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Article

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Is Working from Home Here to Stay? A Look at 35 Million Job Ads*

In parallel with the health emergency, the Covid-19 pandemic triggered a unique social experiment: the shift to working from home. Surveys show that in the spring of 2020, more than one-third of the workforce in Germany worked mostly or entirely from home, a threefold increase compared to pre-crisis levels (Figure 1). The WfH shock has disrupted traditional work arrangements in many places. And it is becoming increasingly apparent that the experience of the pandemic will have a lasting impact on the work arrangements. Essentially all surveys conducted during the pandemic find a high level of satisfaction with WfH arrangements, even among workers without prior WfH experience (e.g., Stürz et al. 2020; Bonin et al. 2020). One recent study finds that US workers are willing to accept wage cuts of seven percent on average for the option to work from home two to three days per week after the pandemic. Four in ten employees would even look for another job if their current employer required them to return to the office full-time (Barrero et al. 2021a and 2021b). On the employer’s side, the experience of going remote often exceeded expectations. A number of large employers in Germany, such as Siemens, Allianz, or Deutsche Telekom, have already announced that WfH will become a part of their hiring strategy for new staff and a regular option for their employees. Yet, most evidence about the use of WfH during the pandemic and about the expectations for future work arrangements originate from snapshots like firm or employer surveys. Thus, the extent to which WfH will actually stick as well as the labor market ramifications are still obscure.

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ABSTRACT

We analyze the prevalence of working from home (WfH) in Germany using more than 35 million online job advertisements from 2014 to 2021. While a WfH option was rare in job ads before the crisis, the Covid-19 shock led to an unprecedented WfH boom. At the same time, regional, occupational, and sectoral inequalities in access to WfH have decreased during the pandemic. We also document a higher demand for digital skills, teamwork, and adaptability in job ads with a WfH option. We conclude with an outlook for the future of WfH.

We contribute to our understanding of the impact of the Covid-19 pandemic on WfH arrangements by providing systematic evidence on the prevalence of jobs offering a WfH option in Germany.¹ Our dataset comprises over 35 million online job ads from January 2014 to the first quarter of 2021. We document four core findings: first, the share of job ads with a WfH option almost tripled to close to 12 percent between 2019 and 2021. Second, occupations that previously had high *untapped* WfH potential experienced the largest increase in WfH postings. This suggests that companies are increasingly advertising jobs that are suitable for WfH explicitly. Third, we observe a convergence of WfH options across occupational groups, industries, and regions. For example, the gap between urban

¹ In this paper, the term “working from home” is used as an overarching definition that refers to various forms of location-flexible work, including mobile or remote work, which is not limited to working from home.



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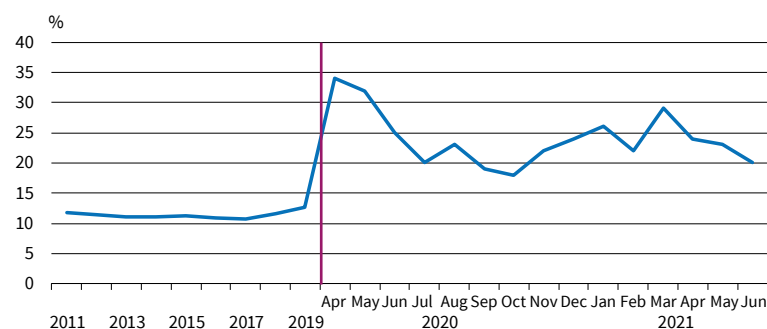
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Figure 1
Proportion of Employees Working Remotely Rises Sharply during the Corona Crisis^a



^a The figure shows the share of employees in Germany who work from home. Source: Data for 2011–2019 are from the EU Labor Force Survey (sometimes or often WfH) and for 2020–2021 from infas 360 (mostly or completely WfH), cf. Alipour et al. (2021).

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and rural counties decreased by 30 percent. Finally, we show that when WfH is advertised, competencies such as adaptability, teamwork, and basic digital skills gain importance.

