

d·i·e



Deutsches Institut für  
Entwicklungspolitik

German Development  
Institute

# **Digitalization and economic development: Do we know the winners and losers?**

**Industry 4.0 Workshop, Bonn, 28 May 2018**

**Wilfried Lütkenhorst and Tilman Altenburg,  
DIE**



*"I regard it as the major domestic challenge...to maintain full employment at a time when automation is replacing men"*

John F. Kennedy, 1962

- Then, in the 1980s, intense debate around “micro-electronics” triggering a wave of industrial automation technologies in both light and heavy manufacturing industries.

⇒ “Jobless growth”

⇒ Developing countries: Relocation of industrial production from developing to developed economies?

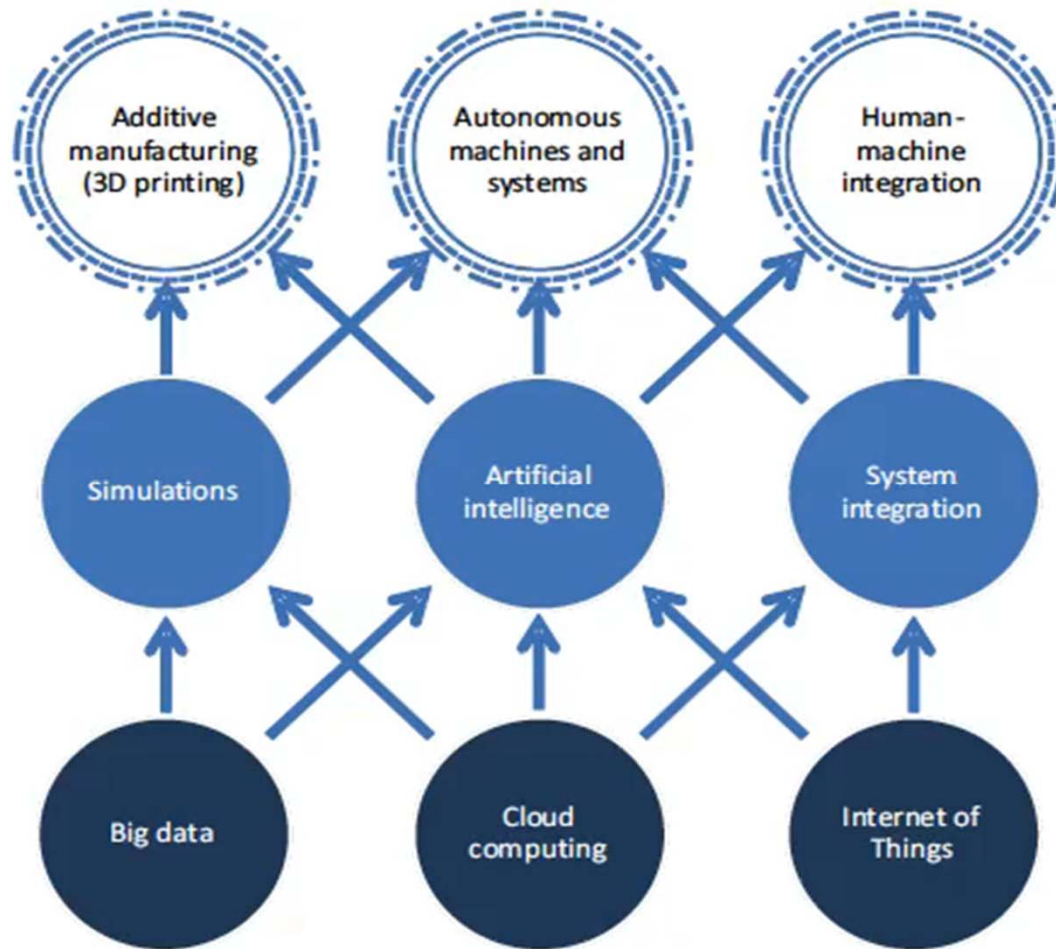
**... but observed changes less disruptive than expected**



- *Will the emerging Industry 4.0 really be a game-changer for productivity, inclusion, labour markets, the development opportunities of developing countries?*
- Widely held agreement: Yes !
- Digital technologies = latest generation of “general purpose technologies” (Jovanovic & Rousseau, 2005): pervasive in their innovative application across the various sectors of industry, transformational reg. business models, newcomers shaking up incumbents, winner takes-all markets ..
- Change is extremely fast !!



