Short and medium-term sectoral employment

Forecasting the future development of remote work

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Contents

Executive summary

This report provides new projections, to 2026, of remote work rates and the accompanying macroeconomic implications for the EU27, Switzerland, Iceland, Norway, Republic of North Macedonia, Turkey and the UK.

Remote work covers a range of practices but few are straightforward to quantify consistently. The definition of remote work used in this report is working from home (WFH), matching the Eurostat Labour Force Survey (EU-LFS) definition. The EU-LFS is the principal data source for this exercise.

The literature review identified a range of drivers (e.g. sectoral composition of the economy) and potential outcomes (e.g. changes in expenditures on information and communications technologies (ICT)). Using a conceptual framework developed from the literature review, we modelled a baseline projection and three alternative scenarios: one that projected lower rates of WFH by 2026 compared to the baseline (*Unwinding of WFH*); and two that projected higher rates of WFH (*Acceleration of WFH and Acceleration of WFH with contract changes*).

By 2026, the baseline projects that 18% of workers in the EU27, and 19.6% of workers in all 33 study countries, will be working from home. There is substantial variation in these rates by individual country, from a 2026 rate of 42% in Luxembourg to 1% in Bulgaria and Romania.

Compared to the baseline, the *Unwinding of WFH* scenario projects nearly 350 000 fewer total workers and more than 10 million fewer WFH workers by 2026, with the reduction concentrated mostly in services. The *Acceleration of WFH* scenario projects more than 830 000 additional workers in total and more than 24 million more WFH workers by 2026, employed mostly in service sectors. The *Acceleration of WFH* with contract changes scenario projects nearly one million more total workers and more than 24 million more WFH workers by 2026. In this scenario, workers are assumed to shift from permanent to self-employed contract positions, leading to a projected increase in the rate of self-employment of 3.7 percentage points compared to the baseline.

An unwinding of WFH in Europe would generate modest increases in costs for firms, mild decreases in total employment for workers and small aggregate output reductions. An acceleration of WFH, coupled with an increase in digital development in Europe, would provide benefits in terms of cost savings to firms, higher employment and higher output. However, there is a risk that higher levels of WFH could lead to contract changes that, while providing benefits to firms, could undermine workers' power, pay and benefits. This has not been explicitly modelled in these projections but warrants deeper consideration.

1. Introduction

This report by Cambridge Econometrics (CE) has been commissioned by the European Trade Union Institute (ETUI) to assess the employment implications of alternative futures for remote work practices.

The analysis considers three scenarios of growth/decline in remote work to 2026, including changes in forms of employment by sector (NACE Rev. 2, level 1). The projections for remote work draw on a Eurostat EU-LFS ad hoc extraction of working from home rates by country and sector. The overall employment assessment, taking into account the wider economic effects, has been carried out using CE's global macroeconometric model, E3ME.[1]

The assessment is made with reference to a 'business-as-usual' scenario (the baseline) against which remote work scenarios can be compared. This baseline considers the impacts of Covid-19 using economic forecasts from organisations including the IMF, OECD and the European Commission.

The report provides forecasts of remote work rates and employment by country and sector. The structure of the report is as follows. Chapter 2 summarises the literature, the conceptual framework and methodology, and the results of the baseline and alternative scenarios. Chapter 3 summarises the expected trends for employment on the basis of the E3ME model, taking account of the development of remote working practices. Chapter 4 concludes, discussing the likely impact of the changes in remote work practices on total employment.

1. For more information on E3ME, see https://www.e3me.com/

2. Remote working practices

2.1 Introduction

This chapter discusses and quantifies the spread of remote work practices by country and sector, both historically and as projected over the next five years.

In Section 2.2 we discuss the possible definitions of remote work and the justification for the measure selected here (i.e. working from home). Section 2.3 presents the drivers of remote work as found in the literature which feed into the conceptual framework and the narrative for the baseline. In Section 2.4 we explain the conceptual framework that forms the basis for deriving the baseline and defining the alternative scenarios. Section 2.5 presents the baseline while Section 2.6 presents the modelling approach to assessing the wider economic implications.

2.2 Definition of remote work

Following the onset of the Covid-19 pandemic, governments all around the world enforced social distancing measures, mandated the closure of 'non-essential' activities and urged workers to perform their jobs at home as far as possible in order to contain the spread of the virus. This led to an unprecedented introduction of new working practices and, perhaps most notably, saw an expansion in working from home. In turn, this sparked the interest of labour economists in the phenomenon of remote working and its consequences for labour relations, management practices, workers' wellbeing and the future of work.

In principle, remote working refers to work carried out away from employers' premises (Eurofound and ILO 2017). However, the concept can be qualified further based on the tools used; namely, whether it is based on ICT equipment. A further distinction relates to the actual work location, whether at the worker's residence or somewhere else (Eurofound and ILO 2017). In this report, we define remote work in the narrower sense of working from home (WFH) at least sometimes, in line with the Eurostat definition. The reasons for this choice are as follows:

- The lockdown measures taken in response to the Covid-19 pandemic forced workers to suddenly change their workplaces from offices to their homes.
- For jobs requiring the use of a computer, a reliable internet connection is needed which is more likely to be available in one's home.

– There are legal constraints on working from other countries (see, for example, Regulation (EC) No 883/2004 on the coordination of social security systems[2]) (Grušić 2023).
– Most of the literature is focused on WFH (see Table 2.1).

Table 2.1 **How working from home is defined by different sources**

Source	Definition
Eurostat (lfsa_ehomp; lfso_19plwk26)	Employed persons working from home as a percentage of total employment, by sex, age and professional status (%). Working from home means doing any productive work related to the person's main job at home. In this context, the breakdown by frequency refers to: 'Usually' – working from home for half the days worked in a reference period of four weeks preceding the end of the reference week. 'Sometimes' – working from home for less than half of the days worked but for at least one hour in a reference period of four weeks preceding the end of the reference week. 'Never' – working from home on no occasion in a reference period of four weeks preceding the end of the reference week.
JRC (2020)	% of employees usually or sometimes teleworking
McKinsey (2021)	Share of workforce in advanced economies that could work remotely three to five days a week without losing effectiveness
Barrero et al. (2021)	Percentage of full days worked from home (in the previous week) based on responses to the questions: - Currently what is your work status? - How many full days did you work last week (whether at home or on business premises)? - How many full paid working days did you work from home last week?
Criscuolo et al. (2021)	In the questionnaire on which this study is based, teleworking is defined as 'carrying out work while remaining physically at home – or at a secondary residence, co-working space, café etc. – and not being present at the company's or a client's premises during normal working hours, irrespective of whether it is occasional or regular'. Strictly speaking, this definition is broader than 'working from home' since it encompasses other working premises (e.g. a co-working space or café) and thus captures broader 'remote working' practices.
Canada CSBC	In 2021 Q4: workers expected to work only on site/hybrid/only telework in the next three months In 2021 Q3: workers expected to telework exclusively once the pandemic is over In 2020 Q1: workers teleworking in February; workers teleworking in March
Morikawa (2020)	People participating in working from home arrangements
Eurofound (2021)	If answers 'home' to the question: During the Covid-19 pandemic, where did you work?

Source: Cambridge Econometrics, based on literature review.

2.3 Literature review

The Covid-19 pandemic was a major driver of the recent increase in WFH practices. However, the pandemic is just one of many factors influencing WFH. As structural factors, these other trends remain relevant to how WFH might evolve in the coming years. To understand these other forces, we conducted a focused literature review

2. See also Regulation (EC) No 987/2009 of the European Parliament and of the Council of 16 September 2009 laying down the procedure for implementing Regulation (EC) No 883/2004 on the coordination of social security systems (Text with relevance for the EEA and for Switzerland), EUR-Lex - 32009R0987 - EN - EUR-Lex (europa.eu)

to identify the drivers of remote work and develop a considered narrative for the scenario analysis. Some of these drivers can be quantified and implemented in the modelling while others cannot be so easily quantified (largely because of an absence of data). The latter therefore inform the analysis in a qualitative manner.

In this section we present the key findings from the literature review on the drivers of remote work. These findings inform the conceptual framework and how both the baseline and alternative scenarios have been constructed.

Table 2.2 lists the drivers we have identified in our literature review alongside a brief summary of their relevance/influence and whether each has been quantified as an input to the projections/modelling. Table 2.3 provides a similar summary but for the potential outcomes that might follow from changing WFH practices. In this case, the likely effect is explained and whether it can explicitly inform the later modelling exercise (using E3ME).

Table 2.2 **Summary of drivers**

Driver	Description	Quantified?
Sectoral composition of the economy	Some sectors involve work and tasks that are more amenable to WFH	Yes
Occupational composition of sectors	Some occupations involve work and tasks that are more amenable to WFH	Yes
Digital infrastructure and skills	WFH is not possible without a baseline level of digital infrastructure and the skills to use that infrastructure	Yes
Investment in ICT	Firms that have historically invested in ICT are more likely to have the necessary equipment to transition workers to WFH	Yes
Size of firms	Large firms are more likely to adopt WFH than small firms	Yes
Self-employment	Those who are self-employed are more likely to WFH than employees	Yes
Preferences on work location	The preferences of employers and employees on where the latter would like to work will influence the level of WFH in some sectors	No
Demand for in-person services	Sectors that have consumers who demand in-person services may not transition to WFH as rapidly	No

Table 2.3 **Summary of possible outcomes**

Outcome	Description	Modelled?
Change in contractual arrangements	WFH could lead to a large-scale change in contractual arrangements (with possible implications for workers' rights and job security)	Yes
Change in ICT expenditures	Greater WFH is likely to lead to higher expenditures in ICT, with macroeconomic consequences in certain sectors	Yes
Change in productivity	If WFH changes worker productivity, this will have macroeconomic consequences in terms of labour inputs to production	No
Change in platform work	An increase in WFH could affect how many workers use platforms	No
Change in offshoring work	Increased WFH may spur workers to move which could have implications for wages	No

The percentage of the workforce able to work from home differs between sectors depending on whether the necessary activities can be carried out beyond the employer's premises. For example, workers in manufacturing sectors need to be physically present in factories to operate machinery and salespeople need to be in shops for face-to-face interaction with customers. In contrast, it is much more likely that clerical and business service-related occupations can be carried out from home.

The literature highlights marked sectoral differences in the rate of WFH both before and during the Covid-19 pandemic. For example, JRC (2020) estimate that, in 2018, ICT was the sector with the highest WFH rate (41%), followed by knowledge-intensive business services[3] (35%). In contrast, manufacturing was among the sectors with the lowest WFH rate (between 15% for high-value manufacturing and 7% for other manufacturing). Similarly, a survey of employers and employees carried out by the OECD found that, before the pandemic, information and communications, professional services and finance had a WFH rate of 38%, followed by public administration with 35%, whereas manufacturing and construction had a rate of around 15% (Criscuolo et al. 2021).

The restrictions adopted by governments in response to the Covid-19 pandemic increased WFH rates in all sectors. As Figure 2.1 shows, the highest WFH rates during the strictest lockdown period were seen in the sectors highlighted above, reinforcing the idea that some are more amenable to WFH than others. There is some evidence to suggest that the pandemic accentuated this effect where WFH rates were already high, such as in ICT and professional services (OECD 2021).

Shifting employment practices by sector with respect to WFH are also evident in online job vacancies. Adrjan et al. (2021) found that vacancies involving remote work increased as the restrictions tightened, growing the most in digital-intensive sectors such as IT-related services and insurance. This may well persist into the future, with Adrjan et al. (2021) suggesting a role for digital infrastructure (as below) in influencing this persistence.

The connection between WFH rates and sectoral employment is corroborated by Figure 2.2 which shows the correlation between WFH rates and selected sectoral employment shares for the EU27 plus Iceland, Norway, Switzerland, the UK, the Republic of North Macedonia and Turkey. WFH rates are positively correlated with the employment share of sectors such as ICT and professional services,[4] while they are negatively correlated with sectors such as manufacturing and wholesale and retail trade.

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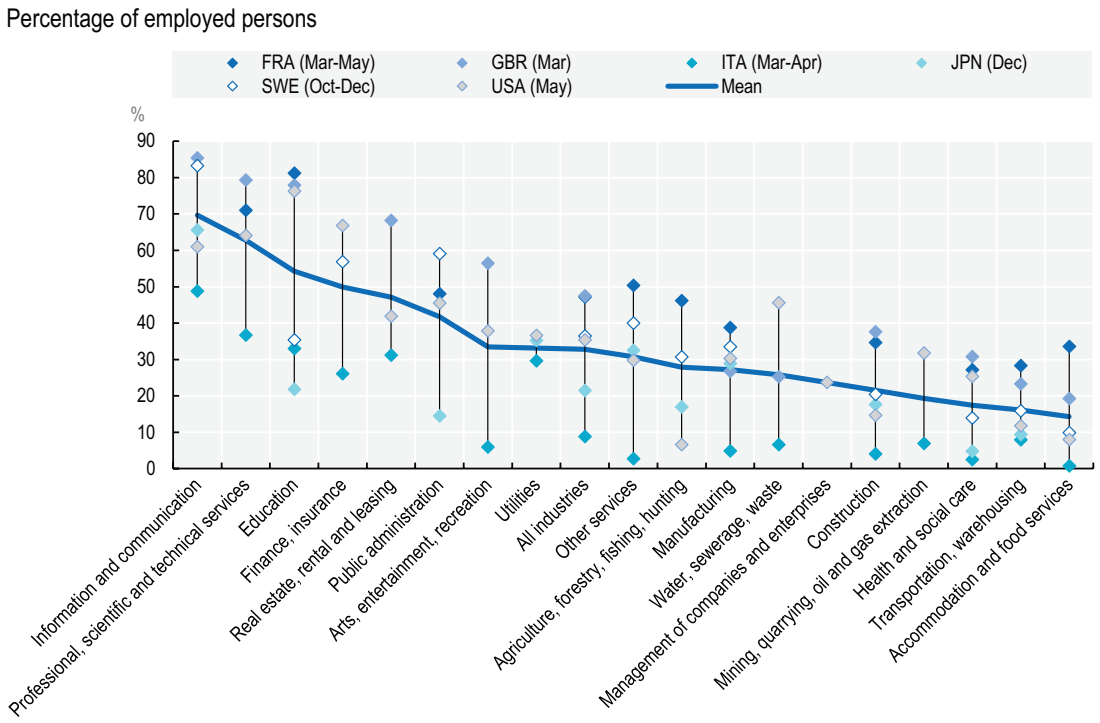
3. Which, here, corresponds to the NACE Rev.2 sector M 'professional, scientific and technical activities'. Papers and reports use somewhat different definitions of knowledge-intensive sectors. In cases in which that distinction is relevant, we make this clear in this report.

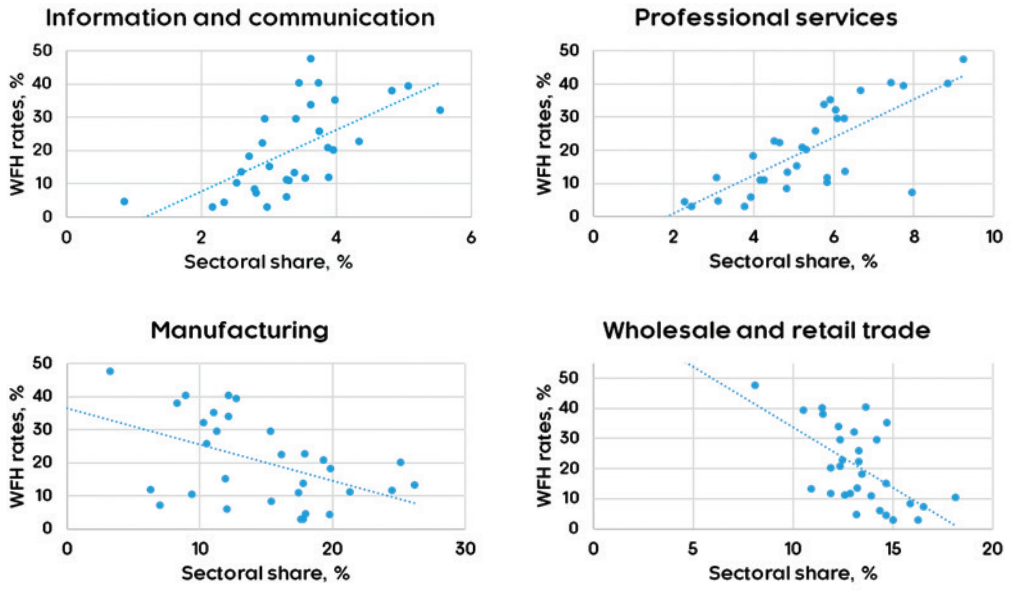
4. The sector human health and social work activities also seems to be highly correlated with WFH rates despite, as discussed below, not being particularly prone to telework.

Figure 2.1 **Teleworking peaks during the Covid-19 pandemic, by industry**



Note: The figure shows WFH rates as documented by surveys independently carried out in various countries during the peak of the pandemic. In the legend of the figure, the reference month(s) of the survey are in parentheses.
Source: OECD (2021).

Figure 2.2 **Correlation between WFH rates and sectoral employment shares**



Source: Cambridge Econometrics, based on Eurostat (lfsa_ehomp, lfssa_egan22d).

Key finding: sectoral patterns of WFH

Some sectors are more amenable to WFH than others. Observed WFH rates are especially high in ICT, professional services and finance.

Consequently, economy-wide rates of WFH are associated with patterns of employment that favour the incidence of such sectors.

Since the onset of the pandemic, a growing literature has investigated which occupations lend themselves to remote work. Dingel and Neiman (2020) were among the first to carry out such an analysis, basing their estimates on the degree of physical activities required by different occupations as measured in the US O*NET[5] dataset. By that analysis, occupations which involve physical activities (e.g. handling objects, operating vehicles, repairing equipment, etc.) were taken to be ones that cannot be performed from home. The resulting list shows the following occupations as those most amenable to being carried out at home:[6] computer and mathematical occupations; education, training and library occupations; legal occupations; and business and financial operations. Sostero et al. (2020) and Basso et al. (2020) apply similar O*NET-based methods, identifying managerial and professional occupations as being more amenable to WFH than others.

There are similar findings for OECD countries from work by Espinoza and Reznikova (2020). Using the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) survey, the occupations with the highest WFH potential were found to be business and administration professionals; ICT professionals; administrative and commercial managers; business and administration associate professionals; science and engineering professionals; and legal, social and cultural professionals.

The research by Adams-Prassl et al. (2020) using US and UK survey data is in line with the above studies. However, this study also notes significant heterogeneity in the content of tasks that can be done from home within both sectors and occupations. That is, while certain occupational categories may appear, on average, more or less amenable to WFH, specific roles in different categories may be quite diverse in their scope for WFH.

The occupations identified above typically require relatively high levels of education. This is a point drawn out by many studies of the periods both before and during the pandemic such as Dingel and Neiman (2020), Barrero et al. (2021), Criscuolo et al. (2021) and OECD (2021). However, this is not to say that all occupations requiring high levels of education can be carried out remotely. Notable examples are health professionals and teaching professionals who work in sectors traditionally requiring physical proximity to deliver services.

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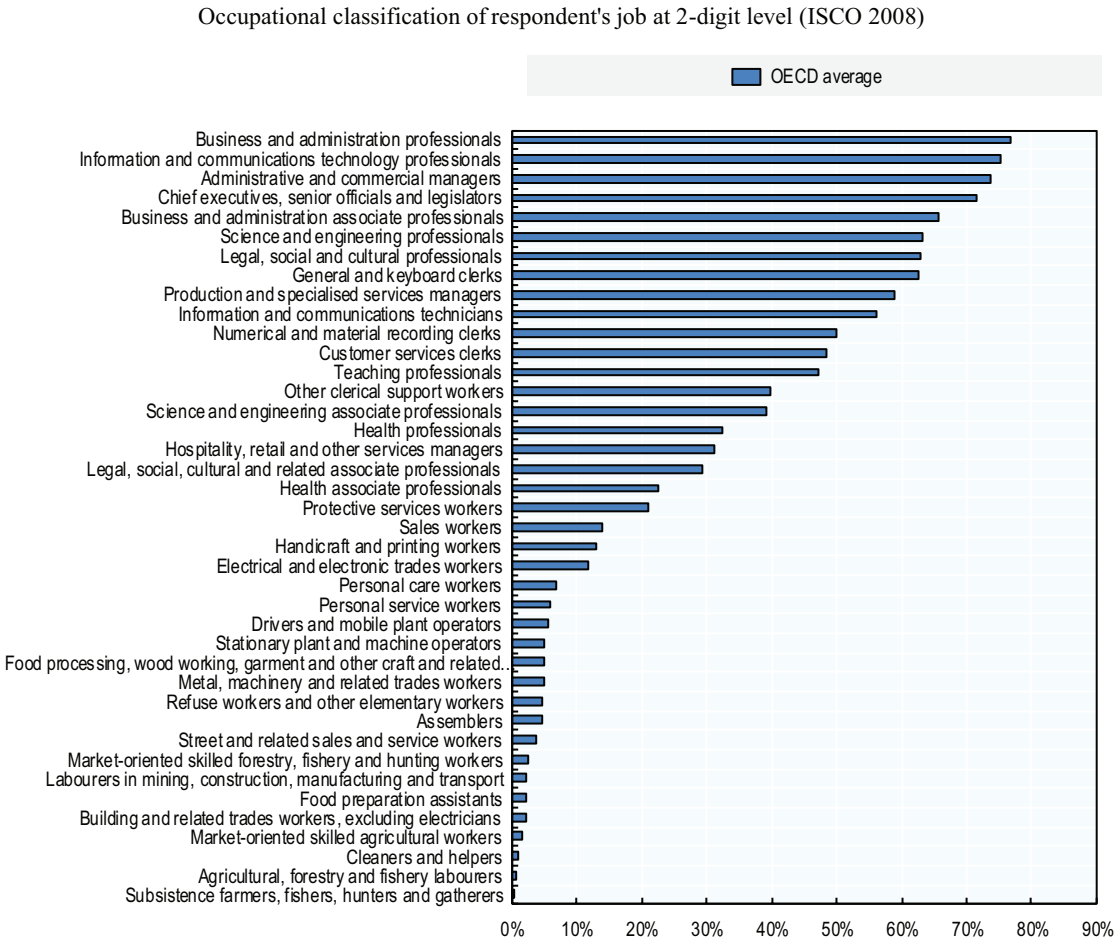
5. O*NET is an extensive dataset of occupational information for the United States economy, listing for each occupation the task content, the activities carried out, the tools used and many other characteristics. See: https://www.onetonline.org/

6. These occupations are defined in the Standard Occupational Classification which is a common taxonomy of occupational types.

Figure 2.3 **Average feasibility of WFH by occupation (2-digit level) (OECD average)**



Source: Espinoza and Reznikova (2020), Figure 3.4.

Key finding: occupational patterns of WFH

The scope for WFH favours managerial and professional occupations. This, in turn, tends to favour occupations requiring relatively higher levels of education.

In a similar manner to sectoral patterns of WFH, economies with employment in relatively more occupations of the above types can be seen to have relatively higher WFH rates.

Digital infrastructure is a precondition for effective WFH. Criscuolo et al. (2021) identify inadequate ICT infrastructure as one of the main reasons for an unsatisfactory remote work experience while Barrero et al. (2021) highlight the sizeable investment in ICT equipment made by firms in order to facilitate remote work. In support, Eberly et al. (2021) note that the shift to WFH during the pandemic was stronger in industries with a higher existing stock of ICT capital. Moreover, in their analysis of online job vacancies, Adrjan et al. (2021) suggest

that persistence of hiring for teleworkers is more likely in those countries and sectors that are more digitally prepared.[7]

Eberly et al. (2021) also emphasise the importance of ICT infrastructure and equipment in enabling the 'potential capital' of workers' homes. In allowing workers to operate remotely, this may in turn have helped avoid a deeper decline in economic output.

As well as digital infrastructure (ICT capital), the literature highlights the importance of workers' digital skills (human capital). Both Criscuolo et al. (2021) and JRC (2020) show that the uptake of telework is associated with levels of digital skill while the EBRD documents that the lack of digital skills may represent a barrier in the increase in remote working (EBRD 2021). Consistent with these findings, Figure 2.4 shows the relationship between WFH rates and the European Commission's Digital Economy and Society Index (DESI) (European Commission 2022a). DESI encompasses a range of digital capabilities: human capital; integration of digital practices/technologies among firms; connectivity infrastructure; and digital public services. Figure 2.4 shows that countries with a higher DESI score had higher WFH rates, both in 2019 and 2020 (i.e. before and during the pandemic).

The necessity to upgrade digital skills and infrastructure is recognised by the European Commission's Digital Europe Programme, which has allocated 7.5 billion euros to design and deliver specialised programmes for skills in new digital technologies and to increase the role of the EU as a digital innovation leader (European Commission 2022b).

