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# Perspectives on Productivity: Benefits to Economy, Business, Workers and Society

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## Why does productivity matter?

- “Productivity is not everything, but in the long run it is almost everything” (Paul Krugman)
- Productivity is the only sustained source of economic growth, as natural resources are finite and labour and capital run into diminishing returns
- Productive firms grow faster and tend to create new employment opportunities
- Productive jobs charge higher wages, and create a virtuous cycle of demand, innovation and investment in human, physical and various types on intangible capital
- Productivity is positively correlated to well-being and supports inclusive growth

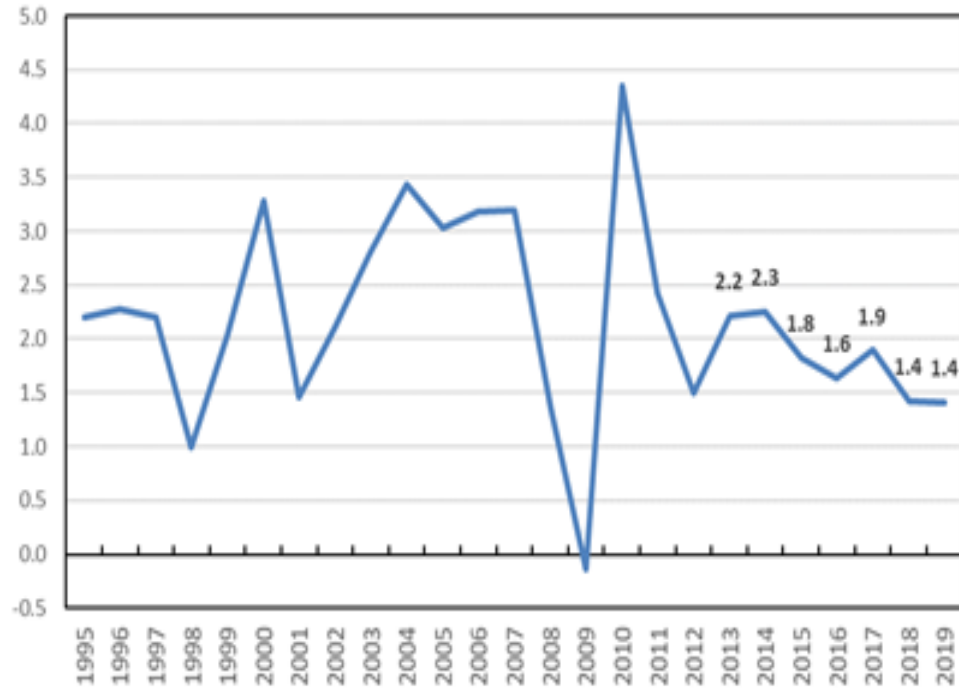
## Agenda

1. The big picture on the global productivity slowdown
2. The Fourth Industrial Revolution and the New Productivity Paradox
3. A productivity recovery post-COVID-19?
4. Towards inclusive productivity growth

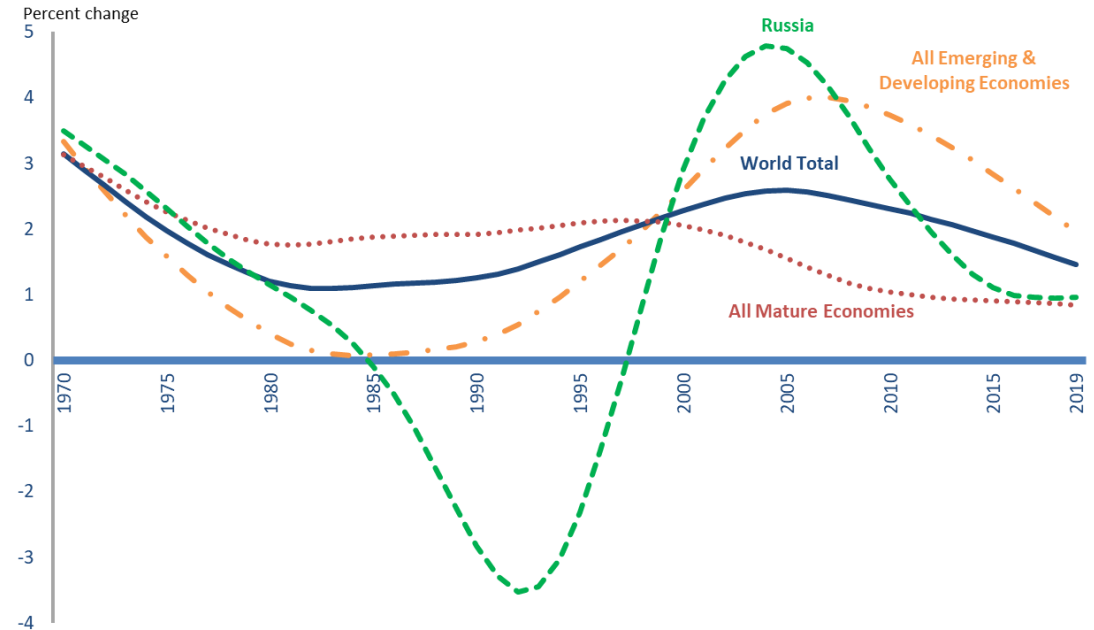
# The big picture on the global productivity slowdown