# The digital industrial universe



**Key digital technologies**

**Amplifiers**

**Enablers**

Source: OECD 2017



## **Expert opinion on labour market trends: Some consensus:**

- accelerating takeover of jobs by robotics & artificial intelligence, affects nearly entire spectrum of professional groups
- rise in global unemployment rate to almost 25%, widening social gaps
- 60% of experts favouring introduction of unconditional basic income
- shift to work being carried out in the collective virtual space
- concentration of new human jobs on activities requiring high levels of empathy and social interaction
- need for workers to acquire basic technological and programming skills ...

**Bertelsmann Millennium Project Delphi study (300 experts, 2050 time frame)**



## **But enormous uncertainty about time frames and effects**

- AM is “not only a disruptive technology that has the potential to replace many conventional manufacturing processes, but also an enabling technology allowing new business models, new products and new supply chains to flourish”

**UK Royal Academy of Engineering, 2013**

- AM is still in its infancy and will in the foreseeable future “not revolutionize industrial production”

**Acatech, Germany, 2017**

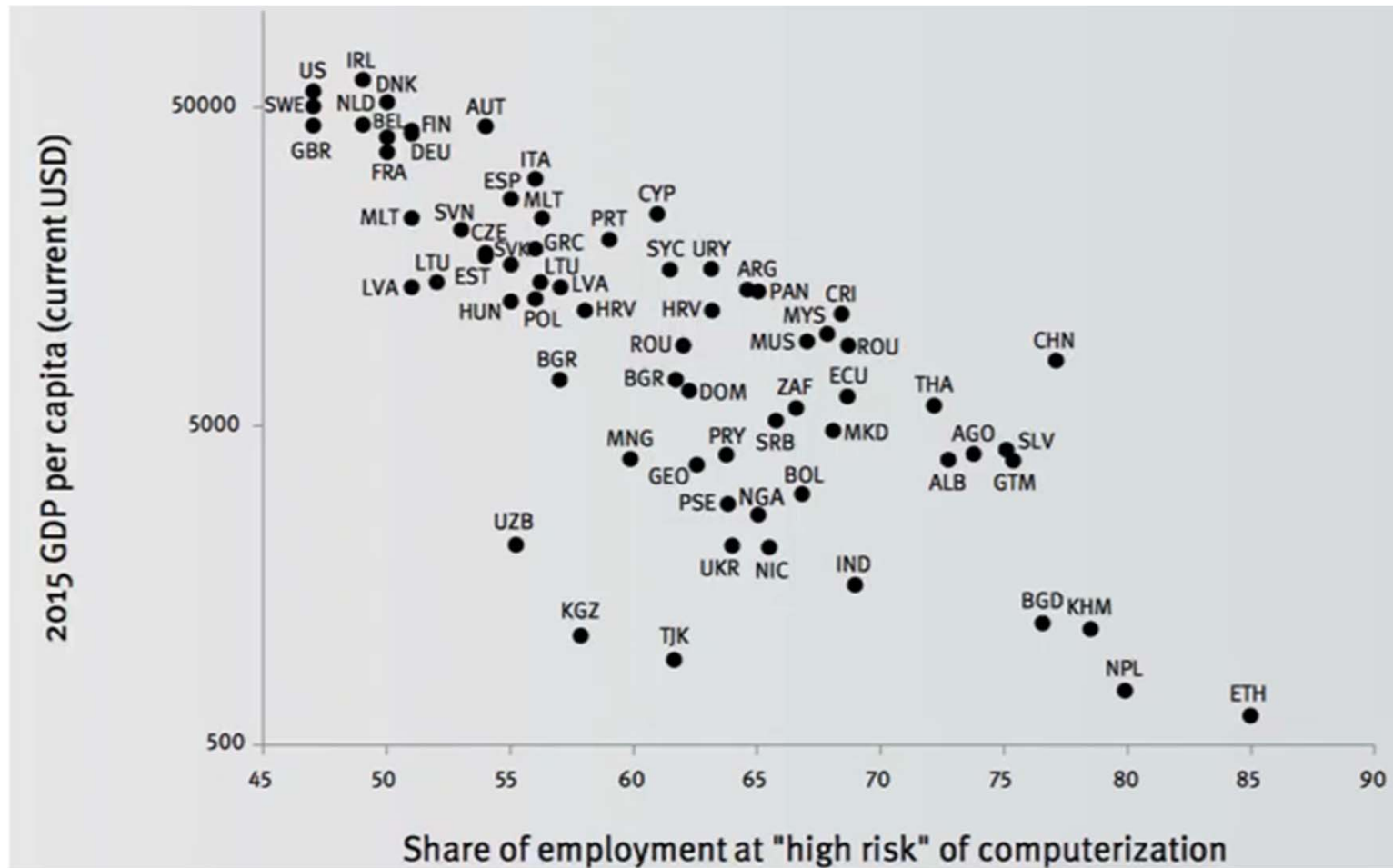


## Even more uncertainty with regard to developing countries ...

- Will local labour markets be MORE affected (because occupations are less sophisticated) or
- LESS affected because technologies diffuse slowly and labour remains cheaper than robots?