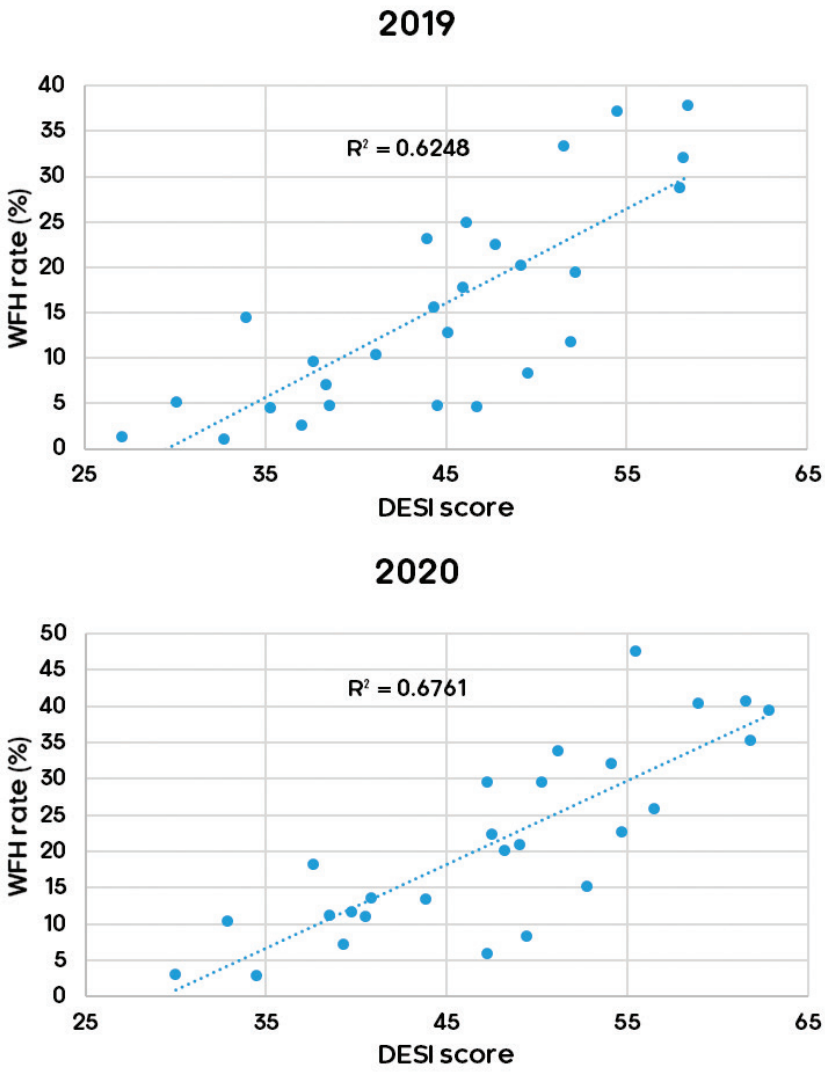
Key finding: digital infrastructure and skills

Digital infrastructure and skills are key enablers of WFH. Higher levels of both are associated with higher rates of WFH before and during the pandemic. Those investments (i.e. digital preparedness) may also point to the persistence of WFH in the future. Conversely, countries with lower digital capabilities may see less growth in WFH in the future in the absence of substantial new investment.

Countries with lower digital capabilities saw lower rates of WFH pre-pandemic and are likely to have lower rates in the future unless they improve significantly in this respect.

7. Digitally prepared countries were defined as those in which the number of per capita broadband subscriptions was above the sample median; while digitally prepared sectors were defined as those with a share of jobs that can be carried out digitally in the upper tercile (as in Dingel and Neiman (2020)).

Figure 2.4 **Relationship between WFH rates and DESI in 2019 and 2020**



Source: Cambridge Econometrics, based on Eurostat (lfsa_ehomp) and European Commission (2022a).

During the pandemic, firms invested heavily in digital technologies to accommodate increases in remote working. The Centre for Economic Performance at the LSE found this in the UK from a survey of businesses (Valero et al. 2021). The survey, conducted in July 2021, found that 75% of firms interviewed had increased the adoption of new digital technologies with 45% prioritising remote working technologies.

In the OECD, Criscuolo et al. (2021) found that 35% of the firms they surveyed helped their workers by purchasing office equipment for WFH and that these purchases were related to a positive experience of WFH which these same firms cited as a reason for their plans to increase working from home further. Barrero et al. (2021) found that, in the US, pandemic-induced investment to enable WFH

amounted to 0.7% of GDP and that firms that bore the cost of setting up WFH-enabling infrastructure think it more likely that they will continue with remote working after the pandemic.

Key finding: ICT investment
Many firms increased their investment in technologies to enable WFH. Such firms are more likely to continue with, if not increase, WFH in the future.

Most of the evidence in the literature points towards larger firms either having a higher propensity to have employees on WFH arrangements or having switched more easily to WFH during the pandemic. For example, the OECD (2021) found that, in France and the UK, firms with more than 250 employees had higher WFH rates during each month in 2020, while Morikawa (2020) found that, in Japan, the rate of WFH was 47% for firms with more than 1000 employees versus 30% in firms with fewer than 500 employees. JRC (2020) highlights that WFH rates in knowledge-intensive sectors were higher in those countries with higher shares of larger firms (50+ employees) in those sectors. The survey of employers and employees carried out by Criscuolo et al. (2021) showed that, before the pandemic, more than 30% of workers in large companies (250+ employees) in OECD countries could regularly work from home. This compared to less than 20% in small companies (of fewer than 50 employees). During the first wave of the pandemic, WFH increased among all firms but more so in large ones (to a rate of around 65%) than in small ones (around 42%) (Criscuolo et al. 2021).

Key finding: firm size
Larger firms have higher rates of WFH, especially in knowledge-intensive sectors.

Those who are self-employed are more likely to work from home. This applied before the pandemic. Some self-employed workers, especially those involved in small businesses, use their homes as their place of work regardless of whether they use ICT equipment for their work (e.g. freelance designers or software developers) or not (e.g. farmers or artisans). In the information and communications sector, self-employed workers constituted a majority of pre-pandemic WFH workers in Austria, Czechia, France, Germany, Hungary, the Netherlands, Poland, Slovenia and Sweden (JRC 2020).

Key finding: self-employment
Self-employed workers are more likely to be WFH and constituted a large share of WFH workers in ICT pre-pandemic.

The preferences of workers and employers regarding the location of work may have a sizeable impact on future rates of WFH. Survey data show that workers are generally keen to continue WFH, at least to some extent, beyond the pandemic and employers have tended to declare plans to expand the share of their workforces who work from home. In particular, workers who usually spend more time commuting to work may be more willing to adopt WFH arrangements.

However, this may raise a question as to where WFH might take place and its consequences for the geographical distribution of economic activity. There is some literature, focusing on US data, which is beginning to consider this.

Ramani and Bloom (2021) found that, in the US, workers have tended to move since the pandemic from city centres to lower-density suburbs but there is no evidence of reallocation from larger to smaller cities; that is, movements are within city boundaries. They rationalise these findings with the idea that, in the future, the prevailing pattern of WFH will be hybrid, meaning that workers will spend some days during the week in the workplace and the rest at home.

In contrast, Althoff et al. (2021) found that, during the Covid-19 pandemic, business workers left the big US cities for areas with lower population densities and that consumer spending declined the most in areas with larger populations, thus reducing the employment of non-tradable service workers. The question that follows is whether these outflows of people will be permanent.

The survey data in Criscuolo et al. (2021) show that both workers and managers expected to increase WFH to 2-3 days per week compared to pre-pandemic levels. Barrero (2022), using an updated survey of Barrero et al. (2021), found that 31% of employees in the US expected their employer to adopt a hybrid work arrangement, 54% expected to be fully on-site and only 15% expected to adopt full WFH. In the UK, Valero et al. (2021) found that around 45% of businesses expected to adopt WFH for around 1-2 days per week, 25% expected 3-4 days per week and only 8% expected full WFH. From this, it is reasonable to think that the hybrid part of WFH will increase.

Key finding: workers' location

While there is now a stronger preference for working from home, the emerging model appears to be hybrid in nature. This may limit the extent to which workers locate far from employer premises.

Developments in WFH may be influenced by consumer preferences for in-person services. On the one hand, the use of e-commerce increased markedly during the pandemic, strengthening pre-existing trends (UNCTAD 2021). On the other, many services usually delivered in person were instead delivered online such as telemedicine, learning, sales and even fitness (McKinsey 2021). Hence, an increasing number of workers could deliver these services from their home if consumers were to be satisfied with such online interactions. However, there is still too little evidence to affirm whether this will be the case.

In other cases, consumers (households) may be keen to return to in-person delivery. One notable example is children's education, which resumed in-person interaction as soon as it was practicable to do so. This is likely to reflect a combination of preferences regarding the mode of delivery and how parents struggled to work while also taking on childcare and home schooling responsibilities during the pandemic. Moreover, the negative impact of online learning, implemented during forced school closures, on children's cognitive skills and socio-emotional wellbeing has been documented in Werner and Woessmann (2021).

Key finding: consumer demand for in-person services

Higher consumer appetite for services delivered online, instead of in person, could increase WFH but it is too soon to tell if this will happen.

The impact of WFH on different contractual forms of employment is not well documented in the literature. The development of WFH may give employers access to a wider pool of talent (possibly in developing countries, as argued by Forslid and Baldwin (2020)), easing the process of finding the right worker. It is thus possible that employers may resort to temporary workers in order to carry out specific tasks without incurring the (higher) costs associated with hiring a permanent worker.

Given the limited amount of information available on the linkages between WFH and temporary work, we looked at the EU-LFS to see if the spike in WFH rates seen in 2020 coincided with an increase in temporary work. Table 2.4 shows the absolute numbers of those who were both working from home and on a fixed-term contract, and the shares of fixed-term contract employees among those who were working from home. The data show that the number of fixed-term remote workers increased in all countries, which is to be expected given the pandemic-related restrictions. However, at EU27 level, the share of fixed-term remote workers increased by around 1 percentage point in 2020, to a level not seen in previous years, indicating that the number of fixed-term workers who were also working from home increased faster than the total number of those working from home. This may be indicative of a linkage between WFH and the use of fixed-term contracts. At country level, the same can be observed for Germany, Greece, Spain, Croatia, Italy, Poland, Portugal and Finland. The evidence presented here is only indicative and it is probably too soon to tell whether the increase in WFH will increase the use of fixed-term contracts, but the data shown in Figure 2.4 indicate that this could be a possibility.

Table 2.4 **Shares of fixed-term workers among those WFH and numbers of fixed-term workers WFH**

	Numbers (000s)				Shares (%)			
	2017	2018	2019	2020	2017	2018	2019	2020
EU27	**1712**	**1690**	**1788**	**2902**	**6.7**	**6.3**	**6.2**	**7.2**
BE	40	35	31	47	4.0	3.6	2.8	3.2
CZ	15	14	10	17	3.1	2.8	1.9	2.5
DK	35	25	30	39	4.3	3.3	3.8	4.1
DE	248	260	292	489	5.5	5.3	5.4	6.1
IE	7	10	7	12	2.0	2.3	2.0	2.0
EL	8	7	7	21	4.2	4.1	3.8	5.5
ES	75	74	113	317	5.6	5.3	7.1	11.2
FR	288	278	259	428	5.7	5.4	4.5	5.6
HR	5	5	7	15	6.7	5.3	7.2	9.1
IT	21	26	21	191	2.0	2.4	2.0	6.1
LU	2	3	5	5	2.3	3.8	5.7	3.7
NL	236	238	239	271	7.9	7.7	7.3	7.7
AT	33	36	33	42	3.7	3.9	3.5	3.4
PL	93	112	116	180	4.3	5.1	5.1	6.2
PT	47	49	50	92	8.6	8.5	8.0	9.6
SI	11	7	5	7	7.1	4.1	3.0	3.9
FI	34	49	44	72	5.1	6.6	5.6	7.5
IS	1	1	1	1	2.3	2.4	1.6	2.3
CH	96	87	87	128	6.7	6.0	5.8	6.8
TR	45	38	23	35	5.7	4.6	2.6	2.8

Source: Cambridge Econometrics based on Eurostat ad hoc extraction (data not available for all countries).

Key finding: contractual arrangements

In 2020 the share of fixed-term workers within all those working from home increased in many countries but it is too soon to tell whether this will continue in the future.

If WFH increases productivity, we would expect firms to increase the use of this type of work arrangement. However, the impact of WFH on productivity remains unclear.

On the worker side, WFH might increase satisfaction (and, potentially indirectly, productivity) through a better work-life balance, reduced time spent commuting and the offer of greater autonomy. On the firm side, WFH might increase productivity by reducing capital use (e.g. office space and equipment), more so if savings are redirected into productivity-enhancing investments and reorganisations. Moreover, firms could obtain a better match between job requirements and skills because of a wider pool of talent less constrained by geography (proximity to the

office). Hiring-related costs might also decrease due to lower voluntary quits if worker satisfaction increases (Criscuolo et al. 2021).

On the positive side, Barrero et al. (2021) estimated for the US that, when taking into account reduced commuting time, WFH could increase productivity (output per unit of time devoted to working for pay) by 4.6%, while Mizen et al. (2021) found that, in the UK, workers assessed themselves to be about 2% more productive when working from home. Davis et al. (2021), using an equilibrium model, estimated that, during the pandemic, WFH workers increased in productivity relative to working in the office by 46%. Criscuolo et al. (2021) found that more productive firms relied on WFH to a greater extent both before and during the pandemic and that more than 60% of managers interviewed believed that the productivity of their employees had increased as a result of WFH. However, the same study also found that 75% of managers believed that WFH decreases collaboration between team members and that 73% believed company culture could be jeopardised.

However, and conversely, workers' productivity may decrease because of fewer interactions with colleagues, reduced knowledge flows within firms, feelings of isolation, having to work in inappropriate (home) working environments and not being able to separate work and private life as easily. A lower density of economic activity within a geographic area may also reduce positive agglomeration effects thus reducing firms' performance in the long run (Criscuolo et al. 2021).

Regarding the possible negative impacts, Morikawa (2021) documented a substantial decrease in workers' productivity while WFH in June 2020 in Japan, to a level 30-40% lower than pre-pandemic productivity (in the office), partially recovering to 22% lower in July 2021. However, it must be borne in mind that these effects vary widely by sector and occupation depending on worker characteristics such as industry and occupation, gender, earnings and employment status, as highlighted by Etheridge et al. (2020).

Key finding: productivity

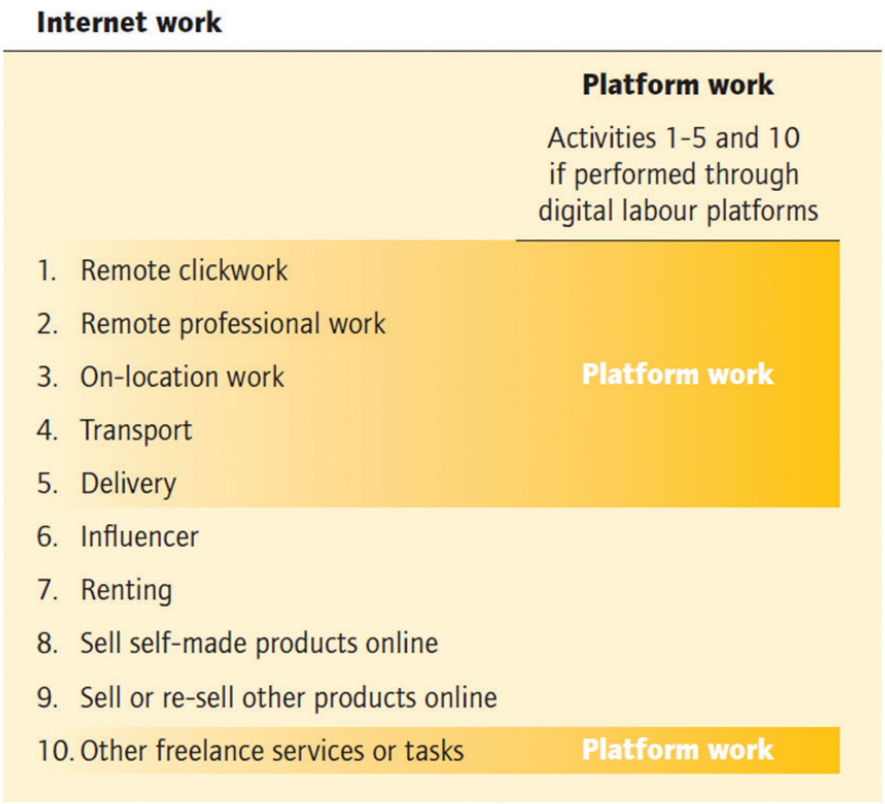
The arguments and evidence for and against WFH and productivity remain inconclusive. It is possible that further research into the pandemic effects will shed light on this in the future.

Since its establishment, the internet has changed the way that many people work and has also enabled means and methods of working that were previously not possible. More recently, there has been a proliferation of internet-based platforms that match labour with demand for services, such as Uber, which matches drivers with passengers via an internet app for transport.

Piasna et al. (2022) describe two categories of the means by which work can generate income from online sources in non-traditional ways: internet work and platform work. Figure 2.5 describes the differences between these two terms as defined by Piasna et al. (2022). Internet work is the broader category of activities in which platform work is placed. Internet work covers income-generating activities

by means of online platforms, websites or mobile apps, including exchanging services, selling goods and renting assets. For the purposes of this report, categories 1, 2 and, in some cases, 10 from Figure 2.5 are considered remote work under our operational definition.

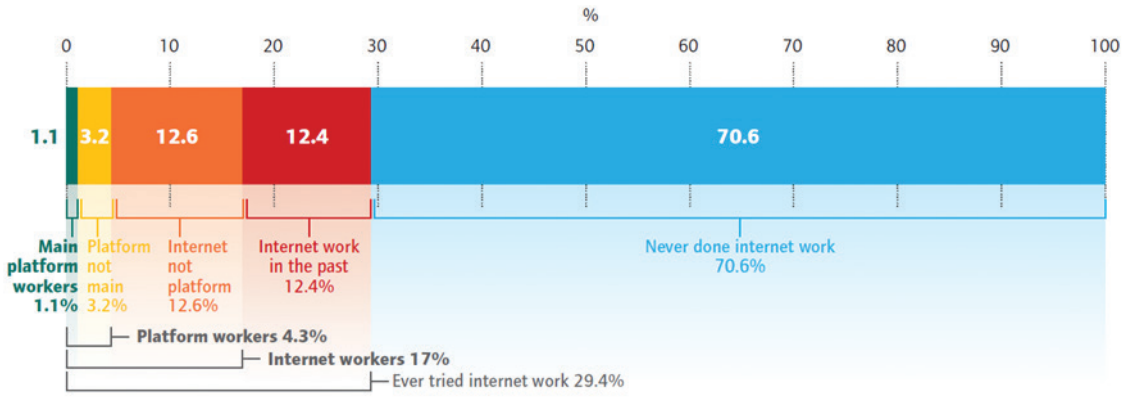
Figure 2.5 **Internet work and platform work**



Source: Piasna et al. (2022).

According to the World Employment and Social Outlook 2021 Report (ILO 2021), there were over 777 active online platforms operating globally as of January 2021. This compares to fewer than 200 such platforms in 2010. Estimates of the number of platform workers vary widely, depending on how platform work is defined and how often survey respondents engage in platform work. Some surveys estimate that 9% or more of the workforce in the US and Europe have ever engaged in work on a digital platform (ILO 2021). The number of regular users is much lower, however, probably in the region of 1-2% of the workforce across European countries (ILO 2021). Piasna et al. (2022) define 'main' platform workers as those who work at least 20 hours per week on a platform or for whom more than 50% of their income stems from this type of work; they estimate that this is 1.1% of all workers in Europe (see Figure 2.6).

Figure 2.6 **The extent of internet and platform work**



Note: Average across 14 EU countries. All working adults.

Source: Piasna et al. (2022).

As the majority of those who have ever, or even who regularly, carry out platform work do not meet the definition of main platform worker, platform work may for many act as a supplement to other earnings. Alternatively, some workers may have tried platforms once or over a short period of time but never became regular users. Among main platform workers, nearly 30% are unemployed, retired, students or otherwise not active[8] in the labour market; about 30% are self-employed; and just over 40% have contract-based employment (Piasna et al. 2022).

Main platform workers (following the definition above) in Europe are more likely to be men (nearly 65%) and more likely to be under the age of 35 (nearly 60%). This is in contrast to the wider workforce in which men account for just over 50% and where the median age of workers is higher (Urzì Brancati et al. 2020).

As platform workers tend to spend less than half of their work effort on platform work, it can be difficult to classify the sectors in which platform workers are involved. The ETUI Internet and Platform Work Survey included a question about the sector of the respondent's primary job (Piasna et al. 2022); Table 2.5 below shows the primary sector for various types of platform worker.

Among main platform workers, the largest segment (41.8%) work in the trade, transport and accommodation sectors. Among those categories that could be classified as remote workers by our definition (see Section 2.2), fewer people are in sectors where remote work is more prevalent, such as information and communications, finance and real estate, and professional, scientific and technical activities. This finding suggests that platform workers are distinct from other kinds of remote workers.

8. For the purposes of their study, Piasna et al. (2022) consider those who are unemployed or not otherwise active in traditional labour activities as fitting within those categories even if they do platform work.

Table 2.5 **Sector of primary occupation for European platform workers**

Sector (NACE 1-digit code)	Main platform workers	All platform workers	
		Remote clickwork	Remote professional
Agriculture (A)	0.8%	4.2%	1.5%
Manufacturing (B-E)	8.7%	11.1%	10.1%
Construction (F)	3.1%	1.5%	5.6%
Trade, transport and accommodation (G-I)	41.8%	33.5%	18.8%
Information and communications (J)	6.3%	9.5%	13.7%
Finance and real estate (K-L)	4.7%	5.7%	5.8%
Professional, scientific and technical activities (M)	5.4%	2.8%	6.4%
Administration and support (N)	3.9%	3.5%	5.1%
Public administration, education and health (O-Q)	8.3%	17.1%	18.0%
Other services (R-U)	17.0%	10.9%	14.9%
TOTAL	100.0%	100.0%	100.0%

Notes: Average across 14 European countries.
Main platform workers: those who earn at least 50% of income from or spend at least 20 hours per week on platform work.
All platform workers: those who have done platform work within the last 12 months, regardless of how much income earned from or time spent on platform work.
Totals may not precisely match column sums due to rounding.

Source: Piasna et al. (2022).

Key finding: platform work

The number of online platforms has grown substantially, though the share of platform workers in the total workforce remains quite small. The available data are relatively sparse but platform work is distinct from remote work as defined earlier in this report (on the basis of sectoral data), although certain types of platform work can be performed from home. Compared to the workforce as a whole, main platform workers are more likely to be younger and male.

More jobs moving to fully remote working could potentially increase the possibility of them being offshored as the work could feasibly be done from almost anywhere with a decent internet connection. The question of the potential for remote jobs to be offshored was explored even before the Covid-19 pandemic, most notably by Blinder (2007). Based on various characteristics of occupations, Blinder (2007) categorises jobs into four levels of 'offshorability':

- Category I: highly offshorable
- Category II: offshorable
- Category III: non-offshorable
- Category IV: highly non-offshorable

According to this taxonomy, Baldwin and Dingel (2021) examined the question of offshorable jobs in the age of remote working. Table 2.6 shows examples of major US occupations categorised by their offshorability score, following Blinder (2007).

Table 2.6 **Major occupations ranked by offshorability score (OS) category**

Occupation	OS category
Computer programmers	I
Telemarketers	I
Computer systems analysts	I
Billing and posting clerks and machine operators	I
Bookkeeping, accounting and auditing clerks	I
Computer support specialists	I and II
Computer software engineers, applications	II
Computer software engineers, systems software	II
Accountants	II
Welders, cutters, solderers and brazers	II
Helpers – production workers	II
First-line supervisors/managers of production and operating workers	II
Packaging and filling machine operators and tenders	II
Team assemblers	II
Bill and account collectors	II
Machinists	II
Inspectors, testers, sorters, samplers and weighers	II

Source: Baldwin and Dingel (2021); Blinder (2007).

However, the measures of offshorability in the literature do not necessarily capture the new phenomenon of those who work fully remotely moving to a country which is different to their place of employment. This phenomenon is difficult to understand with macro-level data because workers living abroad but working for a domestic company may still be counted as resident workers (thus, not as offshore ones). Erickson and Norlander (2021) examine the phenomenon of remote working in the context of both offshoring (performing work tasks in a location abroad) and outsourcing (hiring a third-party organisation to perform work tasks). The authors argue that changing expectations from both employees and employers due to new technologies and the external shock of the pandemic will lead to an updated social contract on where and how work is done. However, the legality and feasibility of remote, offshored work depends on the policies of the countries where employers and workers are located.

Key finding: offshoring

The pandemic has rapidly changed expectations of remote work which could lead to a rise in remote workers being located offshore from a business's headquarters. However, laws and policies may prevent this type of work arrangement from becoming feasible in the short term. Evidence is not currently available to determine whether the number of offshored remote workers in Europe has changed due to the pandemic.

In the next section, we set out how these drivers are organised in our conceptual framework.

2.4 Conceptual framework and methodology

This section presents the conceptual framework, the data and the methodology for producing forecasts of WFH rates by country and sector.

2.4.1 Conceptual framework

In Section 2.3, we highlighted the main drivers of remote work and their likely influence. In this section, we assemble those drivers into a coherent conceptual framework with which to produce the baseline and alternative scenarios.

Figure 2.7 shows this framework. The left-hand side lists the drivers identified in the literature review, divided into those that are quantified (represented in pink in the figure) and those that are not quantified (represented in green).

Two drivers determine a country's aggregate WFH feasibility: the sectoral composition of the economy; and the occupational composition of each sector. Many activities carried out in knowledge-intensive sectors such as ICT and professional services can be performed remotely; and managerial and professional occupations involve tasks which can also be more easily performed remotely. Hence, the higher the share of employment in those sectors and occupations, the higher the feasibility of WFH in a given country. High WFH feasibility does not always translate to high rates of actual WFH, though, since some workers who could feasibly complete tasks remotely still work on site.

