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VOXEU COLUMN CLIMATE CHANGE LABOUR MARKETS

Labour markets in the green economy

Cagatay Bircan, Lucas Kitzmüller, Sehar Noor, Niharika Satish / 22 Nov 2023

Many individuals are aware of climate change and its consequences; however, they are not necessarily willing to pay higher taxes or forgo growth and jobs to prioritise environmental policies. This column analyses attitudes and labour markets in the green transition, with a focus on emerging Europe. Despite the increasing demand for green skills, labour market adaptation remains sluggish in many countries. To maintain public backing for climate action, it is vital to ensure a just transition process and address the economic concerns of vulnerable groups.

AUTHORS**Cagatay Bircan****Sehar Noor****Lucas Kitzmüller****Niharika Satish**

Public support for environmental policies depends not only on their ecological benefits, but also on their perceived economic implications. Most people's perceptions are shaped by their own experience and they feel the implications of the green transition most directly in the labour market. On the one hand, the green transition can create 'good jobs' that are less prone to geographical concentration, dehumanising repetitive tasks, and automation or delocalisation (Terzi 2022). On the other hand, evidence shows that past green fiscal stimulus packages were effective in creating jobs only in the long run, but not in the short run (Popp et al. 2020). This column presents findings from the EBRD's *Transition Report 2023-24* (EBRD 2023), which documents what the transition to a green economy means for labour markets.

Attitudes towards the green economy

We use data from the most recent wave of the Life in Transition Survey (LiTS IV), conducted in 2022 and 2023 by the EBRD and the World Bank, to explore people's attitudes towards climate policies and support for green action. Overall, people living in emerging Europe (as well as Germany) recognise that climate change is real and has serious consequences. However, those beliefs do not necessarily translate into a willingness to pay higher taxes or forgo economic growth and job creation to prioritise environmental policies. For instance, only 43% of surveyed individuals would prioritise the environment at the expense of economic growth and jobs. Unwillingness to support green policies tends to be greater among the socio-economic groups that are most vulnerable to such changes, including those in the bottom half of the income distribution and the less educated.

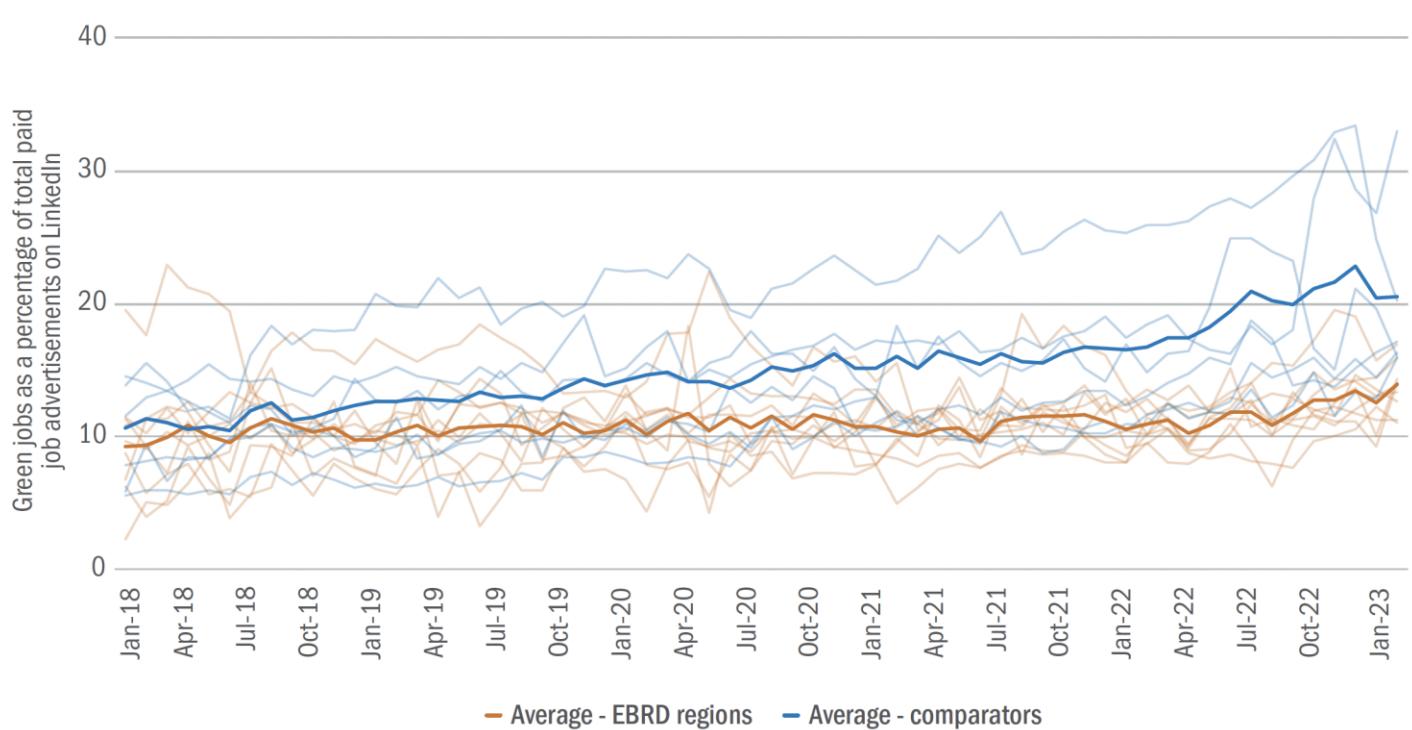
Demand for skills and labour mobility

The green transition cannot take place without an adequately skilled workforce that can satisfy the demands of a greener economy. Demand for workers with green skills is already on the rise, and our analysis documents a wage premium of 4% for such workers. However, that green premium accrues disproportionately to highly skilled workers and less to individuals who are more likely to be climate sceptics.

The green wage premium suggests that demand for green skills in the market exceeds the supply of workers with the requisite skills. Our analysis draws on the online activity of more than 200 million LinkedIn members across several economies in the EBRD regions where LinkedIn Economic Graph data are sufficiently representative of job vacancies, job to job transitions and job seekers' skills. We also use France, Germany, Italy, the UK and the US as comparators.

Across the EBRD regions, green jobs accounted for 14% of total paid job postings at the beginning of 2023, up from just under 9% in 2018 (see Figure 1). In the advanced comparator economies, this ratio – a measure of demand for green skills – increased more rapidly, from 10% to 21% on average over the same period.

