



Effects of Digitalisation on the Labour Market

Key points

- Digitalisation is not a force of nature, its effects on the labour market can and should therefore be shaped by political action.
- Researchers identify two main risks to the labour market: (i) polarisation between high-skilled and low-skilled jobs and between secure and precarious working conditions, while medium-skilled jobs with average working conditions will disappear, and (ii) negative effects on employment in the low-skilled to medium-skilled segment.
- Negative effects on those concerned and on society in general can be mitigated by progressive measures such as reducing working hours, policy-making with respect to new forms of work, the expansion of an inclusive welfare state and targeted training and continuing professional development measures.
- In order for digitalisation to be beneficial for workers, they need to be able to share in the productivity gains. In addition, the opportunities provided by structural change need to be used to create good working conditions.
- If human labour is increasingly automated in the future, then – more than ever before – our key economic problem will be one of distribution of wealth.

What does it involve?

“Will we run out of work?” This question immediately poses itself in connection with digitalisation. Worst-case scenarios suggest that one in two jobs is at risk. Other experts believe that history shows that technological progress may indeed kill off certain occupations, but it always creates new ones¹.

While forecasts about specific effects on the labour market should be treated with caution, we should be guided by approaches that are as reliable as possible and explore policy-making options for making digital transformation beneficial for all workers.

Risks:

- Job losses due to automation
- Increasing polarisation on the labour market between high-skilled and low-skilled jobs and between normal and precarious working conditions
- Negative effects on jobs mainly in the low-skilled segment and/or the medium-skilled segment
- Rising inequality among income earners

Opportunities:

- Emergence of new sectors and jobs
- Increased need for high-skilled work and work that is difficult to automate (analytical, interactive and with a high proportion of non-routine work)
- Reduction in physically demanding, monotonous work in favour of higher-quality jobs

1. Cf. Schweighofer Johannes: Zur Befreiung des Menschen von mühevoller Arbeit und Plage durch Maschinen, Roboter und Computer – Auswirkungen der Digitalisierung auf die Arbeitsmärkte [On emancipation of people from laborious work through machines, robots and computers – effects of digitalisation on labour markets]. (2016). In: Wirtschaft und Gesellschaft. 2016/Issue 2, p. 219.

Key findings

What can we learn from the past?

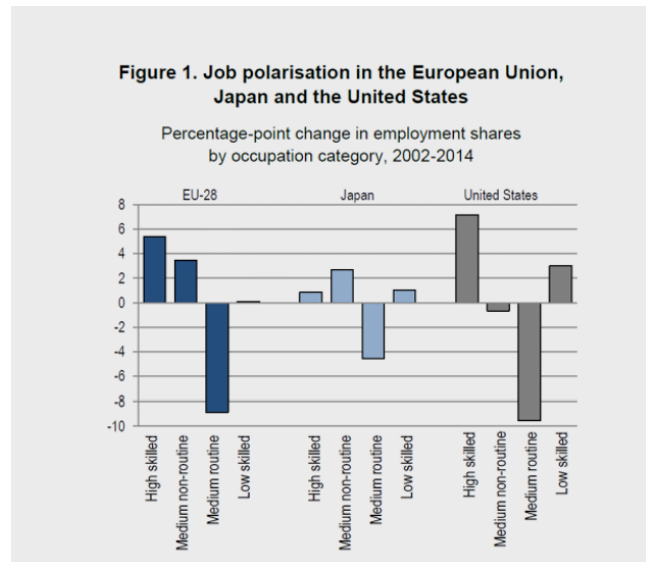
It goes without saying that it is difficult to predict the future. It is easier to review the effects of technological progress on employment in the past. In his analysis of changes in employment in the 20th century, Michael Mesch concludes that: “despite unparalleled technical progress in the 20th century, there was no long-term trend towards rising unemployment or consolidation of structural unemployment”². In particular, automation technologies replaced physical, monotonous work that was harmful to health in sectors such as mining, manufacturing and agriculture. The use of new technologies called for higher-skilled workers and increased macroeconomic demand. That in turn led to an increase in macroeconomic demand for labour. The issue of distribution played a pivotal role, along with the fact that workers shared in increased profits through productivity-based wage policies, with an associated impact on prices, incomes and product innovations. In addition, product innovations led to the emergence of new sectors and occupations. Despite massive increases in productivity and in the number of working women, there was no long-term increase in unemployment. One reason for that may be the reduction in working hours, which halved between 1870 and 2000 to 1,500 hours per year³.

Will the future take a different turn?