Whether the actual level of WFH will tend towards the highest feasibility level depends on another set of drivers. Digital skills and infrastructure are essential for WFH to take place effectively and higher levels are expected to increase the rates of actual WFH. Firms who have invested in ICT are more likely to have the equipment, software and tools necessary to support WFH workers. Larger firms have both greater capacity and potentially greater inclination to allow workers to WFH, so economies with employment concentrated in larger firms would be expected to have higher rates of actual WFH. Those who are self-employed are also more likely to WFH and country rates of self-employment could thus affect actual WFH rates.

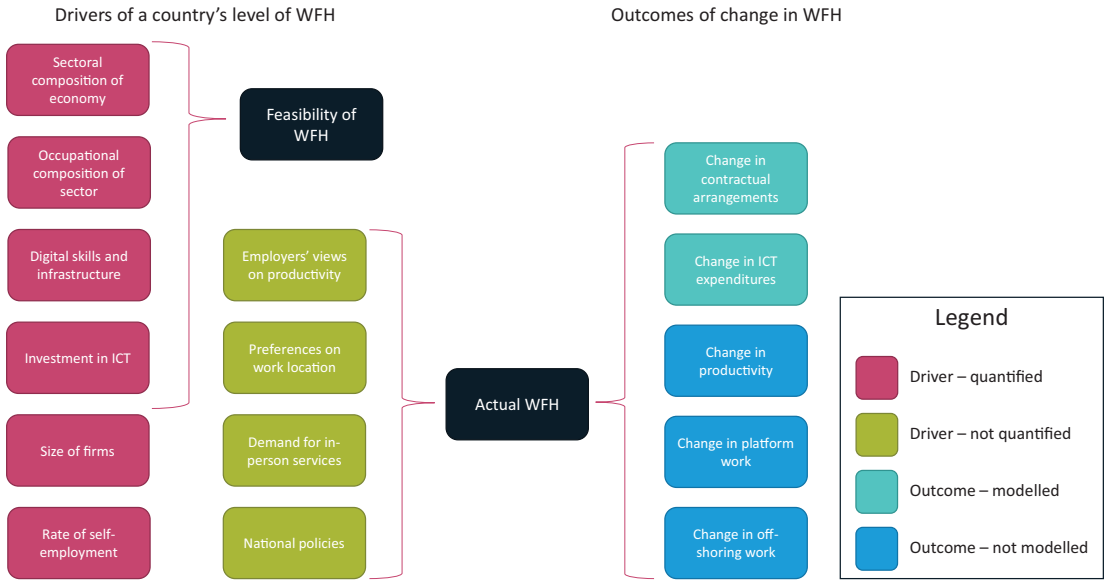
Additional factors that could drive the actual rate of WFH, which we do not quantify in this report, are employers' views on productivity, preferences on work location, demand for in-person services and national policies. While WFH feasibility may be high, it is largely employers that decide whether their employees can WFH. Factors like employers' views on their workers' productivity and preferences for where workers are located may determine the rate of actual WFH. Workers themselves may prefer positions where WFH is a possibility, so they could influence employers to convert positions from on-site to WFH. Similarly, sectors that could feasibly allow workers to WFH may also face consumer demand that expects in-person services, thus preventing WFH from developing. Finally, national policies may directly restrict or require working from home, such as those imposed during the height of the pandemic. National policies that encouraged

or mandated WFH during the pandemic are captured in the EU-LFS data, with WFH rates available for 2020 (see Section 2.2 for more detail on our definition of remote work and what is captured thereby). Other policies, such as schemes to provide subsidised or free childcare, may indirectly affect WFH rates by making WFH more or less attractive for families or individuals.

Based on this conceptual framework, we construct four scenarios:

- Baseline scenario: the drivers of feasibility and actual WFH rates included in the conceptual framework follow the trends set out in the historical data. This scenario assumes that digital investment continues over the forecast period.
- Unwinding of WFH: rates of WFH revert to pre-pandemic levels in 2022 and then grow in line with historical trends thereafter.
- Acceleration of WFH: the drivers of actual WFH move in such a way that countries progress towards the Europe's Digital Decade targets for 2030.[9] We focus specifically on three targets: basic digital skills reaching the target minimum 80% of the population; gigabit broadband connectivity being available for everyone; and more than 90% of SMEs reaching at least a basic level of digital intensity.
- Acceleration of WFH with contract changes: this shares the same WFH rates as the previous scenario with changes to workers' contractual arrangements under which some WFH workers switch to self-employment. This scenario is discussed in more detail in Section 3.

Figure 2.7 **Conceptual framework**



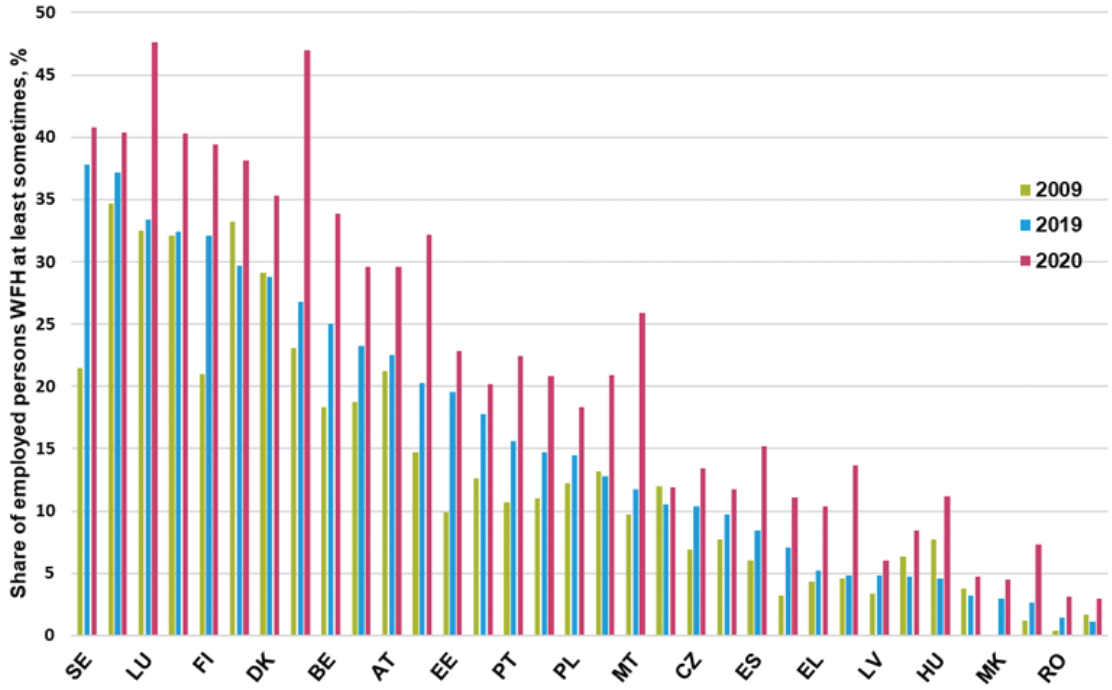
Source: Cambridge Econometrics.

9. https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

2.4.2 Data used to estimate WFH rates

The main source of comparable data on WFH rates comes from Eurostat's EU-LFS,[10] which measures the percentage of workers who work 'usually' or 'sometimes' from home.[11] Figure 2.8 shows the WFH rates in 2009, 2019 and 2020 for EU27 Member States, Switzerland, Iceland, Norway, the Republic of North Macedonia, Turkey and the UK. There is substantial cross-country variation in the historical rates of WFH. For example, in 2019, WFH rates ranged from 38% in Sweden to 1% in Bulgaria. The rates of WFH remained broadly stable during the 2009-19 period in countries with the lowest WFH rates, whereas marked increases can be seen elsewhere especially in Sweden, Finland, Belgium and Estonia. In 2020, the widespread increase in WFH rates was brought about by the lockdown measures adopted in response to the pandemic, which translated into a six percentage point increase at EU27 level compared to 2019 (almost double the increase in the EU27 average over the 2009-19 period of 3.7 points).

Figure 2.8 **WFH rates in 2009, 2019 and 2020, by country**



Note: * Values for LU and NL for 2015 instead of 2009; value for PT refers to 2011 because of break in the series. Value in 2020 for SE imputed.

Source: All data from Eurostat (lfsa_ehomp) [Date accessed: 16/02/2022], except 2020 value for the UK: OECD (2021).

10. Eurostat dataset code: lfsa_ehomp. The 2021 data were not available at the time that the analysis was made. Since then, 2021 data have been published by Eurostat but are flagged as a break in the series. Hence, comparability between 2020 and 2021 values may still be limited due to differences in the survey design or changes in definitions.
11. 'Usually' means working from home for half the days in a reference period of four weeks preceding the end of the reference week; 'sometimes' means working from home less than half of the days but at least one hour in the four weeks preceding the end of the reference week.

Table 2.7 shows WFH rates by sector and country in 2019 and 2020. These data are based on an ad hoc extraction by Eurostat.[12] The empty cells represent data not shown due to reliability flags. The sectors with the highest WFH rates in most countries are information and communications (J) and professional services (M), with rates sometimes as high as 60% or more in 2019, followed by education (P).[13,14] In contrast, sectors such as industry (B-E), construction (F) and trade, transport and accommodation (G-I) have very low rates of WFH. Low rates in these sectors are to be expected since they require either human interaction or the use of specific (typically on-site) machinery. The increase in WFH rates during the pandemic was the strongest in those sectors that already had high WFH rates prior to the pandemic. Finance and real estate (K-L) had somewhat lower WFH rates in 2019 compared to information and communications, and professional services, but saw a noticeable jump in 2020. Overall, the data confirm the sectoral distribution of WFH highlighted in the literature review.

We use data from DESI (European Commission 2022) to approximate the levels of digital infrastructure and digital skills in each country. To construct our baseline scenario, we use the overall DESI index score for each country as a means of classifying countries into three clusters. To construct the Acceleration of WFH scenario, we use three component indicators of DESI, all at country level: fixed very high capacity network (VHCN) coverage (a measure of broadband coverage); the percentage of individuals with at least basic digital skills; and the percentage of small and medium enterprises (SMEs) with at least a basic level of digital intensity (businesses reporting the use of at least four digital technologies out of a possible 12).

To estimate levels of investment in ICT, we use national accounts data from Eurostat on gross capital formation.[15] From these, we use figures for each country's spending on ICT equipment as a proxy for overall ICT investment. To account for large variations in size among countries, we divide expenditure on ICT equipment by the number of people in the workforce to obtain a measure of ICT investment per worker. Employment data also come from Eurostat national accounts.[16]

In some cases, data are not available for every country or sector. This is especially true of Eurostat's sectoral estimates of WFH by country. Differences in how countries collect sectoral data and small sample sizes (most often in small countries with small sectors) translate into data gaps. Where possible, we have tried to fill these through interpolation (filling the gaps based on values from previous or subsequent years) and imputation (filling a data gap with an average of countries

12. The EU-LFS ad hoc extraction was obtained on 28 March 2022 and did not include values for 2021.
13. Letter codes in brackets indicate the corresponding sections (top-level groupings) of the European NACE Rev. 2 classification of economic activities.
14. The definition of WFH includes persons working at least sometimes from home. This explains the high rates observed for the education sector pre-pandemic: in normal times teachers attend classes in person, but they may spend some time at home reviewing homework or preparing lessons. In 2020, the rates were influenced by the restrictions in place.
15. Dataset code: nama_10_a64_p5
16. Dataset code: nama_10_a10_e

Table 2.7 **WFH rates in 2019 and 2020, by country and sector**

	A	A	B-E	B-E	F	F	G-I	G-I	J	J	K-L	K-L	M	M	N	N	O-Q	O-Q	R-U	R-U
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
AT	66%	64%	11%	19%	12%	15%	13%	17%	48%	71%	31%	56%	38%	52%	15%	22%	26%	31%	27%	33%
BE	60%	54%	15%	23%	21%	26%	14%	18%	52%	65%	39%	61%	47%	59%	16%	22%	25%	31%	33%	41%
BG				1%						12%				7%			1%	3%		
CH	52%	54%	20%	30%	17%	19%	23%	27%	61%	78%	38%	62%	45%	58%	22%	28%	36%	41%	40%	46%
CY								3%	6%	24%	4%	12%	8%	20%				6%	1%	
CZ	10%	11%	4%	6%	8%	6%	7%	7%	37%	47%	30%	31%	35%	43%	10%	19%	6%	11%	28%	29%
DE	32%	20%	9%	18%	9%	10%	7%	9%	35%	58%	21%	36%	28%	44%	10%	12%	13%	20%	16%	21%
DK	37%	35%	23%	29%	20%	21%	17%	20%	54%	67%	38%	52%	53%	65%	24%	28%	30%	38%	29%	37%
EE	22%	14%	9%	10%	14%	16%	11%	13%	52%	65%	30%	39%	50%	58%	7%	8%	20%	25%	16%	22%
EL	3%	3%	2%	4%	2%	5%	2%	4%	12%	28%	7%	21%	16%	25%		4%	8%	19%	3%	3%
ES	7%	6%	4%	10%	9%	9%	5%	7%	17%	52%	13%	32%	26%	43%	4%	9%	11%	19%	6%	9%
EU27_2020	17%	16%	8%	13%	11%	11%	8%	11%	36%	58%	24%	42%	34%	47%	11%	16%	17%	24%	16%	20%
FI	52%	50%	24%	34%	26%	30%	22%	24%	67%	82%	50%	67%	57%	66%	23%	27%	27%	36%	38%	40%
FR	35%	27%	13%	21%	18%	18%	14%	17%	47%	69%	24%	50%	42%	55%	15%	21%	25%	30%	22%	26%
HR			4%	5%	5%	3%	4%	6%	18%	40%	6%	23%	25%	37%		10%	8%	16%	6%	8%
HU			1%	4%	1%	4%	2%	6%	25%	49%	4%	30%	18%	44%	2%	11%	4%	12%	3%	9%
IE	51%	45%	12%	26%	15%	17%	6%	11%	39%	72%	30%	59%	36%	58%	6%	22%	17%	31%	5%	10%
IS	26%	45%	19%	25%	20%	24%	17%	23%	47%	71%	40%	72%	48%	64%	30%	34%	27%	35%	18%	26%
IT	5%	5%	2%	8%	3%	5%	3%	6%	14%	50%	9%	34%	21%	37%	3%	10%	3%	19%	3%	7%
LT	14%	14%	1%	3%	1%	1%	2%	5%	7%	26%	4%	12%	13%	25%		4%	2%	7%	3%	6%
LU	100%	50%	15%	29%	19%	17%	20%	28%	41%	66%	24%	72%	48%	65%	35%	36%	30%	42%	37%	62%
LV	8%	25%		1%			1%	1%	10%	19%			16%	12%			3%	2%		3%
MK	3%	2%	2%	1%			1%	1%		19%		5%		3%			3%	10%		
MT			2%	9%			5%	9%	30%	55%	11%	51%	32%	62%	5%	17%	8%	28%	13%	37%
NL	18%	16%	25%	29%	31%	30%	19%	20%	69%	73%	66%	67%	63%	67%	26%	32%	46%	48%	46%	47%
NO	25%	27%	3%	5%	12%	9%	5%	4%	15%	18%			23%	21%			6%	8%	8%	8%
PL	34%	32%	5%	6%	7%	6%	8%	9%	40%	60%	21%	40%	39%	48%	8%	12%	17%	24%	14%	17%
PT	11%	10%	6%	10%	8%	9%	8%	11%	38%	71%	20%	49%	39%	53%	8%	19%	22%	30%	2%	9%
RO				1%				1%		19%				14%			2%	8%		
SE	54%		28%		30%		26%		71%		49%		67%		27%		34%		45%	
SI	23%	26%	8%	10%	11%	11%	11%	12%	44%	49%	23%	28%	47%	48%	8%	9%	24%	27%	27%	20%
SK			4%	4%	6%	4%	6%	5%	44%	49%	14%	28%	37%	43%			8%	13%	4%	
TR	1%	2%	3%	4%		1%	1%	2%	6%	15%	1%	5%	5%	10%	0%	2%	9%	12%	3%	4%
UK	36%		21%		25%		12%		52%		40%		47%		23%		28%		30%	

Note: A – agriculture; B-E - mining, manufacturing, electricity and gas, water supply and waste; F – construction; G-I – wholesale and retail trade, transport and storage, accommodation and food services; J – information and communications; K-L – finance and insurance, real estate; M – professional services, N – administrative and support services, O-Q – public administration, education, health; R-U – arts and entertainment, other services, households as employers, extraterritorial organisations.

Source: Cambridge Econometrics based on EU-LFS ad hoc extraction.

within the same cluster or from a country that is geographically and economically similar).

These methods allow us to complete our projections of the rates of WFH in spite of missing values in the raw data. The results in Section 2.5 should be interpreted with caution, especially the estimates of the rates of WFH within sectors that represent a small number of workers.

2.4.3 Scenario design

The purpose of the modelling exercise presented in this section is to illustrate the likely changes in remote work practices in the next five years. Below we present the main assumptions used in assessing the remote work implications of the four scenarios.

The focus of the scenarios is the period to 2026. The assumptions were drawn from the most recent statistical data available at the time of the modelling exercise.

The baseline represents a business-as-usual case and seeks to include assumptions on the evolution of the drivers of WFH by 2026. Unfortunately, not all drivers can be easily quantified. In those cases, we provide a qualitative characterisation of the driver instead to inform and/or frame the narrative.

The main assumptions that underpin the baseline projection are:

- that 2020 WFH rates are considered to be an outlier driven by the pandemic restrictions
- in 2021, the easing of restrictions in most countries led to somewhat lower rates than in 2020 but which were still above 2019 levels
- in 2022, companies that have invested in the digital infrastructure suitable for WFH will continue the practice while the rest return to pre-pandemic levels
- after 2022, the increase in WFH rates is driven by past growth.

The approach to constructing the baseline by country has the following steps:

1. Use data on WFH rates to create a historical time series.
2. Create country groups based on:
   - their 2020 WFH rate, which illustrates the readiness of countries and sectors for WFH; that is, the feasibility of WFH
   - their 2021 DESI score (European Commission 2022a), which is meant to summarise in a composite indicator the digital capability of a country in many of the aspects needed to support increases in WFH rates.

We use k-means clustering[17] on these two variables to define (and assign countries to) three country groups. Table 2.8 shows these clusters. The 'high adopters' group includes countries with a high rate of WFH implementation and a high level of digital capability. These countries leveraged their digital infrastructure and skills to implement more WFH before the pandemic, and it was thus relatively easy to increase WFH during it. The 'middle adopters' group includes countries with good digital capabilities but average rates of WFH, implying that they did not fully exploit their digital capabilities in 2020. The 'low adopters' group includes countries with low levels of WFH and lower digital capability compared to the other two groups. These are countries that need to improve their digital capabilities before they are able to increase their WFH rates.

The results are robust to different combinations of WFH rates and DESI scores and serve as a guide only as to how the countries can be categorised for modelling purposes. For example, Norway belongs to the middle adopters group because of the relatively lower levels of WFH compared to other countries in the high adopters group; while Poland and Czechia belong among the low adopters because they both have low WFH rates and DESI scores. As we explain later, we carry out further adjustments to the rates so as to account better for the sectoral distributions of economies.

Table 2.8 **Country groupings based on WFH rates and digital capabilities**

High adopters High feasibility and high implementation	**Middle adopters** Medium feasibility and medium implementation	**Low adopters** Low feasibility and low implementation
BE	AT	BG
CH	DE	CY
DK	EE	CZ
FI	ES	EL
IE	FR	HR
IS	MT	HU
LU	NO	IT
NL	PT	LT
SE	SI	LV
UK		MK
		PL
		RO
		SK
		TR

Source: Cambridge Econometrics, based on Eurostat (lfsa_ehomp) and European Commission (2022a).

17. k-means clustering is an algorithm that sorts observations into a desired number of groups based on the variables of interest. The groups are formed when the sum of the distance between each of the observations and the centre of the cluster is minimised and the distance between cluster centres is maximised.

3. Over the period 2009-19, create an average sectoral WFH rate for each country group as the weighted average of the rates for individual countries, weighted by employment.

4. For each group, forecast the linear trend of sectoral/total WFH by group of countries such that each country in a group will see the same growth in WFH until 2026.

5. Forecasting 2021 and 2022:
Given that the rates of remote working seen during the pandemic were, to a large extent, the result of government restrictions, it is likely that part of the increase in remote working will be reversed, especially in some sectors.[18] We implement a procedure which estimates the subsequent decline as restrictions eased.

   First, we determine the percentage point increase in remote working between 2019 and 2020, as shown in Figure 2.8.

   Then we use Eurostat data[19] on the Covid-19 impact on ICT usage to assess how much of that increase in digitalisation is likely to persist after the pandemic. In 2020, the survey asked enterprises whether they had increased the use of online meetings, remote ICT access and remote access to email; and whether this was due fully to Covid-19, partially to Covid-19 or was not at all related to Covid-19. For each country, we take into account the percentage of enterprises that had increased remote working practices partially or not at all due to Covid-19, assuming that these are the firms that are more likely to continue teleworking after the pandemic. We then calculate the average across the three forms of work (online meetings, remote access to ICT and to email) to get a final estimate of the percentage of enterprises likely to continue remote working.

   Finally, we multiply these figures by the percentage point difference in remote working between 2019 and 2020 to obtain the WFH rate in 2022.

   Table 2.9 shows the results by country for all enterprises. Because the survey does not have data for all countries, some values are imputed from other countries (i.e. belonging to the same group), and highlighted in bold in the table.

18. For example, in education, while most of the activity could technically be carried out remotely, there seems to be a broad preference for in-person teaching where possible.

19. Eurostat dataset code: isoc_e_cvd. This dataset is part of Eurostat's ICT usage in enterprises survey.

Table 2.9 **The baseline WFH rate from 2021 and 2022**

Country	A Enterprises likely to continue WFH	B PP increase in WFH in 2019-20	C=A*B Increase in WFH likely to persist	D Share WFH 2019	E=D+C Share WFH 2022
AT	37%	7.1	2.6	21.8	24.4
BE	52%	7.3	3.8	23.6	27.4
BG	45%	1.2	0.6	0.2	0.7
CH	**56%**	8.1	4.5	32.0	36.6
CY	49%	4.0	2.0	1.2	3.1
CZ	**61%**	3.0	1.8	10.0	11.8
DE	56%	7.2	4.0	12.7	16.7
DK	**54%**	6.7	3.6	27.9	31.5
EE	**49%**	3.5	1.7	17.4	19.1
EL	48%	5.2	2.5	4.7	7.2
ES	48%	6.7	3.2	8.1	11.3
FI	53%	7.6	4.0	31.3	35.3
FR	**52%**	6.8	3.6	21.8	25.4
HR	**48%**	4.0	1.9	6.2	8.1
HU	72%	6.8	4.9	3.4	8.4
IE	**52%**	12.7	6.6	16.8	23.4
IS	**54%**	9.8	5.3	25.8	31.1
IT	48%	9.0	4.3	4.6	8.9
LT	45%	3.9	1.8	3.2	5.0
LU	**52%**	15.6	8.2	30.8	39.0
LV	53%	1.5	0.8	2.5	3.3
MK	**45%**	1.7	0.7	1.5	2.3
MT	53%	15.0	8.0	8.5	16.5
NL	**53%**	2.8	1.5	36.8	38.3
NO	55%	1.0	0.5	7.0	7.5
PL	34%	3.9	1.3	14.0	15.3
PT	56%	7.3	4.1	13.3	17.4
RO	**45%**	2.0	0.9	0.3	1.1
SE	54%	**2.9**	1.5	37.3	38.8
SI	61%	2.4	1.5	17.0	18.5
SK	61%	1.6	1.0	8.0	9.0
TR	67%	1.6	1.1	3.1	4.2
UK	**53%**	**20.2**	10.7	26.8	37.5

Note: Values highlighted in bold are imputed. In the first column the imputations (in parenthesis) are: CH (DE), CZ (SK), DK (FI), EE (average of LT and LV), EL (IT), FR (BE), HR (IT), IE (BE), IS (FI), LU (BE), MK (BG), NL (FI), RO (BG), UK (BE). In the second column, these are: SE (FI), UK (BE).

Source: Eurostat (*isoc_e_cvd*, *lfsa_ehomp*).

6. Forecasting 2022-26:
   Based on the trend forecasts by country group from Step 4 above, an annual growth rate for the 2022-26 period is obtained for each group. These annual growth rates are applied to the individual countries in each group to continue the trend in WFH rates from 2022 onwards. This approach provides diversity across groups of similar countries while also helping to subdue any excessive growth or decline that might arise from the analysis of individual countries.

   The approach described above is applied to construct the forecast by country and sector. The sectoral trends by country group are computed only for sectors with sufficient data availability by country and for which we expect there to be meaningful changes in WFH rates. For these reasons the assumptions for the industry sector (encompassing mining, manufacturing, electricity and gas, and water supply and waste) are kept at their 2019 levels from 2022 onwards. We think that the high value of WFH in agriculture in some countries is probably due to the EU-LFS survey design; that is, the figure is more related to self-employment[20] rather than being a type of remote work that increased during the pandemic. Consequently these WFH rates remain constant at their 2019 values over the forecast period. Construction is also kept at the 2019 value since it was mostly stable pre-pandemic and it is unlikely to be relevant for future developments.