Figure 1 Green jobs are increasing as a percentage of total paid job postings

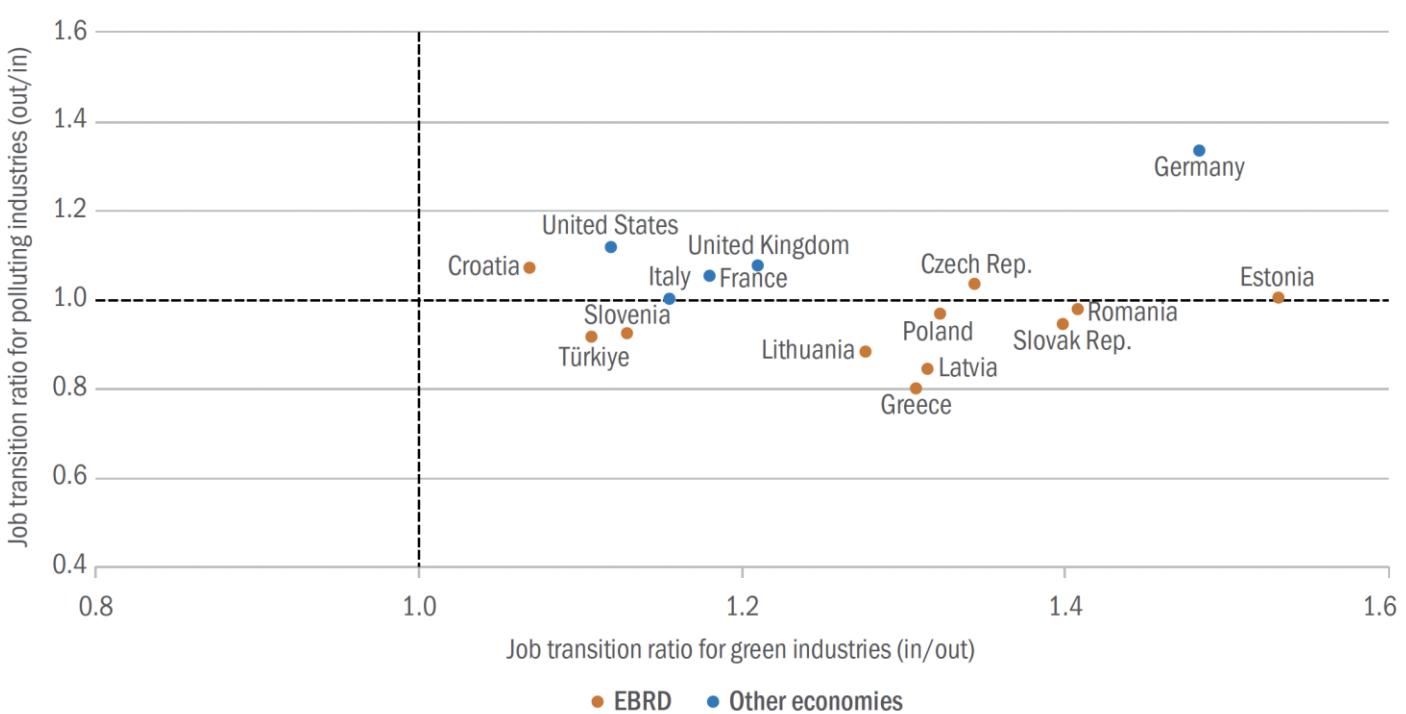


Source: LinkedIn (via the Development Data Partnership) and authors' calculations.

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Despite a substantial wage premium in green sectors, mobility from brown to green sectors remains limited in the EBRD regions. LinkedIn data indicate that there was a net flow of workers into green activities between 2015 and 2023 across all economies (i.e. more workers moved into green industries than moved out of them; see Figure 2). Average net rates of transition into green activities were similar across the EBRD regions and advanced comparators. However, there was also a net flow into polluting industries in the EBRD regions over that period: more workers found new employment in brown industries than left those industries. In advanced comparators, by contrast, there was a net outflow of workers from brown industries.

Figure 2 Between 2015 and 2023, more workers moved into green industries than moved out of them



Source: LinkedIn (via the Development Data Partnership) and authors' calculations.

Note: The vertical axis measures the number of workers moving out of a brown sector divided by the number moving into such a sector (so figures in excess of 1.0 denote a net outflow). The horizontal axis indicates the number of workers moving into a green sector divided by the number moving out of such a sector (so figures in excess of 1.0 denote a net inflow).

