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Artificial Intelligence in the European Labour Markets

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AT A GLANCE

- Adoption of artificial intelligence (AI) in production can automate nonroutine cognitive tasks performed by middle- and high-income workers and thus exacerbate job polarisation.
- Adoption of AI in firms and by workers has accelerated since generative AI has become more widely available. Adoption is, however, uneven among workers and firms.
- AI could decrease productivity differences between workers, but the existing evidence points to the continuation of skill-biased technological change, with mainly high-skilled labor benefitting.
- The inclusive distribution of productivity gains requires policies that support labour's bargaining power and labour's ability to productively contribute to production.

INTRODUCTION

Artificial intelligence (AI), a set of technologies that learn patterns from data to make predictions with new data, can perform an increasing range of tasks that only humans could once do. Adoption of AI in production changes the labour market value of different skills in different ways and thus alters incomes. The emerging evidence on the effects of AI in the labour market and on labour market inequality has been surveyed here.[1]

AI COULD EXACERBATE JOB POLARISATION

Producing goods and services requires the completion of a set of tasks. These tasks are allocated to labour and capital. Machines are good at following step-by-step instructions to repeat tasks in stable environments. Such routine tasks have been vulnerable to automation, and, as such, being reallocated from labour to capital. Thus, demand for workers has been decreasing in occupations with many routine tasks. This routine-biased technological change has led to job polarisation: middle-income occupations with many routine tasks are losing their labour share, while nonroutine manual low-wage and nonroutine cognitive high-wage occupations are increasing their labour shares.

While nonroutine manual tasks have mostly evaded automation, the increase in the supply of labour for routine tasks has exceeded the supply of labour for nonroutine cognitive tasks. This increase in the supply of labour for nonroutine manual tasks has put

downward pressure on wages in nonroutine manual jobs. These developments have contributed to increasing wage inequality and stagnating wages among low- and middle-skilled workers. Automation is believed to have played a significant role in increasing wage inequality in the US and Europe.

Applications of AI in non-physical tasks automate nonroutine cognitive tasks. AI is capable of prediction, which is crucial for decision-making and at the core of many white-collar jobs. Generative AI can perform a variety of tasks, including image, video and text classification and generation, reasoning, mathematics, coding, and writing. AI may therefore automate tasks, even jobs, previously considered invulnerable to automation. This may also exacerbate job polarisation.

AI ADOPTION BY WORKERS AND FIRMS IS RAPID BUT UNEQUAL

In the 2010s, AI adoption by firms was rare and concentrated in the ICT industry. In the current decade, adoption has been rapid. In 2024, the percentage of businesses using AI varied between European Union member states, from 3 % in Romania to 27 % in Denmark.[2] The percentage of workers using AI themselves or knowing a colleague who does varied across surveyed European Union member states, from 15 % in Spain to 43 % in Luxembourg.[3] In May 2025, 41 % of German firms surveyed reported using AI.[4]

The adoption of generative AI is often on the initiative of employees and the language chatbot user interfaces prevalent after the release of ChatGPT in late 2022 have made AI models more accessible. Nevertheless, AI is more often adopted by younger, more educated, higher-income, male workers. Varying adoption rates among workers may lead to productivity and earnings gaps. Employer-led AI adoption and training alleviates these gaps. Required complementary capital and investment may lead to uneven adoption amongst companies. However generative AI models' accessibility could also democratise access. While AI adoption seemed more prevalent in large firms capable of investing in advanced tools in the 2010s, Danish workers' chatbot AI use does not correlate with employer size in the current decade.[5]

SKILL-BIASED TECHNOLOGICAL CHANGE CONTINUES

Evidence on the effects of AI on productivity, employment and wages is mixed. This is not surprising, given the early phase of AI adoption. Also, the effects are not expected to be uniform. Automation without productivity increases may decrease employment, while automation with productivity increases and sufficient demand for output may increase employment, and new technologies may create completely new jobs. Thus, the effects depend on how, why, and what kind of AI is adopted. However, there are some patterns which stand out.