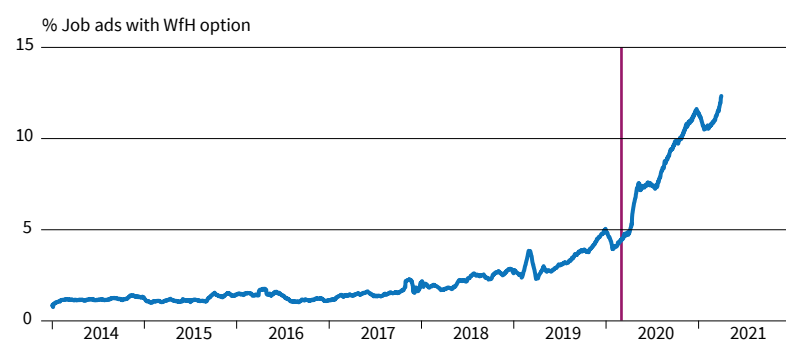
ONLINE JOB ADS OFFER IMMEDIATE INSIGHT INTO THE LABOR MARKET

Job postings are available almost in real time and offer insights into the skills and qualifications required by employers. Thus, job postings basically shed light on the *demand side* of the labor market. In contrast to company or employment surveys, they represent an objective and forward-looking measure, as companies advertise vacancies to create new employment relationships. While it is not possible to determine whether advertised vacancies were ultimately filled, using the (near) universe of online job ads for Germany allows us to analyze the demand for qualifications and skills as well as job characteristics in the German economy at a granular level over time.

We use data from Emsi Burning Glass (BG), a US-based labor market analytics firm specializing in online job ads.² BG scrapes more than 200 relevant online job boards and company websites in Germany

² Data requests can be made to Emsi Burning Glass via uksales@burning-glass.com.

Figure 2
Increased WfH Option in Online Job Ads during the Crisis^a



^a Figure shows the 30-day moving average of job ads with a WfH option as a share of total job ads between January 2014 and March 2021. The vertical line marks March 1, 2020. Source: Data from Emsi Burning Glass.

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for job ads and processes them systematically. After cleaning the data for duplicates, job ads are classified by occupation, industry, and company location. This leaves us with over 35 million job postings between January 2014 to March 2021. To identify ads that explicitly offer a WfH option, we first manually review several hundred job ads and create a list of WfH-related keywords, including *Home Office*, *Mobiles Arbeiten*, *Remote Work*, *Work from Home*, *Arbeiten von zu Hause*, *Mobiles Office*, *Remote Option*, *flexibler Arbeitsort*, *Telearbeit*, *Heimarbeit*, *Fernarbeit*. Second, we perform computer-automated readings of the job descriptions. If the text contains one or more keywords, we assume that the job offers a WfH option.³

In principle, offering WfH in a job ad does not necessarily imply that a new hire will actually work from home. Likewise, WfH agreements can also be made subsequently without an option having been advertised in a job posting. In our view, these limitations are negligible since we aim to focus on lasting changes in the organization of work. Such changes are more likely if flexible working arrangements are actively advertised in advance, rather than granted as a result of negotiations or following an assessment of individual needs (e.g., due to child care responsibilities).

We supplement our dataset with measures of the theoretical scope for WfH at the regional and occupational level. For this purpose, Alipour et al. (2020) calculate WfH potentials for regions and for occupational groups using the BIBB-BAuA Employment Survey 2018 and administrative data from the Federal Employment Agency. WfH potential is defined as the proportion of jobs (in an occupation or in a region) that can be done from home according to their job profile. According to this definition, 56 percent of employees in Germany have a job that can be performed at least partly from home. In addition to WfH potentials, we also determine pre-crisis untapped WfH potentials, defined as the proportion of employees in the 2018 survey who have a WfH feasible job but who never worked from home before the Covid-19 crisis.

