

Policy Paper: Navigating Workforce Ageing and Technological Change to Sustain Firm-Level Productivity

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Background

The ageing of the population – driven by persistently low birth rates since the 1980s, increases in life expectancy and the gradual retirement of the baby boomer generation – is fundamentally changing labour markets in most industrialised countries. This demographic shift results in a shrinking and ageing workforce, accompanied by growing shortages of workers and skilled labour. While policy measures such as raising statutory retirement ages have partially mitigated workforce contraction, they have also increased the average age of workers. Consequently, retaining, upskilling, reskilling the workforce and integrating underrepresented groups—including women, the unemployed, and older workers—into the labour market has become increasingly vital.

The relationship between workforce ageing and firm-level productivity is complex and influenced by individual factors (such as education and health), institutional settings, and firm responses to age diversity. Simultaneously, rapid advances in automation, digitalisation, robotisation, and artificial intelligence (collectively referred to as ADRA) are transforming production processes and productivity outcomes. Understanding how these demographic changes interact with productivity of Austrian firms is crucial for designing effective policies.

Using a linked dataset on employers and employees for the years 2013–2022, we examine how firm characteristics (size, age, sector, location, capital intensity and production technology) and the composition of the workforce (age, gender, educational attainment and employment status) are related with labour productivity – measured as value added per employee.

Key Findings

- **Age–productivity relationship:** The study identifies a statistically significant inverted U-shaped relationship between workforce age composition and labour productivity. Both a high share of younger workers (aged 29 or younger) and older workers (aged 50 or older) correlate negatively with productivity, particularly in micro and small firms.
- **Firm size and sector variation:** No significant age-productivity relationship is observed in medium-sized and large firms, nor in certain sectors such as mining, energy, water supply, real estate, and repair services. Sector-specific effects vary, with some sectors showing positive productivity effects from older workers, and this is particularly true for those working in scientific and research areas.
- **Technological adoption:** Capital intensity and investment in ADRA technologies have strong positive associations with productivity. ADRA has a stronger association with productivity than workforce ageing or age concentration.
- **Heterogeneity and complementarities:** The relationship between workforce age and productivity is heterogeneous across firm size, sector, and productivity levels.

Policy Implications

1. Foster Age-Inclusive Employment Practices

- Promote age-sensitive human resource management to leverage the strengths of both younger and older workers.
- Encourage lifelong learning and upskilling initiatives to maintain productivity across all age groups.

2. Support Micro and Small Firms

- Provide targeted support to micro and small firms, which, in terms of the total number of firms in Austria, constitute the majority of firms and are most sensitive to workforce age composition. Among small firms we find a higher share of self-employed and elder workers as well as a less age diverse workforce. Also, investments in new technologies tend to be a higher financial burden for micro and small firms than for medium sized to large firms.

3. Accelerate Digital and Automation Adoption

- Incentivise investment in ADRA technologies, particularly among smaller firms, to enhance productivity since productivity is positively associated to productivity for minor and small firms.

4. Improve Data and Research Infrastructure

- Enhance data collection on working hours, part-time employment, training, human resource practices, and detailed technology use to better understand productivity dynamics.
- Support longitudinal studies to capture long-term effects of demographic and technological changes and to identify causal relationships.

Limitations and Future Research

The study acknowledges limitations including measurement of labour input by headcount rather than hours worked, lack of detailed data on work experience, job tenure, and HR practices, and broad categorisation of production technologies. The relatively short ten-year data period restricts insights into long-term trends.

Future research should aim to:

- Measure labour productivity more precisely as output per hour worked.
- Incorporate age-oriented human resource management and working conditions.
- When data is available over a longer period, use the time dimension to analyse causal the relationship between changes in the age structure of the workforce and productivity within a company..

Conclusion

Sustaining firm-level productivity in ageing economies requires a dual focus on workforce age composition and technological advancement. Policies that combine support for age-diverse workforces with the promotion of modern production technologies are essential. Tailored approaches recognising firm size and sectoral differences will enable firms to adapt effectively to demographic and technological challenges, ensuring economic resilience and growth.

The full study can be found at: Mahlberg, Bernhard; Mara, Isilda; Prskawetz, Alexia; Gerstner, Isabel (2026): Automation, Workforce Age Structure, and Firm Productivity: Evidence from Austrian Linked Employer-Employee Data, ECON WPS – Working Papers in Economic Theory and Policy, No. 01/2026, available at <https://hdl.handle.net/10419/342377>