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Digital economy and the future of European welfare states

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Abstract

As a consequence of new technology, labour markets are changing. This article's central aim is to discuss variations among welfare states in Europe to adjust to changing labour markets. These variations in adjustment suggest that some welfare states are more prepared than others, including their capacity to ensure their sustainable financing. In the years to come, the predicted impact of technological development on labour markets will be huge. Impacts will include stronger "dualization" and new cleavages between "insiders" and "outsiders". Fewer industrial jobs are to be expected, and service-sector employment faces a risk of decline due to automation. While the creation of new jobs is likely, it remains to be seen whether these will replace the number of jobs destroyed, leaving the risk that many people whose skills become obsolete will become unemployed in the short as well as the longer term. Furthermore, even if the same number of jobs are eventually created, there will be a period of transition. In the light of this, welfare states will be challenged, not only in how they can finance their activities but also in terms of the threat posed to social cohesion by emerging labour market "winners" and "losers", with an accompanying higher risk of increasing inequality. The article offers suggestions as to how welfare states may cope with the changes related to the financing of welfare states, and how active labour market policy can be part of the response to help alleviate the expected dramatic changes. Also required is a discussion on the annual average number of hours people will work and how this might be a factor in lower future levels of unemployment.

Keywords welfare state, Europe, technological change, dualization, labour markets

Introduction

Technological change is not a new phenomenon. Such change has characterized society for centuries, at least since Gutenberg's printing press (MacGregor, 2016), and the concept of "creative destruction" was coined by Joseph Schumpeter as long time ago as the 1940s (Schumpeter, 1942). In the present context, what is new is the pace with which change is expected to take place.[1] The debate on the impact on the labour market of the possible real and rapid changes in the use of information and communications technology (ICT), artificial intelligence (AI), robots, etc., implies the likelihood of new cleavages in societies. This can be expected to occur regardless of whether the overall outcome of this development is positive or negative (Greve, 2017b).

This article probes into not only the possible impact of new technology on the labour market, but also, as a central issue, how this might influence welfare state development in Europe. There are several channels through which labour market changes might influence welfare states. These range from the risk of increasing inequalities, less social cohesion and overall more fractured societies, to difficulties in ensuring sufficient resources to finance welfare state activities. This is not to neglect that the use of new technology might also, as previous technological shifts have shown, positively reduce the number and types of jobs with high rates of accidents and a high risk of work injuries, such as, for example, fewer jobs with heavy work. Nevertheless, through the possible adoption of new technologies, the quality of work might decline, as well as improve. It may decline because more people may be at risk of not having a job and/or may be in a more precarious work position in the labour market with spells of unemployment, low income and/or short-term contracts.

The article is structured as follows. The next section highlights some of the existing studies of the impact of technological change mainly related to two elements: the number and types of jobs. Given that we are using projections, we can only offer an indication of what is likely to happen, but nevertheless these underline the need for welfare states to be alert. We then look more specifically at some possible threats to welfare states and identify who might be the "winners" and "losers", before the focus is shifted to how welfare states can be prepared. This will look into which types of welfare

1. This expectation is expressed in the titles of a number of recent books, such as *Humans need not apply: A guide to wealth and work in the age of artificial intelligence* (Kaplan, 2015); *Fourth industrial revolution* (Schwab, 2016); *Raw deal: How the "Uber economy" and runaway capitalism are screwing American workers* (Hill, 2015); *Will robots steal our jobs* (PWC, 2017); *The rise of the robots: Technology and the threat of mass unemployment* (Ford, 2015); and *Disappearing routine jobs: Who, how, and why?* (Cortes, Jaimovich and Siu, 2017).

states may be most at risk and how the manner in which welfare states are financed and structured influences how, and to what degree, they are challenged by the expected changes related to the implementation and use of new technology. The expected changes, regardless of whether these are predicted to be positive or negative, will be accompanied by periods of transition that will present challenges for societal development. Certainly, the challenges will be even more profound when the number of job losses is significantly higher than those created.

This article has set itself limits. Accordingly, a discussion of the new forms of employment, increased flexibility in work, etc., that may emerge as a consequence of new technology is deemed to lie outside the scope of this article. In this regard, readers are directed towards Mandl et al. (2015).

