

# Session 1 – Innovation, investment and productivity

## Does productivity growth threaten employment?

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*Discussion*

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# Agenda

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- Context
- Comments on Autor & Salomons
- Recommendations for productivity growth in Europe
- Wrap-up

## Innovation and productivity growth (1/2)

- Europe has not delivered on productivity growth after the last recession
- apparently stable long-term structures ...
  - two thirds of R&D privately financed and performed, one third by public sector - almost all basic R&D publicly financed
  - stable institutions at national levels in EU countries, and at the European level (FP, ERC)
  - low turnover among established industrial players
- ... questioned by disruptive change – “digital transformation”
  - driven largely by successful non-European players
  - large European corporates in follower positions – across industries
  - corporate experimentation with start-ups, accelerators, CVC, open innovation
  - new government focus on start-ups, VC

## Innovation and productivity growth (2/2)

- in some quarters: declining trust in science and experts of any kind
- responses: inclusive growth, citizen science, participatory approaches
- biggest challenge to firms: new business models requiring major organizational change
- European short-term challenges in the digital realm
  - classical SMEs - digital divide?
  - start-ups and ecosystems – working with market forces?
  - digital infrastructure – policy failure in some EU states?
- governments as strategic innovators („The Entrepreneurial State“)?

# Context



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## The least safe jobs

Telemarketer	Chance of automation <b>99%</b>
Loan officer	Chance of automation <b>98%</b>
Cashier	Chance of automation <b>97%</b>
Paralegal and legal assistant	Chance of automation <b>94%</b>
Taxi driver	Chance of automation <b>89%</b>
Fast food cook	Chance of automation <b>81%</b>

Source: The Future of Employment

## The safest jobs

Mental health and substance abuse social worker	Chance of automation <b>0.3%</b>
Occupational therapist	Chance of automation <b>0.35%</b>
Dietitian and nutritionist	Chance of automation <b>0.39%</b>
Physician and surgeon	Chance of automation <b>0.42%</b>
Clergy	Chance of automation <b>0.81%</b>

Source: The Future of Employment

## Setup

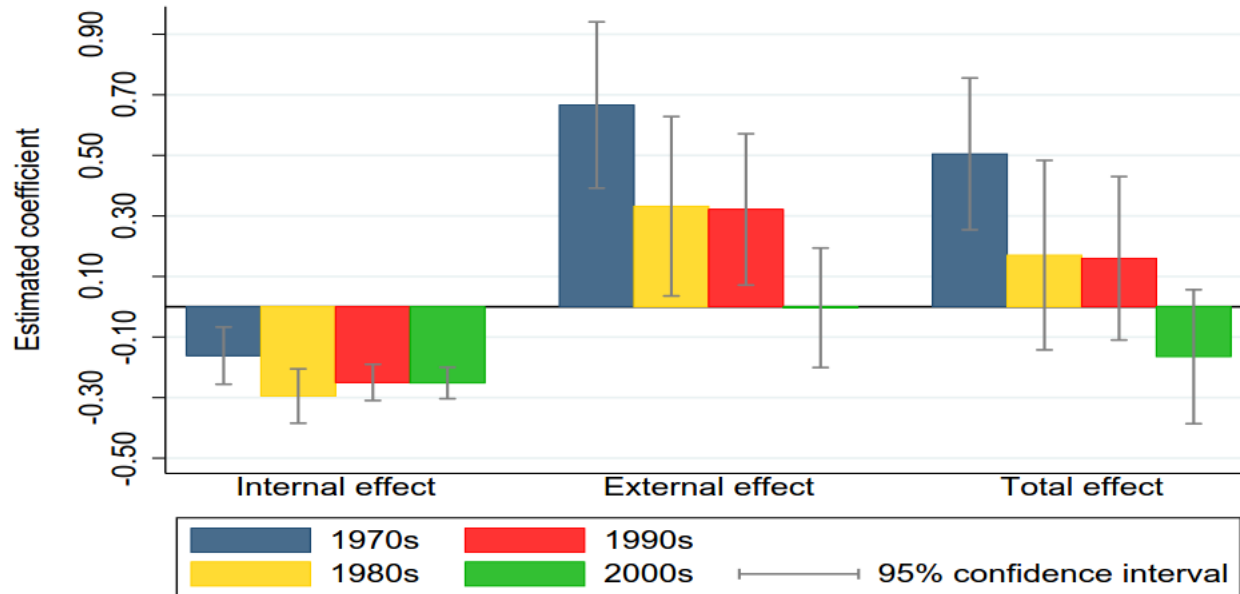
- ample contributions on skill-biased and routine-biased technical change by these authors
- systematic attempt to estimate various effects in one model to allow for aggregation of direct and indirect effects
  - KLEMS data for 17 countries, 25 industries, 37 years
  - country- by-industry-by-year stacked first-difference models
  - some experimentation with IV approaches
  - all results reduced-form
  - logical step-by-step derivation
  - very few quibbles from this discussant (off-line)

