1. **Contribution**
   - Provide first evidence on the diffusion of cutting-edge 4.0 technologies among German firms
   - Estimate the impact of technology on jobs on a firm-level
   - Estimate complementarity/substitution effects between technologies and worker groups

2. **Data**
   - Firm survey among 2032 producers and service providers (March 2016)
   - Current, past and future work equipment (machines, computers, robots, etc.)
   - Linked to social security records of all workers employed in the surveyed firms

3. **Descriptives**
   - **Composition of Firms’ Work Equipment**
     - Office and communication equipment (% in 2011, 2016, 2021)
     - Production equipment (% in 2011, 2016, 2021)
   - **Digital Divide**
     - **Group I: Forerunners**
       - Mostly larger and more capital-intensive firms
       - Larger revenues and profits
       - More aware of chances and risks of digitization
       - A lot of interactive work
     - **Group II: Latecomers**
       - Never invested in 4.0 technologies
       - Least digitized
       - Smaller firms with lower revenues and profits
       - Least aware of chances and risks of digitisation
       - Employ mostly middle skilled workers
       - A lot of manual routine work

4. **Econometric Approach**
   - Estimate 5-year changes (Δ) in labor demand in firm $i$ and worker group $j$:
   - $\Delta \ln N_{ij} = \alpha \Delta \ln Y_i + \beta \Delta \ln \sum \sum C_{jk} + \epsilon_{ij}$
   - **Complementarity/Substitution Effects Between Capital Type $k$ and Worker Group $j$**

5. **Results**
   - **Impact of Technology Investments on Firm Labor Demand by Worker Group, 2011–2016, in Percent**
   - Labor demand effect by age, education, tasks, and wages
   - Modern technologies complement younger workers while substituting for older ones
   - Polarization within firms in favor of both low- and high-skilled workers at the expense of the middle-skilled
   - Shifts in labor demand from routine tasks towards non-routine tasks (e.g., problem solving, intuition, creativity and social competence)

6. **Conclusions**
   - Slow but accelerating adoption of 4.0 technologies
   - Widening digital divide in the firm landscape
   - Neutral effect on total firm labor demand
   - Labor demand shifts
     - Towards interactive and analytical tasks
     - From medium skilled to low- and high-skilled workers
     - In favor of younger workers

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