Reasons for and the size of possible change

"It is difficult to predict – especially about the future", says a Danish proverb. This is even more so with regard to developments in jobs and types of jobs, as many of the possible jobs of the future do not yet exist. A main way to distinguish the risk of job substitution as a consequence of new technology was defined as early as 2003 (see Table 1). A decline in the number of routine jobs, e.g. jobs where the tasks is done repeatedly, will most likely influence the "dualization"[2] of the labour market, as those losing a routine job might have difficulties in finding a new job. Given the manner in which access to many social security benefits is linked with stable labour market participation, the implication here is that "policies increasingly differentiate rights, entitlements, and service provided to different categories of recipients" (Emmenegger et al., 2012, p. 10). Furthermore, while it can be expected that even some "insiders" (cf. the classical distinction between insiders and outsiders (Doeringer and Piore, 1971)) will be at risk of losing their jobs, for "outsiders" the difficulties to enter or re-enter the labour market might be greater than heretofore. These impacts will be highly dependent on the size of the change as well as the present structure of national labour markets.

Table 1. *Skills, risk and consequences of automation, split between routine and non-routine work*

	Routine	Non-routine
Analytical and interactive tasks	Substantial substitution	Strong complementarities
Manual tasks	Substantial substitution	Limited opportunities for substitution or complementarity

2. Dualization refers to a change towards a more dual labour market where those with permanent jobs (insiders) are different from those in more precarious jobs (outsiders)

Source: Autor, Levy and Murnane (2003, p. 1286).

Overall, at least since Keynes discussed technological unemployment, the theory has argued that technology can influence jobs negatively (by displacing workers) and positively (by increased demand in other sectors of the economy, e.g. a productivity argument) (Keynes, [1931] 2009). It is the combination of these factors that will define the overall impact of technology. Nonetheless, when discussing this impact, one should also discuss the types of jobs at risk. Regardless of the type of job, there is broad recognition that technological change will lead to job losses and that there will be a period of transition for those losing their jobs, including for some workers who will, presumably, never re-enter the labour market.

Table 1 draws attention to the important point that it is jobs with elements that can be routinized which will be most at risk of being replaced by different kinds of new technology. Thus, in contrast with the previous technological shift [i.e. the shift to electrical power and industrial automation (Frey and Osborne, 2013, pp. 9–10)] wherein it was mainly low skilled jobs that were replaced, in the present phase the types of jobs that may be replaced will also include a number of functions done by people with higher levels of education. It is of note that, so far, jobs requiring interpersonal skills seem less at risk of being automated.

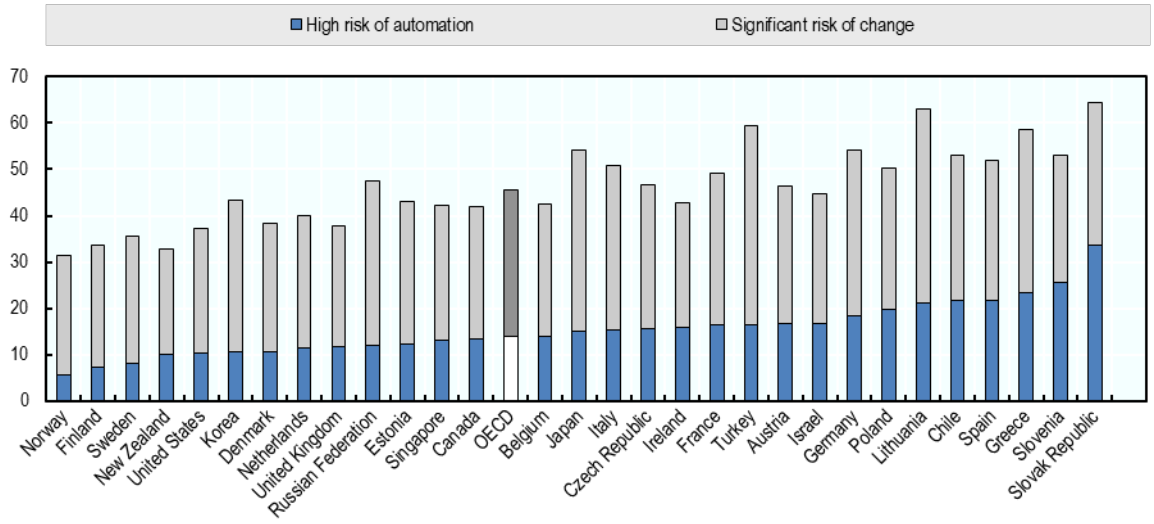
This distinction has shaped, in a variety of ways, the methodology used in studies on the types and number of jobs likely to disappear, including the now classical study by Frey and Osborne (2013), who estimated that the use of algorithms etc., could replace around 140 million persons, and has been replicated in a variety of studies including those refining the data and methods to analyse change. One study estimated that 54 per cent of European jobs were at risk (Bowles, 2014). Obviously, the specific details regarding the composition of labour market sectors and functions influence the results of the analysis (PWC, 2017). Furthermore, the heterogeneity of jobs influence how many jobs can be automated (Arntz, Gregory and Zierahn, 2017). It has also been estimated that around 40–50 per cent of existing job functions will disappear within the next 10 to 20 years, with variations depending on the existing structure, with the outcome that countries in Europe that still have a large industrial sector will be more at risk (Greve, 2017b); [3] see also the data in Annex 1. The country data in Annex 1 is presented according to the conventional method of depicting European welfare "regimes" (Greve,