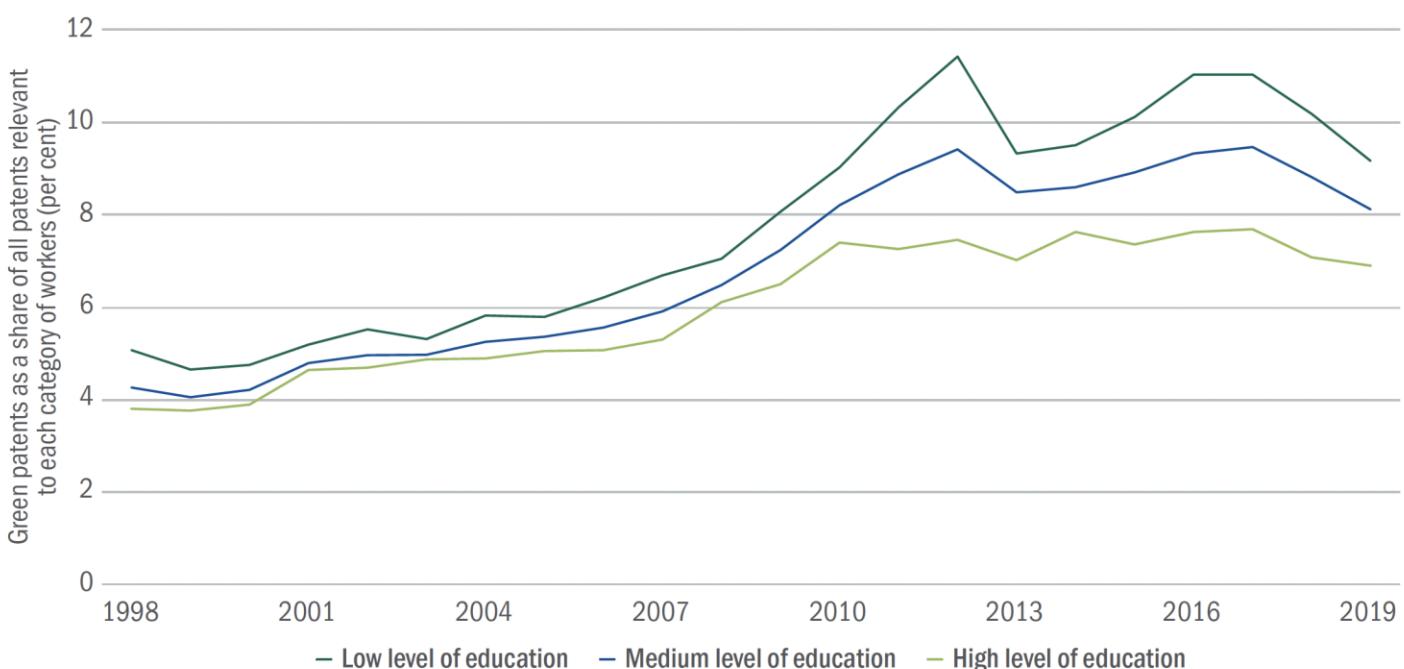
Green innovation and labour markets

The arrival of new green technologies may create or destroy jobs. Over the last few decades, technological change in advanced economies has typically been found to be labour-substituting, with a specific bias against routine tasks (Autor 2015). Yet, innovation also has the potential to be labour-augmenting, complementing the tasks performed by workers and increasing demand for labour.

We analyse how the development of green technologies affects local labour markets by drawing on individual-level data from the EU Labour Force Surveys (EU-LFS). We combine these data with information on patents filed at the USPTO and new green technologies as classified by the EPO. We then develop a novel measure of exposure to green technologies vis-à-vis non-green technologies for each occupation at the three-digit level of the ISCO classification (Kogan et al. 2021, Autor et al. 2022).

Our analysis links local employment growth in each occupation to a measure of exposure to green innovation and various local labour market characteristics. It shows that an occupation's overall exposure to technological innovation tends, on average, to be labour-substituting. However, this labour-substituting effect is more muted where exposure to green innovation is greater. Since some occupations are more exposed to green innovation than others, workers with certain characteristics who dominate these occupations will be affected more by green technologies. For instance, we find that workers with less education are more likely to have occupations with greater exposure to green innovation (see Figure 3).

Figure 3 Less-educated workers are more exposed to green innovation



Source: USPTO, EPO, EU Labour Force Survey and authors' calculations.

Note: Shares are first calculated by occupation and averaged using education-specific weights based on occupation patterns. The sample comprises Bulgaria, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia in the EBRD regions, plus Germany, Italy, Spain and the UK as comparators.

Fast and slow green transitions

How quickly the demand for new skills is met in the labour market will, to a large extent, determine the speed at which countries can roll out green technologies. Experience gained from the ICT transition suggests that skills mismatches have the potential to persist as local markets slowly adjust (Adão et al. 2022). In particular, workers find it harder to transition into jobs with strong skill specificity.

We analyse the speed at which local labour markets have adjusted to green transitions over the past two decades using individual level data from the EU-LFS. The results indicate that labour markets adjust fairly slowly in the face of a green transition. The employment shares of occupations which had greater exposure to green innovation in 2000 did not experience significant changes during the first decade of this century, but showed stronger growth only from 2015 onwards.