## Employment impact: Low-income countries at higher risk?

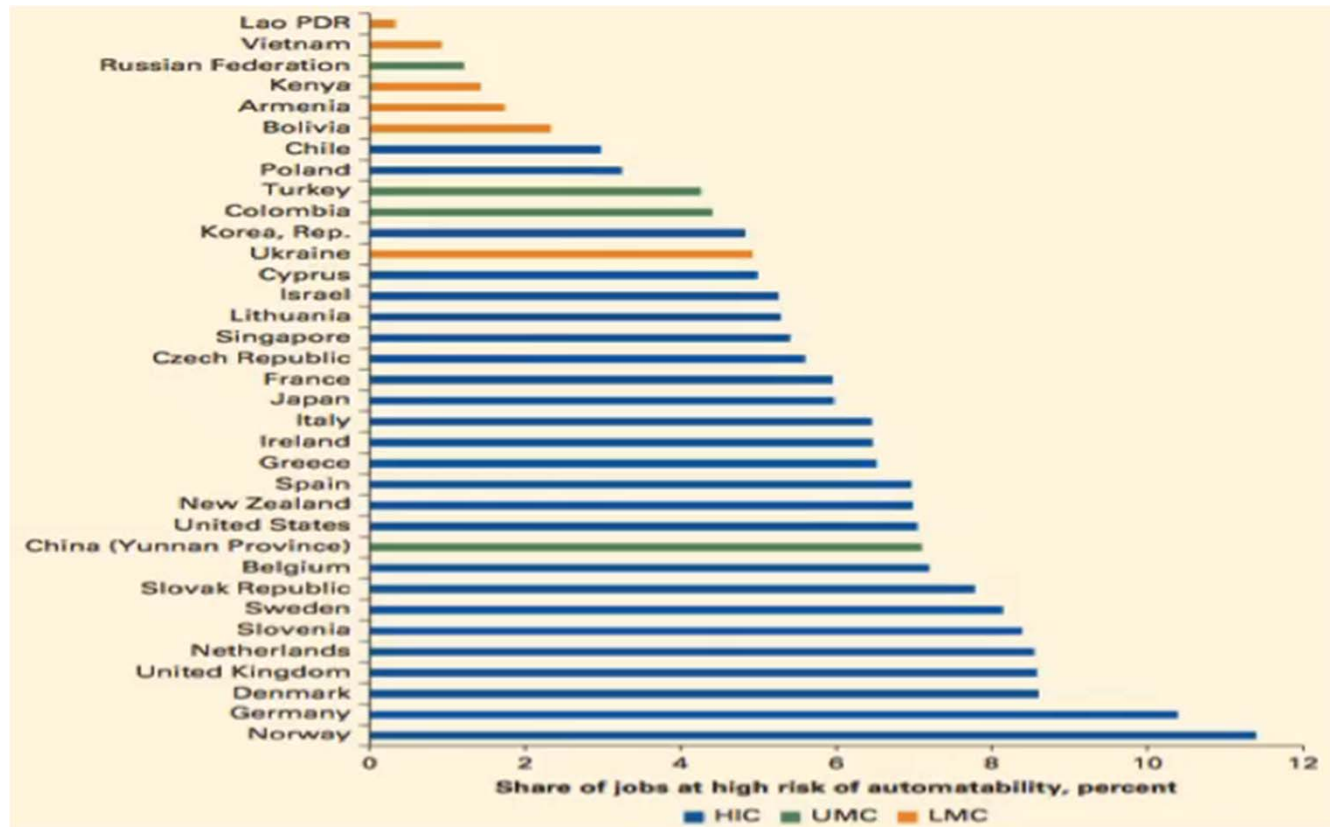


Berger and Frey 2017





... or just the other way round?



... and is the potential impact up to 85% or up to 12 %?

Hallward-Driemeier/Nayyar 2018



## What will happen to Global Value Chains?

- > 50% of trade in goods & ca 75% of trade in services are intermediate goods for further processing
- Trade disruption potential of AM estimated at 5-15% (World Bank) due to rapidly decreasing printer and unit printing prices