Polarisation theory – medium-skilled jobs at risk

Accordingly, digitalisation will result in a more polarised labour market, with high-skilled work on the one hand and low-skilled, non-routine work on the other hand. This is because there are two types of work that are difficult to automate: (i) high-skilled work that requires abstract thought and social action and (ii) manual, non-routine work that requires situative adaptation and personal interactions⁴. Since there are non-routine jobs at both ends of the skills spectrum – in specialised, managerial and technical occupations at one end and in the service segment and complex manual professions at the other end – it seems likely that the automation of routine tasks will simultaneously result in growing demand for high-skilled, high-paid jobs and for low-skilled, poorly-paid jobs⁵ (for example, in the personal services segment)⁶.

2. Mesch Michael: Automatisierung und Beschäftigung: Ein Rückblick aufs 20. Jahrhundert [Automation and employment – a look back at the 20th century], blog.arbeit-wirtschaft.at, 11 May 2016
3. See *ibid.*
4. Cf. Schweighofer (2016), p. 227.
5. Autor David, Why Are There Still So Many Jobs? The History and Future of Workplace Automation. In: *Journal of Economic Perspectives*, Volume 29 3/2015, p. 12.
6. Cf. OECD (2016). Automation and independent Work in a Digital Economy. Policy Brief on The Future of Work, OECD Publishing, Paris.



Source: OECD Calculations based on EU-LFS, Japanese Labour Force Survey and BLS Current Population Survey.

In this scenario, demand for routine work or occupations chiefly consisting of such routine work would be mainly at risk in the low-skilled to medium-skilled segments.

Routine cognitive tasks include calculating, accounting, correcting data, measuring etc., for example in the fields of administration, auditing, inspecting, monitoring, diagnostics and technology. **Routine manual tasks** include operating, monitoring and equipping machinery, for example in the fields of construction, production, harvesting and throughput.⁷

By contrast, automation will favour occupations that largely consist of non-replaceable abstract tasks that can be rendered even more profitable by new technology (for example, computerised processes will enable researchers to focus even more on their core work, interpreting their findings⁸).

The OECD also identifies **another risk of polarisation**, namely between “open-ended and various atypical forms of employment”⁹. Reference is repeatedly made in connection with digitalisation to the emergence of new forms of work that tend to make working conditions more precarious. A Eurofound report lists nine new forms of working – from casual work and job sharing to portfolio work – that have become increasingly prevalent in Europe since 2000¹⁰. “Some transform the relationship between employer and employee, some change work organisation and work patterns, and some do both”¹¹. Risak describes those new forms of work as

7. Cf. Bock-Schappelwein Julia (2016).
8. Cf. Autor (2015).
9. OECD (2016). Automation and Independent Work in a Digital Economy. Policy Brief on the Future of Work. OECD Publishing, Paris.
10. Cf. Eurofound (2015), New forms of employment, Publications Office of the European Union, Luxembourg.
11. Risak Martin (2015): Neue Arbeitsformen [New forms of work]. <http://blog.arbeit-wirtschaft.at/neue-arbeitsformen/>, accessed on 14 March 2017.

having the shared “aim of creating additional flexibility for employers and/or workers” and notes that they raise “numerous legal and social issues”¹².

Such polarisation would therefore result in strong disparities between wage earners in terms of income and security.

However, some studies find no empirical evidence for that theory (Frey Osborne 2013 and Bonin et al. 2015) and describe low-skilled workers as the group most at risk¹³, since their work can most readily be replaced by computers.

However, there is also a gender-specific aspect that should not be ignored. For example, in Austria, a higher proportion of women work in occupations “predominantly involving routine tasks, which are thought likely to come under increasing pressure due to digitalisation”¹⁴

Likelihood of automation

In a study commissioned by the OECD, Arntz, Gregory and Zierahn estimate the automation potential for workers based on the task structure recorded during the PIAAC study at the individual level of workers for the purpose of recording the actual task content of jobs. They note that occupations with a high proportion of routine tasks are very likely to be automated. That is based on the conjecture that only certain tasks, rather than whole occupations, can be automated, and occupations with a high proportion of automatable tasks are at high risk of automation. They conclude that 9% of workers in Europe and 12% of workers in Austria face a high automation risk. However, they note that not everything that can be automated will be automated because: (1) technical possibilities are often overestimated, (2) some jobs will be changed, rather than replaced, by new technologies, (3) there are microeconomic and social hurdles to automation¹⁵.