The Unwinding of WFH scenario represents what could happen if workers who shifted to WFH due to the pandemic revert to working on employer sites once the country-level pandemic restrictions have been rolled back. It assumes that the increase in the aggregate WFH rate that occurred in 2020, and to some extent in 2021, unwinds by 2022 which is designated as the end of the period of unusually high levels of pandemic-related WFH. This 'unwinding' might be driven by both employers' and employees' desire to return to normal. Additionally, the scenario assumes that levels of WFH return to their 2019 pre-pandemic levels by 2022 and subsequently continue the pre-pandemic trend of growth based on the country clusters defined in the baseline scenario (as in Table 2.8). In other words, while the baseline assumes that the increase in WFH rates seen in 2020 will only partially revert in 2022, the Unwinding of WFH scenario assumes a complete return to 2019 levels before the pre-pandemic trends pick up again. WFH projections in this scenario are therefore identical to the baseline scenario for the period 2019-21 and start to deviate from the baseline in 2022. The projected growth over 2023-26 is positive, though modest, for all countries.

The Acceleration of WFH scenario represents what could happen if aggregate WFH rates rise in the short and medium terms, driven by country-level advances toward the Europe's Digital Decade 2030 targets. Since some of these targets are also the factors identified as the drivers of WFH in our literature review, this scenario projects a 'high' estimate of the levels of WFH in a future in which

20. For example, a farmer working on the fields he/she owns might be classified as working from home.

European countries (both Member States and non-Member States) move towards greater digitalisation and feasibility for remote work.

To determine the predicted level of WFH, a simple Ordinary Least Squares (OLS) regression model was constructed with four explanatory variables:

- fixed very high capacity network (VHCN) coverage
- percentage of individuals with at least basic digital skills
- percentage of SMEs with at least a basic level of digital intensity
- amount of ICT investment per worker.

The sample is the 26 countries for which data were complete for all four variables in 2020. Table 2.10 shows the values of the variables for our 33 focus countries, noting where the values have needed to be imputed.[21]

Table 2.10 **WFH explanatory variables in 2020, by country**

Country	VHCN coverage (%)	Basic digital skills (%)	SME digital intensity (%)	ICT investment (€ per worker)
AT	37%	7.1	2.6	24.4
AT	39.3	65.6	63.5	1084
BE	67.5	60.8	75.0	1154
BG	42.9	29.4	32.6	18
CH	**82.4**	**69.3**	**76.9**	1462
CY	26.2	45.0	49.4	194
CZ	33.3	62.1	59.3	647
DE	55.9	70.2	62.2	516
DK	93.8	70.0	88.4	837
EE	70.9	61.6	73.6	607
EL	10.2	50.5	**54.3**	506
ES	91.7	57.2	62.4	423
FI	66.7	76.5	87.6	404
FR	52.6	57.3	54.9	428
HR	46.5	53.4	62.1	281
HU	48.6	48.7	45.6	187
IE	83.3	53.4	66.0	1038
IS	**82.4**	**69.3**	**76.9**	541
IT	33.7	41.5	68.6	497
LT	67.1	56.1	53.5	523
LU	95.1	64.6	64.4	902
LV	88.1	43.0	41.9	289
MK	**48.9**	**46.6**	**49.9**	169
MT	100.0	55.8	71.1	239

21. The 2021 version of DESI (which included indicator values for 2020) was only available for the 27 EU Member States. In the case of Norway and the UK, DESI 2020 (which included indicator values for 2019) included some indicators for these countries which were used in lieu of the 2020 values. ICT investment data from Eurostat was not available for Poland or Turkey.

Country	VHCN coverage (%)	Basic digital skills (%)	SME digital intensity (%)	ICT investment (€ per worker)
NL	89.8	79.4	75.1	586
NO	85.4	89.5	**63.2**	1327
PL	64.6	44.4	51.5	**372**
PT	86.6	51.8	50.7	250
RO	75.9	31.0	32.6	507
SE	80.5	72.4	81.7	913
SI	65.6	55.1	67.5	366
SK	50.2	53.9	52.2	277
TR	**48.9**	**46.6**	**49.9**	**341**
UK	**82.2**	77.0	**76.9**	555

Note: The cells highlighted in bold represent imputed values, carried out on the basis of the average for countries within the same cluster for which data were available.

Source: European Commission (2022a); Eurostat.

The results of the regression analysis yielded coefficients which we then used to estimate the projected level of WFH by country into the future. Table 2.11 shows the estimated coefficients of the regression analysis.

Table 2.11 **Results of OLS regression analysis**

Statistic	Value
N (countries)	27
R^2	0.7817
F-statistic	19.70
Explanatory variable	**Coefficient**
VHCN coverage (%)	0.1298*
Basic digital skills (%)	0.4093*
SME digital intensity (%)	0.2036
ICT investment (€1000 per worker)	0.1146*
Constant	-0.2865**

Note: Outcome variable: country rate of WFH.
* p<0.05; ** p<0.01.

Source: Cambridge Econometrics analysis.

The Acceleration of WFH scenario assumes that each country makes progress towards the Europe's Digital Decade targets in respect of each of the three variables that have targets for 2030 (100% VHCN coverage; 80% of the population with basic digital skills; and 90% of SMEs with basic digital intensity). The annual growth rate each country would need to achieve in order to meet the 2030 targets for each of these variables was calculated, beginning in 2020. In some cases, countries started at low levels, requiring very high annual growth in the measures to reach the 2030 targets. To keep the projections realistic, a limit was set on the maximum annual growth of the median annual growth rate for that variable across all countries.

As an example, the average annual growth rate in the basic digital skills variable is limited to 3.6% per year. Greece started in 2020 at 50.5% of the population having basic digital skills. Given the limit of 3.6% annual growth in that variable, Greece is projected to achieve 73.0% of the population having basic digital skills by 2030, representing substantial progress towards the target though not actually meeting it.

ICT investment is not included among the Europe's Digital Decade targets for 2030. The scenario assumes that ICT investment by country grows in line with the annual growth in SME digital intensity (capped as described above).

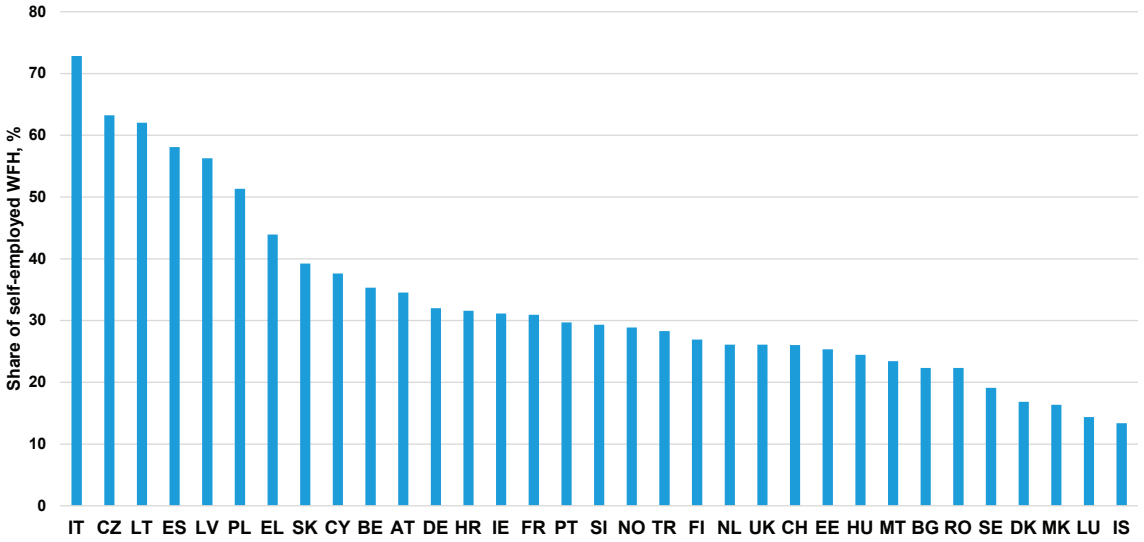
With the 2030 estimates for each of the four explanatory variables, the estimated level of WFH by country in 2030 may be calculated, with the coefficients listed in Table 2.11. As with the Unwinding of WFH scenario, the Acceleration of WFH scenario deviates from the baseline from 2022 onwards. The projected levels of WFH for a country correspond to the linear trajectory that country would take from 2022 to the estimated value in 2030.

While the literature review identified several drivers that could have an impact on a country's level of WFH, only those that correspond to digital skills, digital infrastructure and ICT investment were used to calculate the projections in this scenario. It is therefore assumed that the other drivers, such as average firm size and the rate of self-employment, do not change over the projection period.

This scenario can be interpreted as what might happen if, all else being equal, European countries embark on a mission of digitalisation over the decade between 2020 and 2030 that expands infrastructure, skills and investment and thereby increases the feasibility of WFH. It assumes that WFH rates rise accordingly, in essence realising countries' increasing potential to accommodate WFH.

The assumptions for the final scenario – Acceleration of WFH with contract changes – in terms of WFH rates are identical to those of the previous scenario. The main difference relates to the split of WFH workers between those who are employees and those who are self-employed. While in the Acceleration of WFH scenario it is assumed that any increase in WFH employment is represented by employees, in this scenario we assume that some of the additional WFH workers are (or become) self-employed. The EU-LFS ad hoc extraction allows a calculation of the aggregate share of the self-employed among those working from home in 2019, which is then multiplied by the number of additional WFH workers to find the additional number of self-employed people working from home. The 2019 figures are used as a guide to the more typical shares of the self-employed (given that this share would have fallen markedly in 2020 and 2021 owing to the large numbers of employees sent home as result of lockdown measures). Figure 2.9 shows the shares of self-employed among WFH workers by country, highlighting the significant cross-country variation with values ranging from 73% in Italy to 13% in Iceland.

Figure 2.9 **Share of self-employed workers within those WFH, 2019**



Source: Cambridge Econometrics, based on Eurostat EU-LFS ad hoc extraction.

The scenario assumptions represent different paths for the aggregate WFH rates by country. Sectoral WFH rates are then computed to be consistent with the aggregate WFH figures. This is implemented via the following procedure:

1. Total numbers of WFH workers are calculated by multiplying the aggregate WFH rates in each scenario by the total employment figures from E3ME (see Section 2 for details on employment numbers): WFH_total_{scen}

2. Sectoral values are computed by multiplying the sectoral WFH rates in the baseline by the sectoral employment figures to get an initial value $WFH\_numbers_{baseline,sec}$. The sum of these figures by country is $WFH\_sec\_total_{baseline}$

3. The sectoral numbers obtained in (2) are made consistent with the total number from (1) by applying a scaling factor:

   $$WFH\_numbers_{scen,sec} = WFH\_numbers_{baseline,sec} * \frac{WFH\_total_{scen}}{WFH\_sec\_total_{baseline}}$$

   with scen denoting the scenario and sec denoting the sector. The sum of sectoral WFH is now consistent with the required total (WFH_total_{scen}).

4. Sectoral WFH rates are computed by applying the scaling factor $WFH\_numbers_{scen,sec}$ to the initial sectoral employment figures.

5. The resulting WFH rates might reach unreasonably high levels[22] as a result of the scaling. In such cases sectoral WFH rates are capped at the maximum reached in 2020 across countries.

6. In the Acceleration of WFH scenario, sectors with a zero WFH rate (e.g. because of missing values) grow linearly by 2026 to whichever is the smallest of the country group mean and median in 2020. Where agriculture has missing data, we make it grow gradually to 1% in 2026. This recognises the possibility of such sectors seeing at least some WFH over the period owing to technological advances.

7. Aggregate WFH rates are recomputed for each scenario based on sectoral values to take account of any adjustments in (6).

The sectoral WFH rates (and the implied sectoral WFH employment) that have thus been computed are then fed into the model to determine the effects of changes in WFH practices on the overall economy.

2.5 Results

This section shows the results of the projections for WFH rates in the baseline and alternative scenarios. These results reflect what might happen under different hypothetical scenarios. They should therefore be interpreted as economic futures that are consistent with the WFH assumptions; that is, they are conditional projections.

2.5.1 Baseline

Table 2.12 shows how WFH rates change in each country over the forecast period under the baseline assumptions. By 2022, some of the observed increase in WFH rates from 2020 has been offset, as pandemic-related restrictions are lifted and people gradually return to on-site working. From 2022, WFH rates resume their growth in line with the pre-pandemic trends.

By 2026, almost all countries are still below the 2020 peak (although many come close to it) with the exceptions of Sweden and the Netherlands. The UK and Malta are the countries with the largest difference between the 2020 and 2026 WFH rates (-7 and -6 percentage points, respectively), since they were the countries that saw the largest increases in 2019-20 (20 and 15 points). The differences between groups of countries remain significant in 2026: the average WFH rates in 2026 are 36%, 18% and 7% for the high, middle and low adopter groups.

22. In some cases, the initial estimates reach values as high as 85-100 per cent.

Table 2.12 **Baseline results for WFH rates, 2019-26, by country**

	Country	WFH rate (%)				Change (percentage point difference)	
		2019	2020	2022	2026	2019-20	2020-26
High adopters	BE	24	31	27	30	7	-1
	CH	32	40	37	39	8	-1
	DK	28	35	31	34	7	-1
	FI	31	39	35	38	8	-1
	IE	17	29	23	25	13	-4
	IS	26	36	31	34	10	-2
	LU	31	46	39	42	16	-4
	NL	37	40	38	41	3	2
	SE	37	40	39	42	3	2
	UK	27	47	38	40	20	-7
Middle adopters	AT	22	29	24	26	7	-3
	DE	13	20	17	18	7	-2
	EE	17	21	19	20	3	-1
	ES	8	15	11	12	7	-3
	FR	22	29	25	27	7	-2
	MT	8	24	17	17	15	-6
	NO	7	8	8	8	1	0
	PT	13	21	17	18	7	-2
	SI	17	19	18	20	2	0
Low adopters	BG	0	1	1	1	1	-1
	CY	1	5	3	3	4	-2
	CZ	10	13	12	12	3	-1
	EL	5	10	7	8	5	-2
	HR	6	10	8	9	4	-2
	HU	3	10	8	9	7	-1
	IT	5	14	9	9	9	-4
	LT	3	7	5	5	4	-2
	LV	3	4	3	3	2	-1
	MK	2	3	2	2	2	-1
	PL	14	18	15	16	4	-2
	RO	0	2	1	1	2	-1
	SK	8	10	9	9	2	0
	TR	3	5	4	4	2	0

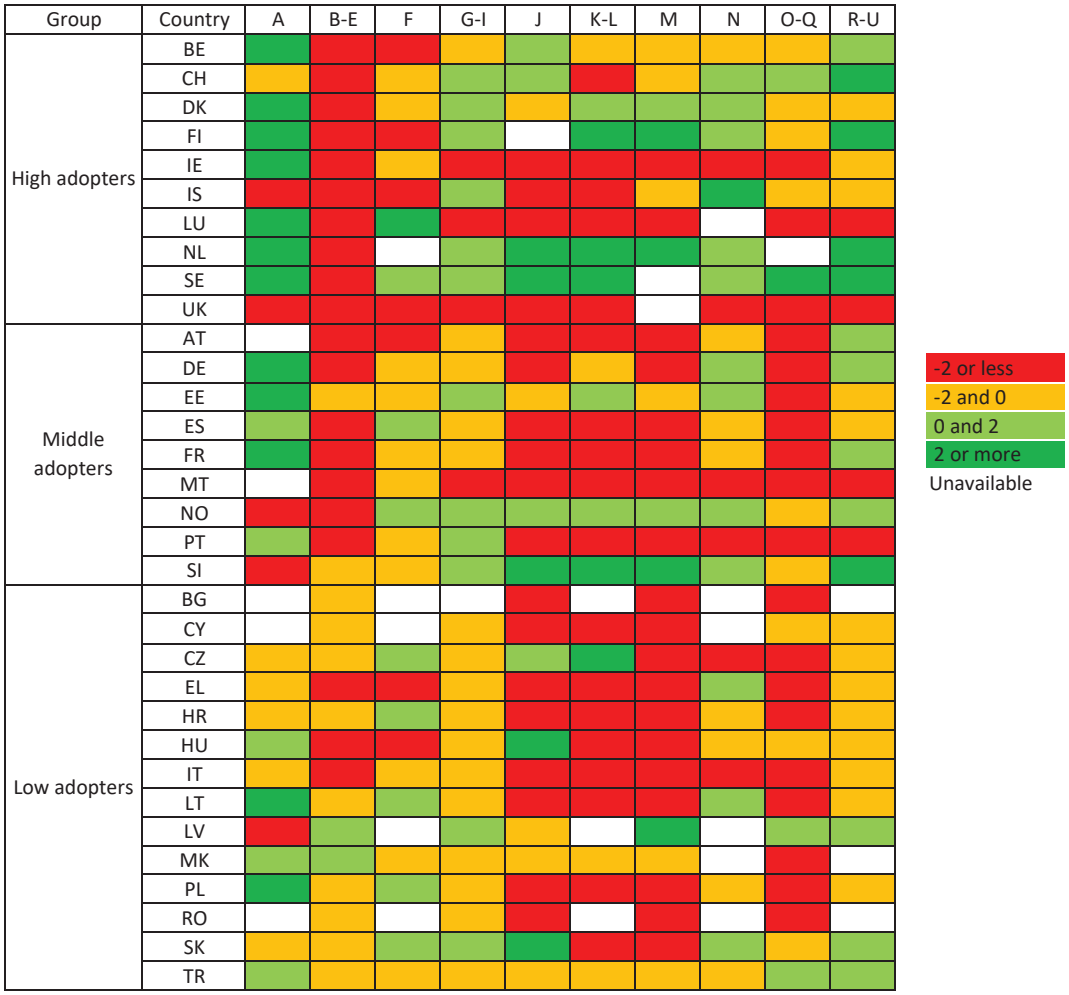
Note: Figures for 2019 and 2020 are data (from Eurostat).

Source: Eurostat ad hoc data extraction; Cambridge Econometrics.

Figure 2.10 shows the percentage point changes in baseline WFH rates over 2020-26 by country and sector. By 2026, most sectors remain below the 2020 peak in a majority of countries (the red and orange cells). However, there are countries in which many sectors show higher WFH rates in 2026 compared to 2020, such as Sweden and the Netherlands. These are countries in which the aggregate rate in

2026 is also projected to be above the 2020 value (see Table 2.12). Milder cases of this include Finland, Slovenia and Norway. The difference is most significant in sectors which saw large increases in WFH in 2020, such as information and communications (J), finance (K) and professional services (M).

Figure 2.10 **Heatmap of percentage point changes in WFH rates by sector in 2020-26**



Source: Cambridge Econometrics.

Figure 2.10 shows additionally how data availability varies between groups of countries: high adopters tend to have data for most sectors whereas low adopters are more likely to have many missing series.

The baseline results show that the levels of WFH seen in 2020 will not be reached (or sustained) by 2026 in most countries and sectors. The pandemic-induced surge in WFH represented a shock that made employers and workers partially change their attitude towards this form of work, but more of the change was brought about by WFH being enforced. Hence, WFH rates will be higher in 2022 than they were in 2019, but lower than they were in 2020. The baseline reflects the idea that, once the pandemic restrictions have been phased out, many workers will resume

working from their employer's premises/on-site. After the net increase between 2019 and 2022, growth in WFH rates then follows the pre-pandemic trends which, in most cases, does not reach 2020 levels by 2026.

2.5.2 Alternative scenario results

The results of the two alternative scenarios show two possible futures for the rate of WFH in European countries (the 27 EU Member States plus Iceland, Switzerland, Norway, Republic of North Macedonia, Turkey and the UK). Table 2.13 shows these results by scenario and country over the projection period 2022-26. Appendix A includes charts for each country that compare the three scenario projections over the period 2019-26.

The Unwinding of WFH scenario projects WFH rates in 2026 that are lower than those in the baseline scenario although, in general, the scenario projection tends to be close to the baseline result, typically within five percentage points. This difference is larger in Iceland (6 point difference), Ireland (7 points), Luxembourg (9 points) and the UK (11 points), all countries in the high adopters group, as well as Malta (8 points) in the middle adopters group. Among low adopters, the difference between the Unwinding of WFH 2026 projected rate and the baseline 2026 projected rate is often quite small, especially for countries that were starting from low historical rates of WFH and did not see substantial increases in 2020. The percentage point difference between projected WFH rates in 2026 and 2022 is small (no more than 3 points) for all countries in this group.

The Acceleration of WFH scenario projects WFH rates in 2026 that are higher, and in some cases substantially higher, than those in the baseline scenario. This difference is most acute in countries in the low adopters group, illustrating the potential for these countries to increase WFH rates from low pre-pandemic levels as a result of digitalisation. Similarly, countries in the middle adopters group have projected WFH rates in 2026 that are much higher than in the baseline; in many cases by 10 points or more. Some countries in the high adopters group are also projected to have a 2026 WFH rate that is much higher than the baseline projection. For others, such as Finland, the Netherlands, Sweden and the UK, there is a smaller difference between this scenario and the baseline projections for 2026: fewer than 3 points.

The percentage point difference in projected WFH rates between 2022 and 2026 tends to be much larger in this scenario than in the other two. This difference is particularly high in the case of Lithuania (16 point difference) and Norway (24 points). This result reflects these countries having relatively high levels of digital skills, infrastructure and ICT investment but low levels of WFH in the historical data, i.e. there was unused potential for WFH.

The results for the final scenario, Acceleration of WFH with contract changes, are not presented in this section. The changes in contractual arrangements have implications at macroeconomic level (as quantified in Section 3), but these changes are not deemed to influence the WFH rates.

Table 2.13 **Summary of WFH forecasts by scenario and country, 2022 and 2026**

Group	Countries	2022 (%)			2026 (%)			2026 vs 2022 (percentage points)		
		Unwinding of WFH	Baseline	Acceleration of WFH	Unwinding of WFH	Baseline	Acceleration of WFH	Unwinding of WFH	Baseline	Acceleration of WFH
High adopters	BE	24	27	31	25	30	40	2	2	9
	CH	32	37	40	35	39	47	3	3	6
	DK	28	31	34	30	34	40	2	2	5
	FI	31	35	37	34	38	39	2	3	1
	IE	17	23	28	18	25	37	1	2	8
	IS	26	31	35	28	34	39	2	2	4
	LU	31	39	43	33	42	46	2	3	3
	NL	37	38	39	40	41	41	3	3	2
	SE	37	38	39	40	41	43	3	3	3
	UK	27	38	38	29	40	40	2	2	2
Middle adopters	AT	22	24	29	24	26	37	2	1	8
	DE	13	17	21	14	18	30	1	1	10
	EE	17	19	22	19	20	31	2	1	8
	ES	8	11	16	9	12	27	1	1	11
	FR	22	25	28	24	27	33	2	1	5
	MT	8	17	22	9	17	30	1	1	8
	NO	7	8	13	8	8	32	1	0	19
	PT	13	17	20	15	18	27	1	1	6
	SI	17	18	21	19	20	30	2	1	9
Low adopters	BG	0	1	2	0	1	4	0	0	2
	CY	1	3	6	1	3	13	0	0	7
	CZ	10	12	15	11	12	25	1	1	10
	EL	5	7	11	5	8	19	1	0	8
	HR	6	8	12	7	9	22	1	0	11
	HU	3	8	11	4	9	17	0	0	7
	IT	5	9	13	5	9	21	1	0	7
	LT	3	5	10	4	5	23	0	0	13
	LV	3	3	6	3	3	16	0	0	10
	MK	2	2	5	2	2	15	0	0	9
	PL	14	15	18	16	16	25	2	1	6
	RO	0	1	4	0	1	11	0	0	8
	SK	8	9	12	9	9	20	1	0	8
	TR	3	4	6	3	4	14	0	0	8

Source: Cambridge Econometrics.

As explained in Section 2.4, we derive sectoral WFH rates in a way that is consistent with the aggregate WFH rates. Table 2.14 shows sectoral WFH rates in 2026 for the Unwinding of WFH scenario. As expected, this scenario shows stark differences in WFH rates between groups of countries. It must be remembered that this scenario assumes that the growth in WFH rates seen in 2020 is completely undone by 2022, with WFH returning to 2019 levels and then growing in line with pre-pandemic trends. In consequence, it largely reflects pre-existing differences in WFH practices with no (or at least only partial) catching-up taking place on the part of low and middle adopters with respect to high adopters.

Table 2.14 **Sectoral WFH rates (%) in 2026: Unwinding of WFH scenario**

Group	Country	A	B-E	F	G-I	J	K-L	M	N	O-Q	R-U
High adopters	BE	51	13	18	14	54	49	49	18	26	35
	CH	47	18	15	24	69	51	50	25	37	42
	DK	34	21	19	18	60	46	58	26	33	33
	FI	49	22	25	23	77	63	63	26	32	40
	IE	39	9	11	7	47	40	39	13	20	7
	IS	24	18	18	20	57	57	54	32	30	22
	LU	57	13	17	23	52	52	55	32	35	49
	NL	18	25	30	21	77	72	70	32	48	51
	SE	55	29	30	28	79	56	72	32	37	50
	UK	43	17	19	16	58	49	54	22	30	35
Middle adopters	AT	62	11	11	15	58	45	44	19	27	31
	DE	26	7	8	8	45	28	32	10	14	17
	EE	20	8	13	12	58	36	52	8	20	19
	ES	5	3	7	5	29	19	27	6	11	6
	FR	32	12	16	15	59	40	46	18	25	24
	MT	0	1	1	4	25	21	26	7	10	15
	NO	22	3	10	4	17	4	20	6	6	8
	PT	10	5	7	9	52	34	43	13	23	5
	SI	22	8	10	12	52	29	48	9	24	24
Low adopters	BG	0	0	0	0	2	0	1	0	0	0
	CY	0	0	0	1	5	2	4	0	2	0
	CZ	9	4	7	6	44	30	36	15	8	26
	EL	2	1	1	2	16	11	15	3	10	2
	HR	1	3	3	4	25	12	24	7	9	5
	HU	5	0	0	2	20	9	14	4	4	3
	IT	3	1	2	3	21	13	17	4	6	3
	LT	11	1	1	3	8	6	13	3	3	3
	LV	7	1	0	1	15	0	13	0	2	3
	MK	2	1	1	1	14	4	2	0	4	0
	PL	34	5	7	8	53	31	43	11	20	16
	RO	0	0	0	0	3	0	2	0	1	0
	SK	3	3	5	4	46	20	34	4	10	3
	TR	2	3	0	2	14	5	9	2	13	4

Source: Cambridge Econometrics.