At worker level, AI tools have increased worker productivity in some occupations. The least productive workers have benefitted from the largest productivity increases. In a representative set of occupations, however, time savings have been modest.[5]

Firms more exposed to AI and adopting AI tend to employ fewer low-skilled workers and more high-skilled workers. The share of job postings requiring AI skills is increasing. Meanwhile, postings for jobs with tasks which can be performed by AI have decreased. Tasks within occupations are changing as well. New tasks have primarily been created in the context of the development and adoption of AI. High-skilled workers have been able to shift toward more complex work, while low-skilled workers have had difficulties. In addition to the demand, AI skills are also paid a premium. These premiums for AI skills may contribute to skill and gender wage gaps: Males and those with high levels of education are more likely to have AI skills.

Thus, even though AI may reduce productivity differences within occupations, and may support low-skilled workers in high-skilled jobs, the emerging evidence points to skill-biased AI displacing low-skilled workers and augmenting high-skilled workers. However, this may be partly because companies are still in the process of implementing AI, making large investments and competing for a limited supply of AI-skilled workers.

SUPPORTING LABOUR'S ABILITY TO CONTRIBUTE SHARES PRODUCTIVITY GAINS

In market economies, the distribution of income is influenced by how different factors of production contribute to production. Policy should focus on ensuring labor continues to be able to contribute.

If AI complements highly-educated labour more than less-educated labour, then increasing labour's education may help labour capture gains of productivity increases. Non-university training and workplace training may be sufficient, as employers may de-emphasise formal qualifications in tight labour markets. Workers' bargaining power helps labour achieve productivity gains but bargaining while having an uncertain contribution to production may encourage automation. Measures such as universal basic income and other measures aimed at adjusting to the decreasing ability of labour to contribute to production may support automation. In addition, if labour's economic power decreases with labour's ability to contribute to production, labour's political power may also decrease.

The direction of technological change, i.e. the type of technologies developed and adopted, may be distorted toward excessive automation, i.e. toward technologies that replace rather than complement labour. A labour-centric direction of technological change emphasises augmenting workers and enhancing labour's contribution to the production process.

The use of labour and capital in the production process is often subject to different tax rates. Employing labour incurs levies such as income tax, social security and pension payments; capital investments, in contrast, benefit from tax-deductible interest rates and accelerated tax deduction schemes. The resulting differences in costs between labour and capital may favour automation. The involvement of trade unions and work councils in the adoption of AI may support the adoption of technologies that augment labour. Employee voices are also important in preventing the adoption of technologies that mainly weaken employees' position without increasing productivity. Governments can direct technological development by making financial support conditional on the development of technologies with socially beneficial prospects.

While education stands out as a promising means of supporting labour's ability to contribute, expanding the availability of education and training may not be popular. Exposure to automation does not seem to increase support for expanding access to education or active labour market policies.

Those who perceive increasing economic insecurity due to technological change tend to support the radical right and anti-establishment parties. These feelings of economic decline may stem from perceived loss of social status rather than actual reductions in reductions in income. Consequently, such voters may not primarily demand redistribution, but instead favour policies that shape market income formation by supporting labour's productive role in the economy.

THE LABOUR MARKET EFFECTS OF AI REMAIN HIGHLY UNCERTAIN

The eventual labor market effects of AI are still uncertain, and the extrapolation of the currently observed labor market effects to the future is not warranted. The emerging capabilities of AI have surprised even the AI developers. Also, the effects take time: The adoption of AI requires investments in and the development of complementarities such as human capital and skill, new production processes and business models, digitalization and data, and organizational structures. It is also important to keep in mind that AI's impact will extend beyond non-physical tasks. Technological change continues elsewhere, especially in robotics, as well, and those developments may keep on automating routine manual tasks and, together with AI, also nonroutine manual tasks.

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