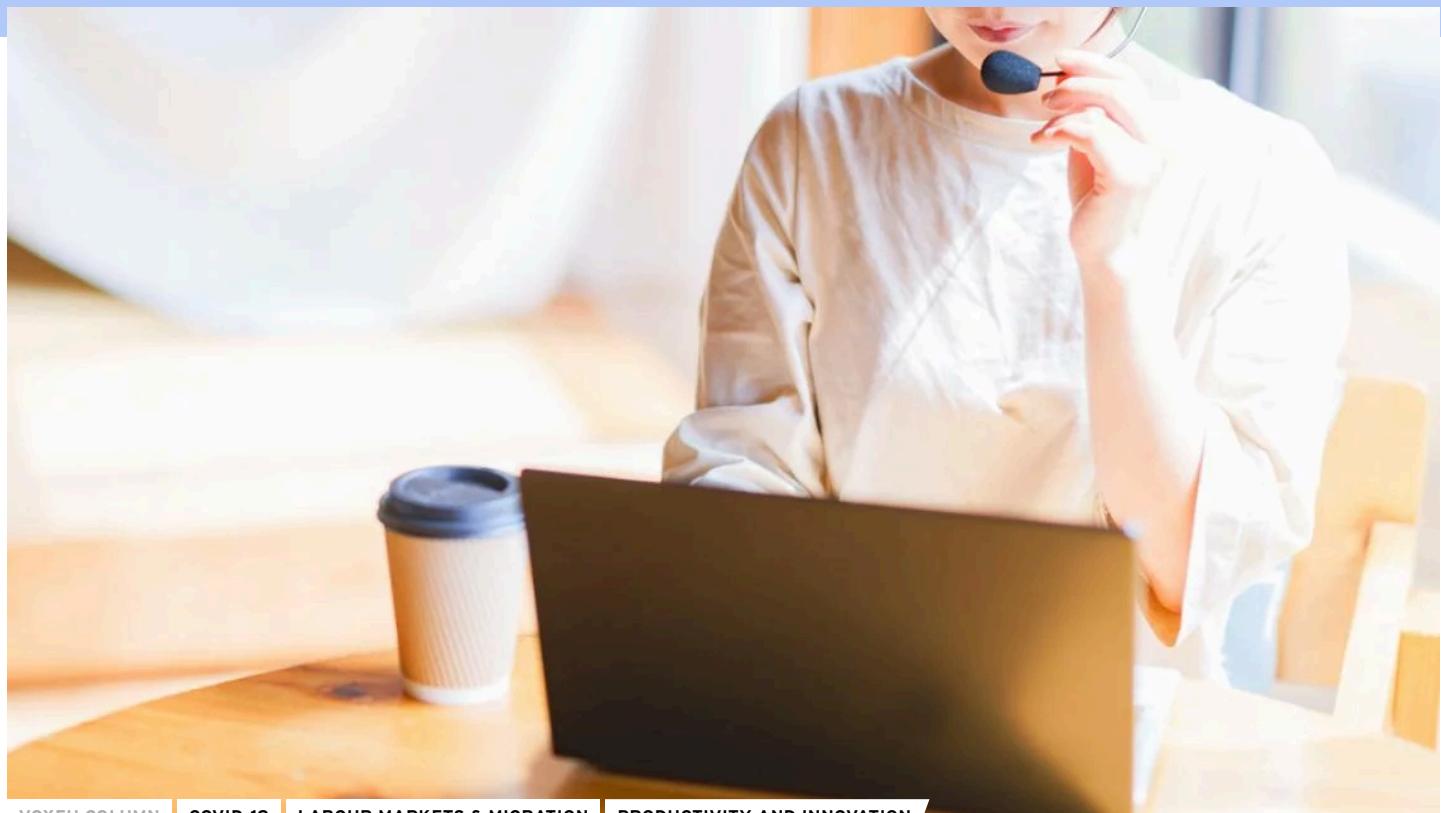
Policy implications

The energy transition offers many new employment opportunities but risks leaving behind lower-skilled, informal workers that have pollution-intensive jobs (World Bank 2023). Labour market adjustment costs can be minimised by using the existing skill sets of workers who are at the greatest risk of displacement in a local area, helping them to move into nearby jobs that require limited reskilling. This should be done with the explicit cooperation and guidance of local businesses. However, there will inevitably be adaptation challenges for specific workers and industries, who will need help in the form of reskilling and training programmes. A strong labour market that is bolstered with social safety nets can enable displaced workers to move across sectors and find new jobs. Because the green transition affects different geographical areas in different ways, a location-based strategy for business support and development will need to complement national policies.

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In this section



VOXEU COLUMN COVID-19 LABOUR MARKETS & MIGRATION PRODUCTIVITY AND INNOVATION

Productivity, amenity value, and the future of remote work

Masayuki Morikawa / 6 Oct 2022

Although the impact of the COVID-19 pandemic has been declining over time, many firms continue to adopt a work-from-home policy. This column reports on a new survey of Japanese firms in the fourth quarter of 2021. It finds that the ratio of firms that allow working from home decreased substantially compared to the spring of 2020, along with the intensity of working from home. Most firms believed workers were less productive when working remotely and thus were likely to limit it once the pandemic ended. If employees have a strong desire to work remotely, there may be serious conflicts after the pandemic.

AUTHORS

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President, Research Institute of Economy, Trade and Industry (RIETI)

Following the onset of the COVID-19 pandemic, the number of firms and workers adopting working from home (WFH), or home-based remote work, increased substantially. Many firms have now moved away from remote work and back to working in the office, while some firms are planning to continue this workstyle into the future. The productivity of WFH is a key determinant in whether or not to continue this workstyle after the end of the pandemic.

Studies on the productivity of WFH during the COVID-19 pandemic based on surveys of individual workers have been conducted in many countries, including Barrero et al. (2021) for the US, Etheridge et al. (2020) for the UK, and Morikawa (2022a) for Japan. However, these studies have produced very different results. Bartik et al. (2020) and Morikawa (2022a) are examples of studies using firm surveys. Bartik et al. (2020) reported that on average, WFH reduced productivity by approximately 20%, based on a survey of small and medium-sized businesses in the US. Morikawa (2022a) indicated that among Japanese firms, the mean productivity of WFH is about 68% of the productivity in their usual workplace. However, both surveys were conducted in the first half of 2020, and WFH productivity is likely to have changed through learning effects and related investments as the COVID-19 pandemic continued.

Analysing the dynamics of this work style using panel data is useful in evaluating the efficacy of WFH. Based on this understanding, I conducted a follow-up survey of Japanese firms in the fourth quarter of 2021 to extend the analysis of Morikawa (2022a). In this column, I document the main findings obtained from the panel data, focusing on the productivity of WFH (see Morikawa 2022b for details).

Change in WFH adoption and intensity

Table 1 compares the share of firms utilising WFH practices, coverage of remote workers, and mean frequency of WFH in 2020 and 2021. The percentage of firms adopting WFH (see Panel A) decreased by approximately 15 percentage points, from 49.5% in 2020 to 34.5% in 2021. When the sample was limited to panel firms that responded to the two surveys, the WFH adoption rate decreased from 47.0% to 28.8%.

However, even if a firm adopts the WFH practice, not all employees use this working style, and the coverage of remote work differs by firms. The mean percentage of employees engaged in WFH (see panel B) decreased from 30.7% in 2020 to 21.2% in 2021. When looking at the subsample of firms continuously utilising WFH practices, the coverage level was relatively high; however, it decreased from 32.9% in 2020 to 24.8% in 2021.

Even if an employee uses WFH, they do not necessarily work at home every working day. The mean weekly frequency of WFH (see panel C) decreased by 1.2 days, from 3.67 days in 2020 to 2.47 days in 2021. Even when limiting the sample to firms that are continuously adopting WFH practice, the mean frequency decreased by about a day, from 3.87 in 2020 to 2.88 days in 2021.

By multiplying the coverage of WFH employees by the frequency of mean WFH (expressed as percentages), we can calculate ‘WFH intensity’, which is the ratio of WFH hours to total working hours. The WFH intensity (see panel D) decreased significantly from 23.7% in the 2020 survey to 10.8% in the 2021 survey. But when limiting the sample to firms continuously utilising WFH practices, the reduction in WFH intensity is relatively small (from 33.1% to 22.2%) and the level of WFH intensity is relatively high even in the fourth quarter of 2021.

Table 1 Adoption and intensity of working from home

		2020 survey	2021 survey	Change
A. Utilizing WFH	All firms	49.5%	34.5%	-14.9%
	Panel firms	47.0%	28.8%	-18.2%
B. WFH coverage	All firms	30.7%	21.2%	-9.5%
	Panel firms	27.1%	18.5%	-8.6%
	Continuing WFH	32.9%	24.8%	-8.1%
C. WFH frequency (weekly)	All firms	3.67	2.47	-1.20
	Panel firms	3.72	2.61	-1.11
	Continuing WFH	3.87	2.88	-0.99
D. WFH intensity	All firms	23.7%	10.8%	-12.9%
	Panel firms	21.3%	9.6%	-11.7%
	Continuing WFH	33.1%	22.2%	-11.0%

Notes: The WFH intensity (panel D) is calculated as the WFH coverage multiplied by the frequency of WFH per week (converted into percentage). Panel firms are those which responded to the 2020 and 2021 surveys. Firms continuing WFH are those adopting WFH practices in the 2020 and 2021 surveys.

To summarise, at the end of 2021, both the ratio of WFH adopting firms (extensive margin) and WFH intensity (intensive margin) decreased substantially compared to when the first state of emergency was declared in spring 2020.