A new study by the Institute for Advanced Studies Vienna (IHS) assesses the potential in Austria for tasks within certain occupations to be replaced based on predicted digitalisation and automation¹⁶. According to

the results of the study, 9% of employees and 8.5% of working hours have a task profile that is highly likely to be replaced by machines (cf. IHS, p. 23.). The study finds that the following occupational groups are most likely to be affected: “unskilled workers, tradespeople, machine operators and people in service occupations”. (Ibid.). According to the study, professionals with a degree and managers are likely to be the least affected. The study also identifies a link with income and level of education – the higher the level of education and level of income, the lower the likelihood of automation¹⁷.

It should be noted that the aforementioned studies only consider the potential negative effects on employment and not the potential creation of new jobs thanks to technological progress.

The analyses agree that certain occupations (or employees with a low and/or medium skill level in jobs with a high proportion of routine tasks) are at greater risk than high-skilled occupations, which tend to be described in all studies as the winners when it comes to automation processes.

A study by Enzo Weber provides a more comprehensive analysis of effects on employment in Germany, though it only covers the industrial sector. He concludes that: “Contrary to fears of a mass reduction in jobs, the net effects on employment up to 2030 will be low. However, the underlying shifts within occupations and skill levels are significantly greater and call for active education and training and labour market policy measures.”¹⁸ Weber points out that labour market dynamics will likewise increase, which will also be associated with transitions into unemployment. There is particular need for targeted training and continuing professional development and targeted investment support, he notes.

Distribution, not scarcity, is the challenge of the future

David Autor makes an important point that is often overlooked when discussing the consequences of automation: “if human labour is indeed superfluous by automation, then our chief economic problem will be one of distribution, not scarcity”¹⁹. In the market economy, wealth is primarily distributed through the labour market. If machines make human labour superfluous, distribution of accumulated wealth would be a major new challenge.

12. See *ibid.*

13. Cf. Schweighofer Johannes: Zur Befreiung des Menschen von mühevoller Arbeit und Plage durch Maschinen, Roboter und Computer – Auswirkungen der Digitalisierung auf die Arbeitsmärkte [On emancipation of people from laborious work through machines, robots and computers – effects of digitalisation on labour markets]. In *Wirtschaft und Gesellschaft*. 2016/Issue 2, p. 229.

14. Bock-Schappelwein Julia, Digitalisierung und Arbeit [Digitalisation and work]: Wie viel Routinearbeit wird von weiblichen und männlichen Arbeitskräften in Österreich geleistet? [How much routine work is performed by female and male workers in Austria?], In: *Wiso* 4/2016, p. 114.

15. Cf. Queisser Monika, Zierahn Ulrich (2016): Digitalisierung, Arbeit, Ungleichheit [Digitalisation, work, inequality]. Paris 2016.

16. Cf. Nagl Wolfgang, Titelbach Gerlinde, Valkova Katarina (2017): Digitalisierung der Arbeit: Substituierbarkeit von Berufen im Zuge der Automatisierung durch Industrie 4.0 [Digitalisation of work – likelihood of occupations being substituted by automation in the Industry 4.0 era]. p. 23.

17. Cf. IHS, p. 20

18. Weber, Enzo (2016): Industrie 4.0: Jobmaschine oder Jobvernichterin? In: *blog.arbeit-wirtschaft.at*, 5 S

19. Autor David (2015), p. 28.

Demands

- Use of technical progress for innovative ways of reducing working hours
- Suitable wage policies to ensure that productivity gains are reflected in earned income.
- In-depth engagement with new forms of work and measures to counteract the increase in precarious forms of work. The aim should be the suitable regulation of employed labour in the digital era.
- School education, training and continuing professional development measures (see the AK policy paper on “School education, training and continuing professional development in the era of digital transformation”), in particular:
 - Time and money for education and training: People should be legally entitled to a minimum income during their training (“training allowance”).
 - Greater inclusion of formally low-skilled workers in training and continuing professional development to counteract increasing segmentation on the labour market.

More Links

All AK policy papers concerning digital work can be found here:

https://www.arbeiterkammer.at/interessenvertretung/arbeit_digital/policypapers/index.html

More links to studies on the topic of digitalisation and effects on the labour market here:

<http://www.oecd.org/employment/emp/Policy%20brief%20-%20Automation%20and%20Independent%20Work%20in%20a%20Digital%20Economy.pdf>

<https://economics.mit.edu/files/11563>

<http://blog.arbeit-wirtschaft.at/automatisierung-und-beschaeftigung-ein-rueckblick-aufs-20-jahrhundert>

http://wug.akwien.at/WUG_Archiv/2016_42_2/2016_42_2_0219.pdf

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<https://wien.arbeiterkammer.at/interessenvertretung/arbeiddigital/index.html>