WFH IN JOB ADS HAS MORE THAN TRIPLED SINCE 2019

Figure 2 shows the share of job ads with a WfH option over time. Between 2014 and 2018, the share remained below 2 percent and increased just slightly. The trend slowly accelerated starting in 2018. In 2019, 3.3 percent of all advertisements included a WfH option. The onset of the Covid-19 crisis in March 2020 (vertical line) triggered a remarkable boom in the prevalence of WfH. By the first quarter of 2021, the percentage

³ In principle, jobs can also be advertised for full-time remote work, i.e., without the possibility of working from business premises. A manual review of a random sample suggests that this type of advertisement represents a minority. Therefore, these ads are currently not classified separately. We did not find ads that explicitly rule out the possibility to work from home.

of ads with a WfH option more than tripled compared to 2019, reaching almost 12 percent.

Figure 3 breaks down the time series by occupations with high, medium, and low WfH potential. Occupations with high potential include Specialists in Information and Communication Technology and Management Experts in Financial and Insurance Services. Occupations in fields such as transportation, physical services, or hospitality, on the other hand, exhibit a lower WfH potential. It is not surprising that the share of ads with a WfH option is always higher in occupations with greater potential, and the upward trend in WfH starting in 2018 is primarily driven by these occupations. However, the Covid-19 shock is not limited to a single occupational group but affects the whole economy. In the first quarter of 2021, nearly 20 percent of job ads in occupations with high WfH potential offered a WfH option and nearly seven percent of ads in occupations with low WfH potential offered a WfH option.

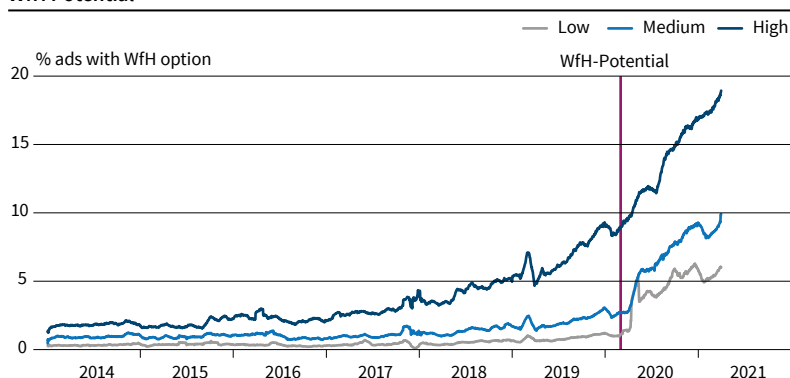
WFH OPTIONS ON THE RISE, ESPECIALLY IN PROFESSIONS WITH UNTAPPED POTENTIAL

The extent to which the upwards trend in WfH was driven by actually upgrading suitable jobs with a WfH option cannot be directly inferred from the raw data. In principle, this trend could also be driven by an increase in demand for jobs that always had a WfH option (composition effect). To shed light on whether employers are increasingly advertising jobs that could be done at home with a WfH option during the crisis, we plot the growth in the share of jobs with a WfH option with respect to their pre-crisis untapped WfH potential (Figure 4). The time series are normalized to 100 starting on 1 March 2020. The figure shows that the strongest growth takes place in occupations in which WfH usage (relative to its potential) was particularly low before the crisis. The share of job ads with a WfH option increased nearly fivefold in these occupations. In contrast, the share with a WfH option in occupations with high WfH potential only doubled. The finding suggests that employers across the economy intensified WfH during the pandemic, particularly by advertising vacant positions that could be performed from home with an explicit WfH option.

REMOTE WORK INCREASINGLY REACHES RURAL AREA

Job postings also contain information on the location of the employer. This makes it possible to examine regional differences in WfH prevalence over time. Figure 5 shows the proportion of ads with a WfH option in East and West Germany as well as in urban and rural regions. Over the entire observation period, WfH options are offered more frequently in metropolitan areas and in Western Germany. However, the increase in offering a WfH option is not exclusively limited to

Figure 3
Development of the Share of Ads with WfH Option Divided by Occupational WfH Potential^a