# Global slowdown in labour productivity growth

CHART 1: Global labor productivity growth (% change)

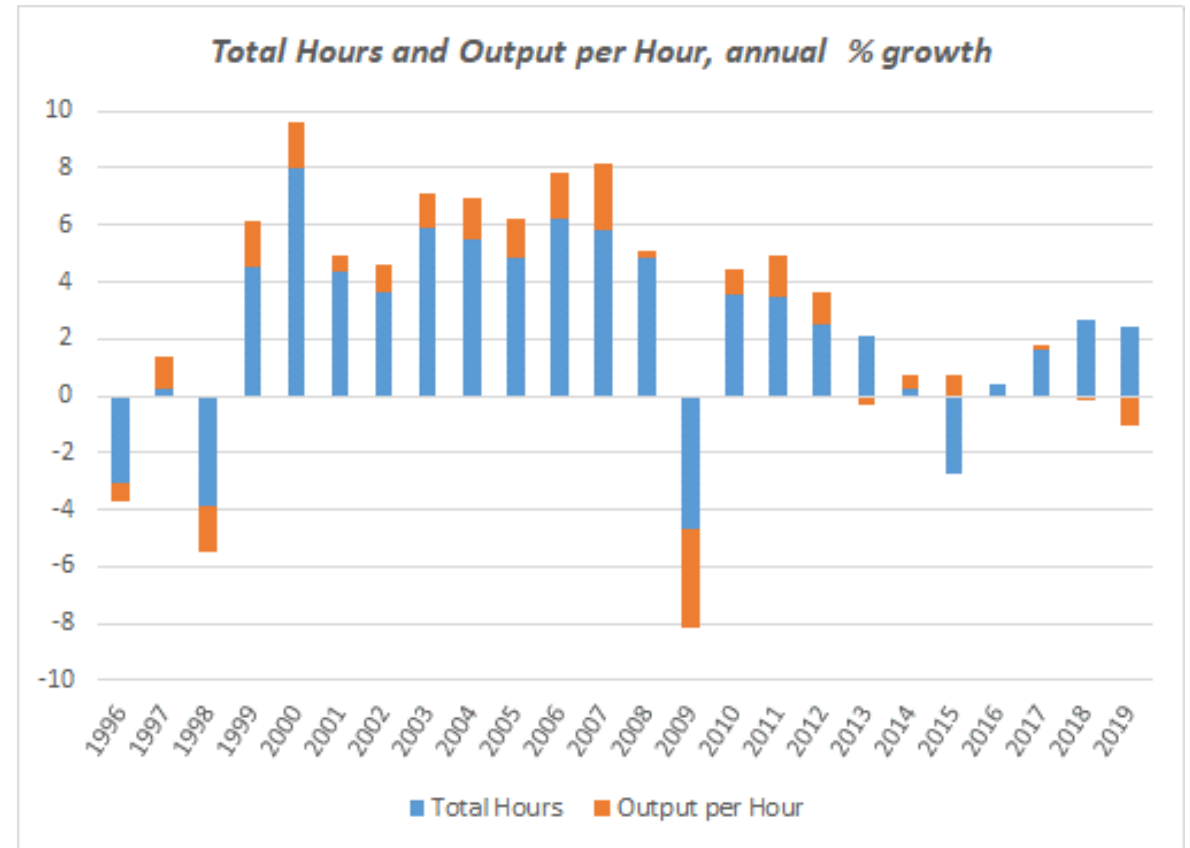
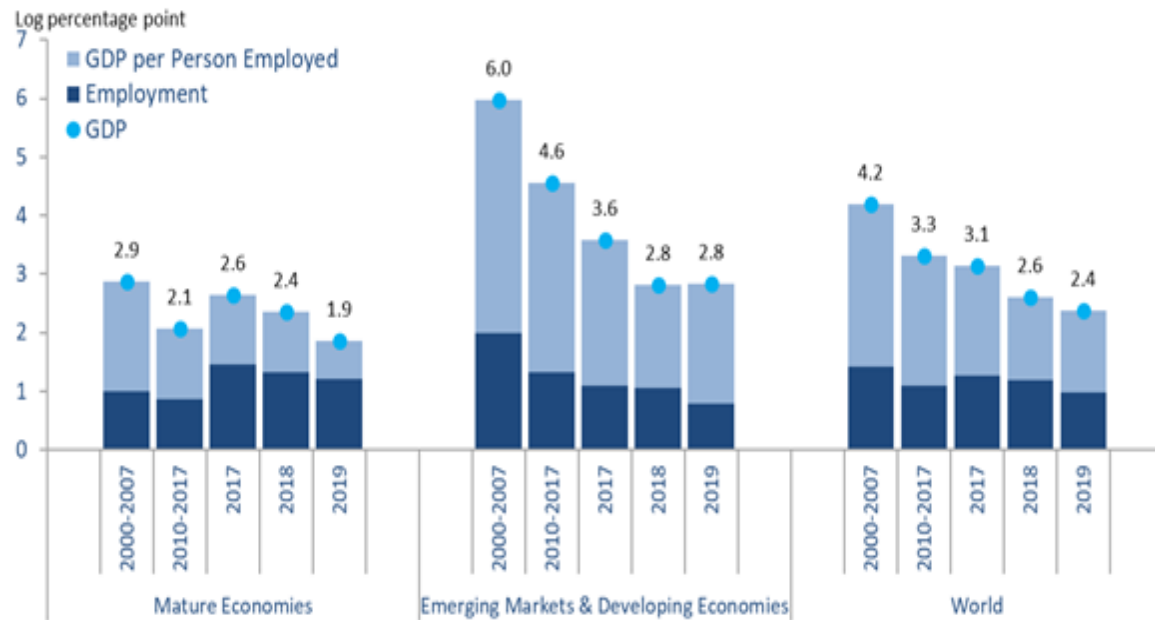


