 F.E.:			Y	Y	Y

Note: The dependent variable is the willingness to pay for the option to WFH 2-3 days per week, computed using the two-part question structure described in the main text. The sample contains individual-level data in the 20 countries for which we have data on the number of children and marital status. All specification include fixed effects for age groups and survey wave. We cluster errors at the country level.

Table 2. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns

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	0.204**	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	33091	36078	34875	36078
R^2	0.098	0.069	0.086	0.057

Note: All regressions include controls for log real GDP per capita, gender, 4 age groups, 3 education groups, 18 industry sectors, and wave fixed effects. The reported COVID deaths and lockdown stringency measures are standardized to zero mean and unit standard deviation across countries. Errors clustered at the country level.

Table 3. Current and planned levels of WFH rise with the cumulative stringency of government-mandated lockdowns, adding controls for cumulative mask mandates

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 4. Lockdown Effects Are Stronger for the More Educated

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
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	22210	24054	23317	24054
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	10954	11826	11468	11826
R^2	0.082	0.056	0.088	0.036

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

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

Figures A.1 through A.5 report additional results referenced in the main text. 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.

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, Survey	Post-Pandemic		WFH Productivity	Roundtrip Commute	Willingness to Pay for WFH	Change in Social
Country	Age	Week	Employer Plans	Worker Desires	Surprises	Time	Option	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

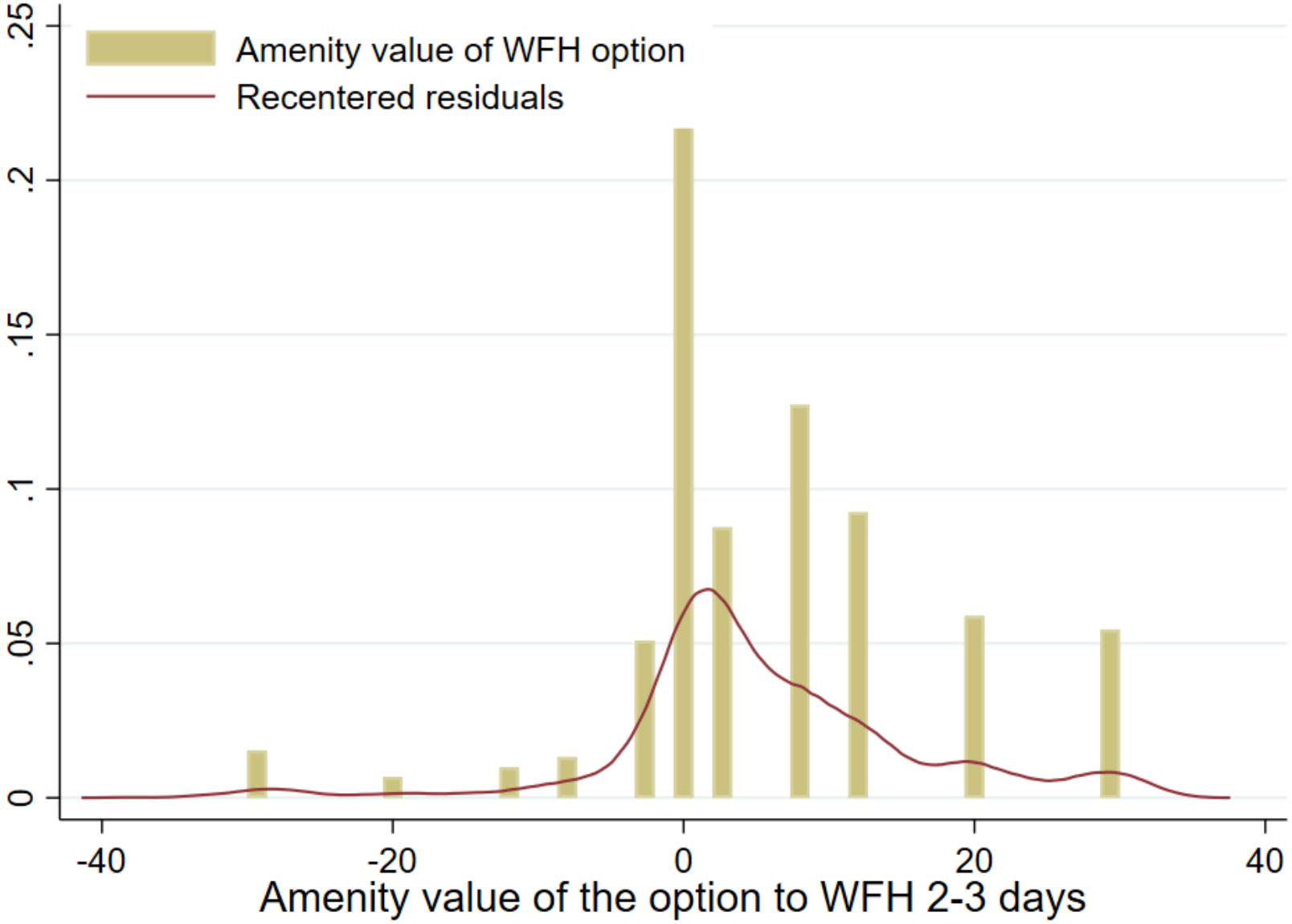
Notes: See Table A.1 for observation counts. We pool data over G-SWA Waves 1 and 2 when data from both waves are available.