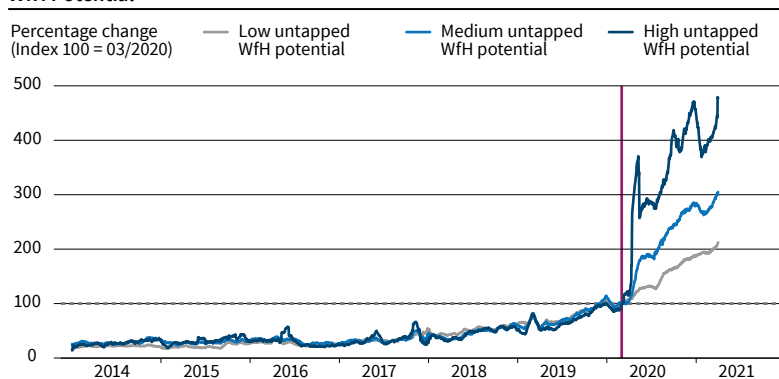


^a Figure shows the 30-day moving average of job ads with a WfH option as a percentage of total job ads divided by occupational WfH potential.

Source: Data from Emsi Burning Glass and Alipour et al. (2020).

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Figure 4
Strongest Growth in the Share of WfH Jobs in Occupations with High Untapped WfH Potential^a



^a Figure shows the percent change in the 30-day moving average of the share of job ads with a WfH option in total job ads by untapped WfH potential (normalized to March 1, 2020 = 100).

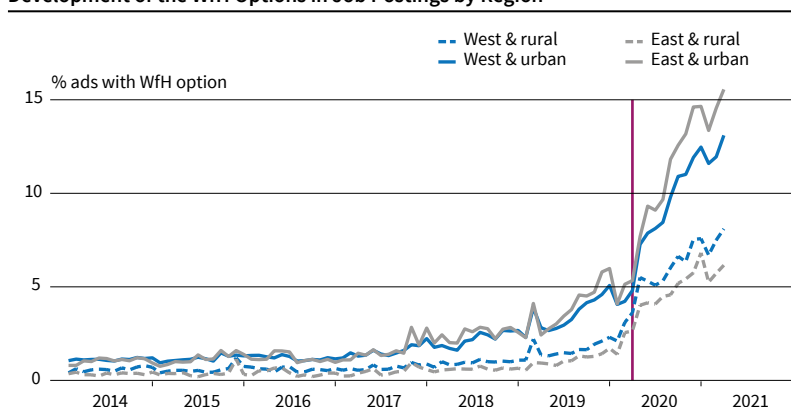
Unused WfH potential is defined as the share of employees with a WfH option who did not work from home before the pandemic (in 2018). The vertical line marks March 1, 2020.

Source: Data from Emsi Burning Glass and Alipour et al. (2020).

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urban areas. In particular, the Covid-19 shock led to a convergence in the WfH shares between rural and urban regions in subsequent months. Figure 6 shows the relationship between the regional WfH options in job ads and *untapped* WfH potential. The size of the bubbles reflects the size of the counties. The highlighted circles indicate independent cities (*kreisfreie Städte*). The positive correlation suggests that at the regional level, growth in WfH options has occurred more strongly in regions with higher untapped potential for flexible work arrangements. This is particularly the case for smaller towns and rural regions. Indeed, the urban-rural gap in access to WfH dropped remarkably during the pandemic (Figure 7): while in 2019, job ads from urban areas were about 2.5 times more likely to offer WfH than job ads from rural areas, the number is only 1.8 in 2020, corresponding to a reduction of about 30 percent. The share in WfH options between March 2020 and March 2021 are particularly high in cities such as Munich (17 percent), Cologne (16 percent), Bonn (16 percent) or Berlin (16 percent).