Trend Growth of GDP per person employed using HP filter, major regions, 1970-2019, %



# The slowdown has made GDP growth increasingly employment-driven, raising labour intensity of productivity

CHART 2: Contribution of Growth of GDP per Person Employed and Employment to GDP growth, Major Regions, 2000-2019



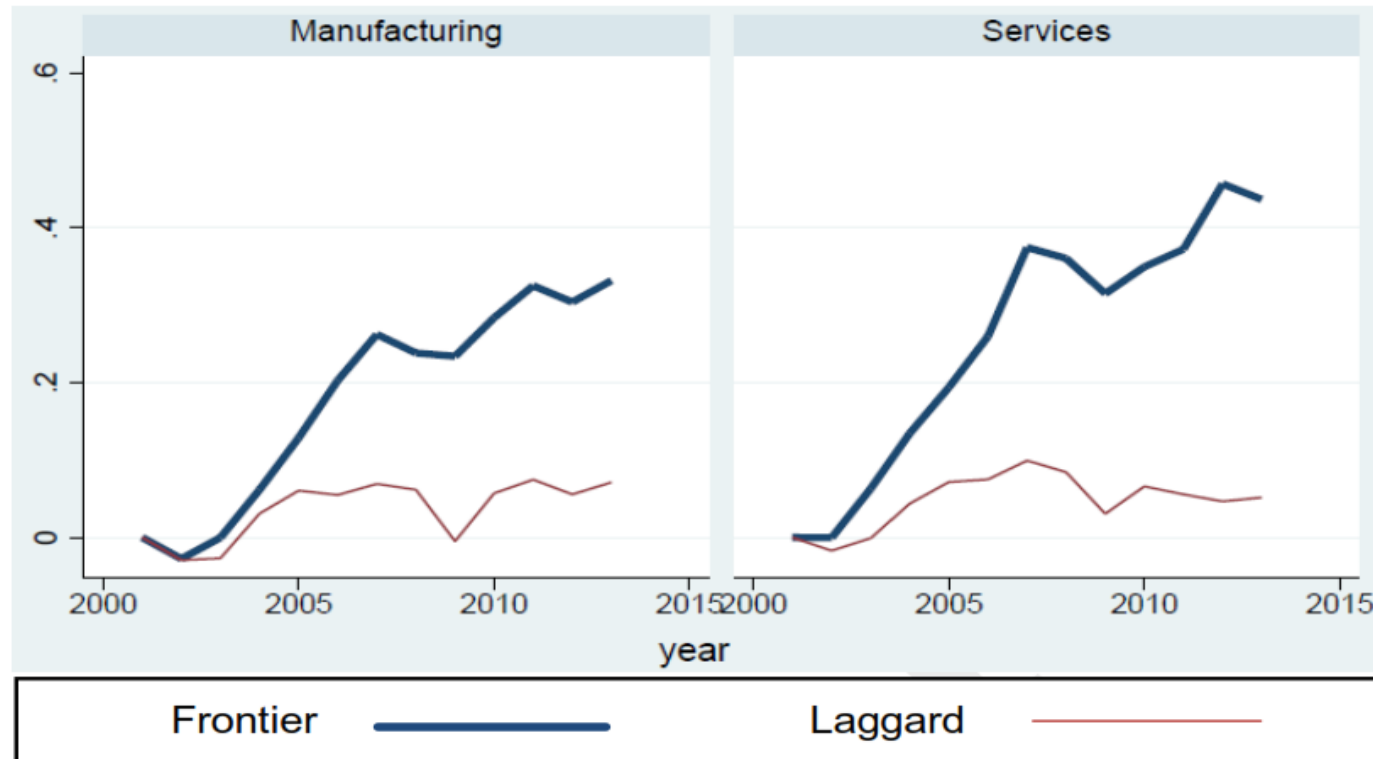
Source: The Conference board, 2020 edition