Table 2.15 shows WFH rates by sector in 2026 for the Acceleration of WFH scenario. It can be seen that important differences remain across groups of countries in many sectors. In agriculture (A), industry (B-E), construction (F) and trade, transport and accommodation (G-I), this is to be expected since WFH rates do not change so much from 2019 levels and the assumed increase in aggregate WFH does not translate into significant changes in those sectors. Instead, in information and communications (J) we see a catch-up between groups of countries: information and communications represented a sizeable share of WFH employment in 2020, so the higher aggregate WFH rates envisaged in the Acceleration of WFH scenario mostly increases WFH employment in that sector. This means that the achievement of the Europe's Digital Decade targets in 2030 may result in similar WFH rates (around 80%) in information and communications across countries. Similar reasoning can be applied to professional services (M) and, to a lesser extent, finance and real estate (K-L). The situation is different in administrative and support services (N), public administration, education and health (O-Q) and in arts and entertainment, other services, households as employers and extraterritorial organisations (R-U), with middle and low adopters still lagging behind high adopters.

The rates shown in Table 2.15 also apply to the Acceleration of WFH with contract changes scenario, recalling that it is the split between employees and the self-employed that distinguishes these two variants.

Table 2.16 shows sectoral WFH rates in 2026 as percentage point differences from the baseline.

The differences from the baseline in the Unwinding of WFH scenario do not show a clear pattern across groups of countries. Since the return to pre-pandemic values affects all countries in a similar way, the difference in aggregate WFH rates is lower in magnitude for the Unwinding of WFH scenario than for the acceleration scenarios (see Table 2.13).

In the Acceleration of WFH scenario, the largest differences from the baseline are seen among low adopters in information and communications (J), finance and real estate (K-L) and professional services (M). Starting from a relatively lower point in 2019, low adopter countries are expected to close the gap with high adopters by 2026. High adopters are expected to see smaller increases compared to the baseline given their already high WFH rates in 2019. Middle adopters are also expected to see increases in WFH rates in these same sectors. For other sectors, in all country groups, the increases in digital infrastructure and in skills are expected to lead to increases in WFH rates in line with increases in employment and pre-pandemic WFH rates.

Table 2.15 **Sectoral WFH rates (%) in 2026: Acceleration of WFH scenario**

Group	Country	A	B-E	F	G-I	J	K-L	M	N	O-Q	R-U
High adopters	BE	64	21	29	23	84	79	73	29	42	56
	CH	64	26	21	31	84	72	70	35	49	59
	DK	46	28	25	24	79	61	73	34	44	44
	FI	56	26	29	27	84	73	72	30	37	46
	IE	64	20	25	15	84	79	73	27	44	15
	IS	34	25	26	28	80	79	73	40	43	31
	LU	64	19	24	31	73	73	73	40	49	68
	NL	19	26	31	22	81	76	73	33	49	53
	SE	59	31	31	30	84	61	73	35	39	53
	UK	61	24	26	23	82	69	73	31	42	48
Middle adopters	AT	64	17	18	24	84	72	70	30	43	50
	DE	59	17	17	17	84	63	71	23	31	31
	EE	34	13	22	20	82	60	71	13	34	32
	ES	13	11	18	15	83	63	72	18	37	20
	FR	43	16	21	20	81	55	63	25	34	33
	MT	2	4	4	12	81	66	73	23	32	48
	NO	34	13	26	20	85	22	62	29	32	39
	PT	18	9	14	17	84	63	73	23	42	10
	SI	36	12	17	20	84	47	73	15	40	40
Low adopters	BG	1	1	3	4	18	22	9	5	2	5
	CY	3	4	6	8	51	23	37	10	16	4
	CZ	22	9	17	15	82	71	71	35	19	62
	EL	7	5	5	9	57	38	53	10	35	8
	HR	2	8	12	12	84	40	73	23	31	18
	HU	18	2	2	9	82	44	68	17	18	14
	IT	11	5	7	11	83	53	68	15	26	12
	LT	52	7	7	21	58	41	73	22	20	23
	LV	34	6	9	4	54	54	47	15	11	14
	MK	13	9	6	5	85	32	19	20	31	22
	PL	54	8	11	13	84	49	68	17	32	25
	RO	4	2	11	3	96	62	57	18	17	16
	SK	7	8	12	11	82	49	71	9	23	8
	TR	6	12	3	10	82	27	53	12	40	26

Source: Cambridge Econometrics.

Table 2.16 **Sectoral WFH rates: difference from the baseline in 2026, percentage points**

Group	Countries	A		B-E		F		G-I		J		K-L		M		N		O-Q		R-U	
		Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.	Unw.	Acc.
High adopters	BE	-8	5	-2	6	-3	8	-2	7	-9	21	-8	22	-8	17	-3	8	-4	12	-6	16
	CH	-7	11	-3	5	-2	4	-3	4	-10	6	-7	13	-7	13	-4	6	-5	7	-6	11
	DK	-4	7	-3	4	-2	4	-2	4	-8	12	-6	9	-7	8	-3	5	-4	6	-4	6
	FI	-6	1	-3	0	-3	1	-3	0	-7	0	-8	1	-8	1	-3	1	-4	1	-5	1
	IE	-15	10	-4	7	-4	9	-3	5	-18	19	-16	23	-16	18	-5	10	-8	16	-3	5
	IS	-5	5	-4	4	-4	4	-4	4	-12	12	-12	10	-11	8	-7	2	-6	6	-4	4
	LU	-7	0	-4	2	-4	2	-6	3	-14	7	-14	7	-14	4	-8	0	-9	5	-13	6
	NL	-1	0	-1	0	0	0	-1	0	-3	0	-3	0	-3	0	-1	0	-1	0	-2	0
	SE	-2	2	-1	1	-1	0	-1	1	-3	2	-2	2	-1	0	-1	1	-2	1	-2	2
	UK	-17	0	-7	0	-7	0	-6	0	-23	0	-19	0	-19	0	-9	0	-12	0	-14	0
Middle adopters	AT	-2	0	-1	6	-1	6	-1	8	-4	22	-3	24	-3	23	-1	10	-2	14	-2	16
	DE	-7	26	-2	7	-2	7	-2	7	-12	27	-7	28	-8	31	-3	10	-4	13	-4	9
	EE	-1	13	0	5	-1	8	-1	7	-3	21	-2	23	-3	17	0	5	-1	13	-1	12
	ES	-2	6	-1	6	-2	9	-2	9	-10	44	-6	37	-9	36	-2	11	-4	22	-2	12
	FR	-4	8	-1	3	-2	4	-2	4	-7	15	-5	10	-5	11	-2	5	-3	6	-3	6
	MT	0	2	-1	2	-1	2	-3	5	-22	34	-18	28	-22	25	-6	10	-9	14	-13	21
	NO	-1	11	0	10	0	15	0	16	-1	68	0	18	-1	41	0	23	0	25	0	31
	PT	-2	6	-1	3	-2	4	-2	5	-13	18	-9	20	-11	20	-3	7	-6	14	-1	3
	SI	-1	13	0	5	0	6	-1	7	-2	30	-1	17	-2	23	0	5	-1	15	-1	15
Low adopters	BG	0	1	0	1	0	3	0	4	-6	10	0	22	-3	5	0	5	-1	1	0	5
	CY	0	3	-1	3	0	6	-1	6	-8	37	-4	17	-6	27	0	10	-3	12	-1	3
	CZ	-1	11	0	5	-1	9	-1	8	-5	33	-3	38	-4	31	-2	19	-1	10	-3	33
	EL	-1	4	-1	3	-1	3	-1	5	-7	35	-5	23	-6	32	-1	6	-4	21	-1	5
	HR	0	1	-1	5	-1	7	-1	8	-6	53	-3	25	-6	43	-2	15	-2	20	-1	12
	HU	-6	7	0	1	-1	1	-2	4	-25	37	-12	23	-18	35	-5	9	-5	9	-4	7
	IT	-2	6	-1	3	-2	4	-2	6	-17	45	-11	29	-14	37	-3	8	-5	14	-2	7
	LT	-5	36	0	5	0	6	-1	17	-4	47	-3	32	-6	54	-1	18	-1	16	-1	18
	LV	-2	25	0	4	0	9	0	3	-3	36	0	54	-3	31	0	15	-1	8	-1	10
	MK	-1	10	0	7	0	5	0	4	-6	66	-1	27	-1	16	0	20	-1	26	0	22
	PL	-1	19	0	3	0	4	0	5	-2	29	-1	17	-1	24	0	6	-1	11	0	9
	RO	0	4	0	2	0	11	0	3	-11	82	0	62	-7	48	0	18	-2	14	0	16
	SK	0	4	0	4	0	7	0	6	-3	34	-1	28	-2	35	0	5	-1	13	0	4
	TR	0	4	-1	8	0	2	0	8	-4	65	-1	22	-2	42	-1	9	-3	24	-1	21

Note: Acc. – Acceleration of WFH scenario

Unw. – Unwinding of WFH scenario

Source: Cambridge Econometrics.

3. Macroeconomic implications of remote work

3.1 Introduction

This section presents the results of the modelling exercise with separate subsections describing the key findings at macroeconomic and sectoral level. In each case, the analysis focuses first on the regional results for economic and labour market indicators (i.e. between the EU27 and the EU27+6), drawing out the differences which reflect their contrasting economic and labour market structures.

The baseline and three alternative scenarios have been modelled to 2026, in line with the descriptions of the remote work scenarios in Chapter 2:

1. **Baseline**: a business-as-usual projection based on long-term growth prospects as well as short-term economic projections, including the estimated impacts of Covid-19. The baseline combines data and analysis by the European Commission with energy projections consistent with those of the European Commission and the International Energy Agency.
2. **Unwinding of WFH**: this scenario assumes that rates of WFH revert to pre-pandemic levels in 2022 and then grow in line with the historical trends. This scenario thus represents a return to pre-pandemic trends.
3. **Acceleration of WFH**: this scenario assumes that countries progress towards the 2030 targets set out in the Europe's Digital Decade vision by the European Commission. This requires greater investment in ICT and supporting infrastructure. Sectors assumed to benefit directly from this additional investment are telecommunications and computer services, architecture and engineering-related services, certain manufacturing sectors such as electronics and electrical equipment, and construction.
4. **Acceleration of WFH with contract changes**: this scenario assumes the same technological trends as the previous scenario but with changes in workers' contractual arrangements (for example, a more marked switch to self-employment by WFH workers).

The role of the modelling exercise using E3ME is to generate a consistent set of economic projections from the above assumptions. This analysis goes beyond changing the projected numbers to considering how those changes in numbers might also affect broader economic factors in a consistent manner across

scenarios.[23] The assumption in each scenario is that the WFH rates developed in Section 2 hold in the modelling such that changes in total employment lead to corresponding changes in WFH; for example, for a given WFH rate, a 1% increase in employment leads to a 1% increase in WFH.

3.2 Macroeconomic impacts

3.2.1 Baseline

Table 3.1 summarises the baseline projection for both the EU27 and the EU27+6 countries.

In the baseline, GDP is expected to grow by almost 1.5% per annum in both the EU27 and the EU27+6 between 2021 and 2026. Consumer expenditure and investment will both contribute to this increase. These economic projections are based on DG ECFIN's autumn 2021 economic forecast of a return to economic growth in 2022 and 2023 following the shock of the Covid-19 pandemic. As such, projected growth is quite strong in the early years of the projection.

Table 3.1 **Summary of the baseline**

EU27	2021	2022	2026	Average annual growth, 2021-26 (%)
GDP (billion euros)	12 231	12 738	13 142	1.4
Consumer expenditure (billion euros)	6 519	6 830	7 043	1.6
Investment spending (billion euros)	3 163	3 299	3 404	1.5
Employment (million)	204	206	206	0.2
EU27+6	**2021**	**2022**	**2026**	**Average annual growth, 2021-26 (%)**
GDP (billion euros)	16 221	16 891	17 430	1.4
Consumer expenditure (billion euros)	8 831	9 242	9 533	1.5
Investment spending (billion euros)	4 157	4 344	4 485	1.5
Employment (million)	272	276	276	0.3

Note: All euro figures revalued to 2010 levels.

Source: Cambridge Econometrics' E3ME model.

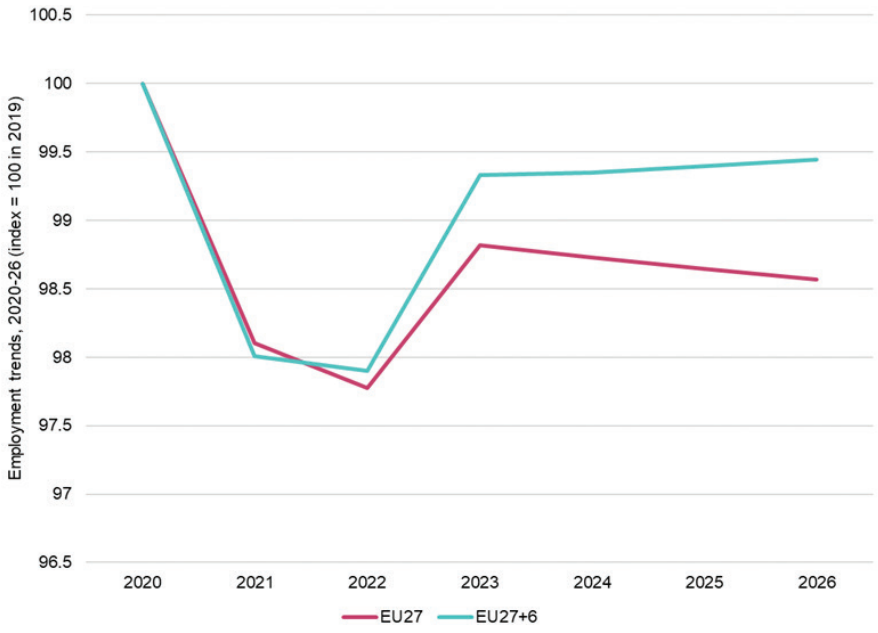
The GDP assumptions used do not capture the most recent political and economic implications of the war in Ukraine. While the DG ECFIN forecast (for Spring

23. Albeit a manner that shows relatively modest changes in impact in percentage terms, though this may still represent many thousands of jobs.

2022[24]) would capture these, both the timetable and the scope of the project did not allow us to make use of it: the cut-off date for the baseline predates these more recent events. The use of more up to date forecasts would lead to some changes in the 2022-23 period but, in the absence of revised longer-term prospects (which have not been published), such as changes in migration patterns and the impacts of higher energy and food prices, outcomes by 2026 may not differ by as much. Furthermore, there is not enough information to infer the impact of these developments on remote working trends, which is the aim of this exercise.

Total employment is projected to grow by 0.2% per annum in the EU27 and by 0.3% in the EU27+6. As with economic growth, much of the increase in employment is expected to come about from the recovery in the short term (i.e. in 2022), with modest growth or decline thereafter. Figure 3.1 shows the projected employment trends in the EU27 and the EU27+6 relative to 2020. In the short term, employment in the EU27 is projected to peak in 2022, as economies recover, and then gradually fall to 2026, constrained by the long-running trend of low population growth. In the EU27+6, employment is projected to rise swiftly from 2021 to 2022, followed by modest growth over 2022-26. The difference between the EU27 and the EU27+6 is driven by stronger relative growth in employment in the UK and Turkey (both countries' populations are projected to continue to increase over the period).

Figure 3.1 **Employment trends, 2020-26**



Source: Cambridge Econometrics E3ME model.

24. https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/spring-2022-economic-forecast-russian-invasion-tests-eu-economic-resilience_en

Table 3.2 shows the expected total percentage change and average annual growth for all countries considered in this study. The strongest employment growth is projected in Luxembourg (1.9%), Turkey (1.8%) and Malta (1.7%); the largest projected declines are in Bulgaria (0.6%), Poland (-0.4%) and the Netherlands (-0.4%).

Table 3.2 **Summary of baseline employment trends by country, 2021-26**

Country	Total growth (%)	Average annual growth (%)
AT	2.4	0.5
BE	1.2	0.2
BG	-3.1	-0.6
CY	4.8	0.9
CZ	0.5	0.1
DE	-1.3	-0.3
DK	2.8	0.6
EE	1.6	0.3
EL	2.1	0.4
ES	2.5	0.5
FI	2.9	0.6
FR	2.4	0.5
HR	1.4	0.3
HU	0.9	0.2
IE	1.1	0.2
IT	0.2	0.0
LT	-1.8	-0.4
LU	9.7	1.9
LV	-1.2	-0.2
MT	8.9	1.7
NL	-1.8	-0.4
PL	-2.1	-0.4
PT	3.7	0.7
RO	-0.3	-0.1
SE	4.4	0.9
SI	1.4	0.3
SK	0.7	0.1
Non-EU countries		
CH	-0.6	-0.1
IS	-0.1	0.0
MK	6.6	1.3
NO	-0.7	-0.1
TR	9.3	1.8
UK	1.9	0.4

Source: Cambridge Econometrics E3ME model.

As mentioned in Section 2.5, the baseline rates of WFH are projected to decrease in 2021 and 2022 from their pandemic peaks in 2020. These rates then increase gradually once more over 2022-26. Table 3.3 shows the aggregate WFH rates in the EU27 and EU27+6 for 2020 and across the projection period (2021-26). In the EU27, the WFH rate is projected to fall to a low of 17.1% in 2022 and then rise to just over 18.2% by 2026. In the EU27+6, the WFH rate is projected to fall to a low of 18.4% in 2022 and then rise to around 19.6% by 2026.

Table 3.3 **WFH rates by year (%)**

	2020	2021	2022	2023	2024	2025	2026
EU27	20.1	18.6	17.1	17.4	17.7	18.0	18.2
EU27+6	21.8	20.1	18.4	18.7	19.0	19.3	19.6

Note: The last year of data is 2020.

Source: Eurostat (lfs_ehomp); Cambridge Econometrics E3ME model.

3.2.2 Scenarios

This section presents the results of the modelling of the three alternative scenarios that differ from the baseline assumptions. The first is the Unwinding of WFH scenario in which rates of WFH return to pre-pandemic (2019) values by 2022 and then follow pre-pandemic trends thereafter, slowly climbing over 2022-26. The second is the Acceleration of WFH scenario in which technological investments rise in line with the goals set out in Europe's Digital Decade for 2030. We assume these developments support sustained increases in WFH from 2022 onwards. The final scenario is Acceleration of WFH with contract changes, in which WFH rates are the same as in the previous scenario but with shifting employment arrangements such that more workers switch from being employees to being self-employed.

Table 3.4 summarises the main scenario assumptions. In the Unwinding of WFH scenario, workers' return to the office results in higher utility bills and rent for firms compared to the baseline. The data (and, by extension, our assumptions) do not explicitly distinguish between different levels of WFH (i.e. full remote versus varying degrees of hybrid work). As such, we are not able to vary the costs by degree of WFH, applying instead a blanket assumption of cost per worker. Workers, on the other hand, save on their utility bills but may have to spend more on commuting to the office.

In the Acceleration of WFH scenario, the above trend is reversed: firms save more on their costs and workers save on commuting but face higher utility bills compared to the baseline. In addition, this scenario assumes additional investment compared to the baseline to ensure the realisation of Europe's Digital Decade targets for 2030. In our scenario, these investments correlate with the increased feasibility and uptake of WFH. The main sectors that benefit from the additional investment expenditure are telecommunications, computer services, architecture and engineering-related services, manufacturing sectors such as electronics and electrical equipment, and construction. As Denmark and Finland have already

reached their 2030 targets, no additional investment is assumed for these two countries.

The Acceleration of WFH with contract changes scenario includes all the assumptions of the scenario above plus changes in firms' social security payments to simulate the change in contractual agreements for those working from home. To estimate the number of people who WFH and who might change their contractual status, we used the 2019 shares of people WFH who are also self-employed by country, with the aim of reflecting historical trends in self-employed WFH. While changes in contractual arrangements may lead to changes in income tax regimes, this was not taken into account in this scenario due to the individual nature of the tax system and business legislation in each country. This precludes detailed modelling because it is not straightforward to decide whether, for example, a self-employed person in the UK might set up as a sole trader or create a limited company instead.

Table 3.4 **Summary of scenario assumptions**

Scenario	Firms	Workers	Infrastructure
Unwinding of WFH	Increased costs because of higher utilities, rent and support services	Lower cost of utilities Increased commuting costs	-
Acceleration of WFH	Decreased costs because of lower utility and rent bills; lower support service costs	Higher utility costs Lower commuting costs	Increased investment expenditure to ensure achievement of Europe's Digital Decade targets for 2030
Acceleration of WFH with contract changes	Decreased costs because of lower utility and rent bills; lower support service costs Decrease in social security contribution payments because of contract changes	Higher utility costs Lower commuting costs	Increased investment expenditure to ensure achievement of Europe's Digital Decade targets for 2030

Table 3.5 shows the percentage differences from the baseline for the three alternative scenarios in 2022 (the year that the scenarios begin to deviate from the baseline) and 2026 (the last year of the projection).

In the Unwinding of WFH scenario, GDP, consumer expenditure and employment are projected to be lower in 2026 than in the baseline. Investment spending is projected to be slightly higher than the baseline as the higher labour costs in this scenario lead to firms substituting labour for capital. These results arise from the assumption that lower rates of WFH translate into higher costs for firms, as shown in Table 3.6 (by more than 85 billion euros in 2026 in the EU27, and nearly 135 billion euros in 2026 in the EU27+6, in current prices) as they must pay to maintain more physical office space for staff. Firms therefore spend less money hiring additional staff, resulting in lower employment, lower consumer spending and lower GDP (albeit quite modestly).

In the Acceleration of WFH scenario, GDP, consumer expenditure, investment and employment are all projected to increase relative to the baseline by 2026. These results are driven by the assumption that firms in this scenario face lower costs

since they have fewer employees in the office. Combined with countries' efforts to digitalise, this contributes to higher investment and more hiring which leads, in turn, to increased consumer spending, investment and thus higher GDP by 2026.

In the Acceleration of WFH with contract changes scenario, GDP, consumer expenditure, investment and employment are all projected to increase by 2026 relative to the baseline. These results are driven by similar trends as in the previous scenario on top of which the costs for firms are even lower due to having fewer permanent employees (and concomitantly lower costs in respect of insurance, taxes, etc.). In this scenario, firms can hire more WFH contractors (classified as self-employed), increasing employment and thereby consumer spending and GDP.

However, while there might be economic benefits in terms of GDP, the change in working arrangements for newly self-employed people could lead, in some cases, to worse working conditions and precarious employment.

Table 3.5 **GDP and components by region and scenario, 2022 and 2026 (% difference from baseline)**

	EU27		EU27+6	
Unwinding of WFH				
GDP	-0.1	-0.2	-0.1	-0.2
Consumer expenditure	-0.2	-0.5	-0.2	-0.4
Investment spending	0.1	0.1	0.1	0.1
Employment	-0.1	-0.1	-0.1	-0.1
Acceleration of WFH				
GDP	0.1	0.6	0.1	0.5
Consumer expenditure	0.2	1.0	0.2	0.8
Investment spending	0.0	0.2	0.0	0.4
Employment	0.1	0.3	0.1	0.3
Acceleration of WFH with contract changes				
GDP	0.1	0.7	0.1	0.6
Consumer expenditure	0.2	1.2	0.2	1.0
Investment spending	0.0	0.2	0.0	0.3
Employment	0.1	0.4	0.1	0.4

Source: Cambridge Econometrics E3ME model.

Table 3.6 displays the costs that firms are expected to pay in each scenario relative to the baseline.

Table 3.6 **Costs for firms, 2022 and 2026 (absolute difference from baseline)**

Change in costs for firms (billion euros)	EU27		EU27+6	
	2022	2026	2022	2026
Unwinding of WFH scenario	89.8	85.5	135.7	134.7
Acceleration of WFH scenario	-89.0	-257.0	-115.7	-345.8
Acceleration of WFH with contract changes scenario	-112.2	-333.4	-139.9	-424.9

Source: Cambridge Econometrics E3ME model.

