

Industrial Robots Widen the Gap Between What European Workers Produce and What They Are Paid

Sector-level evidence on robot adoption and the wage–productivity wedge across 23 EU countries, 1995–2020

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The Issue

Across advanced economies, labor productivity and GDP per capita have kept rising while real wages for many workers have stagnated, opening a growing gap between what is produced and what is paid. Industrial robots are one of the most visible drivers of this trend: by substituting for routine tasks, they can raise output per worker without raising labor compensation by the same amount. Whether and how strongly this happens in Europe has been difficult to establish, because data on robot adoption, value added and wages are rarely available at a comparable sector level across many countries. Understanding this link is essential for designing labor-market and industrial policies that ensure productivity gains from automation are shared with workers, rather than accruing disproportionately to capital.

What We Found

Across all specifications, robot intensity is positively and significantly associated with the wage–productivity wedge, with estimated elasticities of roughly **0.64–0.85** across all sectors and **0.80–0.96** within manufacturing alone. The relationship survives controls for outsourcing and capital intensity.

KEY FINDINGS

- **Robots widen the pay–productivity gap:** Across European country–sectors over 1995–2020, higher robot intensity is positively and significantly associated with a larger gap between value added per worker and the wages workers receive, in every specification we estimate.
- **The effect is strongest in manufacturing:** The wedge rises more steeply with robot intensity in manufacturing (coefficients of roughly 0.80–0.96) than across the economy as a whole (roughly 0.64–0.85)—manufacturing, and especially the automotive sector, has by far the highest robot density.
- **Not explained by outsourcing or capital deepening:** The positive link remains stable once we control for outsourcing of intermediate inputs and the capital-to-labor ratio, indicating that robots have an effect distinct from general capital accumulation.
- **The relationship appears causal:** Instrumenting European robot intensity with adoption trends in the US, South Korea and New Zealand suggests a causal link.

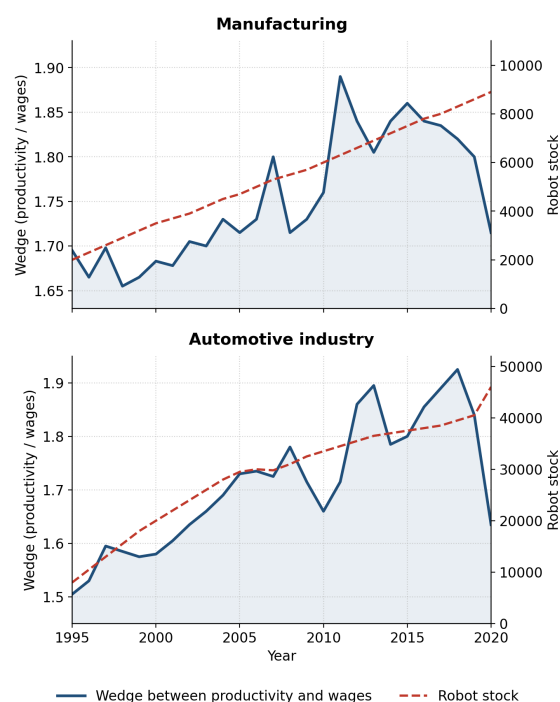


Figure 1: Evolution of robot stocks and the wage–productivity wedge in Manufacturing versus the Automotive sector, 1995–2020 (including the COVID-19 dip in 2019–2020).

Instrumental-variable estimates based on robot-adoption trends in the US, South Korea and New Zealand reinforce these correlational patterns—particularly in weighted specifications with sector and country fixed effects—strengthening the case that robot adoption widens the wage–productivity wedge in economically important sectors.

Who Is Most Affected?

The widening wedge is concentrated in **manufacturing** and, within manufacturing, is most pronounced in the **automotive sector**, where robot intensity (robots per worker) is roughly five times the economy-wide average. Descriptively, the association also appears stronger in routine task-intensive industries, where tasks are more easily substitutable by industrial robots—although this heterogeneity is not always statistically robust. In practice, this means that workers in robot-intensive manufacturing sub-sectors, particularly those performing routine tasks, are the group most exposed to a growing disconnect between the value they help create and the wages they earn.

Policy Implications

1. Strengthen Wage-Setting Institutions in Robot-Intensive Sectors

Where automation raises productivity faster than pay, sectoral collective bargaining, wage agreements and minimum-wage policy in manufacturing—and especially in the automotive sector—can help ensure that workers share in the productivity gains generated by robot adoption, rather than seeing them captured entirely as capital income.

2. Target Reskilling and Lifelong Learning at Routine-Task Occupations

Active labor-market policies should prioritize workers in routine task-intensive occupations within robot-intensive manufacturing sub-sectors, who face the greatest risk of having their bargaining position eroded by automation, helping them move into tasks that are complementary to robots.

3. Establish Routine Monitoring of the Wedge as an Early-Warning Indicator

National statistical offices and ministries of economy/labor should track sector-level robot intensity together with the gap between value added per worker and wages, using harmonized data sources (IFR, EU-KLEMS, OECD ICIO) to identify sectors and countries where decoupling is accelerating and intervene early.

4. Design Redistribution and Industrial Policy with Automation in Mind

Because the robot-driven wedge is concentrated in a relatively small number of economically important, capital-intensive sectors, tax, transfer and sectoral support policies should be calibrated to compensate exposed workers without discouraging productivity-enhancing investment in automation.

References

- Acemoglu, D. & Restrepo, P. (2020). Robots and Jobs: Evidence from US Labor Markets. *JPE*, 128(6), 2188–2244.
- Acemoglu, D. & Restrepo, P. (2022). Tasks, Automation, and the Rise in US Wage Inequality. *Econometrica*, 90(5), 1973–2016.
- Dauth, W., Findeisen, S., Suedekum, J. & Woessner, N. (2021). The Adjustment of Labor Markets to Robots. *JEEA*, 19(6), 3104–3153.
- Graetz, G. & Michaels, G. (2018). Robots at Work. *REStat*, 100(5), 753–768.
- Mihaylov, E. & Tijdens, K. (2019). Measuring the Routine and Non-Routine Task Content of Occupations. *Tinbergen Institute DP*.
- Oleš, T., Prettnner, K., Lábaj, M., Majzlíková, E. & Hojdan, D. (2026). Robots and the Wedge between Wages and Productivity. *Dept. of Economic Policy WP Series*, No. 33.
- Venturini, F. (2022). Intelligent Technologies and Productivity Spillovers. *JEBQ*, 194, 220–243.