## Fundamental causes of growth slowdown, innovation deficit and low productivity

- ***Slowing catch-up growth*** in emerging markets, especially China – a one-off bonus?
- Greater share of ***low-productivity personal services*** in advanced economies (“Baumol effect”)
- ***Demographics***: aging population, declining labour supply and weakening demand
- Exacerbating effects from the ***global financial crisis***
  - Slow demand
  - Weak investment
  - Too low interest rates
  - Failing fiscal policies
- ***Policy effects***: increased regulation, lack of competition, declining global collaboration (trade, tax, etc.)
- Climate change, inequality?
- ***Weaker technological change and innovation***:
  - Technology and innovation pessimism & winner-takes-all effects
  - The Productivity Paradox of the New Digital Economy:

## Productivity gap between frontier and other firms

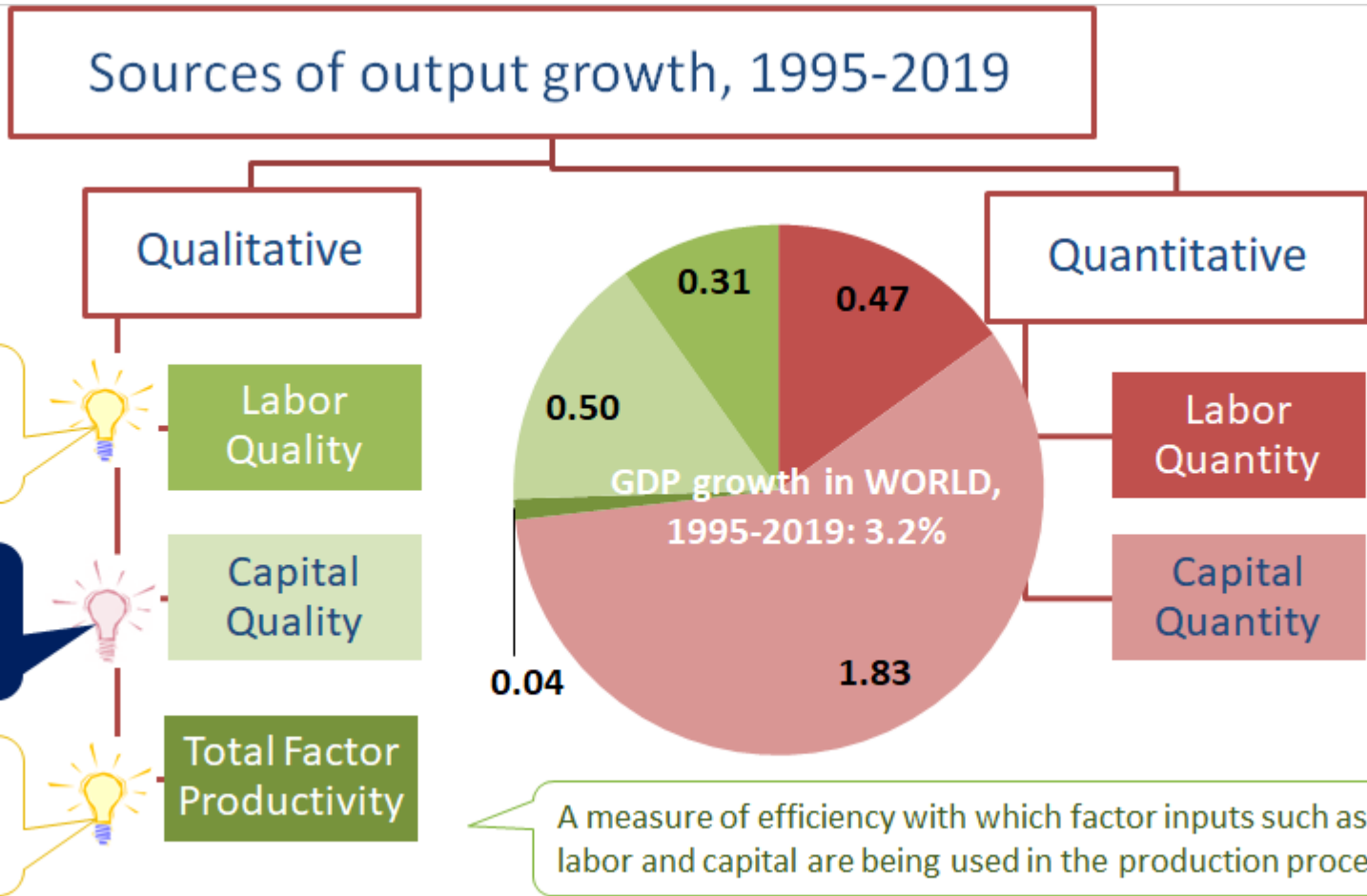
Labour productivity: value added per worker (2001-2013)