## Main results of the conference paper

- (own-industry) employment declines as labor productivity increases - robust positive consumption response
- negative impact at industry, but not aggregate level – why?
- productivity growth has important spillover effects into other sectors - spillover effects fully offset internal effects: net impact on employment/population is weakly positive
- probable sources: income effects (final demand) or interindustry demand linkages
- important heterogeneity across sectors: manufacturing has least negative own-effect; low-tech services has largest positive spillovers
- productivity-employment relationship may have changed over time

# Comments on Autor & Salomons

Internal effect **more (-)** and spillover **less (+)** in 2000s  
Same answer using value-added based productivity rather than gross-output based



Model is estimated by OLS; contains country, year, and industry FE; and controls for population growth.  
Productivity is value added based.



## Does productivity growth threaten employment? - “Not so far ...”

- Employment in advancing sectors shrinks—but spillovers to lagging sectors offset
  - Net effect: Productivity growth modestly contributes to rising employment-to-population—as well as rising consumption
  - Possible concern: relationship may have weakened in the 2000s
- Distribution of productivity growth across sectors matters
  - Productivity growth in services produces largest positive spillovers
  - Good news: Robotics have potential to raise productivity in services
- Virtuous story: productivity growth is good for employment (or at least neutral).
- But the impact of skills is non-neutral. We should worry about the quality of jobs, in particular for low- and medium-skill workers.
- Minor quibble: it would be good to hear why polarization patterns differ.

## Main results of the conference paper

- asymmetric effects - “growth is not enough”
- education and human capital formation matter
- back in an institutional game – skill formation and education
  - how do we teach?
  - how do we generate reliable insights on learning?
  - does technology itself come to the rescue (productivity gains in education)?
  - new skill-upgrading models provided by the market (“coding is not a science, it is a craft“)
- in any case – foregoing the productivity gains is not an option ... what to do?

# Recommendations for productivity growth in Europe



## OECD (2015) - The Future of Productivity (p. 9f) - excerpts

- improvements in funding and organization of basic research
- global mechanisms to co-ordinate investment in basic research and related policies, such as R&D tax incentives, corporate taxation and IPR regimes
- support diffusion from global frontier firms via trade
- do not excessively favor applied over basic research and incumbent over start-up firms
- reduce barriers to firm entry and exit, support improved matching in labor markets
- allow for increased worker mobility and better labor market matches
- ERC, potency of European basic research for patents
- OECD BEPS – Nexus principle for patent boxes, harmonization of IPR systems
- trade in limbo?
- European Innovation Council, VC markets in Europe
- labor market reforms
- Brexit

- To David and Anna:
  - Great analysis of the impact of productivity growth on employment
  - ... and of the skill-bias/routine-bias implications.
- Technological change has the potential of creating disruptions - in terms of wages and employment.
- Apparently growth is not enough.
- To Europeans: let us get those innovation-related policies right ...

Thank you for your attention!

Please find more detailed line of reasoning in Commission of Experts for Research and Innovation (2017). Annual Report. Berlin. <http://www.e-fi.de>.