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.

Figure A.1. Histogram of the Willingness to Pay for the Option to Work from Home 2-3 Days per Week

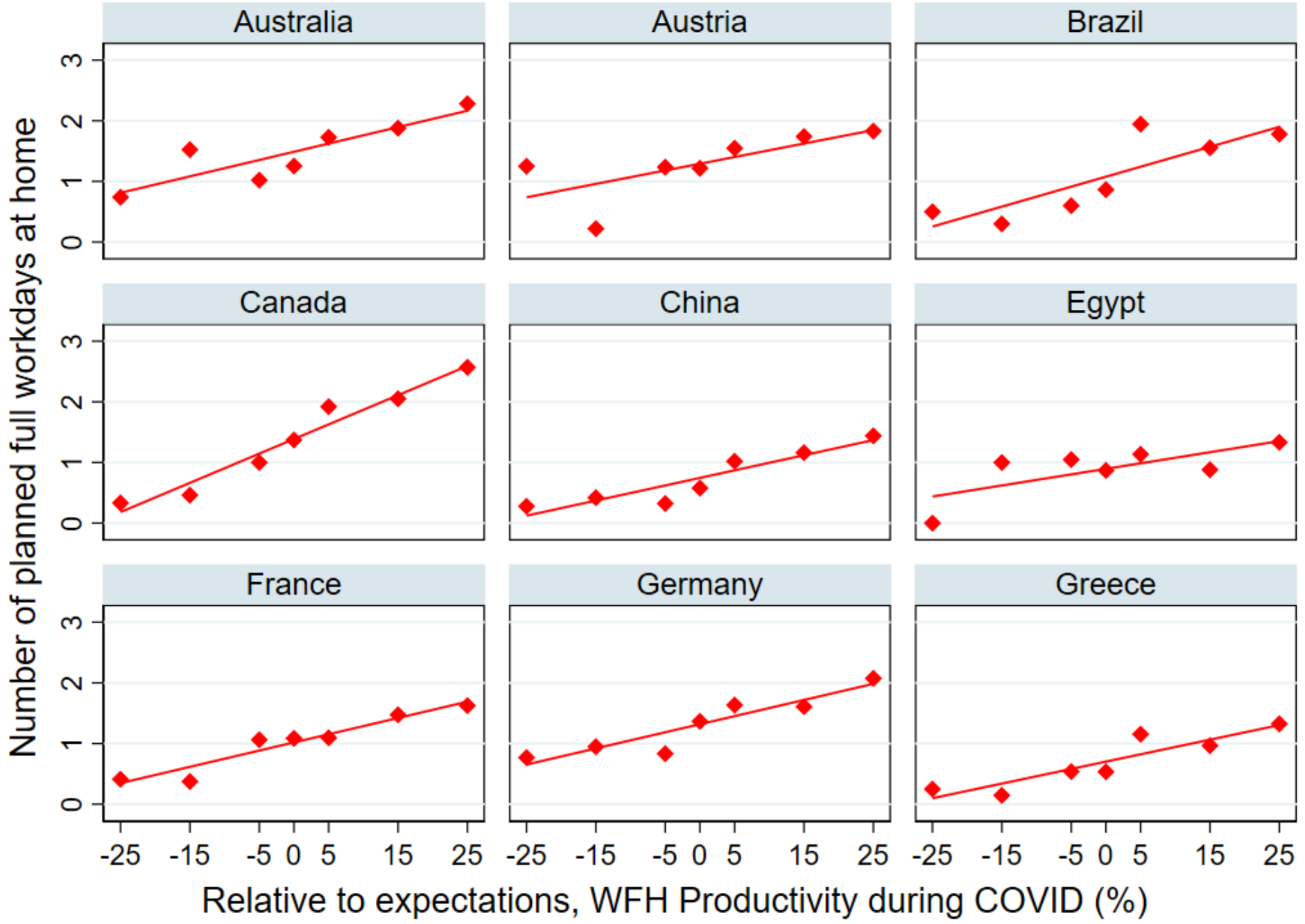


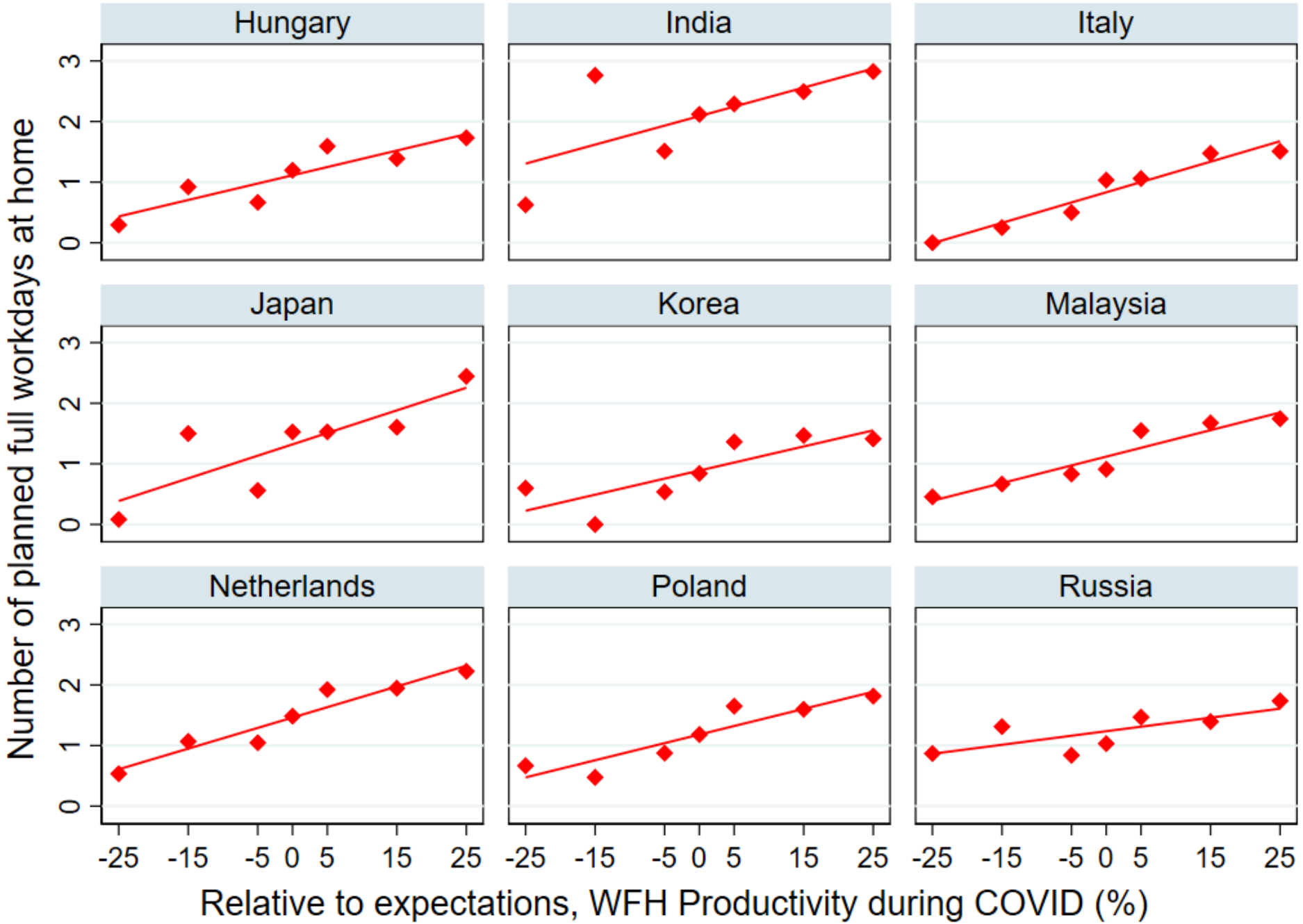
Question: “After COVID-19, in 2022 and later, how would you feel about working from home 2 or 3 days a week?” and "How much of a pay raise [cut] (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?”