Note: The global frontier is measured by the average of labor productivity for the top 5% of companies with the highest productivity levels within each 2-digit industry. Services refer to non-financial business services. See details in Section 3.3.  
Source: OECD-Orbis productivity database



# About one quarter of global growth is driven by qualitative growth sources



Educational attainment: Optimize the use of available labor supply

Capital services: Harness the benefits from digital transformation

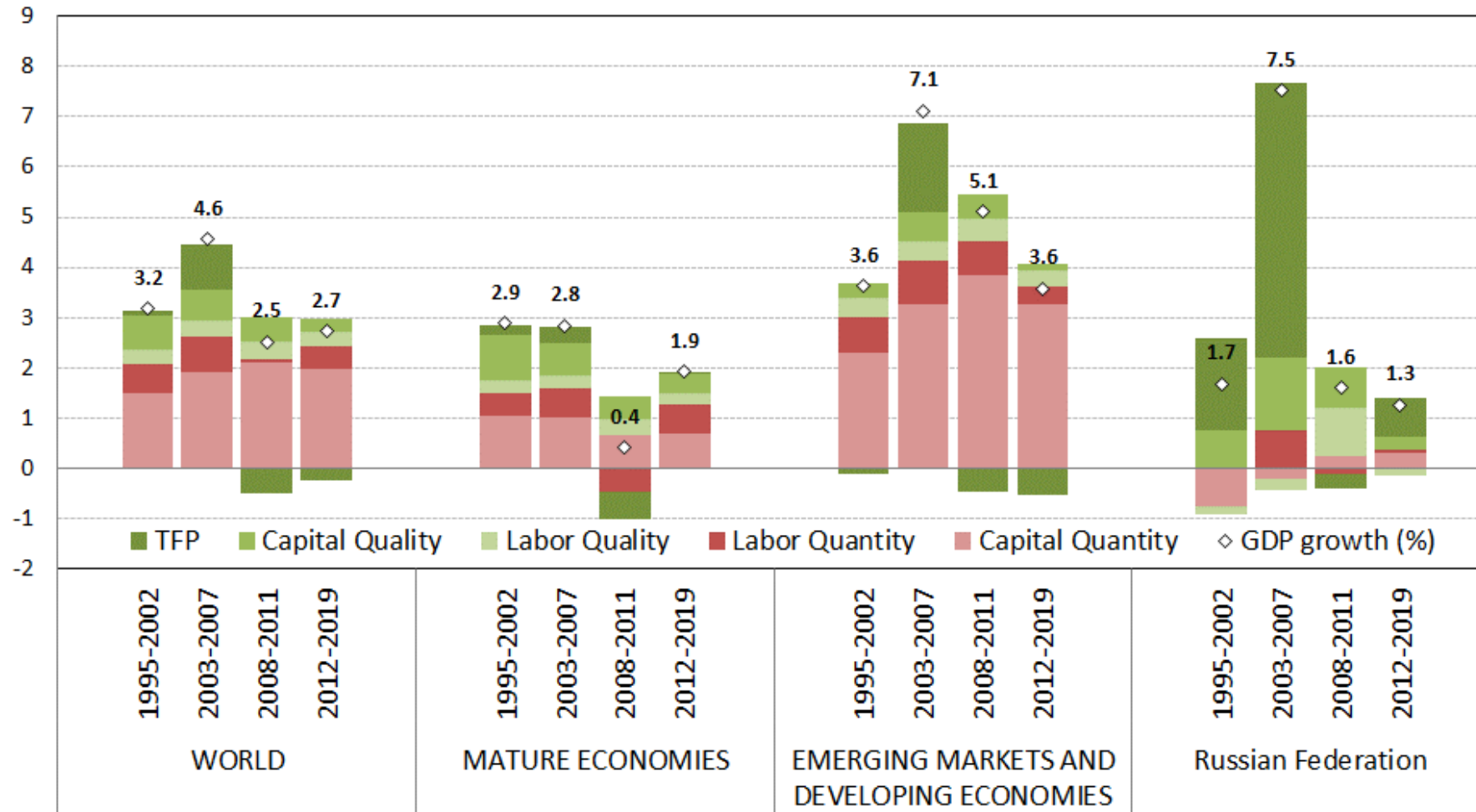
Innovation, smart regulation, collaboration by business, schools and government

