

## Automation and Income Inequality in Europe

Karina Doorley (ESRI, TCD, IZA), Jan Gromadzki (WU Vienna, IBS, IZA), Piotr Lewandowski (IBS, IZA, RWI), Dora Tuda (ESRI, TCD), Philippe van Kerm (LISER, University of Luxembourg)

The rapid expansion of automation has raised concerns for workers' welfare, as robots are often implemented to improve efficiency and may replace workers. In the United States, the displacement of jobs due to automation has reduced wages and employment, especially for those at the lower end of the wage scale.

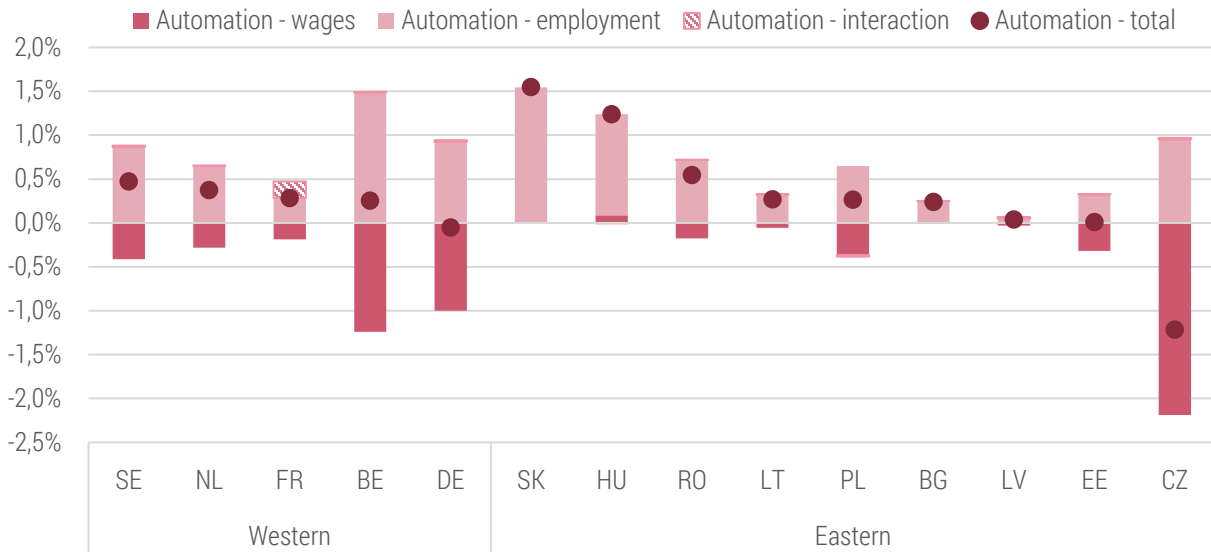
However, in a study of 14 European countries between 2006 and 2018, a period of intensive robot adoption in the EU, researchers found that tax and benefit policies largely absorbed labour market shocks caused by automation.

Past studies into the drivers of income inequality have focused on the role of tax-benefit systems and demographic change, but this is the first evaluation to isolate the effect of automation.

The study used data from several EU sources, including the EU Structure of Earnings Survey, the EU Labour Force Survey, and the EU Statistics on Income and Living Conditions, to estimate the effects of robot penetration on wages and employment rates. Next, these estimates were used to calculate wages and employment rates that would have been recorded in 2018 if robot penetration remained at the 2006 level in each country. Finally, the resulting data was injected into EUROMOD, a tax-benefit microsimulation model, to assess the anticipated effects on household incomes.

While the installation of industrial robots slightly decreased wages and reduced employment among most exposed workers, the effect on household disposable income was relatively small. Automation-driven increase in household income inequality was most pronounced in Eastern European countries with large increases in robot penetration, such as Slovakia and Hungary (Figure 1). However, the magnitude was small – in all countries studied, it was below 1.5% of the 2018 value of the Gini index, much lower than the actual changes in Gini indices in most countries between 2006-2018.

**Figure 1. Contribution of automation to disposable household income inequality**



Notes: The figure shows the terms of the decomposition of the change in household income inequality (automation-induced wage effect, automation-induced employment effect, their interaction and the total automation effect). In Eastern and Western Europe, countries are ordered in decreasing order of the total change in the Gini Index due to automation. Data: EUROMOD, EU-SILC.

Automation had a minor impact on household income inequality despite widening wage inequality and market income inequality more strongly. In most countries, household composition – the fact that workers more exposed to robots tend to live in households where other members have similar exposure – slightly amplified the automation shocks, but the size of this effect was tiny, especially compared to the role of benefits. In general, benefit systems played a dominant role in cushioning market income losses, while taxes had a more muted role (Figure 2).

**Figure 2. The cushioning effect of the tax-benefit system and household formation on automation-induced inequality changes**



Notes: The figure shows the effect of taxes, benefits and household risk-sharing on the change in the Gini Index due to automation. In Eastern and Western Europe, countries are ordered in decreasing order of the total change in the Gini Index due to automation. Data: EUROMOD, EU-SILC

The study shows that while inequality has widened in many European countries in the last 15-20 years, it was not driven by robot adoption, but by other factors and policy choices that limited income redistribution.

There are some limitations to the findings. First, the simulations did not consider behavioural responses to automation. Second, changes in non-labour market incomes, fertility, or household structures were not included in the calculation. Still, the findings paint a less gloomy picture of robots' role in Europe's economic development.

Doorley, K., Gromadzki, J., Lewandowski, P., Tuda, D., and Van Kerm, P. (2023). *Automation and Income Inequality in Europe*. IBS Working Paper 06/2023

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