3. See also <http://bruegel.org/2014/07/the-computerisation-of-european-jobs/> (accessed 16.10.2018).

2019a). The concept of welfare regimes will be used to frame our debate concerning which welfare states will be most at risk of change.

Lordan (2018) offers another estimate for job losses in European countries, for jobs that use the most recent technology. The author argues that one in five jobs in Ireland and 45 per cent of all jobs in Italy are fully automatable (Lordan, 2018). A recent global analysis suggests that by 2030 between 75 million and 375 million workers will have had to shift job and between 400 million and 800 million workers will have had to find new jobs as a consequence of the implementation of new technology (Manyika et al., 2017). Another study, which includes level of education as a factor in the analysis, concludes that close to half of all jobs in 32 Member countries of the Organisation for Economic Co-operation and Development (OECD)[4] will be significantly influenced by the implementation of new technology (Nedelkoska and Quintini, 2018). One further study suggests that "roughly one third or more of all activities can be automated" (Vermeulen et al., 2018, p. 12). Figure 1 presents data for OECD Member countries with estimates of the percentage of jobs at risk.

Figure 1. *Jobs at high risk of automation and significant risk of change in OECD countries* (per cent)



Source: OECD (2017).

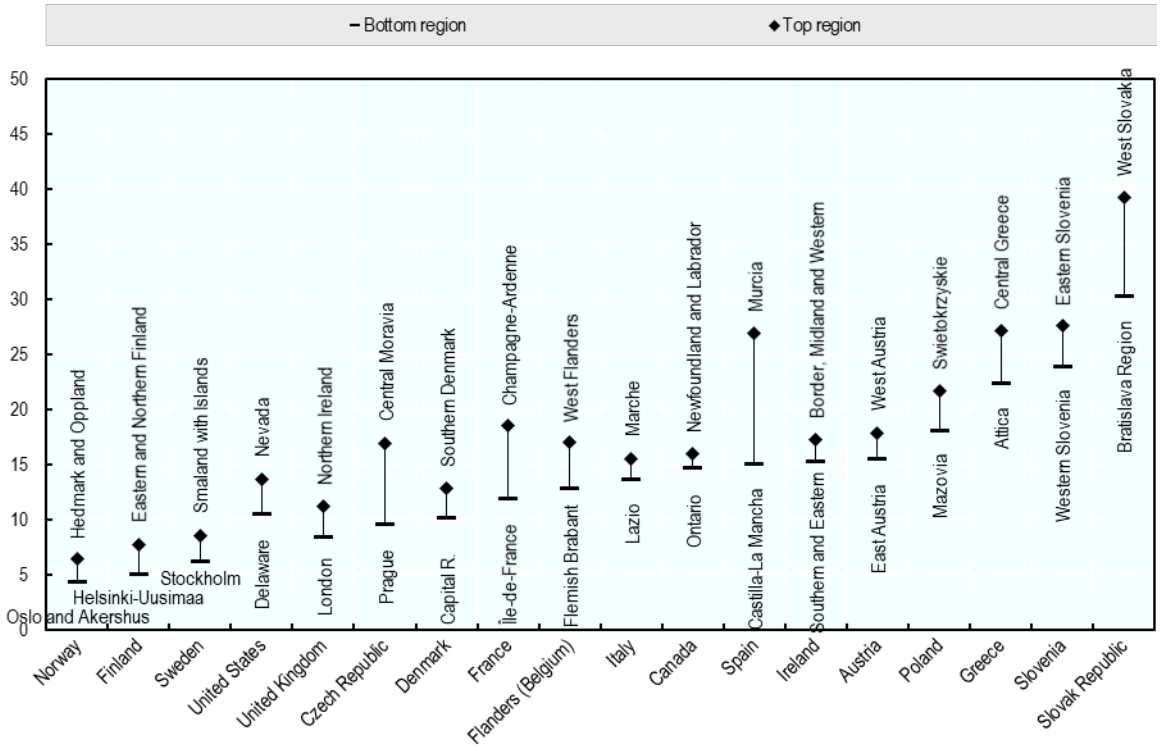
Figure 1 offers a clear indication of the large disparities across countries and the differences in the percentages of jobs at high risk of automation and jobs at significant risk. In accordance with theories