Total hours worked: Raise workforce participation

Machinery, equipment and structures: Grow investment

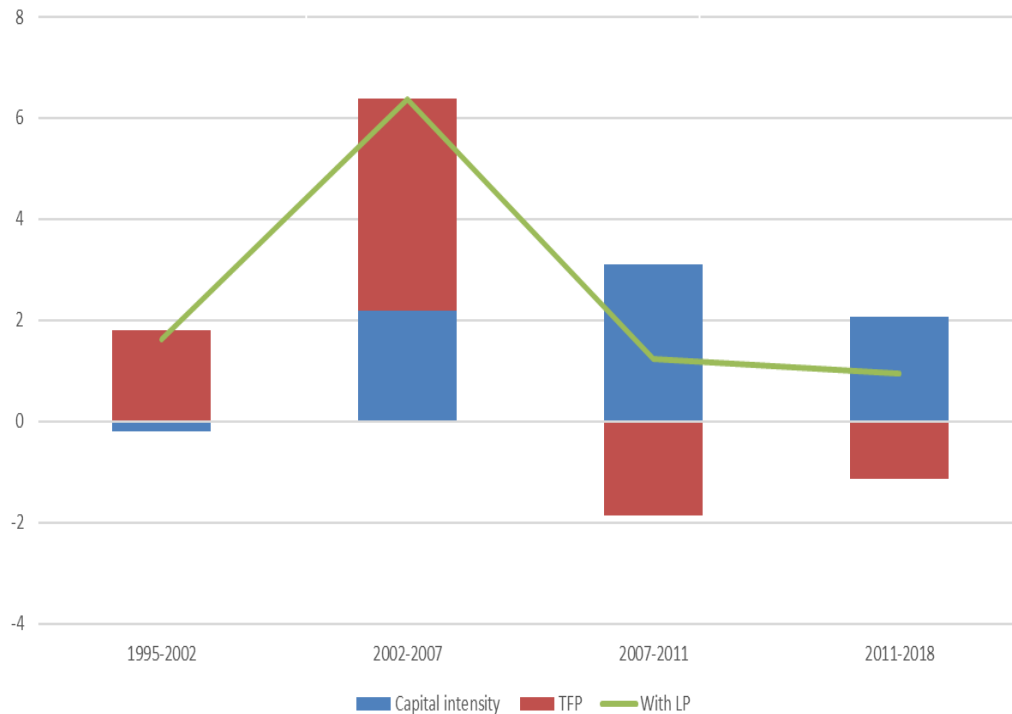
A measure of efficiency with which factor inputs such as labor and capital are being used in the production process

