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MAGAZINE

# The spread of automation in Europe and the impact on family income inequality

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**Piotr Lewandowski, a well-known Polish economist, presented preliminary results of a joint research study aimed at assessing the impact of automation (industrial robots) on household income inequality in 14 European countries.**

Piotr Lewandowski is a labor economist and chairman of the board of the Institute for Structural Research (IBS) in Warsaw, Poland, as well as a research fellow at IZA in Bonn and RWI in Essen.

At the seminar held on September 12, 2023, Piotr Lewandowski presented the preliminary results of a joint research study aimed at assessing the impact of automation (industrial robots) on household income inequality in 14 European countries during the period between 2006 and 2018, which was characterized by the rapid adoption of industrial robots.

To understand the magnitude of the findings of this research, we asked a couple of questions to Piotr Lewandowski.

- **What impact has the spread of automation had on the unemployment rate and household income?**

Over the past decade, efforts have been made to understand how automation, particularly the spread of industrial robots, has affected labor markets in different countries. My understanding of this literature is that we cannot confidently say whether robots reduce employment and wages. The results differ greatly depending on the geographical area considered. In the United States, for example, researchers often find adverse labor market effects of robots. However, studies for European countries or Japan show that these effects are much more limited or even benign.

In our study, we strive to evaluate the employment and wage effects of robot penetration, and to assess the implications for household income inequality. This is critical, because in European welfare states, tax and benefit systems respond to shocks to household market incomes rather than wages per se. We find that robots have a small negative impact on the wages and unemployment rates of more exposed groups of workers.

However, despite automation's adverse labor market impact, its consequences for household income inequality are very small or almost nonexistent. This is mainly because benefit systems in Europe have largely offset the negative income shocks brought about by automation.  In a sense, the European welfare states have been able to respond to this challenge. Inequality has widened in many countries in the last 15-20 years. However, our study shows that robots are unlikely to have driven this. Other factors, perhaps related to trade, and policy choices that limited income redistribution, probably played a larger role.

- **Are there differences, for example, in the effects that occur in the labor market, in terms of wages and employment rates, in some countries versus others? And what macro and microeconomic variables play a key role in this process?**

Our study clearly shows that welfare states played a key role in cushioning labor market shocks from automation. Countries such as Belgium or Germany have experienced strong labor market shocks brought about by automation, but the response of tax and welfare systems has been quite strong and extensive. However, this was not the case in other countries, especially in Eastern Europe. So the quality and strength of social security varies from country to country, and certainly this affects how labor market shocks affect living standards. Labor market institutions are also important: for instance, employment protection legislation, minimum wages or collective bargaining, trade unions, etc. Unfortunately, we still have very little knowledge how they shape the impacts of automation. We know that countries like Germany have been more resilient to automation than the US. Probably, strong collective bargaining and unions who are able to negotiate with employers various actions aimed at securing jobs in Germany played a role. But this is not enough to argue that another country, such as Italy or Poland, should adopt the German model of collective bargaining and would benefit to the same extent. The model and functioning of labor market institutions depends on their history, social norms, social capital, etc.  So, to conclude, welfare state clearly matters for cushioning of labor market shocks. But there's no perfect model of collective bargaining, minimum wage, or employment protection, that would maximise the benefits from automation or trade in every country.

- **Do you think there are economic policies that can influence the impact of industrial automation penetration?**

Technologies potentially replacing people, for example, specialized robots, have two possible effects. First, they improve productivity as products can be made faster and with higher quality. This allows businesses to grow and hire more workers. Second, it reduced demand for labor at a given level of production. So, the overall effect on employment depends on which of these prevails – scale or substitution. This balance can differ between sectors or even products. The response of trade is important – if automation allows firms to increase their global market shares, the rising scale of activity can offset the worker substitution effect of automation technologies. It may even increase employment. So I think part of the challenge is to identify the areas where automation can actually lead to increased production thanks to increased efficiency and lower prices, and therefore trigger trade-related growth.

For instance, we know that there is a huge demand for renewable energy, so we should probably invest more in automation that would help to produce more solar panels or wind turbines more cheaply. We know there would be a large market for them. But automation in a sector where the demand is more or less saturated, as in the case of the automotive sector, will have stronger

substitution effects cause the car sales won't explode just because we can produce them faster. Call centers are an even more extreme example. Chat bots could automate call centers but nobody will call customer support more just because chat bots are cheaper and can answer all day. So public policy could try to target efforts and encourage more automation and innovation in these areas where we can get this expansion, such as renewable energy sectors.

- **You have also studied such a hot topic as the effect of climate and energy policies on the labor market, so can you tell us something about that?**

The climate and energy transitions also have important implications for the labor market. Jobs that are carbon-intensive face a potentially significant adverse shock, either because production is energy-intensive, or because waste or materials are produced that are not at all environmentally friendly. This includes coal mining and energy generation, but also steel, chemical, petrochemical and cement industries that have carbn-intensive industrial processes.

The climate and energy transition will reduce the demand for workers in carbon-intensive sectors, but it will also change the demand for skills. It will be even more visible at the aggregate level: the transition creates many jobs, but they require very different skills than jobs that become obsolete. It is mostly a  reallocation shock that will have a very important geographic dimension: companies that will suffer because production is energy- or carbon-intensive tend to cluster in industrial hubs, while the new jobs that emerge are located in other places or more spread around. Gaps and inequalities may lead some people to earn more and the disadvantaged will find it difficult to move to different sectors.
In this context, education policies in particular should be very future-oriented, to steer younger people into forward-looking programs. It is very important to invest in lifelong learning, but we need to acknowledge that it will be difficult. It is inherently challenging to retrain people who have worked for many years in carbon-intensive manufacturing industries. Authorities should identify jobs with similar and transferable skills and priorities those as alternatives.

- **In your opinion, what impact will the advancement and emergence of artificial intelligence as an evolution or supplement to the work already done by industrial robots, especially in the advanced tertiary (or quaternary) sector have on the labor market of European countries?**

This is a challenging question as these new technologies have not yet been adopted widely and there are very few studies of their actual impact. We rather have assumptions.

The widespread adoption of AI technologies will clearly move the automation beyond routine jobs that could have been automated with previous technologies, towards less routine-intensive cognitive tasks.

In the past, with computers or industrial robots, jobs performed by workers with high mathematical skills, interpersonal skills, and very specific knowledge, such as in legal services, translation, or other fields, could not be replaced by technologies; on the contrary, technological progress benefited workers with such skills. Now it's different, there's a risk that some of the more skilled cognitive jobs will be replaced by these AI technologies.

But there are also two opportunities. First, we can use some of these technologies to improve the living conditions of people who are, shall we say, less privileged. For example, many children in

rural areas do not have as good teachers as urban children. With the help of artificial intelligence, we can improve access to what people can learn or the answers they can get. This presents an opportunity, but also a challenge for policy.

Second, most European countries, especially countries such as Italy and Poland, face fast population aging. The number of people entering the labor market is declining, and labor shortages emerge in many occupations. Europe has fewer and fewer workers and remains dubious to accept more migrants from outside of the EU. The growth of AI creates opportunity in this context, as it allows automation of some tasks in occupations with worker shortages. In a way, the AI may come at the right time to alleviate these shortages. Still, it is a challenge for policy as we need to we need to think about what are the most useful applications of these technologies in the not-too-distant future. The societal benefits from “the best use of AI” may not necessarily align with private benefits of firms that will actually adopt these technologies.
In conclusion, as labor supply in Europe will decline and shortage of workers will grow, the AI technologies we can help us to increase productivity and improve job quality, but they can also lead to unemployment.

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