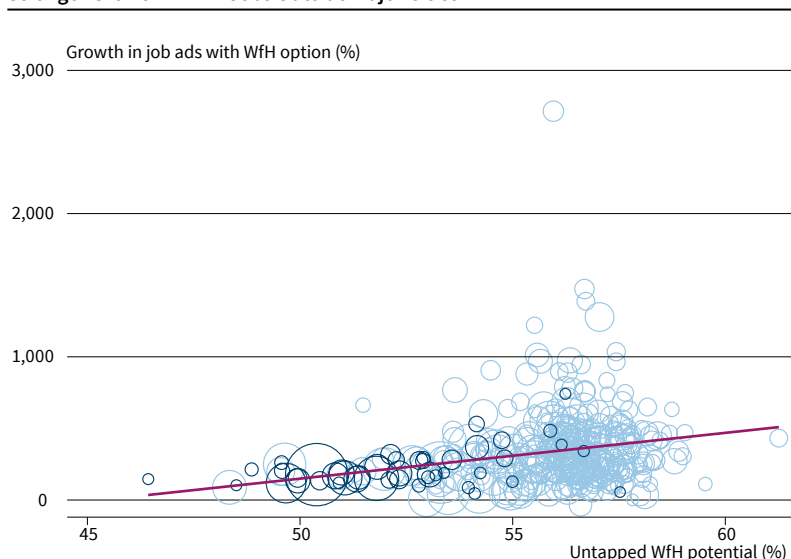
Figure 5
Development of the WfH Options in Job Postings by Region^a



^a Plot shows the share of job ads with a WfH option differentiated by rural and urban areas in Eastern and Western Germany.
Source: Data from Emsi Burning Glass.

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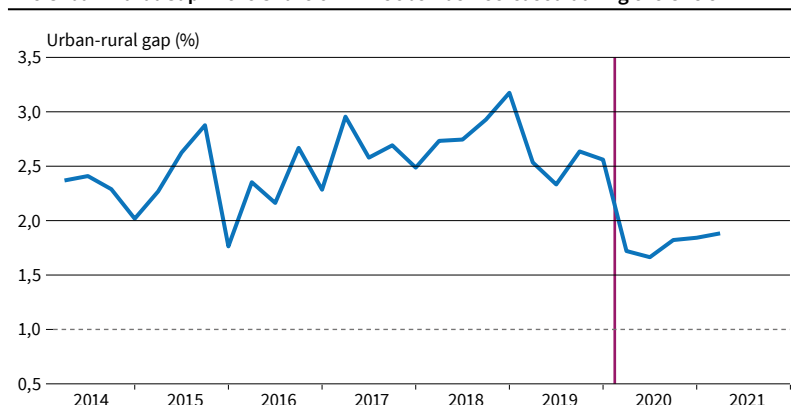
Figure 6
Stronger Growth in WfH Jobs Outside Major Cities^a



^a Plot shows correlation between untapped WfH potential and growth in share of job ads with WfH option between March 2019 - March 2020 and March 2020 - March 2021 at the county level. The size of the circles is proportional to the population of the counties. Circles colored in dark blue mark large independent cities (kreisfreie Städte).
Source: Data from Emsi Burning Glass and Alipour et al. (2020).

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Figure 7
The Urban-Rural Gap in the Share of WfH Jobs Has Decreased during the Crisis^a



^a Maps show the proportion of ads with a WfH option in urban counties relative to the proportion in rural counties.
Source: Data from Emsi Burning Glass.

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But also small counties, such as Gifhorn (21 percent) and Lichtenfels (17 percent), stand out with high values. Figure 8 displays the regional distribution. The left map reports the shares of ads with a WfH option during the pandemic, the right map shows regional WfH potentials. Darker colored areas represent higher values and the red dots indicate big cities. It is apparent that WfH potential and the proportion of job ads with a WfH option are also strongly correlated at the regional level.

WFH ON THE RISE ACROSS ALL SECTORS OF THE ECONOMY

In some sectors, the option to work from home was granted at least to some extent even before the pandemic, but in others this rarely occurred (Figure 9). For example, in 2019 hardly any employers in the Health & Social Services, Education & Teaching, or Hospitality sectors mentioned WfH in their job ads. This trend reversed during the Covid-19 crisis. The percentage of ads with a WfH option has markedly increased across all industries. However, the WfH potential again plays a crucial role: industries that had a higher share of occupations with high WfH potential pre-crisis still display the highest WfH shares in 2020 and 2021. For example, in the ICT sector the offer of WfH in job ads tripled from 9 percent in 2019 to over 17 percent in 2020 to 27 percent in the first quarter of 2021. In the Finance & Insurance industry the WfH share quadrupled (from 6 percent in 2019 to 24 percent in the first quarter of 2021).