# Qualitative sources of growth have been main source of global growth slowdown

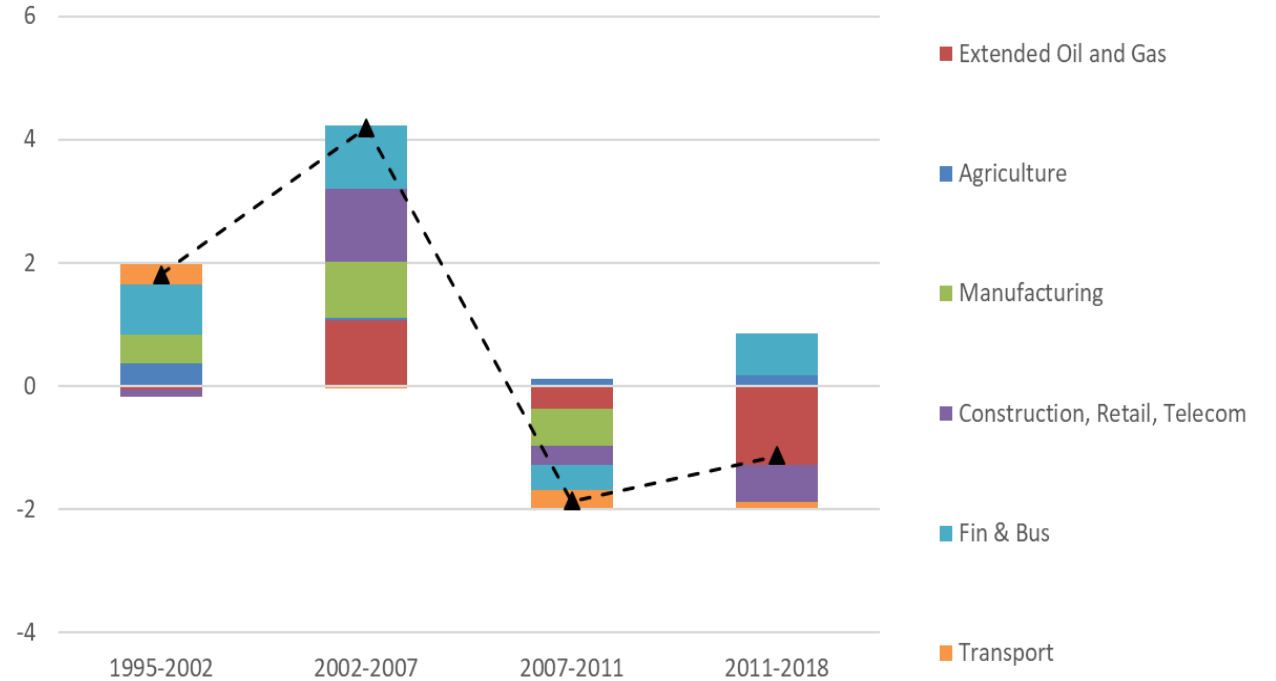


# Slowdown in total factor productivity growth also visible in Russia after shift effect to mining sector is taken into account

Contributions from capital intensity and TFP to labour productivity growth, excluding sector shifts, % per year



Sectoral contributions to aggregate total factor productivity growth, % per year



# The Fourth Industrial Revolution and the New Productivity Paradox

# The New Productivity Paradox deals with the productivity challenges from distinctly different new technologies, innovation patterns and applications

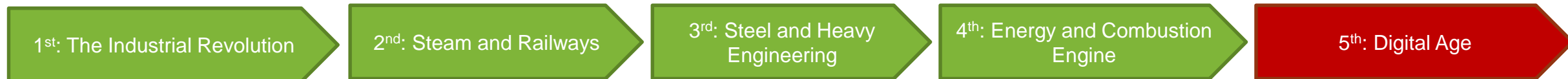


## The Old Digital Economy (1980s-mid 2000s)

Digitization driven by the rise of the PC and the internet as key drivers of greater business efficiency, creating access for individuals to digitization and the beginning of e-commerce.

## The New Digital Economy (as of mid 2000s)

Digitization driven by a combination of mobile technology; ubiquitous internet access; shift toward cloud, and more recently artificial intelligence and robotics



# Digital transformation is more than just the development of a new set of tools in the workplace

- **DIGITIZATION** is the adoption or increase in use of digital technology, which creates value through new products, new processes, business models and organizational structures
- **DIGITAL TRANSFORMATION** is an enterprise strategy that leverages digital technologies and the data they produce to connect organizations, people, physical assets and processes, etc.