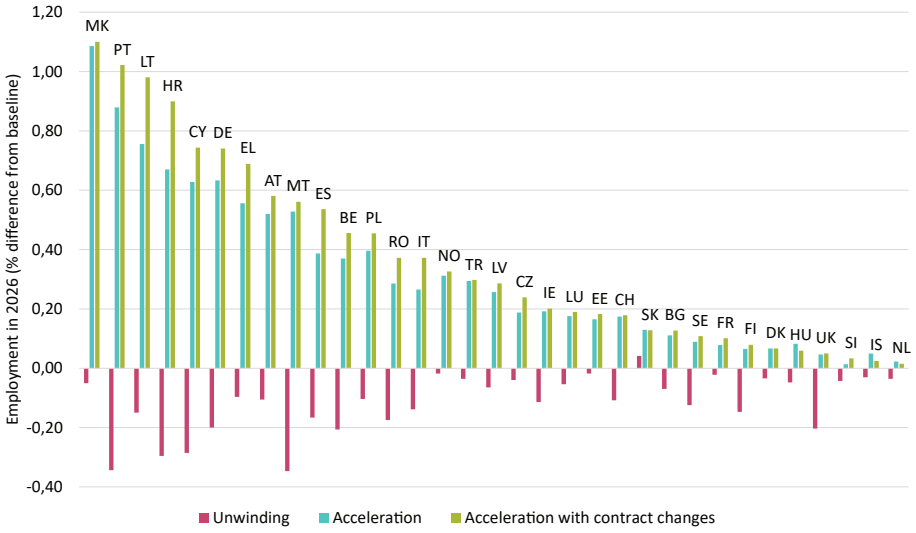
Figure 3.2 shows the percentage differences in total employment between the three alternative scenarios and the baseline in 2026 across all 33 countries. In general, in the Unwinding of WFH scenario, lower employment is expected in 2026 relative to the baseline in all countries except Slovakia (where the increase is negligible, at 0.04%). Baseline WFH rates are higher than in the Unwinding of WFH scenario, so the lower employment outcomes reflect the higher costs that firms face. This is a direct outcome of the lower WFH rates in this scenario. In the case of Slovakia, the 2026 WFH rates are almost the same in the Unwinding of WFH scenario as in the baseline. The mild increase in employment comes about from increased activity in manufacturing which has a low WFH rate to begin with, thus limiting the impact. And while most service sectors do see decreases in employment, the return to the office leads to increased activity in administration and support services, mitigating the employment loss in other sectors.

Compared to the baseline, employment in the acceleration scenarios is expected to be higher in 2026 for all countries. Generally, the Acceleration of WFH with contract changes scenario leads to higher employment by 2026 in most countries, but the modelling cannot capture the quality of the newly created jobs. Generally, countries with larger projected growth in WFH in the acceleration scenarios also see larger increases in employment compared to the baseline. In the UK and the Netherlands, baseline WFH levels are already very close to the estimated potential, leaving little room for further increases. In Denmark and Finland, no additional investment is assumed to take place as these countries have already achieved their 2030 Digital Decade targets. This is expected to lead to relatively smaller increases in GDP compared to other countries as there is no extra investment to generate additional economic activity.

In Slovakia, Hungary, Iceland and the Netherlands, the change in contractual status for (current) employees leads to relatively small differences in employment between the two acceleration scenarios. Iceland is the country with the lowest self-employment rate among the 33 countries modelled, resulting in a very small difference arising from the changes in contractual arrangements. In the Netherlands, as discussed above, WFH rates are already close to potential in the baseline: there is little room for substantial growth in the acceleration scenarios. For Hungary and Slovakia, the increased WFH rates are quite modest with both countries being in the cluster of low adopters, leading to small changes in employment. This, combined with the sectoral structure of these economies, is expected to lead to relatively small differences in the case of contract changes as well.

For the baseline and the Unwinding of WFH and Acceleration of WFH scenarios, we assumed that the rate of self-employment would not greatly vary from its past trends. In the Acceleration of WFH with contract changes scenario, we assume that some workers who convert to WFH will also switch from being permanent employees to being self-employed contractors. Thus, as the rates of WFH rise in this scenario, so does the rate of self-employed workers (as a percentage of the total workforce).

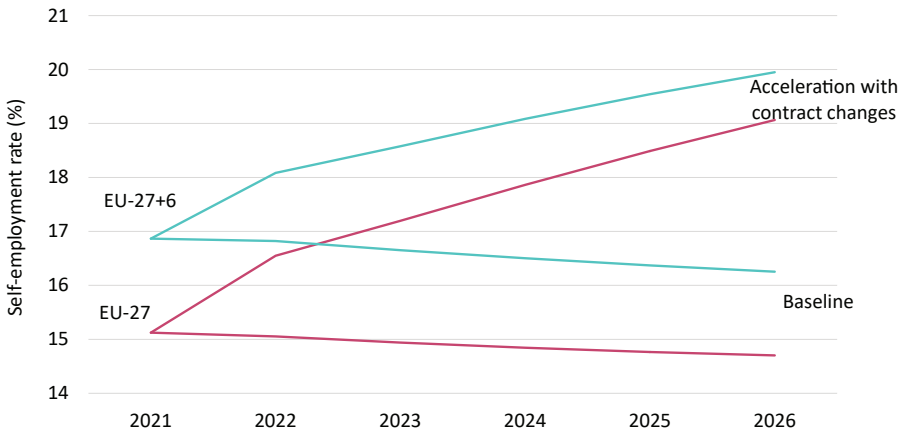
Figure 3.2 **Employment by country, 2026 (% difference from baseline)**



Source: Cambridge Econometrics E3ME model.

Figure 3.3 shows the projected rates of self-employment for the Acceleration of WFH with contract changes scenario and the baseline in both the EU27 and the EU27+6 over 2021-26. By 2026, the self-employment rate is projected to increase compared to the baseline by 4.4 percentage points (from 14.7% to 19.1%) in the EU27 and by 3.7 points (from 16.3% to 20.0%) in the EU27+6.

Figure 3.3 **Projected rates of self-employment, 2021-26; EU27 and EU27+6**



Source: Cambridge Econometrics, based on historical levels.

3.2.3 Caveats

The scenarios modelled include a rough estimate of the net costs of returning to the office and of the savings from increased working from home practices. With limited detailed information available, the estimates of potential costs and savings have been based on readily available (but quite general) data such as current household expenditure patterns and company unit costs. As such, it is not possible to isolate in detail the impact on costs and savings specific to adjustments in working from home practices. Moreover, the changes in costs are small relative to other aspects of the scenario and are thus not the main driving factor in the results. The scenarios do not assume any changes in productivity resulting from adjustments in working practices. There is limited and, in some cases, conflicting evidence on the relationship between working from home and productivity (see Section 2.3). Regardless, given the scale of WFH deployment, a change in productivity is unlikely to have a very large impact at total economy level.

Furthermore, the scenario exploring the impact of contract changes does not include the implications of any changes in tax regimes. As tax systems are highly intricate and can vary substantially between countries, assumptions on the potential impacts of changes in the tax regime were deemed beyond the scope of this study.

In the acceleration scenarios, a shift toward higher WFH rates is largely assumed to affect employees. Thus, the increasing stock of WFH workers would be drawn from the existing stock of in-office employees. The final scenario with contract changes explores the implications of firms converting some of these new WFH positions from permanent employees to self-employed contractors. This shift from permanent to contractor positions should therefore be considered as a shift in labour demand rather than a change originating from the supply side.

Based on the literature (see Section 2.3), we have made no assumption about productivity differences between those working from home and those returning to the office.

3.3 Sector-level employment impacts

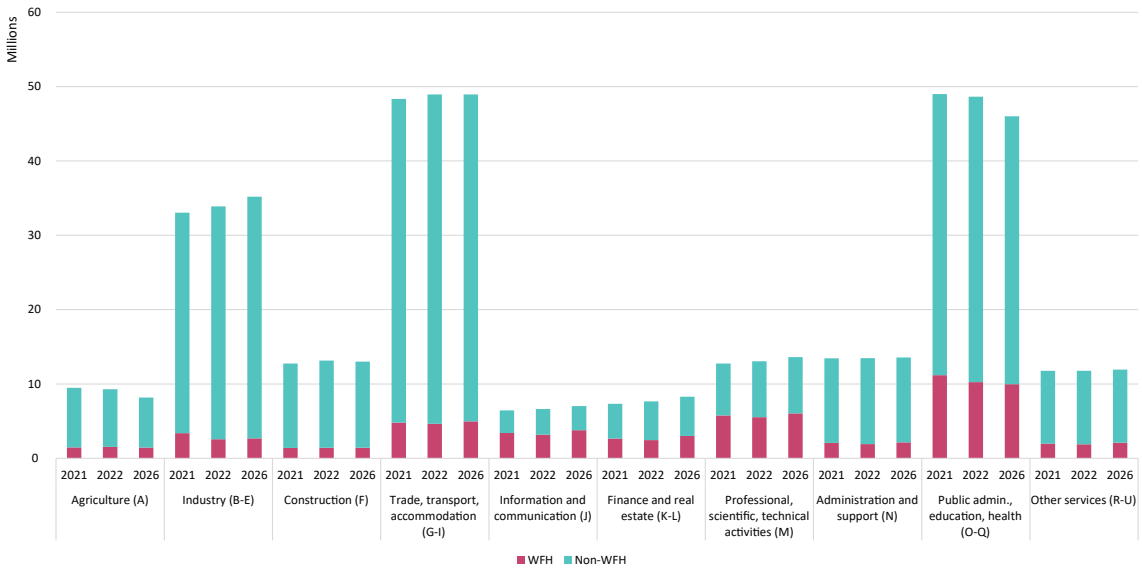
This section presents the short-term employment forecasts for the ten major sectors of the economy.

3.3.1 Baseline

Figure 3.4 and Figure 3.5 show the number of WFH and non-WFH workers by broad sector in the EU27 and EU27+6, respectively, for 2021, 2022 and 2026. As the charts show, employment is expected to increase in all sectors except agriculture (A) and public administration, education and health (O-Q).

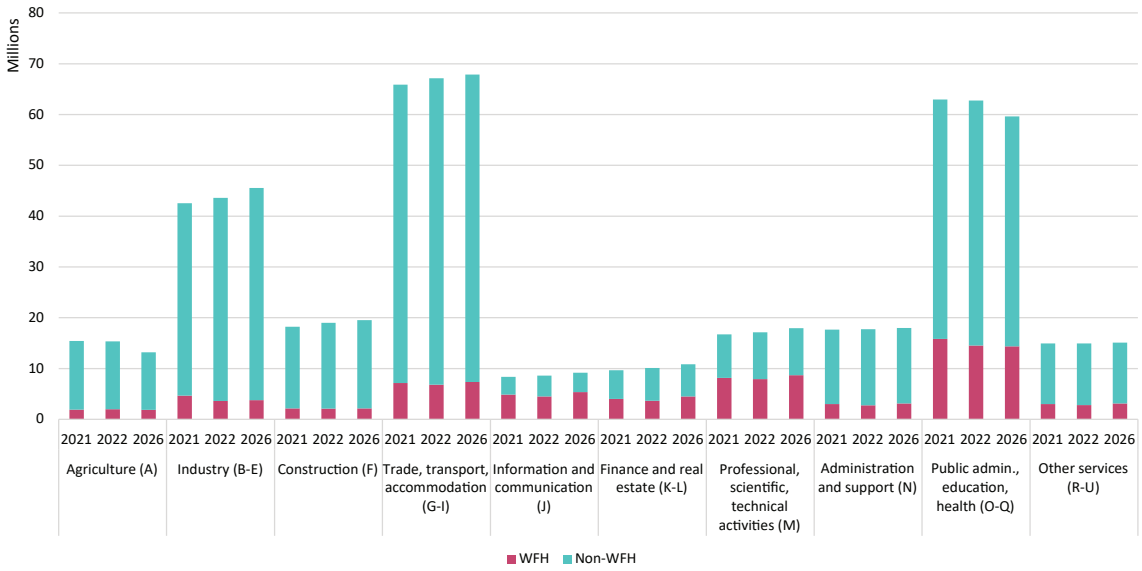
The largest sectors in terms of employment are public administration, education and health (O-Q); trade, transport and accommodation (G-I); and industry (B-E). The sectors with the highest future rates of WFH are those offering services that can be delivered remotely: information and communications (J); finance and real estate (K-L); and professional, scientific and technical activities (M). Among the sectors with the highest employment, those with the most WFH workers are in public administration, education and health (O-Q) since some of these services can also be delivered remotely.

Figure 3.4 **Total employment forecast by sector and WFH, EU27**



Source: Cambridge Econometrics E3ME model.

Figure 3.5 **Total employment forecast by sector and WFH, EU27+6**



Source: Cambridge Econometrics E3ME model.

3.3.2 Scenarios

The employment changes between the scenarios and the baseline depend on WFH rates, the sectoral distribution of employment in the baseline (which affects the scope for WFH) and how the scenarios' macroeconomic assumptions (investment and other costs) affect each sector.

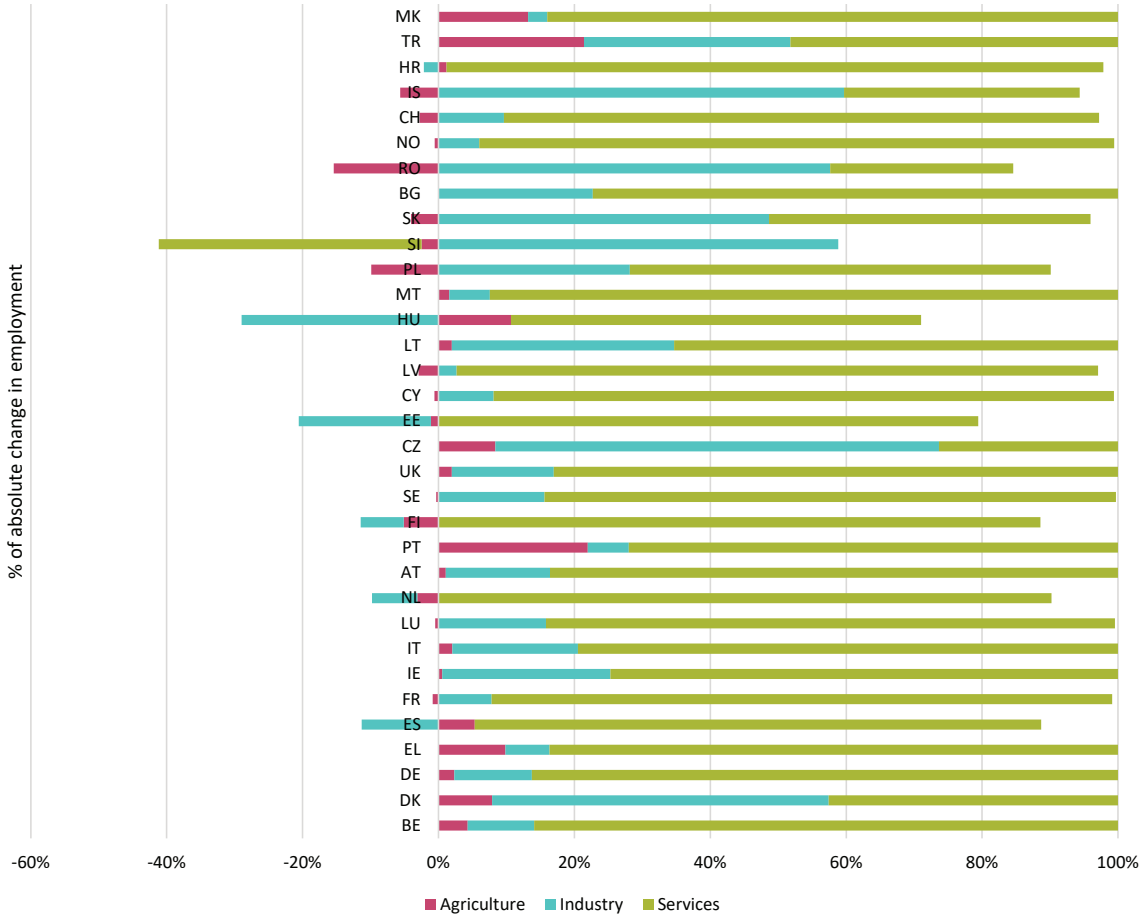
Under the assumptions of the Unwinding of WFH scenario, around 263 000 fewer jobs will be created by 2026 in the EU27 (347 000 in the EU27+6) should WFH revert to pre-pandemic levels. As shown in Table 3.7, the EU27 sectors which are most affected are those whose WFH rates are the highest, though the percentage changes remain quite small: information and communications (-0.2%); finance and real estate (-0.2%); and professional, scientific and technical activities (-0.2%). This reflects the relatively small changes as shown in Table 2.16.

In the two acceleration scenarios, more than 700 000 (Acceleration of WFH) and 850 000 (Acceleration of WFH with contract changes) jobs will be created in the EU27 compared to the baseline. The sectors that benefit the most from increases in WFH rates are those where the potential for WFH is high in the baseline, such as in information and communications (J), which sees a 1% increase in employment (although information and communications (J) also directly benefits from the additional investment in ICT). Other sectors, such as industry (B-E), trade, transport and accommodation (G-I) and other services (R-U) benefit mostly through indirect and induced effects; reflecting how changing WFH practices alters economic activity (albeit mildly). For example, increased consumer expenditure is expected to lead to increased activity in sectors providing consumer goods and services, leading to additional employment. Increased investment expenditure is

expected to generate activity not only in the sectors directly involved in building the infrastructure to meet the Europe's Digital Decade targets but also in sectors in their respective supply chains, leading again to additional employment and thus increased income and consumer expenditure.

Figure 3.6 summarises the sectors and countries that contribute the most to the increase in employment in the Acceleration of WFH scenario. Generally, services are expected to see the largest gains as they have the largest WFH potential and, therefore, relatively larger cost savings potential. This effect is balanced by the reduced activity in services that cater to commuting (e.g. transport and petrol stations) and support services for offices. These lead to a lower net contribution and, in the case of Slovenia, a negative one (although the impact in absolute terms is small).

Figure 3.6 **Sectoral breakdown of absolute employment gains between the Acceleration of WFH scenario and the baseline in 2026**



Source: Cambridge Econometrics E3ME model.

Table 3.7 **Employment in 2026, by sector (% difference from baseline)**

Sector	EU27			EU27+6		
	Unwinding	Acceleration	Acceleration with contract changes	Unwinding	Acceleration	Acceleration with contract changes
Agriculture (A)	-0.2	0.2	0.3	-0.2	0.3	0.3
Industry (B-E)	0.0	0.2	0.2	0.0	0.2	0.2
Construction (F)	0.0	0.2	0.1	0.0	0.2	0.1
Trade, transport and accommodation (G-I)	-0.1	0.3	0.4	-0.1	0.2	0.3
Information and communications (J)	-0.2	1.0	1.1	-0.2	0.8	0.9
Finance and real estate (K-L)	-0.2	0.6	0.7	-0.2	0.5	0.6
Professional, scientific and technical activities (M)	-0.2	0.5	0.6	-0.3	0.4	0.5
Administration and support (N)	-0.1	0.3	0.3	-0.2	0.2	0.3
Public administration, education and health (O-Q)	-0.1	0.4	0.5	-0.1	0.4	0.5
Other services (R-U)	-0.2	0.4	0.4	-0.2	0.4	0.4

Source: Cambridge Econometrics E3ME model.

Table 3.8 **WFH workers in 2026, by sector (absolute difference (000s) from baseline)**

Sector	EU27			EU27+6		
	Unwinding	Acceleration	Acceleration with contract changes	Unwinding	Acceleration	Acceleration with contract changes
Agriculture (A)	-180	741	742	-277	950	952
Industry (B-E)	-391	1471	1471	-666	2048	2048
Construction (F)	-189	718	717	-381	849	848
Trade, transport and accommodation (G-I)	-772	2806	2812	-1384	3649	3656
Information and communications (J)	-657	2015	2023	-1072	2191	2199
Finance and real estate (K-L)	-502	1890	1896	-898	2016	2022
Professional, scientific and technical activities (M)	-1029	3311	3321	-1664	3681	3691
Administration and support (N)	-308	1023	1024	-575	1211	1212
Public administration, education and health (O-Q)	-1496	5297	5317	-2617	6515	6535
Other services (R-U)	-337	1019	1021	-601	1316	1318

Source: Cambridge Econometrics E3ME model.

Table 3.8 shows the impacts by 2026 on the number of WFH workers by scenario and sector. In the Unwinding of WFH scenario, the number of people working from home is expected to be around five million fewer in the EU27 compared to the baseline while, in the EU27+6, the number is 10 million. Professional, scientific and technical activities (M) and public administration, education and health (O-Q) are the two sectors which will see the largest reductions in WFH workers when set against the baseline. These two sectors substantially increased their WFH rates in 2020 compared to 2019 since most of the services they provide are compatible with WFH.

In the two acceleration scenarios, over 20 million more remote workers are expected by 2026 in the EU27 compared to the baseline (24 million in the EU27+6). Much of this effect arises directly from the investment impacts but these lead to further employment increases through supply chains and consumer expenditure (net).

4. Conclusions

This report presents the results of four scenarios to examine sectoral employment outcomes taking into account the future development of remote work practices. The Covid-19 pandemic and the various measures introduced to limit the spread of the virus have had an immediate and sizeable impact on EU Member States' economies and labour markets. The last two pandemic years have shown the feasibility of remote work in several settings and, as economies adjust post-pandemic, our projections suggest that remote working will continue in some form, gradually growing over time.

As described in Section 2.4, the four scenarios incorporate assumptions that reflect alternative future developments in remote work practices by 2026 in the 27 EU Member States as well as Iceland, Norway, the Republic of North Macedonia, Switzerland, Turkey and the United Kingdom. Based on the literature and data available (see Section 2), the quantitative analysis presented in this report considers only one type of remote work: WFH. Evidence on other forms of remote work remains too limited to develop a set of scenarios with confidence.

The following future pathways of WFH were quantified:

- Baseline (business as usual), driven by the assumption that digital investment continues over the forecast period but largely following past trends.
- Unwinding of WFH, assuming that rates of WFH revert to pre-pandemic levels in 2022 and then grow in line with historical trends to 2026.
- Acceleration of WFH, spurred by countries' progress towards the Europe's Digital Decade targets for 2030, supporting more WFH.
- Acceleration of WFH with contract changes: mirroring the previous scenario but with changes to workers' contractual arrangements (with some WFH workers forced to switch to being self-employed).

The modelling approach combines CE's E3ME macroeconomic model, which generates employment projections by sector, with a methodology to estimate WFH rates by country and sector. The WFH rates by country and sector were first estimated using an EU-LFS ad hoc data extraction of the number of employed persons working from home. The E3ME model was then used to capture the direct, indirect and induced effects of changes in investment and costs on firms and workers based on those estimated changes in WFH patterns. A return to the office, as under the Unwinding of WFH scenario, is assumed to lead to higher costs for firms in terms of utilities, rent and office-related services, while workers

are expected to save on utility bills and spend more on commuting. In the case of increased WFH, the reverse is assumed.

The results of the scenario projections should be interpreted as illustrative of the potential outcomes of hypothetical scenarios, not as forecasts of the future.

Table 4.1 summarises the results of the scenarios compared to the baseline in the EU27 (the results for EU27+6 can be found in Appendix Table B.2).

Table 4.1 **EU27 employment and WFH workers by scenario (difference from baseline, 000s)**

Variable	Scenario name	2022	2023	2024	2025	2026
Total employment (000 workers)	Unwinding of WFH	-165	-188	-218	-245	-263
	Acceleration of WFH	174	286	429	564	705
	Acceleration of WFH with contract changes	204	342	515	687	863
WFH workers (000)	Unwinding of WFH	-6535	-6399	-6241	-6057	-5852
	Acceleration of WFH	6843	10 271	13 728	17 070	20 229
	Acceleration of WFH with contract changes	6848	10 282	13 747	17 100	20 271

Source: Cambridge Econometrics E3ME model.

The Unwinding of WFH scenario considers a situation in which WFH rates return to pre-pandemic levels by 2022. The reduction in the number of WFH workers, of around six million compared to the baseline, leads to additional costs for firms and also shifts consumer expenditure patterns (workers save on utility bills but spend more on commuting). The outcome at macroeconomic level by 2026 is a reduction in employment of 263 000 workers in the EU27 compared to baseline employment.

In the Acceleration of WFH scenario, all countries see continued increases in WFH rates compared to the baseline in all sectors to 2026. This increase is supported by investments in digital infrastructure and a reduction in on-site costs for firms. By 2026, we project an additional 20 million EU27 workers would be working from home compared to the baseline. The indirect and induced effects of this accelerated adoption of WFH would lead to some 705 000 additional workers in the EU27.

Changing the contractual arrangements of WFH workers from employees to the self-employed leads to an additional decrease in labour costs for firms. This reduction in costs would create additional employment by 2026 of 863 000 workers in the EU27.

Different developments in the adoption of remote work would lead to different employment outcomes at macroeconomic level through changes in investment needs and costs. The analysis suggests that more remote working may generate jobs, but policymakers should pay attention to the quality and condition of those jobs, especially in the case of self-employed workers.

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All links were checked on 24.04.2023.