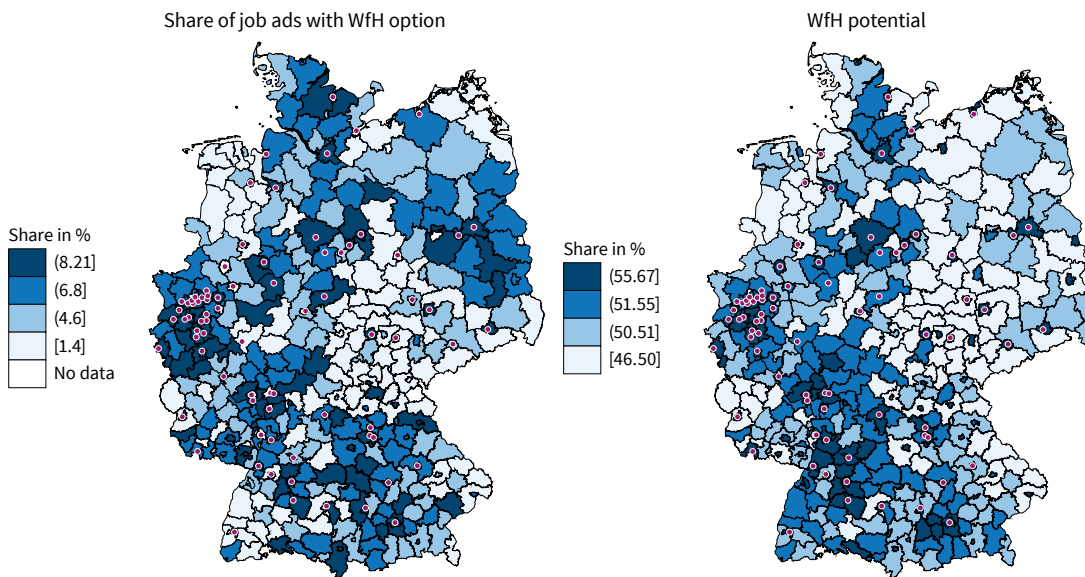
TEAMWORK AND DIGITAL SKILLS GAIN IMPORTANCE WHILE WORKING FROM HOME

In general, the possibility to offer WfH arrangements depends on a job's task profile and the associated skill requirements. A special feature of job ads is that the postings contain very precise descriptions of the skills demanded by employers. This enables us to evaluate job requirements needed when working from home. We calculate the share of job ads that ask for a given skill for the period from 15 March 2020 to 31 March 2021 separately for ads with and without a WfH option.

There are clear differences in the skills required between jobs with and without a WfH option (Figure 10).⁴ The relocation of well-established workflows from the office to a worker's home leads to drastic changes both in the social and communication context as well as in the organization of work itself; for example, through fewer interactions, increasingly asynchronous communication, and more autonomy of employees. In job ads that are explicitly advertised

⁴ This comparison refers to job postings with and without a WfH option across all occupational groups. To be able to establish systematic relationships beyond simple correlations, more granular analyses within occupational groups would be needed.

Figure 8

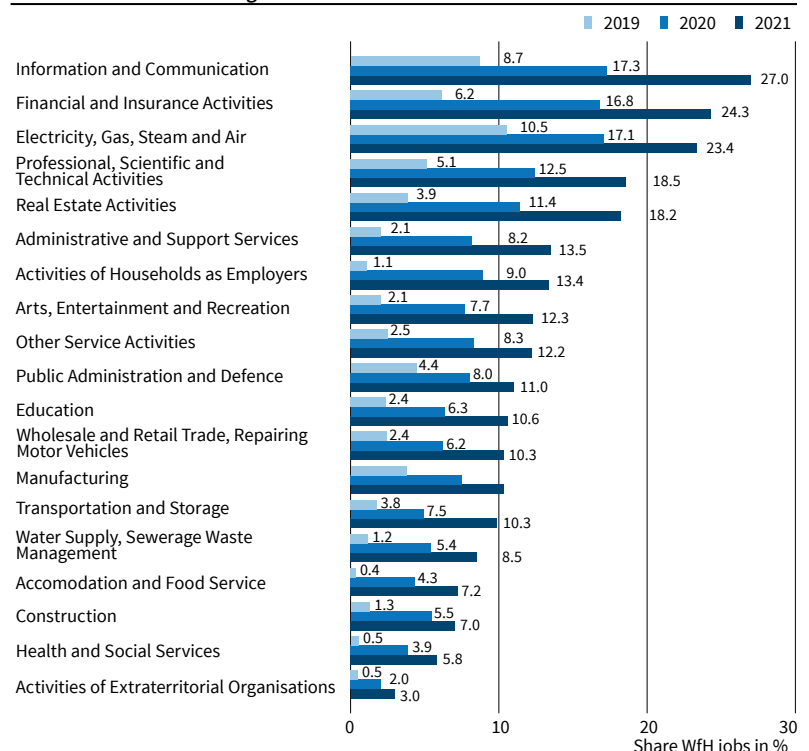
Regions with Higher WfH Potential Offer More Jobs with WfH Option^a