4. Despite this discussion on welfare state preparedness that focuses mainly on Europe, the use of OECD data is a way of presenting a broader picture of the possible impact of change across OECD countries.

of dualization, this evaluation of jobs at risk implies the increased polarization of labour markets.

Besides these national variations, in several countries there are also strong internal differences (Figure 2). These differences suggest that the future segmentation of labour markets within countries might be even stronger than that witnessed to date.

Figure 2. *Variation in share of jobs at risk across regions in different countries, 2016*



Source: OECD (2018).

The regional differences shown in Figure 2 are not large. Nevertheless, they point further to the risk of stronger national internal conflicts and reduced levels of social cohesion. It is to be underlined that it is not simply a matter of the number of jobs that are at risk from automation, but also how this may also influence wage levels, the number of non-standard jobs and the incidence of "bogus" self-employment. It has been estimated that one additional robot per thousand workers reduces the United States' employment-to-population ratio by about 0.18–0.34 per cent and wages by 0.25–0.5 per cent (Acemoglu and Restrepo, 2017a). Generally, this will also have implications for societies' social

cohesion, as it will compound an already strong tendency towards polarization in the labour market (OECD, 2017), wherein higher levels of social inequality increase polarization and risk reduced levels of economic growth (OECD, 2015). Countries that want to reduce this risk might thus also need to be willing to redistribute income from richer to poorer areas in their national territory, as well as across the European Union (EU) for EU Member States.

In contrast to the changes that accompanied the shift from industrial to service production, a novel aspect of the projected changes to the labour market is that it is not only unskilled jobs that are at risk of being replaced, but also high skilled jobs, including those of doctors, researchers, lawyers, etc. This is foreseen because work "will be streamlined and optimized through the application of technology" (Susskind and Susskind, 2015, p. 271).

Some observers argue that even if jobs are destroyed, technological change has always resulted in new jobs being created (Bessen, 2015). New technology has always replaced some jobs. However, even for those who argue that new jobs will be created, there is an awareness that there will be a transition period during which those workers who lose their jobs might not easily find another. Welfare states might in different ways support them, for example, through an active labour market policy.

Moreover, the introduction of new technology has also led to a gradual decline in the annual number of hours worked. On the one hand, this can be seen as positive, leading to a gain in "free time". On the other hand, it also suggests that if the ongoing changes are not to result in higher levels of unemployment then there is likely to be a need to continue to reduce the number of average hours worked annually. So, it seems logical to accept the likelihood of technology-driven unemployment. However, the scale of such future unemployment remains difficult to estimate. Regardless, there will be a challenging period of transition that will lead to the creation of new cleavages in societies.

Threats to welfare states

Demographic ageing is often argued to be a challenge for welfare states due to pressures stemming from lower economic growth and higher expenditures (see the discussions in Greve, 2019a). Higher spending is mainly due to more elderly in need of care (health and long-term) and entitlement to an old-age pension. Lower economic growth is seen as a consequence of a higher old-age dependency ratio, with fewer adults of working age. Thereby, an increase in the number of persons in need of income transfers and social services might imply heightened financial pressure on welfare states if current levels of transfers and services are to be maintained in the future. In countries where cash

benefits are taxable, given that income transfers are lower than previous income, this will also imply lower tax revenue from income taxes and duties. There is, however, no overall indication that population ageing has a negative impact on GDP per capita (Acemoglu and Restrepo, 2017b). In part, this is thought to be due to the adoption of new technology.

