# New technologies and jobs in Europe

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New technological advances built upon the development of artificial intelligence (AI) and robotics have activated research into the traditional topic of the labour market impacts of technology. Both in the academic and in the policy debates there are increasing concerns about the employment consequences of a new general-purpose technology based on robotics and artificial intelligence. Many papers have attempted to face these concerns by focusing on country studies using micro data on worker flows and wages to identify the causal effects of the introduction of new technologies on the level of employment and wages. Results from this line of research are far from conclusive, with papers finding different effects for different labour markets and time periods.

In contrast to the country-specific studies, in Albanesi et al. (2023), we document the labour market effects of new technologies in 16 European countries during the 2011-2019 period. Also, instead of looking at employment levels, we focus on the association between employment shares and relative wages of different occupations, on the one hand, and potential exposure to new technologies.

As a general-purpose technology, AI (advancements in robotics, supervised and unsupervised learning, natural language processing, machine translation, image recognition, and the like) enables automation of productive tasks, both in manufacturing and services. Occupations are defined as a collection of productive tasks, some of them more easily performed by AI than others. Felten et al. (2019) and Webb (2020) provide metrics to measure the potential exposure of each occupation to AI by looking at reports on the progress of AI-enabled technologies and patents. Both measures stand from different angles that complement each other: one relies on experts' opinions about the capabilities of new technologies (Felten); the other is constructed from hard data on the introduction of these technologies in the production of goods and services (Webb). Using these metrics of potential exposure of productive tasks to new technologies, something between 23% and 29% of total employment in the European countries was in occupations highly exposed to AI-enabled automation (upper tercile of the exposure measures). These occupations mostly employ high-skilled, high-paid workers, in contrast with other technologies such as software.

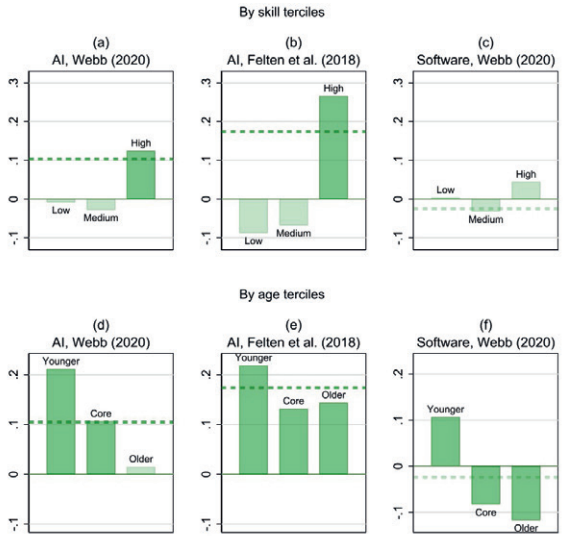
We show that there is a positive association between AI-enabled automation and changes in employment shares in the pooled sample of European countries, regardless of the metrics used. According to the AI exposure indicator proposed by Webb (2020), moving 25 centiles up along the distribution of exposure to AI is associated with an increase of sector-occupation employment share of 2.6%, while using the measure provided by Felten et al. (2018, 2019) the estimated increase of sector-occupation employment share is 4.3% (Figure 1). In the working paper version, we document in detail which occupations are more potentially exposed to AI and which occupations have suffered from lower relative weight in aggregate employment.

Interestingly, there is no significant change in employment shares associated with AI exposure for the occupations whose average educational attainment is in the low and medium terciles. However, for the high skill tercile, there is a positive and significant association: moving 25 centiles up along the distribution of exposure to AI is estimated to be associated with an increase of sector-occupation employment share of 3.1% using Webb's AI exposure indicator, and of 6.7% using the measure by Felten et al. Panels (c) and (d) in Figure 1 report the estimates by age terciles. AI-enabled automation appears to be more favourable for those occupations that employ relatively younger workers. Regardless of the AI indicator used, the magnitude of the coefficient estimated for the younger group doubles that of the rest of the groups.

Despite the results for employment shares, we did not find statistically significant effects on wages for either AI or software exposure, except for the Felten et al. measure, which indicates that occupations more exposed to AI have slightly worse wage growth. The paper also shows that results are heterogeneous across countries, possibly reflecting differences in underlying economic factors, such as the pace of technology diffusion and education, but

Figure 1

**Exposure to technology and changes in employment shares, by skill and age**




NOTES: Regression coefficients. Exposure to technology and changes in employment share by skill and age groups. Whole sample coefficient is the horizontal dotted line. Bars display coefficients for subsamples. Coefficients that are statistically significant at least at the 10% level are plotted in dark shaded colour.

also the level of product market regulation (competition) and employment protection laws.

## REFERENCES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