^a Maps show the percentage of ads with WfH options between March 2020 and March 2021 (left) and WfH potential (right) at the county level. Red dots mark major cities.
Source: Data from Emsi Burning Glass and Alipour et al. (2020).

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for WfH, skills such as the ability to work in a team, creativity, adaptability, and digital competences are more important. The most commonly demanded skill in jobs with a WfH option is adaptability to change, which is mentioned in 79 percent of these job ads (compared to 66 percent in jobs not advertised for remote work). Communication and teamwork also need to adapt considerably when working from home, as team members are usually not immediately available. Teamwork skills are required in 63 percent of WfH-jobs, compared to 54 percent in jobs without this option. Significant differences are also apparent in basic computer skills. Jobs that explicitly mention a WfH option are almost twice as likely to ask for computer use skills than jobs without a WfH option (43 percent vs. 22 percent). This difference in the explicit statement of specific skills is greatest for the skills computer use (21.1 percentage points difference between jobs with and without a WfH option), teamwork principles (15.8 percentage points), Microsoft Office (15.8 percentage points), and adapting to change (12.7 percentage points).

Figure 11 shows the growth in demand for skills throughout the Covid-19 crisis across all occupational groups. In this figure, we do not explicitly distinguish between job ads with and without WfH options. We consider the period from 1 March 2019 to 14 March 2020 as the pre-crisis period and calculate growth rates compared to the period from 15 March 2020 to 31 March 2021. Increased demand during the pandemic is most evident in healthcare skills (Pathogenic Microorganisms 510 percent, Nursing 52 percent, Medical Terminology 33 percent), IT (Developing Animations 43 percent, Using IT Tools 39 percent, Using

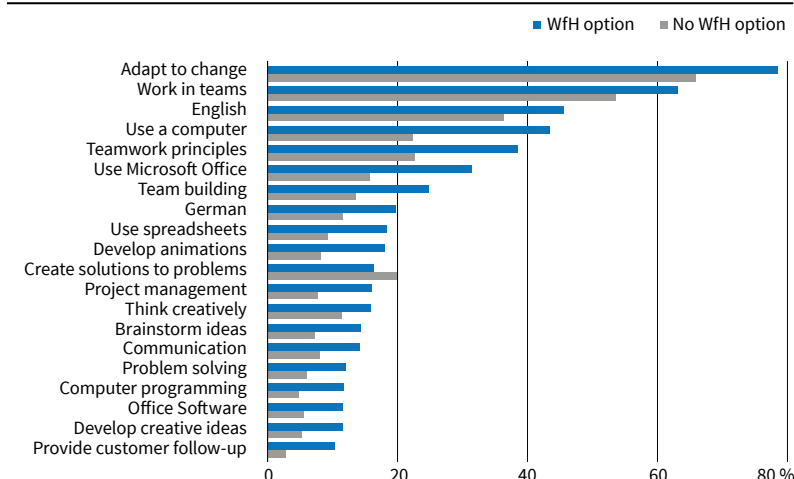
Figure 9
Increased WfH Offer during the Crisis in All Industries^a

^a The figure shows the share of job ads with a WfH option by industry in Germany.
Source: Data from Emsi Burning Glass.

