Digitalization and the Future of Work: Macroeconomic consequences for tomorrow’s employment, unemployment and wages

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Panel 4 – Employment forecasts and the digital, green and demographic transitions
A „Jobless Future“?

“According to this report, 47% of all employees in the USA work in occupations that likely can be automated within the next 10 to 20 years.”

“The experts are divided in two camps. Some claim that the flood is rising rapidly and destroys 80 percent of jobs in 20 years. The others think that this result will only be achieved later.”

Der Spiegel, 17.4.1979

Der Spiegel, 3.9.2016
1. **How many jobs are automatable?**

2. **What are the employment effects of digitization and automation?**
Automation Potentials: Large Differences

Automation Potential

Data & methodology vs. occupation - vs. job-level

F/O - occ. AGZ - occ. AGZ - ind. N/Q - ind. AGZ - Germany Arnold et al. D/M

Occupational Level Individual/Job Level
Automation Potentials vs. Employment Effects

• Occupation-level approaches overestimate automation potentials
  • Why? Many workers specialize in non-automatable niches

• Automation potential ≠ employment effects!!!
  • Slow diffusion of technologies
  • Flexibility of workers
  • Macroeconomic adjustment mechanisms

• Necessity to consider economic adjustments!
  • So far most studies focus on technological feasibility, not economic effects
Employment Effects: Mechanisms & Estimation

**Structural Model: Mechanisms**

- **Task Change**
  - Machines complement/substitute workers

- **Product Demand**
  - Relative Prices
  - Income Effect
  - Capital Production

- **Wage Adjustment**
  - Adjusting wages compensate employment responses

- **Mobility**
  - Workers move to growing segments

**Data**

- **Establishment Survey**
  - Technology Adoption
  - Production, Costs

- **Social Security Records**
  - (Un-)Employment
  - Wages
  - Occupational Mobility

- **Socio-Economic Accounts**
  - Production
  - Prices, Costs

- **WIOD**
  - International Flows
  - Sectoral Flows

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Empirical Estimation
Employment Effects of Digitization
small net positive effects (baseline scenario)

Employment Change, 2016-2021

net effect
substitution / complementarity
product demand
labor supply

Employment Change, 2016-2021
Employment Effects of Digitization
structural shifts between occupations

![Employment Change, 2016-2021](chart)

- analytical
- interactive
- cognitive routine
- manual routine
- manual non-routine

Employment Change, 2016-2021

-6% -4% -2% 0% 2% 4% 6% 8% 10%
Conclusions

• Occupation-level studies overestimate automation potentials
• Automation potentials ≠ employment effects
  • Slow diffusion of technologies
  • Flexibility of workers
  • Macroeconomic adjustment mechanisms
• Small net aggregate employment effects of technological change
• Large restructuring (occupations, industries) due to technological change
• Macroeconomic adjustment mechanisms play an important role

• Key question is not how many jobs, but which jobs we will have
• Are workers able to fill these jobs?
  • Rising inequality
  • Rising importance of further training
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References