- Increasing evidence of 'botsourcing' (production remaining in OECD and being automated)
- Only anecdotal evidence of actual backsourcing (reshoring) of productive investments from developing countries
- China: 85 million jobs at risk of automation: automated at home or migrating to low cost countries?



## **Future of industrialization?**

- Still “flying geese”?

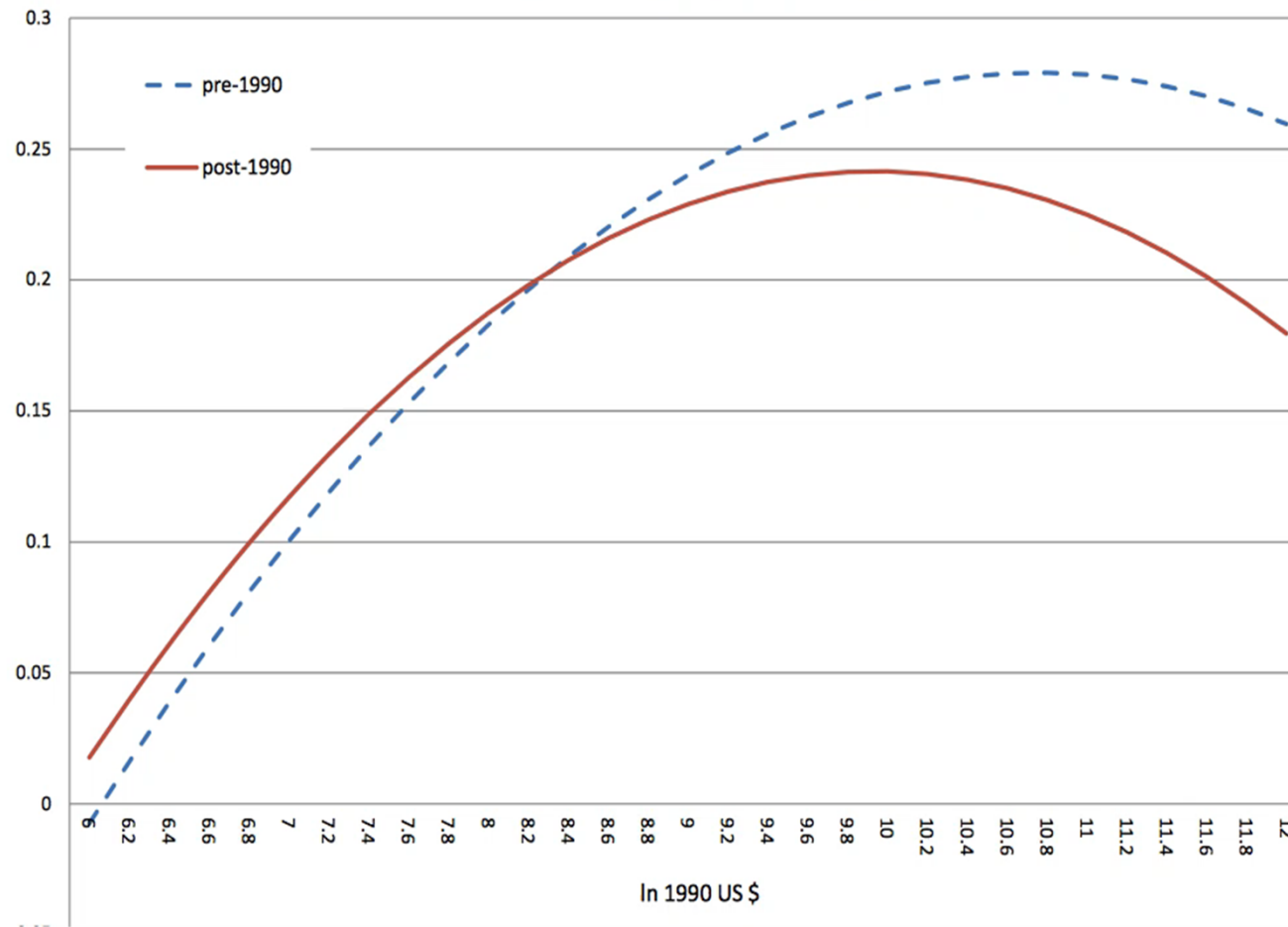
## **Or premature deindustrialization?**