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Presentation Software such as Zoom 29 percent), and Scientific Research (38 percent). Customer service skills (selling services and products 38 percent, maintaining relationships with suppliers 37 percent, satisfying consumers 30 percent, social media 34 percent) or business management (adhering to budget princi-

Figure 10

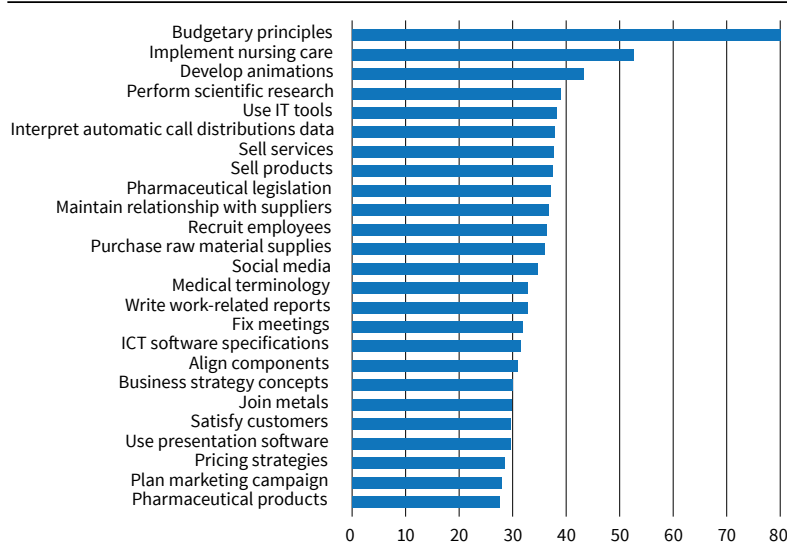
The Most Important Skills in Jobs with and without WfH Option during the Crisis^a

^a The chart shows the percentage of job ads with and without a WfH option that require each skill. The period considered is between 15 March 2020 and 31 March 2021.

Source: Data from Emsi Burning Glass.

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Figure 11

Absolute Growth In Demand for Skills across All Occupations during the Crisis^a

^a The chart shows growth in demand for skills in job ads across all occupations. Shown are the 25 skills with the greatest growth during the crisis. The period March 2019–February 2020 is compared with March 2020–March 2021.

Knowledge on Pathogenic Microorganisms has grown by 520% as this specific skill was hardly in demand before the pandemic. This value is not shown in the graph.

Source: Data from Emsi Burning Glass.

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ples 80 percent, devising business strategy concepts 30 percent) grow significantly. Some of these shifts may endure beyond the pandemic, others may lose importance as the economy begins to recover. This underscores the importance of developing a better understanding of how disruptive or sustainable the changes triggered by the Covid-19 pandemic are in the labor market.

OUTLOOK

The WfH experiment has shown that workers' performance generally does not plummet at home. Firm sur-

veys consistently show that a majority of companies in Germany intend to enable WfH permanently (ifo Business Survey May 2020; BSI 2021). The negative stigma that has long been attached to working from home could also be largely related to the fact that in the past managers were unable to adequately assess the performance of remote workers. This often disadvantaged remote workers compared to employees who worked at the office, for example with regard to promotions (Bloom et al. 2015). Emanuel and Harrington (2021) show that switching to remote work generates productivity gains, but higher-performing employees prefer to work at the office to avoid the "out-of-sight-out-of-mind" effect. The result is a productivity gap between those who work from home and those who work from the business premises, which in turn convinces managers of their (false) assumption that remote work can impair performance. The decisive factor for the future of remote work is therefore likely to be whether companies are willing and have the capacity to adapt their management style to a hybrid workforce. Mere investment in digital infrastructure is unlikely to be enough to achieve this. Our study suggests that companies are increasingly gearing their work organization towards working from home. The descriptive analyses cannot necessarily be interpreted as causal. Likewise, crisis-related effects, such as the above-mentioned composition effect, cannot be ruled out even at the current margin. However, the rich information in the dataset has promising potential for more detailed analyses in future research.

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