If new technology implies an increase in unemployment, then these higher levels of unemployment may also give rise to higher levels of dissatisfaction and imply support for more populist parties (Greve, 2019b), which might imply support for welfare chauvinism and anti-migrant policies as been witnessed around in Europe. This could thereby also implicitly imply a threat to the idea of the free-movement of workers, even though so far this has only more limited been witnessed. There are thus several threats to welfare states that arise as a consequence of the possible changes in labour markets resulting from the implementation of new technology. Specifically, these threats refer to:

- The risk of losing revenue (from income taxation and duties).
- The risk of increased spending pressure on the social security system.

Besides these two issues, which will be explored further below, there is also a risk of more unequal and divided societies due to the increased dualization of labour markets. Dualization refers to a division between those who are able to find a stable job and those who are often (or more permanently) outside the labour market without formal employment, and when they do find work it is likely to be a non-standard job.

The risk of losing revenue relates to the fact that the financing of welfare states comes mainly from different kinds of taxes and duties, and, with fewer people working, there is a risk of a reduction in tax revenue. This points to greater pressure on Nordic welfare states in particular, as well as Continental welfare states. The data in Appendix 1 indicates this pressure in terms of the number of jobs at risk of disappearing in EU countries. In Continental welfare states, pressure on spending might be less strong given the strong connection between paying into social insurance and having access to coverage, and in the Liberal welfare states given the more limited role of these welfare states. This should also indirectly point towards less pressure in Southern and Eastern Europe; however, in these countries a greater number of jobs are at risk.[5]

Furthermore, there is also the risk of a “winner takes all” development resulting from the use of IT,

5. For a detailed discussion of the impacts on different welfare regimes, see Greve (2017b).

AI and robots. For example, a new app might win a substantial share of the market, excluding other competitors. The near-monopoly held by some "tech-giants" bears witness to this. One possible policy response might be for countries to tax robots (Guerreiro, Rebelo and Teles, 2017). The challenge is to balance the need for the use of new technology to ensure continuing economic development with high levels of growth and productivity, with the need to ensure sufficient public-sector revenue. Even if robots are not taxed, it might be the case that companies will have to be taxed in such a way that welfare states will continue to have reliable and stable income with which to finance their activities. This might be achieved through a tax on companies' turnover, as well as international agreements concerning in which national jurisdiction the taxes should be paid. The European Commission thus, for example, has been working to establish a Common Consolidated Corporate Tax Base (CCCTB).[6] There is, furthermore, an EU debate on a tax on turnover,[7] again to ensure income to finance welfare states, with the EU Commission proposing a 3 per cent tax on the turnover of large companies.[8] This approach has been discussed in France, as well as in the United Kingdom where the idea of a 2 per cent turnover tax has been proposed.[9] The use of such a tax in relation to commercial activities on digital platforms will not necessarily lead to raising tax revenue in all the countries where such platforms are in use. Moreover, tax competition among countries implicitly risks reducing the tax income available for welfare states to be adequately financed. The trend towards the overall reduction in corporate tax rates is a further pointer in this direction.

The ability to finance welfare states can depend on the level of economic growth. Therefore, if new technology implies higher levels of economic growth than otherwise would be the case (McKinsey&Company, 2017), then the issue becomes one of how welfare states can receive a share of the income created by national economic development. The redistribution of the national productivity gain might raise the well-being of all citizens (Sachs, Benzell and La Garda, 2015), but

6. See <https://ec.europa.eu/taxation_customs/business/company-tax/common-consolidated-corporate-tax-base-ccctb_en> (accessed 06.11.2018). For the time being, there does not seem to be support for this.

7. See <https://ec.europa.eu/taxation_customs/sites/taxation/files/d_proposal_common_system_digital_services_tax_21032018_en.pdf>, (accessed 06.11.2018).

8. See <https://ec.europa.eu/taxation_customs/business/company-tax/fair-taxation-digital-economy_en> (accessed 06.11.2018).

9. <https://www.theguardian.com/uk-news/2018/oct/30/hammonds-digital-tax-faces-opposition-from-big-tech-firms> (accessed 06.11.2018).

this will presumably not be the case if left to the market alone. Evidently, economic development does not fully inform on the distribution of the well-being of individuals (Greve, 2017a), thus there might be positive economic development, but those workers losing their job will likely have a lower level of life satisfaction.