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.2. 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 (%)

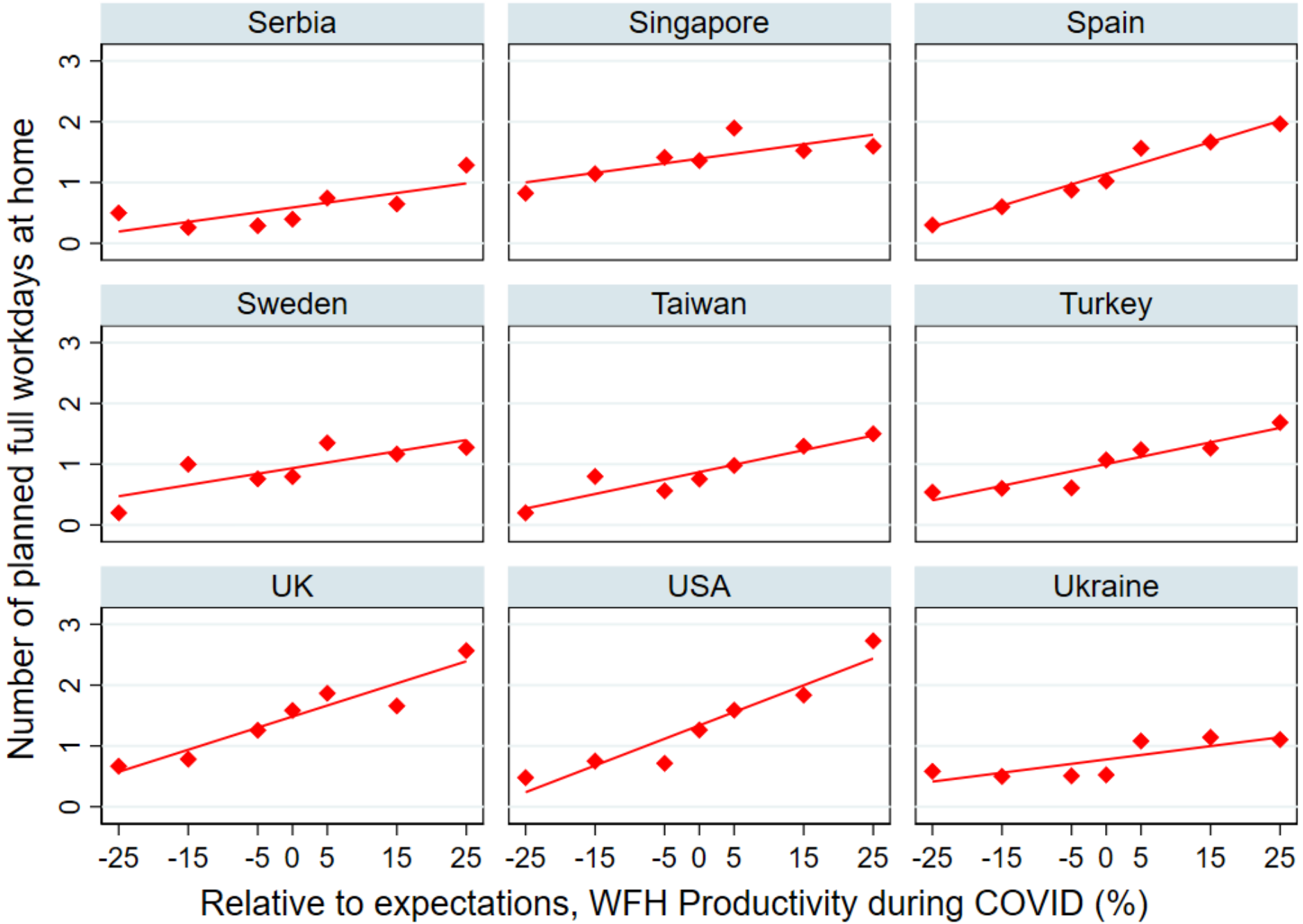
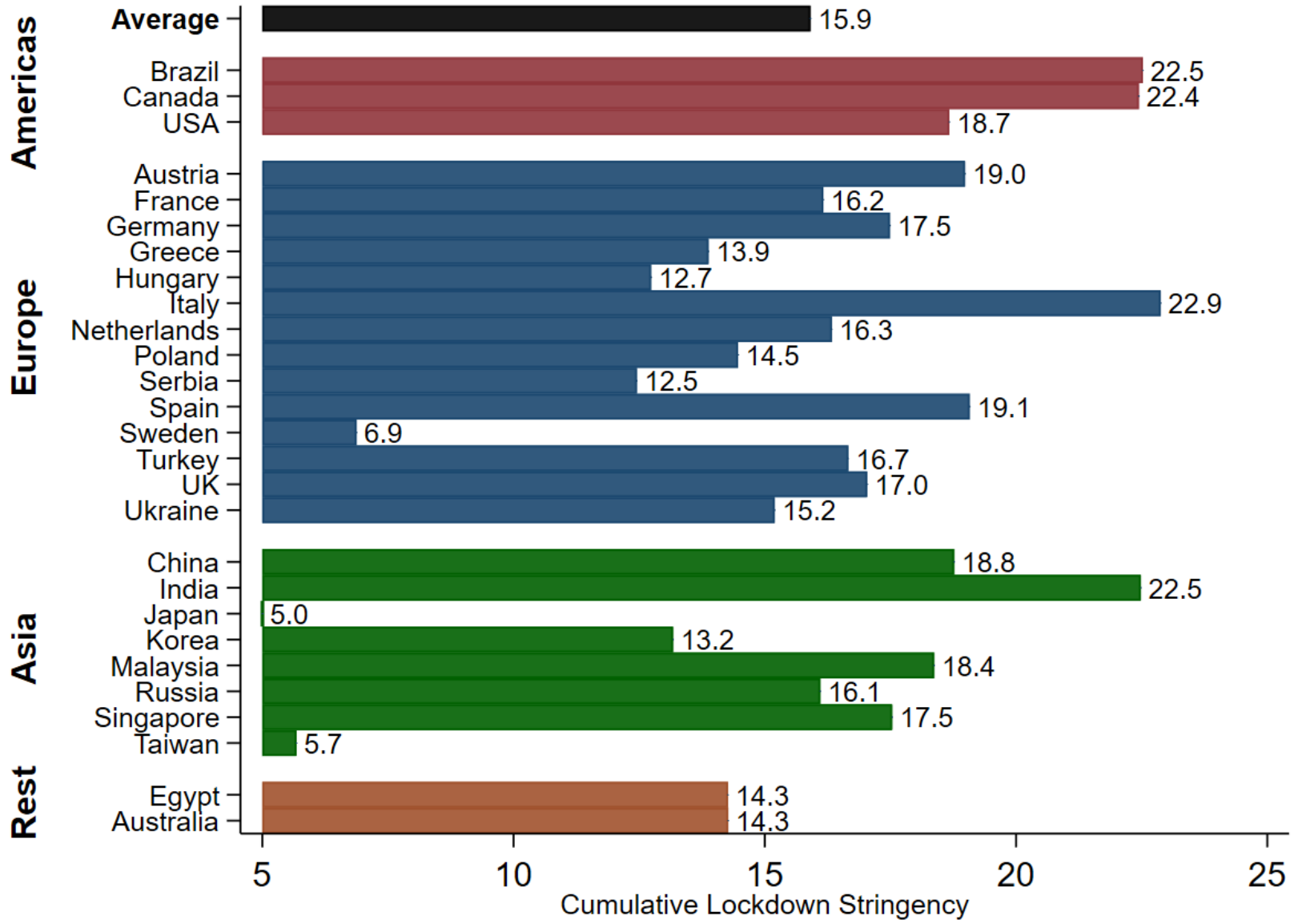
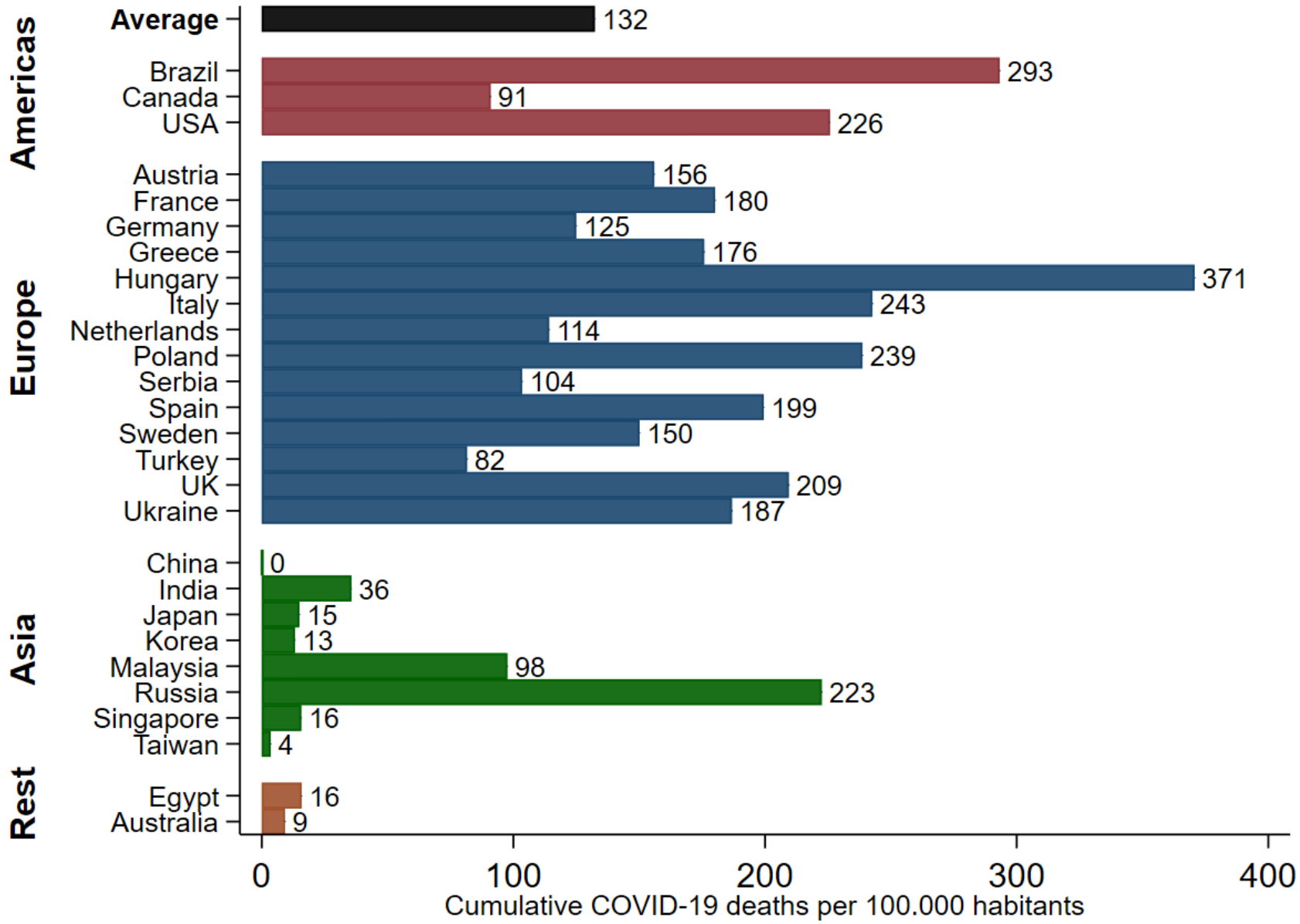

Serbia
Singapore
Spain
Sweden
Taiwan
Turkey
UK
USA
Ukraine
Number of planned full workdays at home
0
1
2
3
-25
-15
-5
0
5
15
25
Relative to expectations, WFH Productivity during COVID (%)

Figure A.3. 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.4. 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.

Table A.5. 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)	(0.058)	(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.6. 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.