Productivity of remote work

Table 2 reports the productivity of WFH in 2020 and 2021. The productivity of WFH is a firm’s subjective evaluation of their remote workers’ mean productivity at home relative to productivity at the office (=100). The mean WFH productivity of firms utilising WFH improved by about four points from 68.3 in the 2020 survey to 72.2 in the 2021 survey. When limiting the sample to firms that are continuously using WFH practices, productivity improved by about 5.5 points from 73.9 in 2020 to 79.4 in 2021. My interpretation is that the improvement in productivity of WFH continuing firms arises from the learning effect and redistribution of work within the firm, such as with returning employees and/or tasks with relatively low productivity from home to the office.

Table 2 Firms’ evaluation of WFH productivity

		2020 survey	2021 survey	Change
All firms	Mean	68.3	72.2	4.0
	WFH>Office	1.2%	1.5%	0.3%
	WFH=Office	6.6%	15.0%	8.4%
	WFH<Office	92.3%	83.5%	-8.7%
Panel firms	Mean	66.9	70.8	3.9
	WFH>Office	1.6%	1.6%	0.0%
	WFH=Office	5.9%	13.1%	7.1%
	WFH<Office	92.4%	85.3%	-7.1%
Continuing WFH	Mean	73.9	79.4	5.5
	WFH>Office	2.9%	2.9%	0.0%
	WFH=Office	8.6%	19.0%	10.4%
	WFH<Office	88.5%	78.1%	-10.4%

Notes: Mean WFH productivity is a subjective assessment of employee productivity at home relative to the office (=100). WFH>office, WFH=office, and WFH<office are percentages of firms. Work from home: WFH.

However, the mean evaluation of remote worker productivity at home is still approximately 20% lower than at the usual workplaces. When dividing the responses into WFH>office, WFH=office, and WFH<office, the percentage of firms that evaluated productivity at home as lower than the office was 92.3% in the 2020 survey and 83.5% in the 2021 survey. In the 2021 survey, the percentage of firms that stated that there is no difference in productivity between work at home and in the office increased slightly, but the majority of firms rated WFH as less productive than office work. The results suggest that there are technical and institutional factors that reduce the efficiency of WFH and that face-to-face information exchange is still important, even if various online communication tools have become available.

Remote work after the pandemic

Table 3 presents the results on WFH adopting firms' views of WFH after the pandemic. The percentage of firms that responded that they would use WFH practices as intensively as now was 15.6% in the 2021 survey, up slightly from 12.9% in 2020. Even for the subsample of continuing WFH firms, the change was small (from 20.8% to 22.8%). In both the 2020 and 2021 surveys, the majority of firms chose "discontinue WFH practices," and more than 30% of firms intended to reduce the coverage of employees and/or the WFH frequency. These figures suggest that most Japanese firms are likely to reduce WFH once the COVID-19 pandemic subsides. Since the productivity of WFH is, at least on average, lower than in the office, firms' intentions are unsurprising.

Table 3 Working from home after the COVID-19 pandemic

	2020	2021
As intensively as now	12.9%	15.6%
Less intensively than now	35.3%	32.9%
Discontinue WFH practices	51.8%	51.5%

However, there is a large gap between employers and employees regarding the intention to use WFH practices after the COVID-19 pandemic. According to the findings from the employee survey (Morikawa 2021), the percentage of remote workers who want to continue frequent WFH is more than 60%, suggesting a non-pecuniary benefit or amenity value of WFH for remote workers. From the viewpoint of the balance between productivity and wages as well as the theory of compensating wage differentials, it is likely that the relative wages of remote workers will decline in the future.¹ However, in practice, it is extremely difficult to evaluate the productivity of individual remote workers accurately. Therefore, there will be serious conflicts between employers and employees regarding the use of WFH after the pandemic.

Editor's note: The main research on which this column is based (Morikawa 2022b) first appeared as a *Discussion Paper* of the Research Institute of Economy, Trade and Industry (RIETI) of Japan.