Proponents of new technology argue that it will stimulate higher levels of economic growth as well as make products cheaper, see more in (Greve 2017b; Peralta-Alva and Roitman 2018). This then makes it possible for consumers to buy new types of goods and services, including, for example, personal service and leisure activities. With the current technological shift, the challenge may be that a greater number of people will become more marginal to the formal labour market. The predicted outcome of higher levels of household consumption will not be possible without a welfare system that redistributes income to support household spending. Therefore, the adoption of new technology – in the absence of income redistribution – can also imply that demand will fall, which will then negatively influence overall economic development.

It is possible, therefore, to talk of there being double pressure on social security systems. If the number of people without jobs rises, national social security systems will have a heightened role to alleviate poverty and to help uphold and drive overall levels of economic demand. The extent of the pressure to be faced will depend on the type of welfare state. In principle, as implied above, at the outset the more generous types of welfare states will be more at risk than, for example, Liberal welfare states (Greve, 2019a, 2017c). Continental welfare states, such as Germany, might face greater pressure owing to the strong link between work and social security entitlement in its social insurance model. For Continental welfare states, the challenge is likely to be one of how to provide access to coverage for those more or less permanently outside the labour market (Obinger and Starke, 2015). However, as indicated above, there might not necessarily be a direct relationship between the size of the welfare state and the risk of job losses. It seems more likely that countries that still have a large industrial sector will be more at risk. For this reason, in Europe the pressure will be greater in Eastern and Southern Europe; see data in Annex 1.

Overall, the analysis presented here suggests that all types of welfare states in Europe, albeit for different reasons, will be strongly influenced by the changes in, and the use of, new technology. The repercussions of these impacts in Europe risk being felt globally, as jobs that have been outsourced beyond the frontiers of Europe might, by the adoption of new technology, be repatriated. This particular discussion, although interesting, will not be pursued further here (for a detailed discussion

on the projected global distribution of future jobseekers, see Bloom, McKenna and Prettner (2019) in this special issue).

How can welfare states be prepared?

The identified pressure facing all welfare states begs an important question. What possible options exist for European societies to pursue a development path that includes a continuing role for welfare states as traditionally understood? Overall, a first observation is that welfare states must seek out possible policy choices that will help to alleviate the negative consequences of new technology. This will also include building knowledge about the size of the possible change, designing rules for using new technology, and then implementing those policies that might help address the downside consequences for welfare states of the adoption of new technology.

A core issue will be the development of human capital. Probably, those that will lose their jobs will be workers without the necessary qualifications for work in societies transformed by the use of new technology. Given that not only unskilled jobs are at risk, the pressure on human capital development will be stronger than witnessed previously. To underline the important role of welfare states in this regard, the use of social investment in human capital "could alter the distribution of market income" (Peralta-Alva and Roitman, 2018, p. 14). This reaffirms the need for welfare states to focus on education as an investment in the future.

This should include not only a focus on basic education, but – and more so than has previously been the case – on life-long learning. The latter aspect is still not high on the agenda for EU Member States. Table 2 shows the percentages participating in formal or non-formal education and training in the four weeks preceding the labour force survey from which the data comes.

Table 2. *Percentage participating in life-long learning in the EU28 in selected years 2008–2017, by age group*

EU28	2008	2010	2012	2014	2016	2017
25-34	15.7	15.8	15,7	17.5	17.3	17.6
35-44	9.6	9.3	9,1	11.0	10.8	11.1
45-54	7.5	7.5	7,5	9.1	9.1	9.1
55-64	4.8	4.6	4,5	6.0	6.1	6.3

Source: Eurostat, <trng_lfse_01>, (accessed 06.11.2018).

As can be seen from Table 2, despite many years of debate on this matter, only a limited increase in

life-long learning has taken place. Notably, it is still the case that the rate of participation declines with age. Despite problems with the data (self-informing, including whether it is informal/formal), they offer an indicator that the policy aims of promoting life-long learning remains a challenge. To ensure a closer match between supply and demand for labour, this could be better supported by looking into the design of national educational systems. Participation rates also show that low-skilled workers, elderly workers, unemployed workers, and workers with low income and on temporary contracts are disadvantaged with regard to getting support for life-long learning (OECD, 2019).