List of tables and figures

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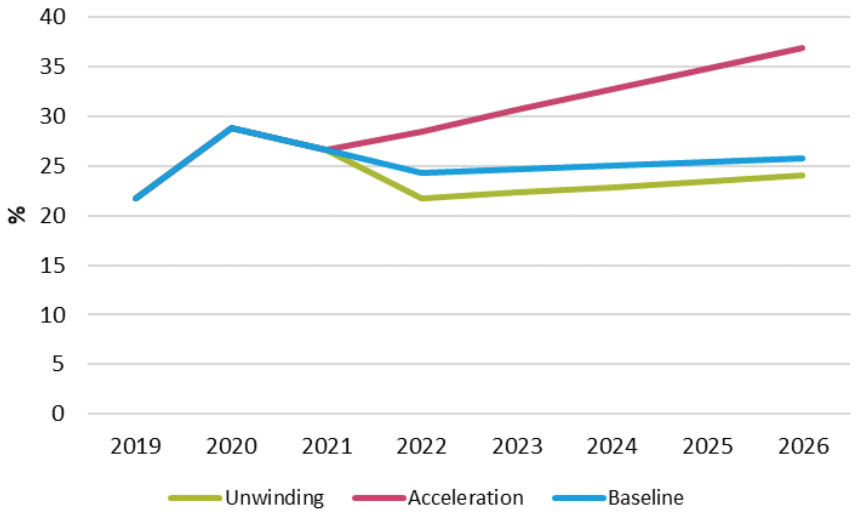
Appendices

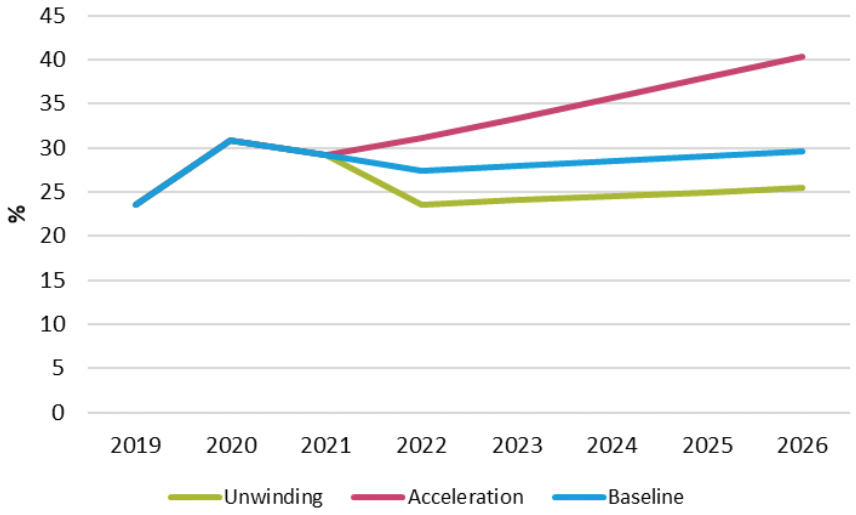
Appendix A Country results by scenario

Figure A.1 **Forecast of WFH rates for Austria**



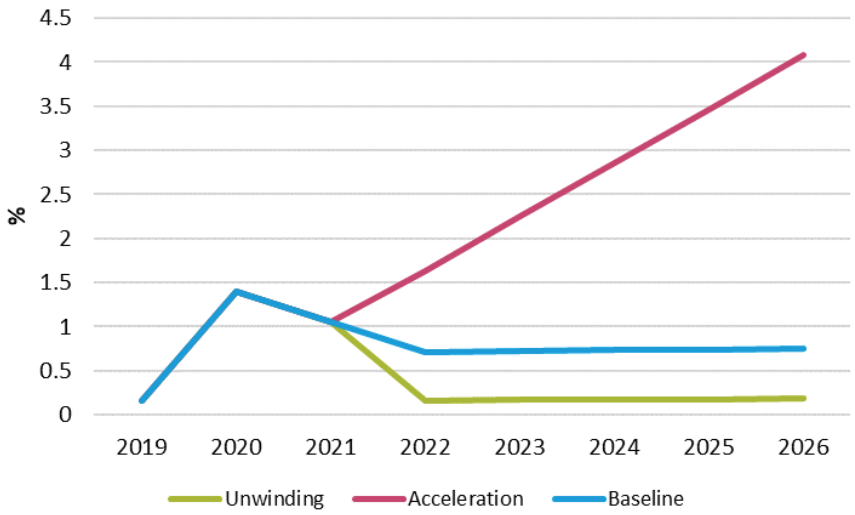
Source: Cambridge Econometrics.

Figure A.2 **Forecast of WFH rates for Belgium**



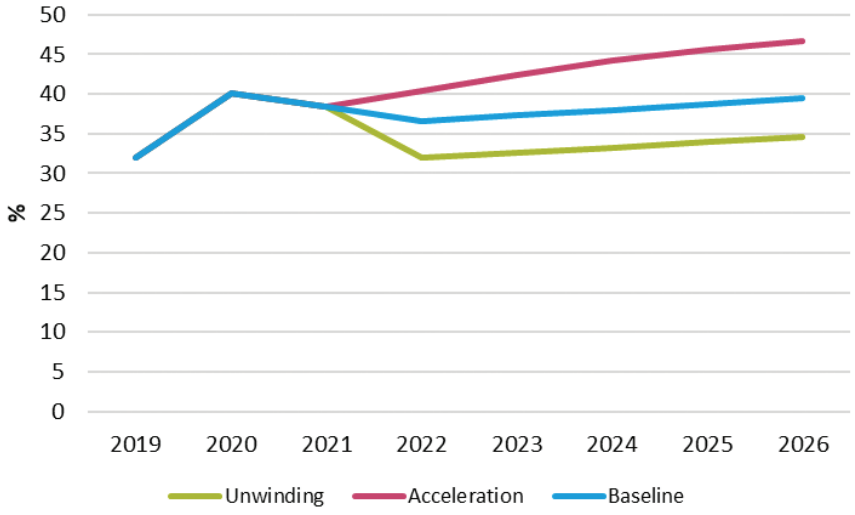
Source: Cambridge Econometrics.

Figure A.3 **Forecast of WFH rates for Bulgaria**



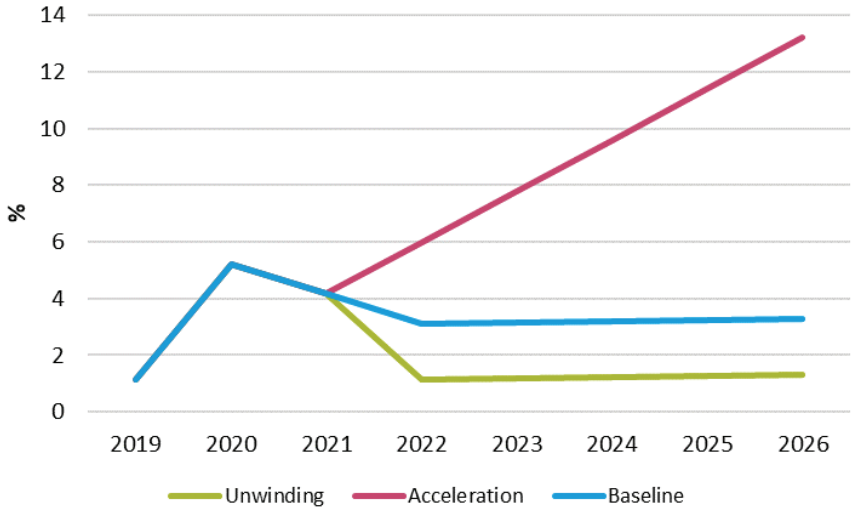
Source: Cambridge Econometrics.

Figure A.4 **Forecast of WFH rates for Switzerland**



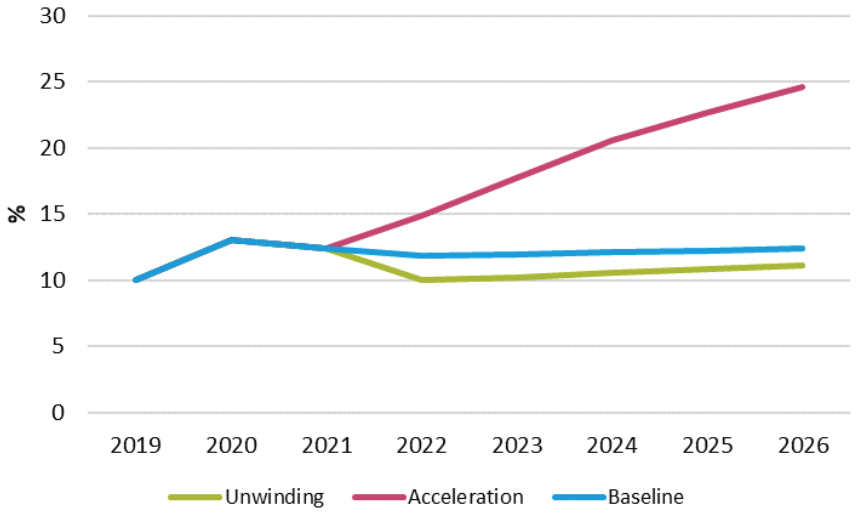
Source: Cambridge Econometrics.

Figure A.5 **Forecast of WFH rates for Cyprus**



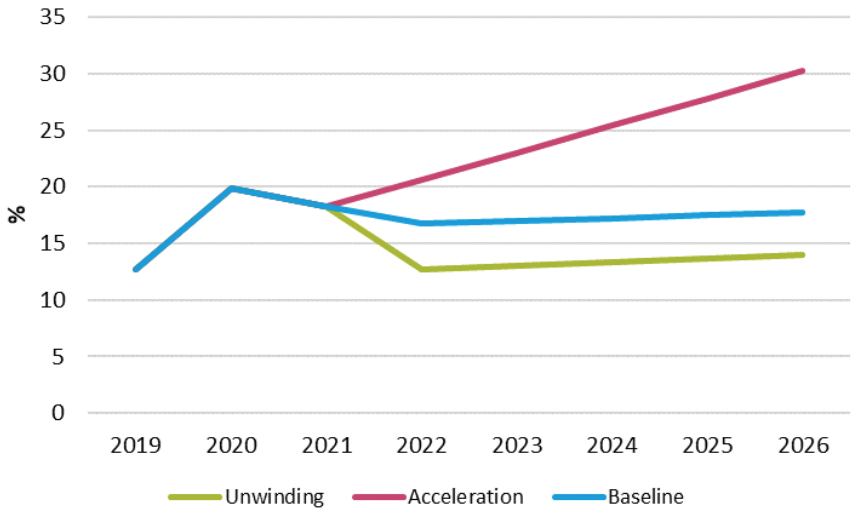
Source: Cambridge Econometrics.

Figure A.6 **Forecast of WFH rates for Czechia**



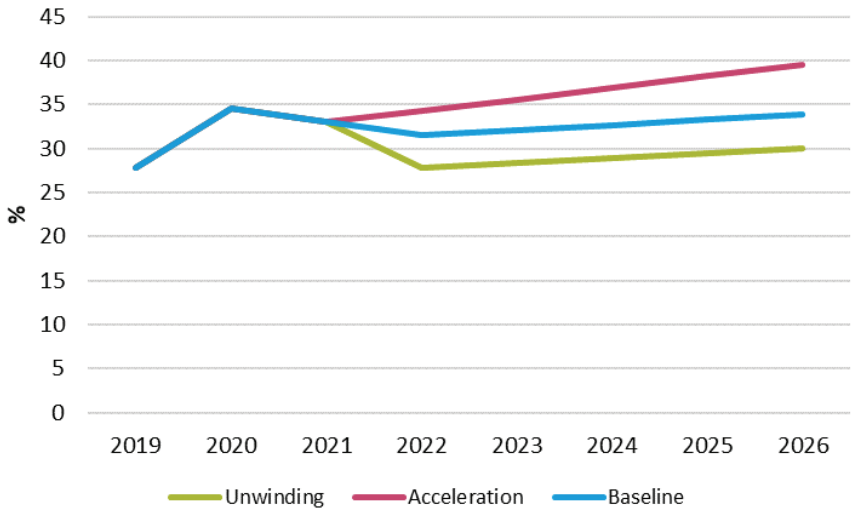
Source: Cambridge Econometrics.

Figure A.7 **Forecast of WFH rates for Germany**



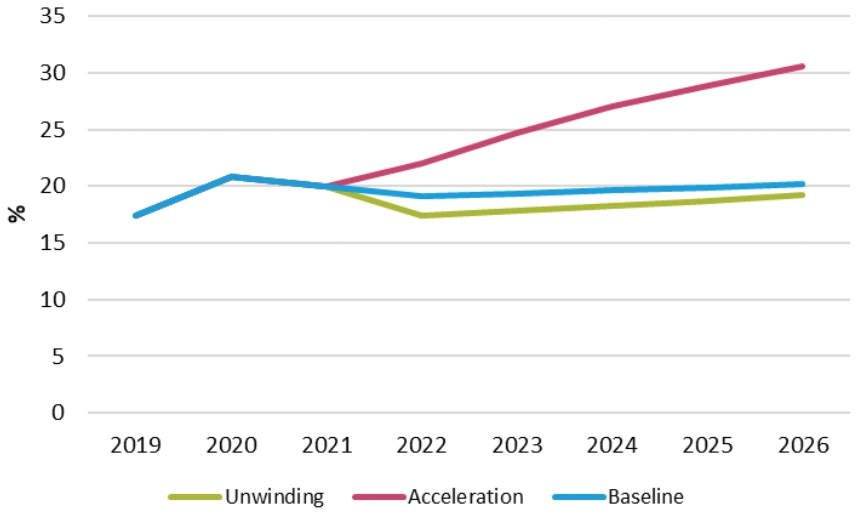
Source: Cambridge Econometrics.

Figure A.8 **Forecast of WFH rates for Denmark**



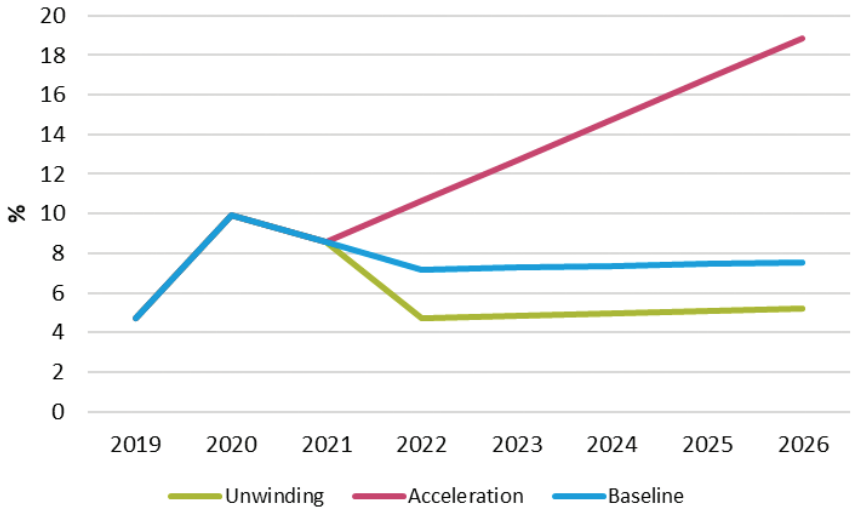
Source: Cambridge Econometrics.

Figure A.9 **Forecast of WFH rates for Estonia**



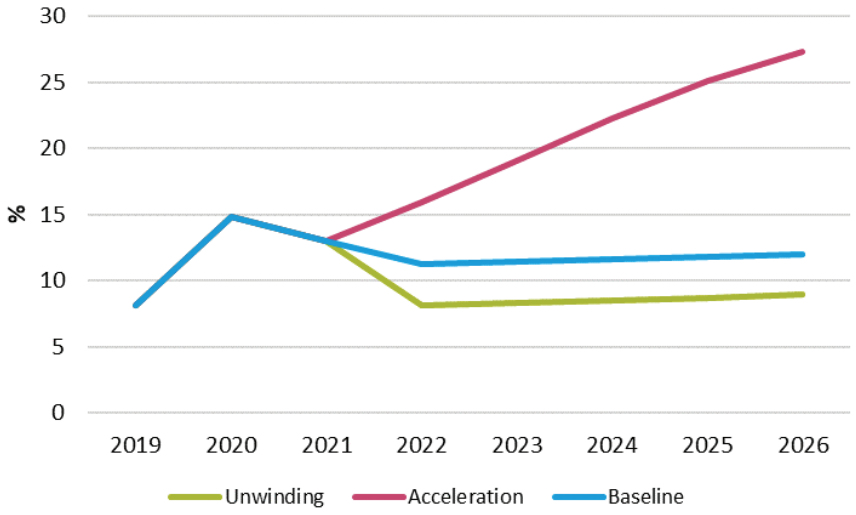
Source: Cambridge Econometrics.

Figure A.10 **Forecast of WFH rates for Greece**



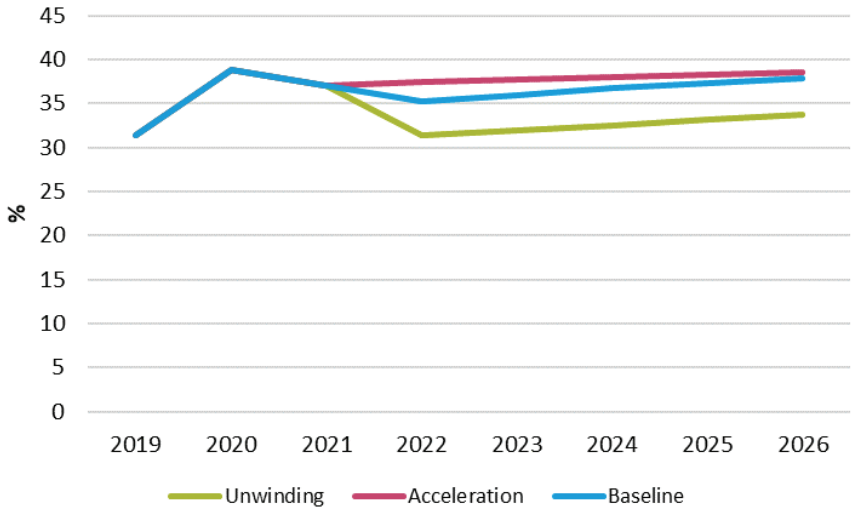
Source: Cambridge Econometrics.

Figure A.11 **Forecast of WFH rates for Spain**



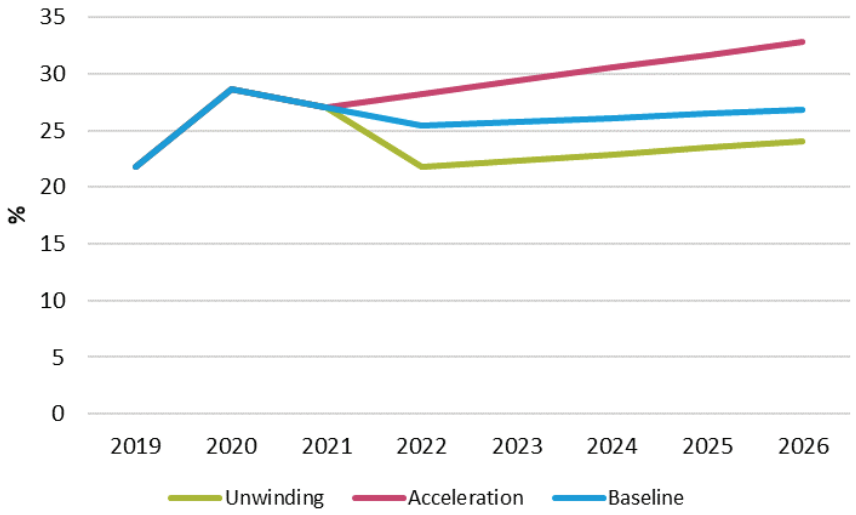
Source: Cambridge Econometrics.

Figure A.12 **Forecast of WFH rates for Finland**



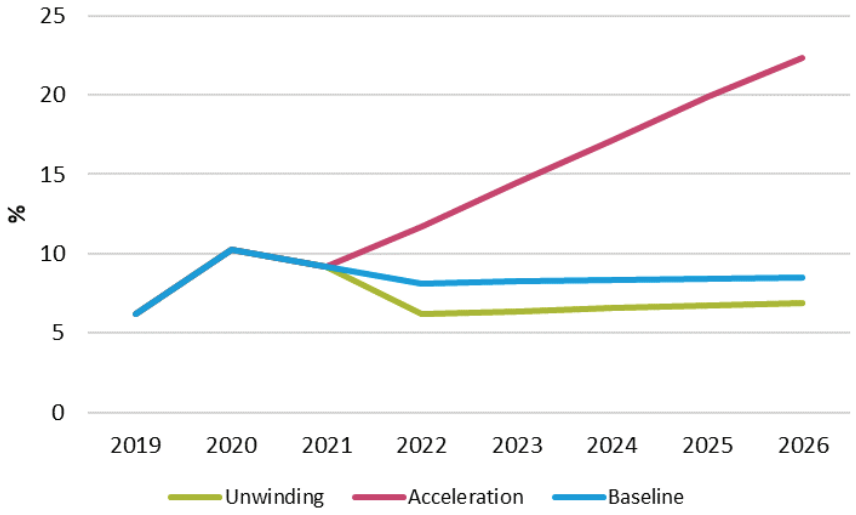
Source: Cambridge Econometrics.

Figure A.13 **Forecast of WFH rates for France**



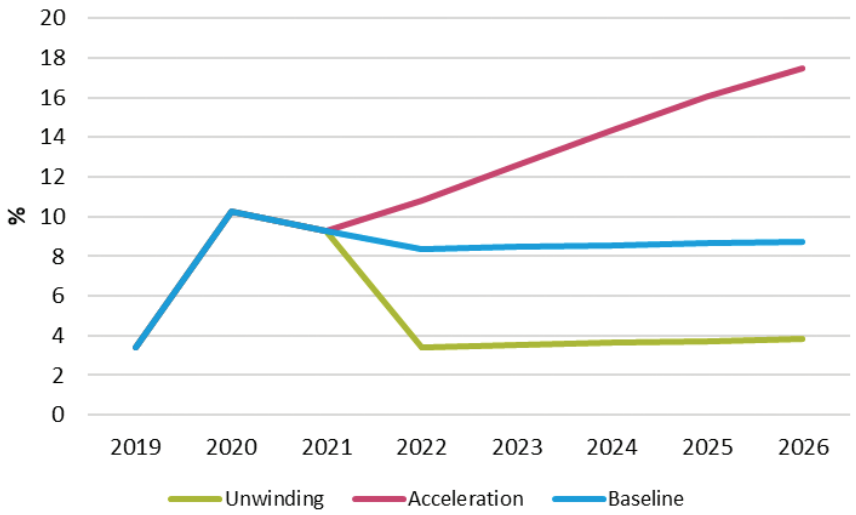
Source: Cambridge Econometrics.

Figure A.14 **Forecast of WFH rates for Croatia**



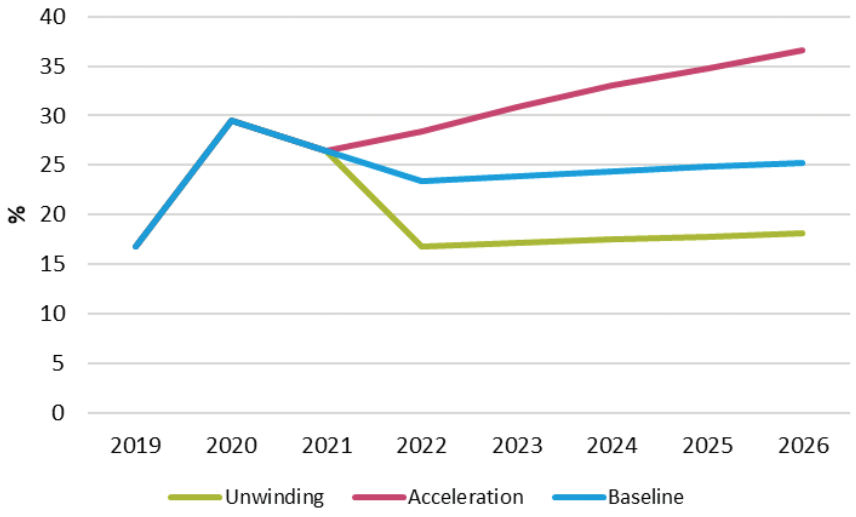
Source: Cambridge Econometrics.

Figure A.15 **Forecast of WFH rates for Hungary**



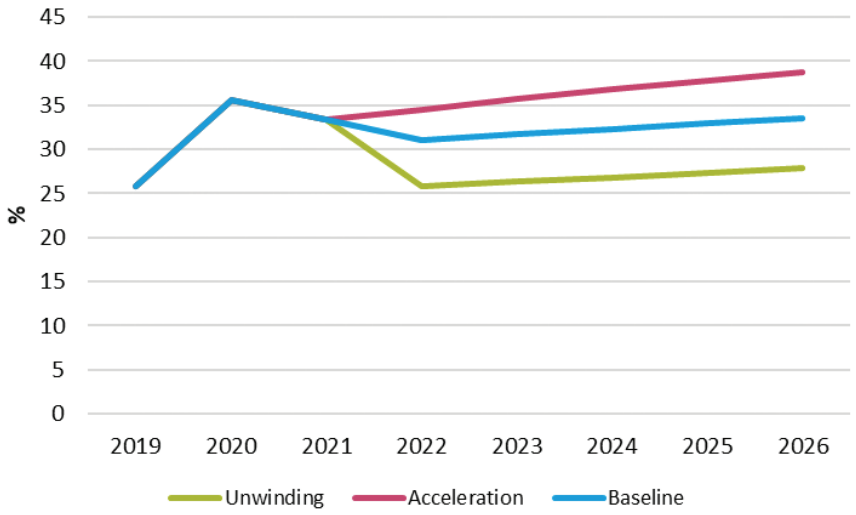
Source: Cambridge Econometrics.

Figure A.16 **Forecast of WFH rates for Ireland**



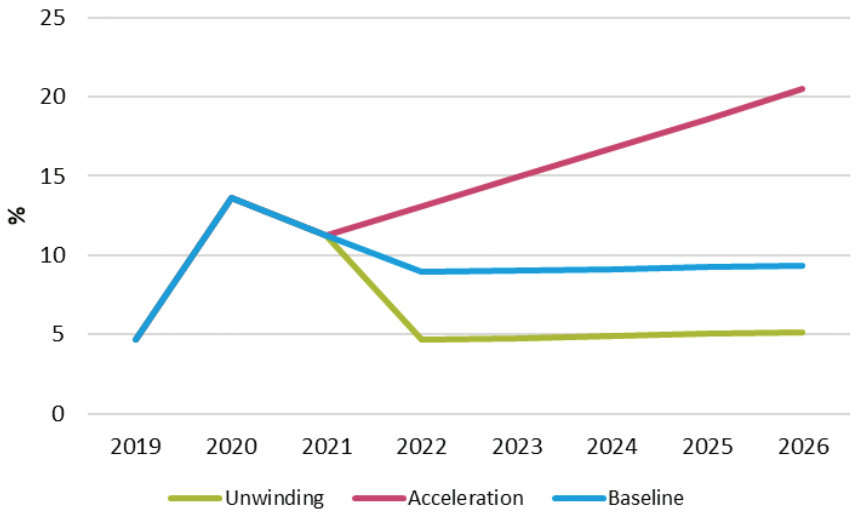
Source: Cambridge Econometrics.