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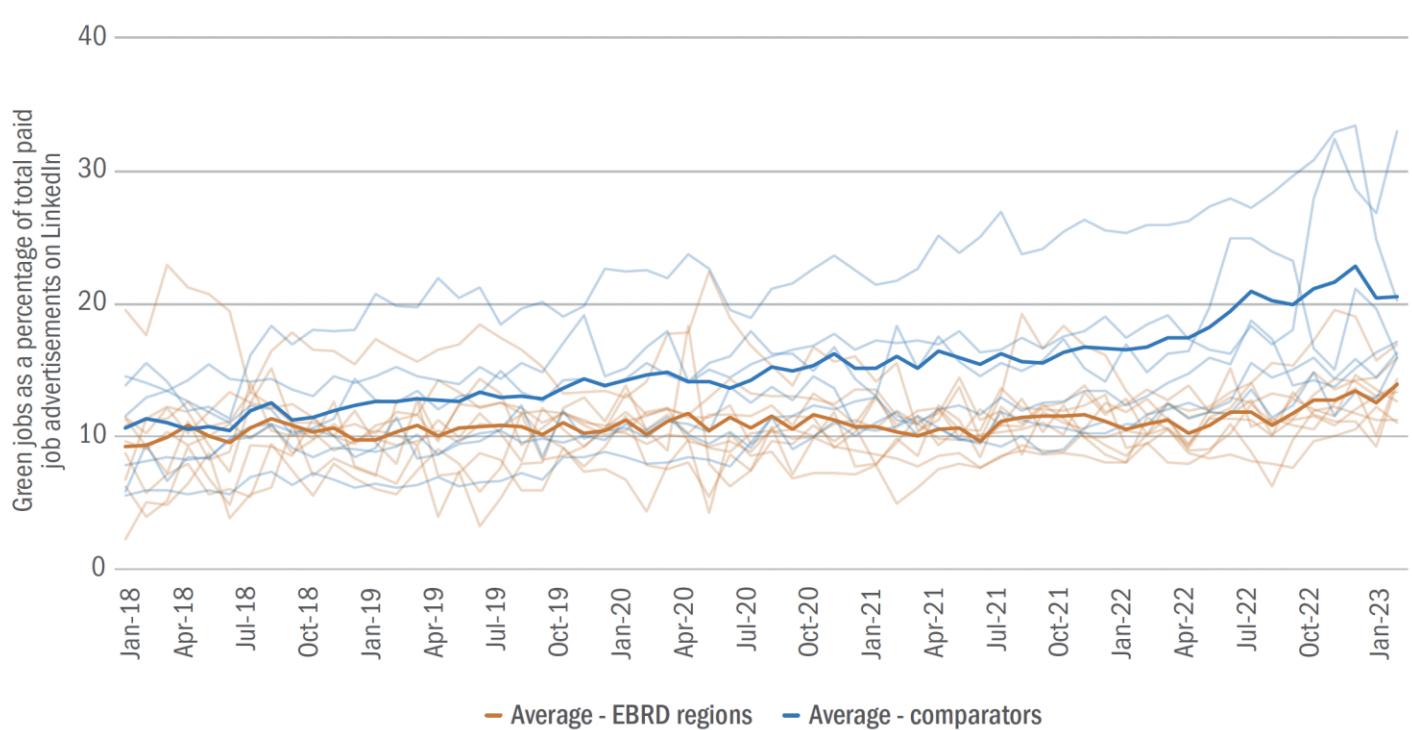
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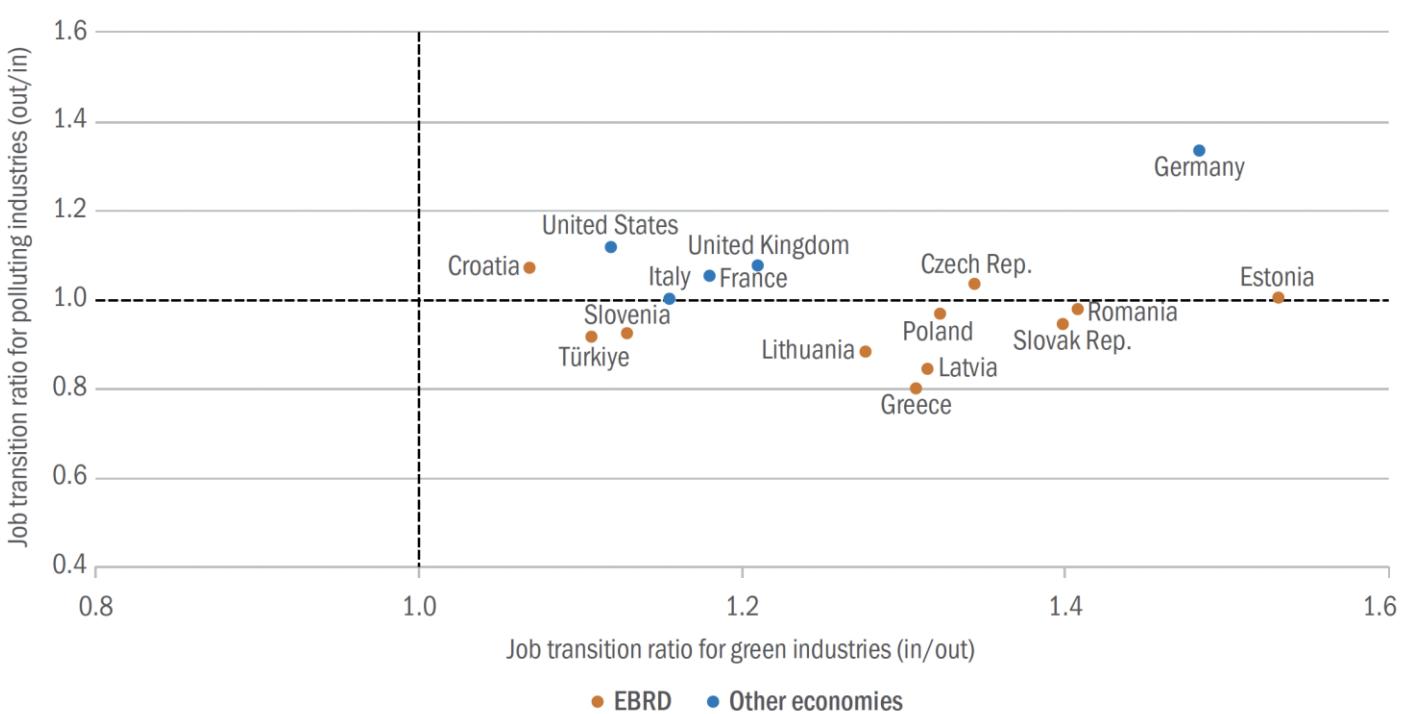


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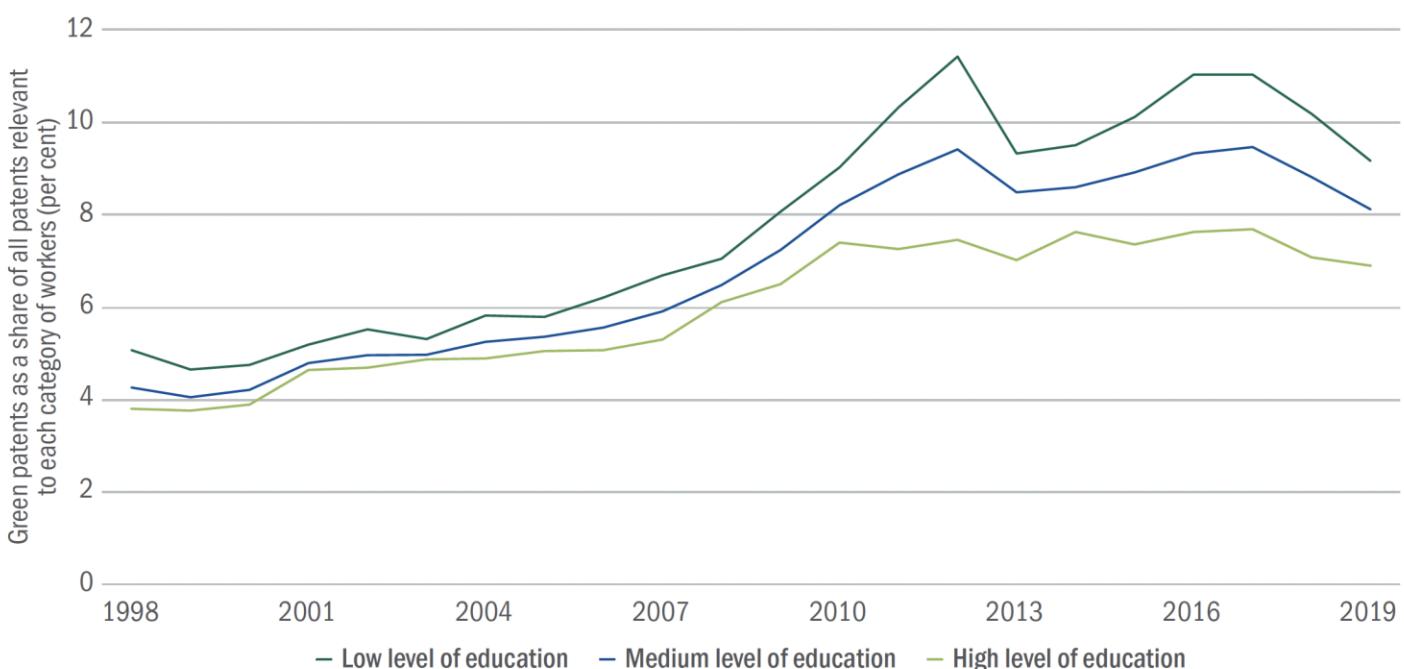
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Figure 3 Less-educated workers are more exposed to green innovation



Source: USPTO, EPO, EU Labour Force Survey and authors' calculations.