As indicated above, a possible risk is that demand for goods and services will be reduced, regardless of economic growth driven by technological change. This will be the case if welfare benefits are paid at very low levels and greater numbers of workers find themselves excluded from the labour market. Consumer markets require a population with buying power, and, with more inequality in the distribution of economic resources, this population may decline in size, leaving only those with higher incomes and higher personal savings. Therefore, if welfare states wish to ensure a continuation of a demand-management policy then this also implies a strategic need to provide adequate social security benefits.

If it comes to pass that there are fewer jobs, an option is to reduce the average annual number of working hours. Whether such a reduction in the overall supply of labour should be achieved by fewer working days or an increase in the number of days of statutory annual leave remains a discussion point. Regardless, a lower overall supply of labour will reduce the risk of higher levels of unemployment. However, redistributing part of the increase in societies' wealth as free time could help to make certain that social cohesion will be less challenged than it would be otherwise. Social protection, in order to ensure social inclusion, could prove important (Euzéby, 2012). Given that people will work, but also have more free time, this could make possible jobs for more people, and, importantly, provide income to meet household consumption needs.

Another issue relates to whether the welfare state will create new types of public-sector jobs. The ability to do so will depend on the availability of finance. An argument in support of such job creation is that it could permit services that improve the quality of life, for example, providing care for elderly people, which might also replace the payment of some passive benefits (Atkinson, 2015). Challenges to be addressed are the level of wages and the necessary qualifications related to conducting new job activities. Positively, the possibility of job creation raises an important issue related to the redistribution of options and opportunities in societies that have a mismatch between the number and

kinds of jobseekers and available jobs. At the end of the day, such redistribution will depend on political decisions.

Some preliminary conclusions

There is no doubt that we will witness dramatic changes in labour markets in the years to come. There is also no doubt that this will influence all European welfare states – as it will countries across the globe. These changes will decrease livelihood opportunities for many and change many aspects of daily life, including the risk for many of not having access to well-paid, decent and stable work. A further risk is that all forms of inequalities (economic as well as social) will rise, and social cohesion will weaken.

Reflection is required now as to how welfare states may ensure: i) options for all who wish to work and to have access to a job, ii) how to ensure the income security and the consumer buying power of those excluded from labour markets, and, importantly, iii) how to finance the welfare state in the years to come.

Policies that might help in doing so include lowering the average annual number of hours worked, maintaining a stable social security system, including an unemployment benefit, with benefits paid at an adequate level to support household expenditure needs, and the development of a strategy to enable life-long learning. Naturally, there might be an issue of work-incentives to balance. Furthermore, a case can be made for the establishment of international tax agreements, including for the taxation of activities related to, and undertaken using, digital platforms. Also required is greater control over options that make use of variations in national tax systems to transfer taxable income to tax heavens, expressly to avoid paying taxes in one or other national jurisdiction. Therefore, for welfare states to surmount the increasing pressures that confront their continuing operation, it is no longer only national decisions that are necessary, but also broader international co-operation.

Europe's welfare states are challenged, not only as a consequence of the increasing digitalization of the economy, but also as a consequence of there being fewer traditional economic instruments available to decision-makers. Therefore, the use of instruments outside the traditional economic policy area, such as educational, including life-long learning, can offer ways to cope with the many emerging and expected changes that will stand in the path of the development of Europe's welfare states.

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Annex 1.

Table A1. *Percentages of EU jobs at risk of automation in future decades, split into welfare regimes*

Regime/country	Percentages
Nordic	
Denmark	49.5
Finland	51.1
Sweden	46.7
Continental	
Austria	54.1
Germany	51.1
Netherlands	49.5
Belgium	50.4
France	49.5
Liberal	
United Kingdom	47.2
Ireland	48.5
Southern Europe	
Greece	56.5
Italy	56.2
Portugal	58.9
Spain	55.3
Eastern Europe	
Croatia	57.9
Estonia	53.9
Czech Republic	53.7
Poland	56.3
Slovakia	54.7
Latvia	51.1
Lithuania	51.9
Bulgaria	56.6
Romania	61.9
Slovenia	53.2
Hungary	55.3

Source: Data from www.bruegel.org (accessed 13 April 2016), adapted here from Greve (2017b, p. 32).