Figure A.17 **Forecast of WFH rates for Iceland**



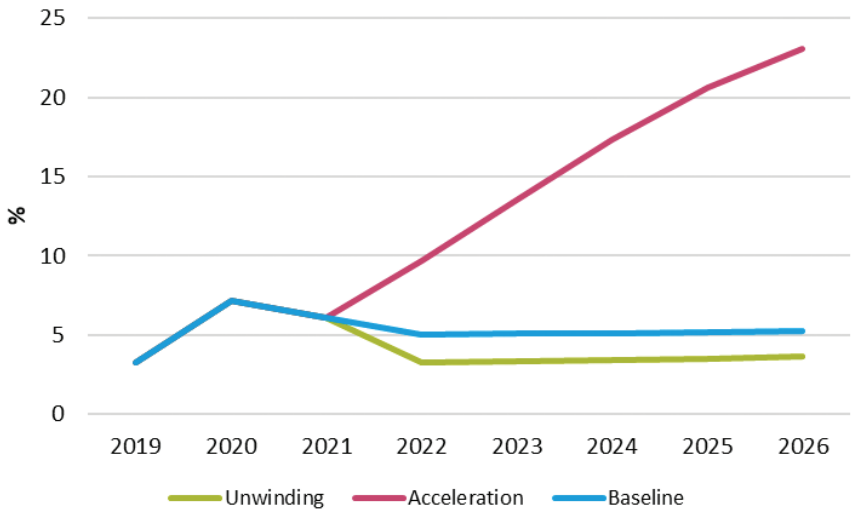
Source(s): Cambridge Econometrics.

Figure A.18 **Forecast of WFH rates for Italy**



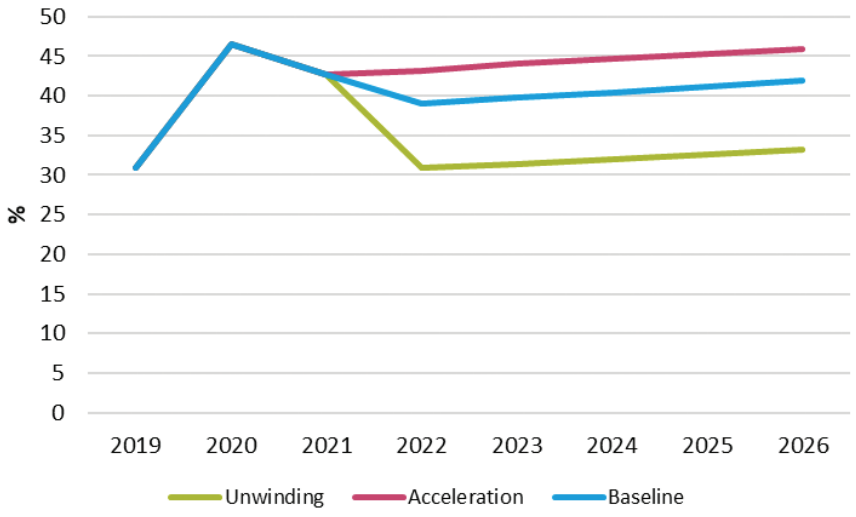
Source: Cambridge Econometrics.

Figure A.19 **Forecast of WFH rates for Lithuania**



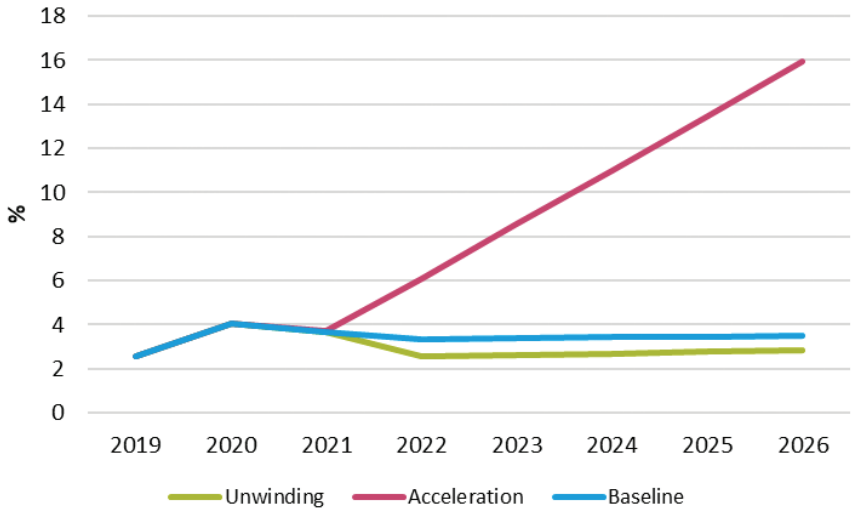
Source: Cambridge Econometrics.

Figure A.20 **Forecast of WFH rates for Luxembourg**



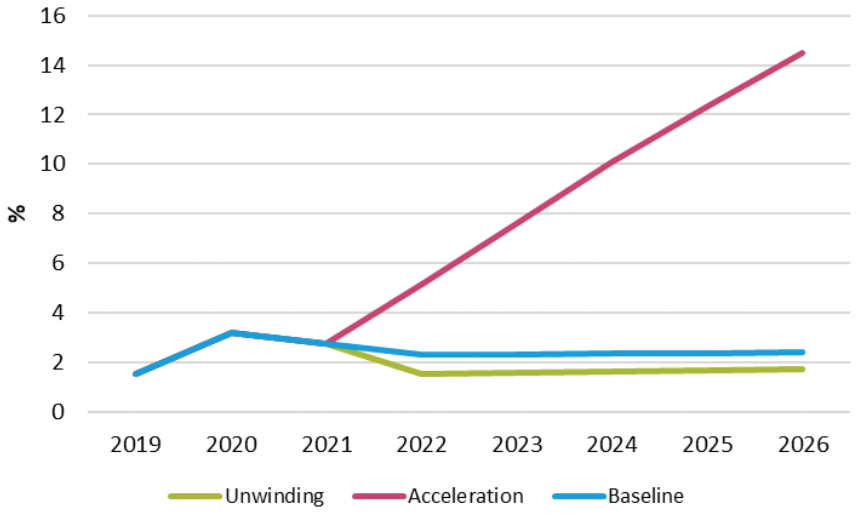
Source: Cambridge Econometrics.

Figure A.21 **Forecast of WFH rates for Latvia**



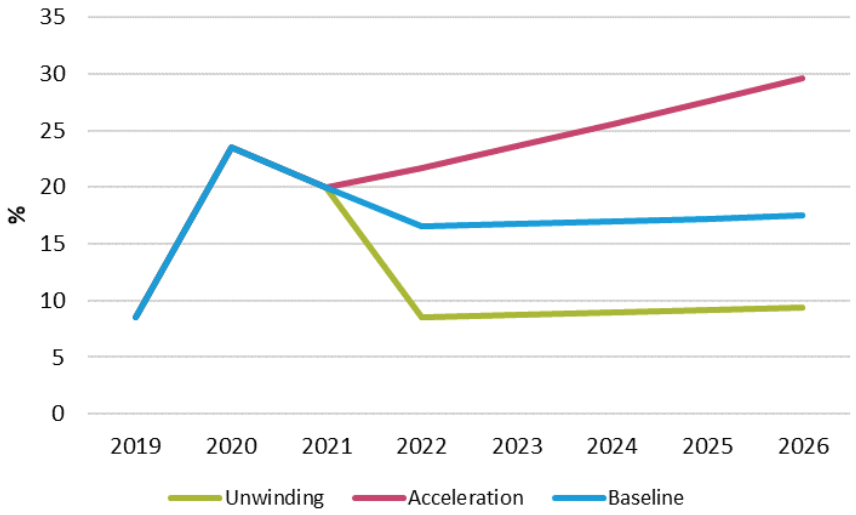
Source: Cambridge Econometrics.

Figure A.22 **Forecast of WFH rates for Republic of North Macedonia**



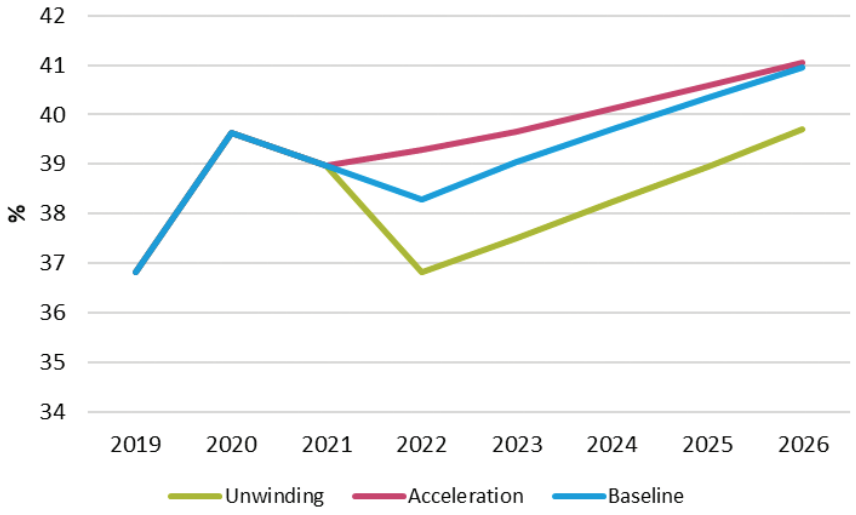
Source: Cambridge Econometrics.

Figure A.23 **Forecast of WFH rates for Malta**



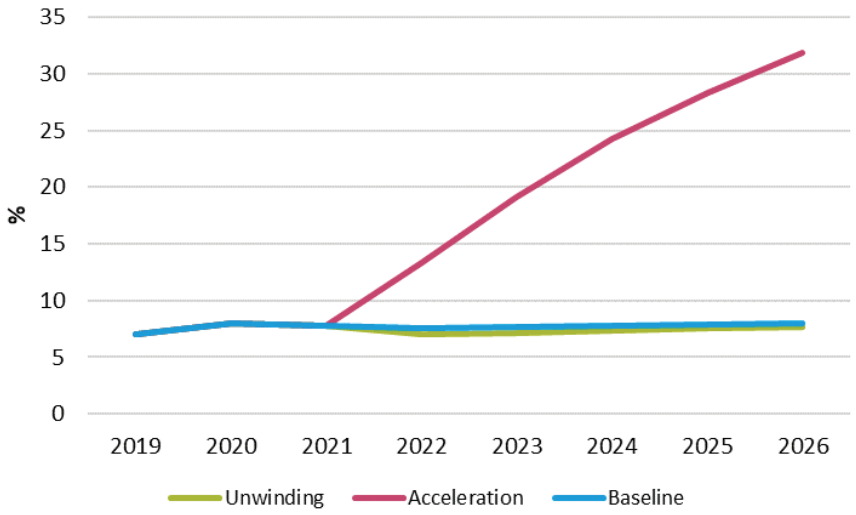
Source: Cambridge Econometrics.

Figure A.24 **Forecast of WFH rates for the Netherlands**



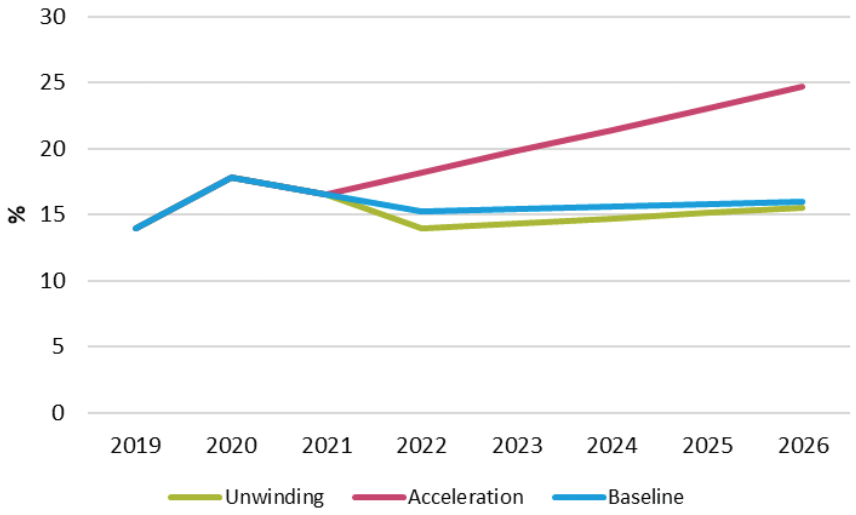
Source: Cambridge Econometrics.

Figure A.25 **Forecast of WFH rates for Norway**



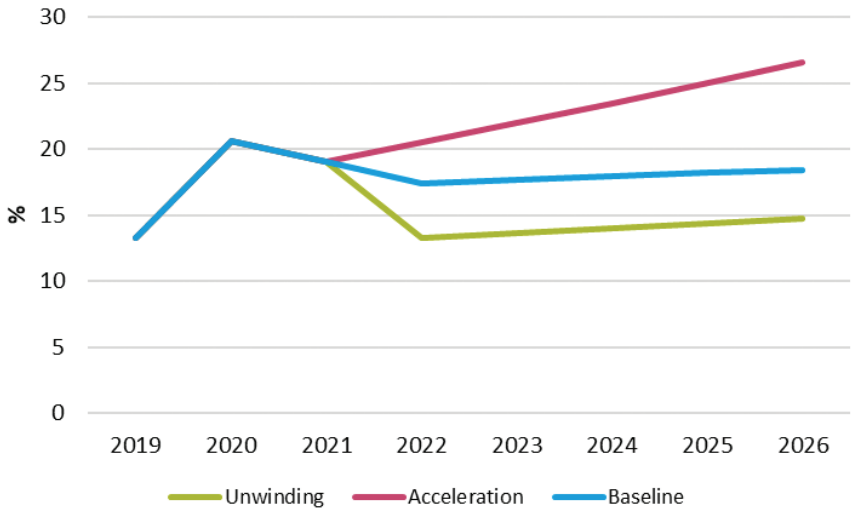
Source: Cambridge Econometrics.

Figure A.26 **Forecast of WFH rates for Poland**



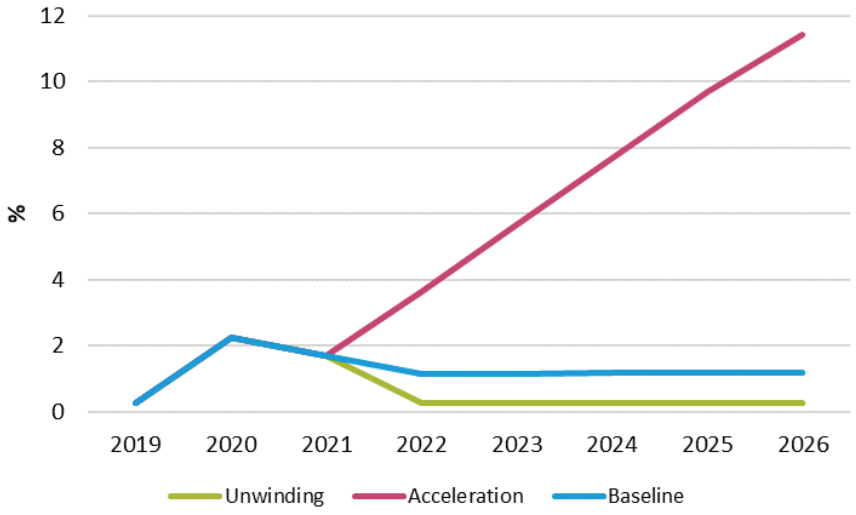
Source: Cambridge Econometrics.

Figure A.27 **Forecast of WFH rates for Portugal**



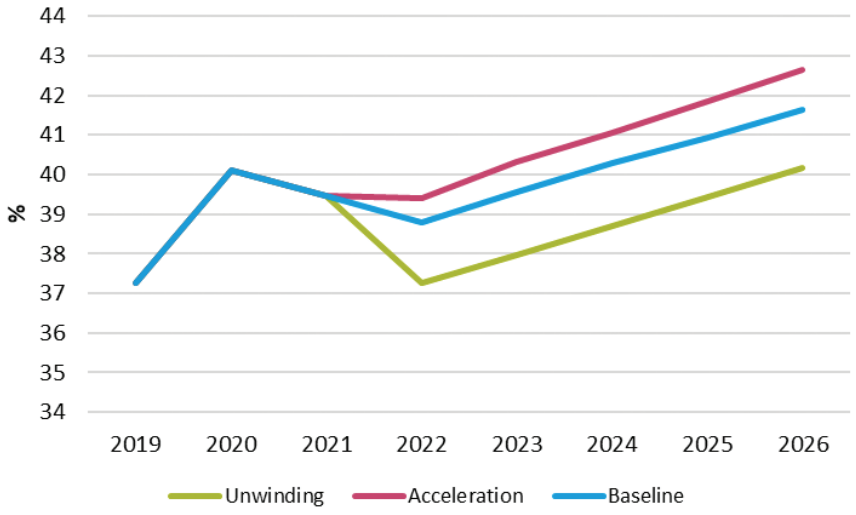
Source: Cambridge Econometrics.

Figure A.28 **Forecast of WFH rates for Romania**



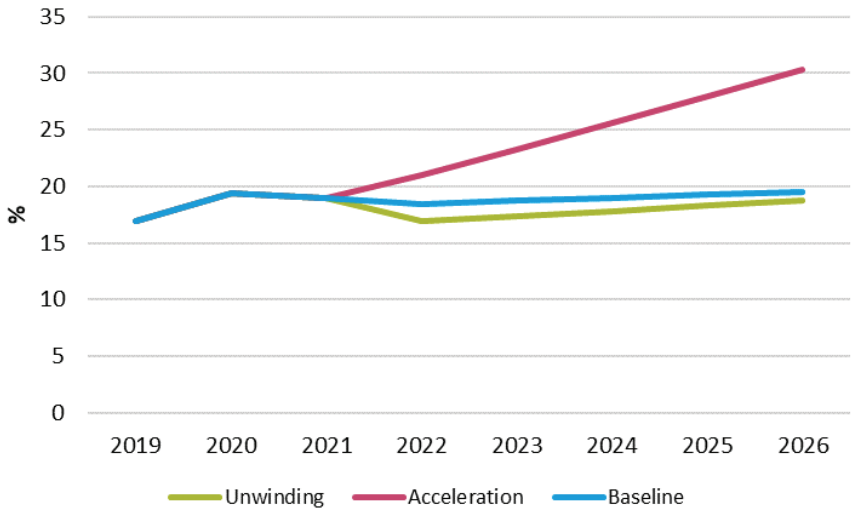
Source: Cambridge Econometrics.

Figure A.29 **Forecast of WFH rates for Sweden**



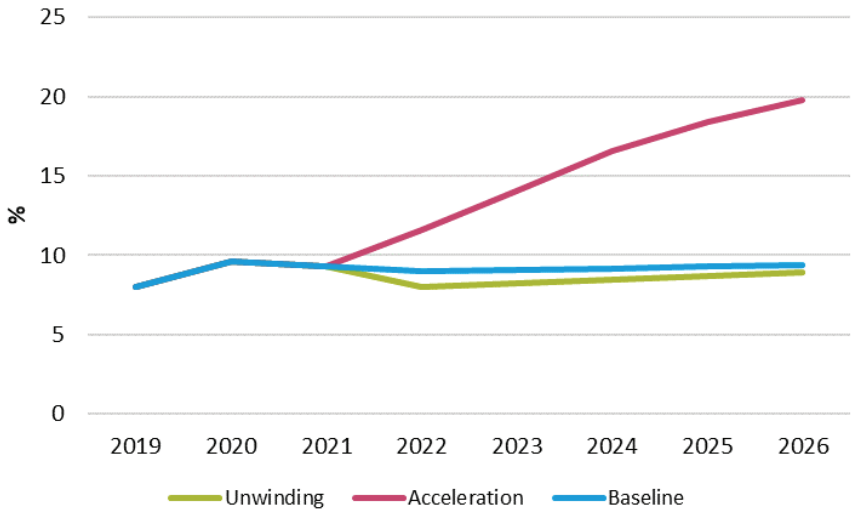
Source: Cambridge Econometrics.

Figure A.30 **Forecast of WFH rates for Slovenia**



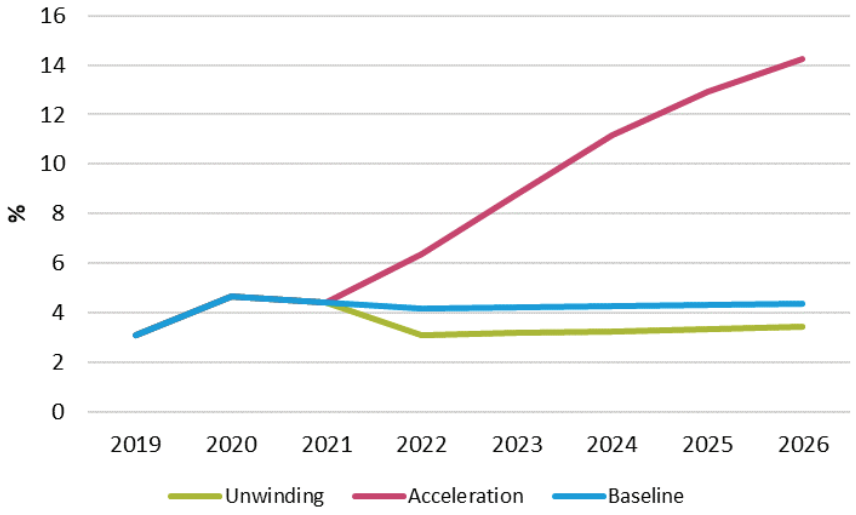
Source: Cambridge Econometrics.

Figure A.31 **Forecast of WFH rates for Slovakia**



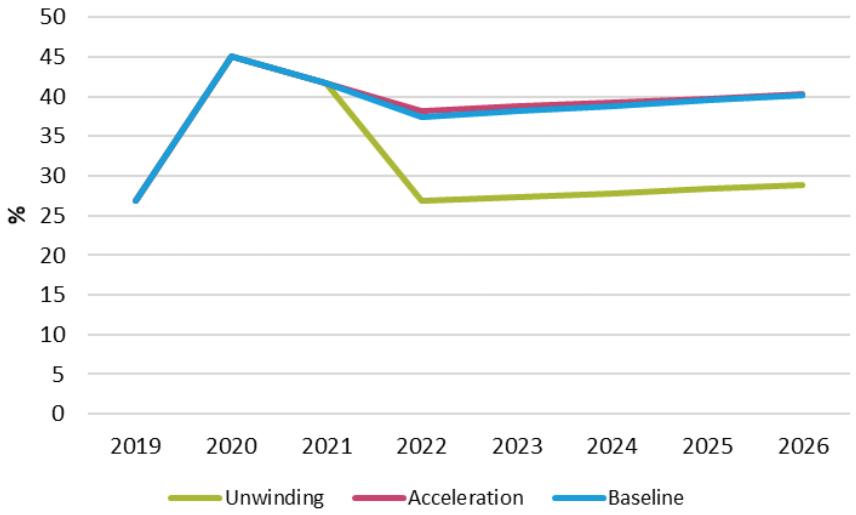
Source: Cambridge Econometrics.

Figure A.32 **Forecast of WFH rates for Turkey**



Source: Cambridge Econometrics.

Figure A.33 **Forecast of WFH rates for United Kingdom**



Source: Cambridge Econometrics.

Appendix B Additional tables

Table B.1 **Baseline employment and WFH rates in 2026, by sector**

EU27	Total employment (workers, million)	WFH rate (%)
Agriculture (A)	8.16	17.65
Industry (B-E)	35.20	7.58
Construction (F)	13.00	10.90
Trade, transport and accommodation (G-I)	48.95	10.15
Information and communications (J)	7.03	53.63
Finance and real estate (K-L)	8.28	36.34
Professional, scientific and technical activities (M)	13.61	44.40
Administration and support (N)	13.57	15.75
Public administration, education and health (O-Q)	46.02	21.67
Other services (R-U)	11.92	17.59
EU27+6	**Total employment (workers, million)**	**WFH rate (%)**
Agriculture (A)	13.18	14.15
Industry (B-E)	45.53	8.35
Construction (F)	19.53	11.00
Trade, transport and accommodation (G-I)	67.87	10.86
Information and communications (J)	9.16	58.39
Finance and real estate (K-L)	10.86	41.47
Professional, scientific and technical activities (M)	17.94	48.49
Administration and support (N)	17.99	17.32
Public administration, education and health (O-Q)	59.63	24.14
Other services (R-U)	15.11	20.65

Source: Cambridge Econometrics E3ME model.

Table B.2 **EU27+6 employment and WFH workers by scenario (difference from baseline, 000s)**

Variable	Scenario name	2022	2023	2024	2025	2026
Total employment (000 workers)	Unwinding of WFH	-186	-234	-278	-319	-347
	Acceleration of WFH	194	325	504	667	833
	Acceleration of WFH with contract changes	224	382	588	791	994
WFH workers (000)	Unwinding of WFH	-10 528	-10 483	-10 413	-10 284	-10 116
	Acceleration of WFH	8117	12 429	16 740	20 721	24 358
	Acceleration of WFH with contract changes	8123	12 440	16 760	20 751	24 401

Source: Cambridge Econometrics' E3ME model.

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