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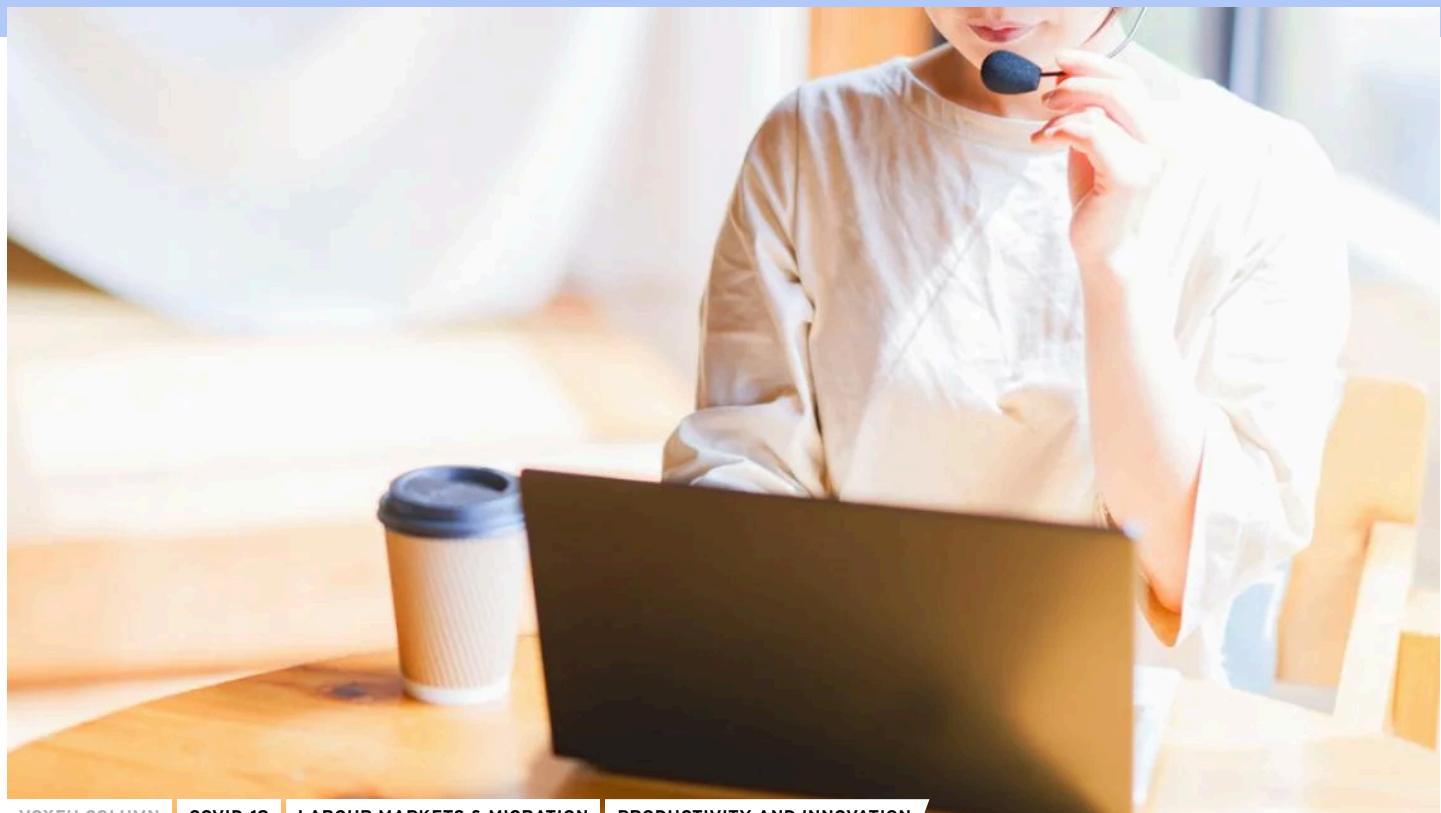
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Following the onset of the COVID-19 pandemic, the number of firms and workers adopting working from home (WFH), or home-based remote work, increased substantially. Many firms have now moved away from remote work and back to working in the office, while some firms are planning to continue this workstyle into the future. The productivity of WFH is a key determinant in whether or not to continue this workstyle after the end of the pandemic.

Studies on the productivity of WFH during the COVID-19 pandemic based on surveys of individual workers have been conducted in many countries, including Barrero et al. (2021) for the US, Etheridge et al. (2020) for the UK, and Morikawa (2022a) for Japan. However, these studies have produced very different results. Bartik et al. (2020) and Morikawa (2022a) are examples of studies using firm surveys. Bartik et al. (2020) reported that on average, WFH reduced productivity by approximately 20%, based on a survey of small and medium-sized businesses in the US. Morikawa (2022a) indicated that among Japanese firms, the mean productivity of WFH is about 68% of the productivity in their usual workplace. However, both surveys were conducted in the first half of 2020, and WFH productivity is likely to have changed through learning effects and related investments as the COVID-19 pandemic continued.

Analysing the dynamics of this work style using panel data is useful in evaluating the efficacy of WFH. Based on this understanding, I conducted a follow-up survey of Japanese firms in the fourth quarter of 2021 to extend the analysis of Morikawa (2022a). In this column, I document the main findings obtained from the panel data, focusing on the productivity of WFH (see Morikawa 2022b for details).

Change in WFH adoption and intensity

Table 1 compares the share of firms utilising WFH practices, coverage of remote workers, and mean frequency of WFH in 2020 and 2021. The percentage of firms adopting WFH (see Panel A) decreased by approximately 15 percentage points, from 49.5% in 2020 to 34.5% in 2021. When the sample was limited to panel firms that responded to the two surveys, the WFH adoption rate decreased from 47.0% to 28.8%.