- Peak GDP shares of MVA lower for developing countries today compared to OECD countries earlier AND kicking in at lower GDP per capital levels
- Industrialization possibly losing its historical function as growth escalator
- Rodrik: “very little chance that other countries will be able to replicate the export-oriented miracles of East and Southeast Asian countries”
- Digital automation as an amplifying force?

## **Service sector (‘servicification’) stepping in as a substitute?**

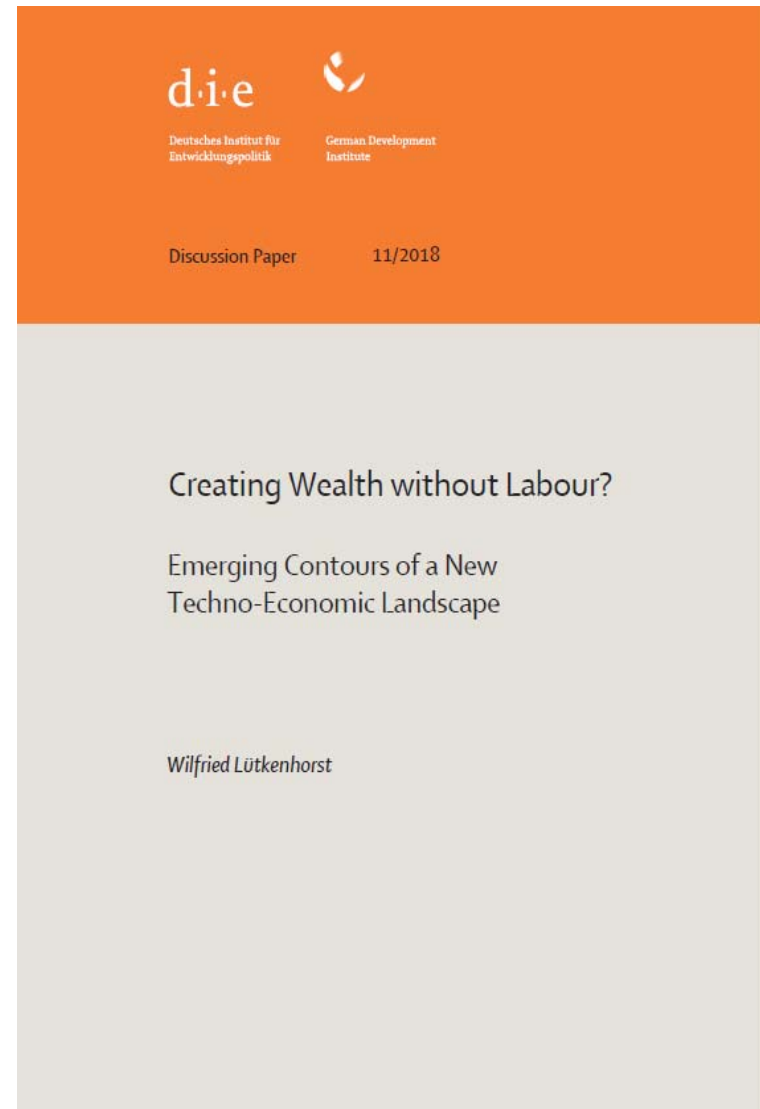


### Simulated manufacturing output shares (MVA/GDP at constant prices)



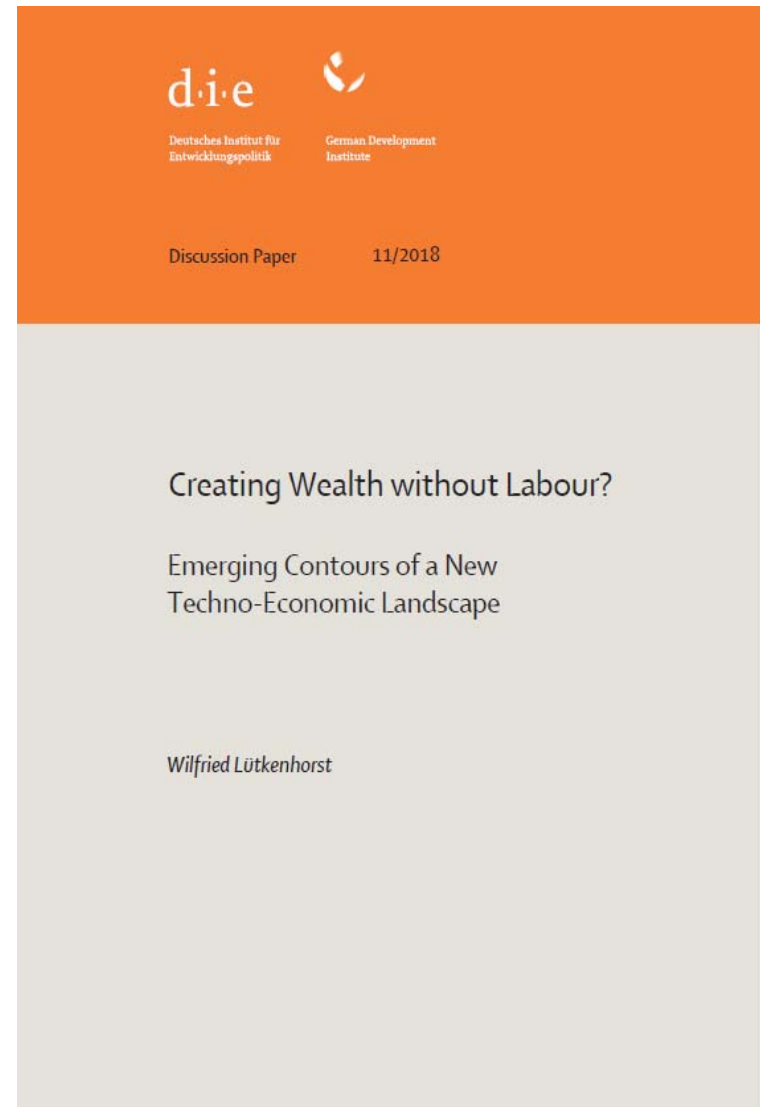


**Thank you for your attention!**





**Thank you for your attention!**





<https://www.youtube.com/watch?v=OsSDI8wWYyQ>