However, even if a firm adopts the WFH practice, not all employees use this working style, and the coverage of remote work differs by firms. The mean percentage of employees engaged in WFH (see panel B) decreased from 30.7% in 2020 to 21.2% in 2021. When looking at the subsample of firms continuously utilising WFH practices, the coverage level was relatively high; however, it decreased from 32.9% in 2020 to 24.8% in 2021.

Even if an employee uses WFH, they do not necessarily work at home every working day. The mean weekly frequency of WFH (see panel C) decreased by 1.2 days, from 3.67 days in 2020 to 2.47 days in 2021. Even when limiting the sample to firms that are continuously adopting WFH practice, the mean frequency decreased by about a day, from 3.87 in 2020 to 2.88 days in 2021.

By multiplying the coverage of WFH employees by the frequency of mean WFH (expressed as percentages), we can calculate ‘WFH intensity’, which is the ratio of WFH hours to total working hours. The WFH intensity (see panel D) decreased significantly from 23.7% in the 2020 survey to 10.8% in the 2021 survey. But when limiting the sample to firms continuously utilising WFH practices, the reduction in WFH intensity is relatively small (from 33.1% to 22.2%) and the level of WFH intensity is relatively high even in the fourth quarter of 2021.

Table 1 Adoption and intensity of working from home

		2020 survey	2021 survey	Change
A. Utilizing WFH	All firms	49.5%	34.5%	-14.9%
	Panel firms	47.0%	28.8%	-18.2%
B. WFH coverage	All firms	30.7%	21.2%	-9.5%
	Panel firms	27.1%	18.5%	-8.6%
	Continuing WFH	32.9%	24.8%	-8.1%
C. WFH frequency (weekly)	All firms	3.67	2.47	-1.20
	Panel firms	3.72	2.61	-1.11
	Continuing WFH	3.87	2.88	-0.99
D. WFH intensity	All firms	23.7%	10.8%	-12.9%
	Panel firms	21.3%	9.6%	-11.7%
	Continuing WFH	33.1%	22.2%	-11.0%

Notes: The WFH intensity (panel D) is calculated as the WFH coverage multiplied by the frequency of WFH per week (converted into percentage). Panel firms are those which responded to the 2020 and 2021 surveys. Firms continuing WFH are those adopting WFH practices in the 2020 and 2021 surveys.

To summarise, at the end of 2021, both the ratio of WFH adopting firms (extensive margin) and WFH intensity (intensive margin) decreased substantially compared to when the first state of emergency was declared in spring 2020.

Productivity of remote work

Table 2 reports the productivity of WFH in 2020 and 2021. The productivity of WFH is a firm’s subjective evaluation of their remote workers’ mean productivity at home relative to productivity at the office (=100). The mean WFH productivity of firms utilising WFH improved by about four points from 68.3 in the 2020 survey to 72.2 in the 2021 survey. When limiting the sample to firms that are continuously using WFH practices, productivity improved by about 5.5 points from 73.9 in 2020 to 79.4 in 2021. My interpretation is that the improvement in productivity of WFH continuing firms arises from the learning effect and redistribution of work within the firm, such as with returning employees and/or tasks with relatively low productivity from home to the office.

Table 2 Firms’ evaluation of WFH productivity

		2020 survey	2021 survey	Change
All firms	Mean	68.3	72.2	4.0
	WFH>Office	1.2%	1.5%	0.3%
	WFH=Office	6.6%	15.0%	8.4%
	WFH<Office	92.3%	83.5%	-8.7%
Panel firms	Mean	66.9	70.8	3.9
	WFH>Office	1.6%	1.6%	0.0%
	WFH=Office	5.9%	13.1%	7.1%
	WFH<Office	92.4%	85.3%	-7.1%
Continuing WFH	Mean	73.9	79.4	5.5
	WFH>Office	2.9%	2.9%	0.0%
	WFH=Office	8.6%	19.0%	10.4%
	WFH<Office	88.5%	78.1%	-10.4%

Notes: Mean WFH productivity is a subjective assessment of employee productivity at home relative to the office (=100). WFH>office, WFH=office, and WFH<office are percentages of firms. Work from home: WFH.

However, the mean evaluation of remote worker productivity at home is still approximately 20% lower than at the usual workplaces. When dividing the responses into WFH>office, WFH=office, and WFH<office, the percentage of firms that evaluated productivity at home as lower than the office was 92.3% in the 2020 survey and 83.5% in the 2021 survey. In the 2021 survey, the percentage of firms that stated that there is no difference in productivity between work at home and in the office increased slightly, but the majority of firms rated WFH as less productive than office work. The results suggest that there are technical and institutional factors that reduce the efficiency of WFH and that face-to-face information exchange is still important, even if various online communication tools have become available.

Remote work after the pandemic

Table 3 presents the results on WFH adopting firms' views of WFH after the pandemic. The percentage of firms that responded that they would use WFH practices as intensively as now was 15.6% in the 2021 survey, up slightly from 12.9% in 2020. Even for the subsample of continuing WFH firms, the change was small (from 20.8% to 22.8%). In both the 2020 and 2021 surveys, the majority of firms chose "discontinue WFH practices," and more than 30% of firms intended to reduce the coverage of employees and/or the WFH frequency. These figures suggest that most Japanese firms are likely to reduce WFH once the COVID-19 pandemic subsides. Since the productivity of WFH is, at least on average, lower than in the office, firms' intentions are unsurprising.

Table 3 Working from home after the COVID-19 pandemic

	2020	2021
As intensively as now	12.9%	15.6%
Less intensively than now	35.3%	32.9%
Discontinue WFH practices	51.8%	51.5%

However, there is a large gap between employers and employees regarding the intention to use WFH practices after the COVID-19 pandemic. According to the findings from the employee survey (Morikawa 2021), the percentage of remote workers who want to continue frequent WFH is more than 60%, suggesting a non-pecuniary benefit or amenity value of WFH for remote workers. From the viewpoint of the balance between productivity and wages as well as the theory of compensating wage differentials, it is likely that the relative wages of remote workers will decline in the future.¹ However, in practice, it is extremely difficult to evaluate the productivity of individual remote workers accurately. Therefore, there will be serious conflicts between employers and employees regarding the use of WFH after the pandemic.

Editor's note: The main research on which this column is based (Morikawa 2022b) first appeared as a *Discussion Paper* of the Research Institute of Economy, Trade and Industry (RIETI) of Japan.

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