## Digital Technologies

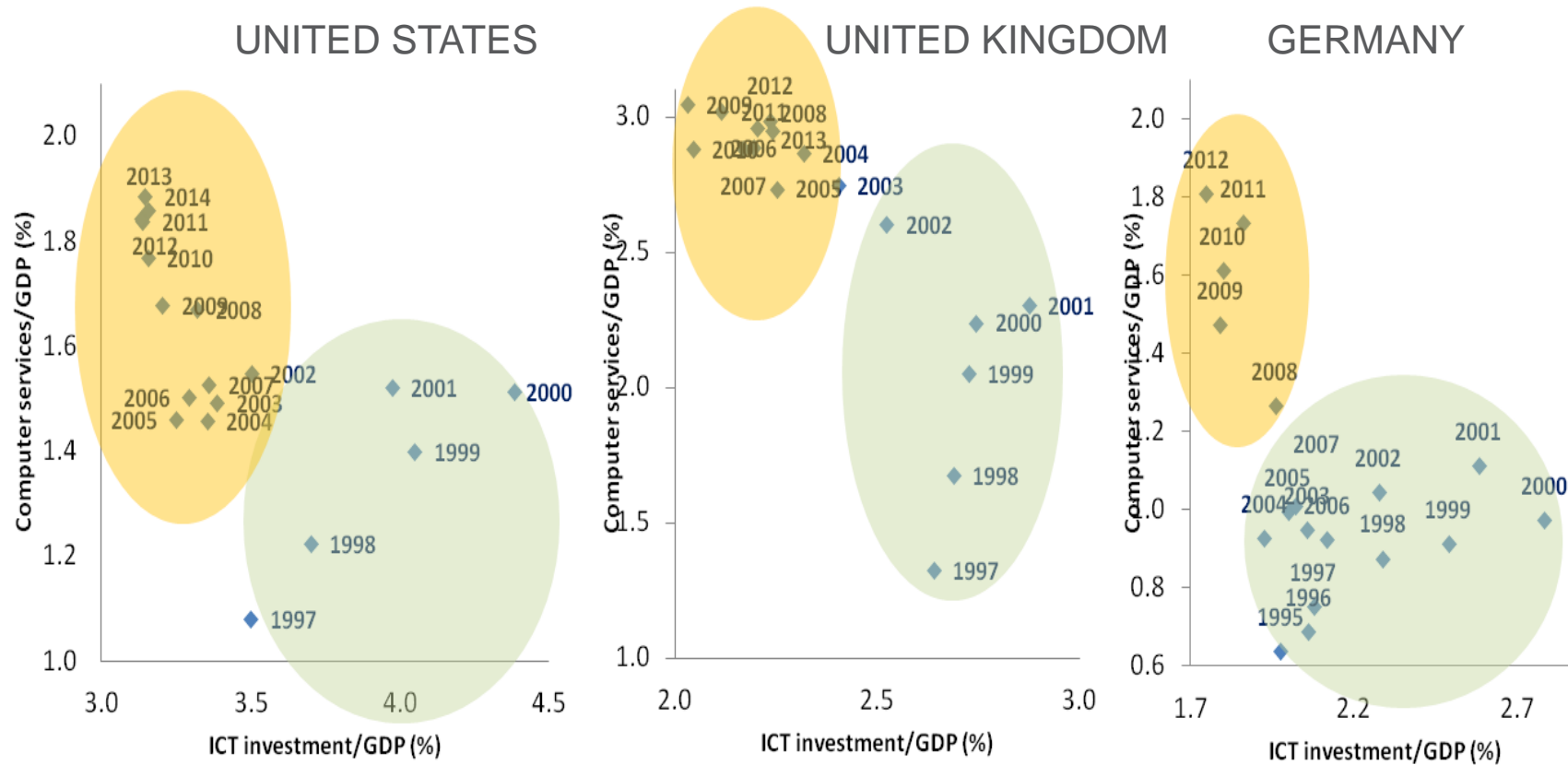
- Internet
- Mobile
- Embedded sensors
- Cloud
- Social media
- Enterprise or business collaboration platforms
- Public or open platforms
- Advanced analytics
- Artificial intelligence/ cognitive computing
- Automated trend scouting
- Bots
- 3-D printing
- Block chain
- Robotics
- Artificial intelligence

## Digital Transformation

- The use of digital technologies and the data they produce to
  - Connect organizations, people, physical assets, processes, etc. in new ways
  - Rapidly develop new products, services, markets, business models
  - Meet emerging customer needs
  - Aligned with digital business strategy
- Digital End-to-End processes:
  - Integration of stakeholders, systems and processes across multiple functions and geographies

# The shift from investment in ICT assets to spending on ICT services happened at different times and speeds

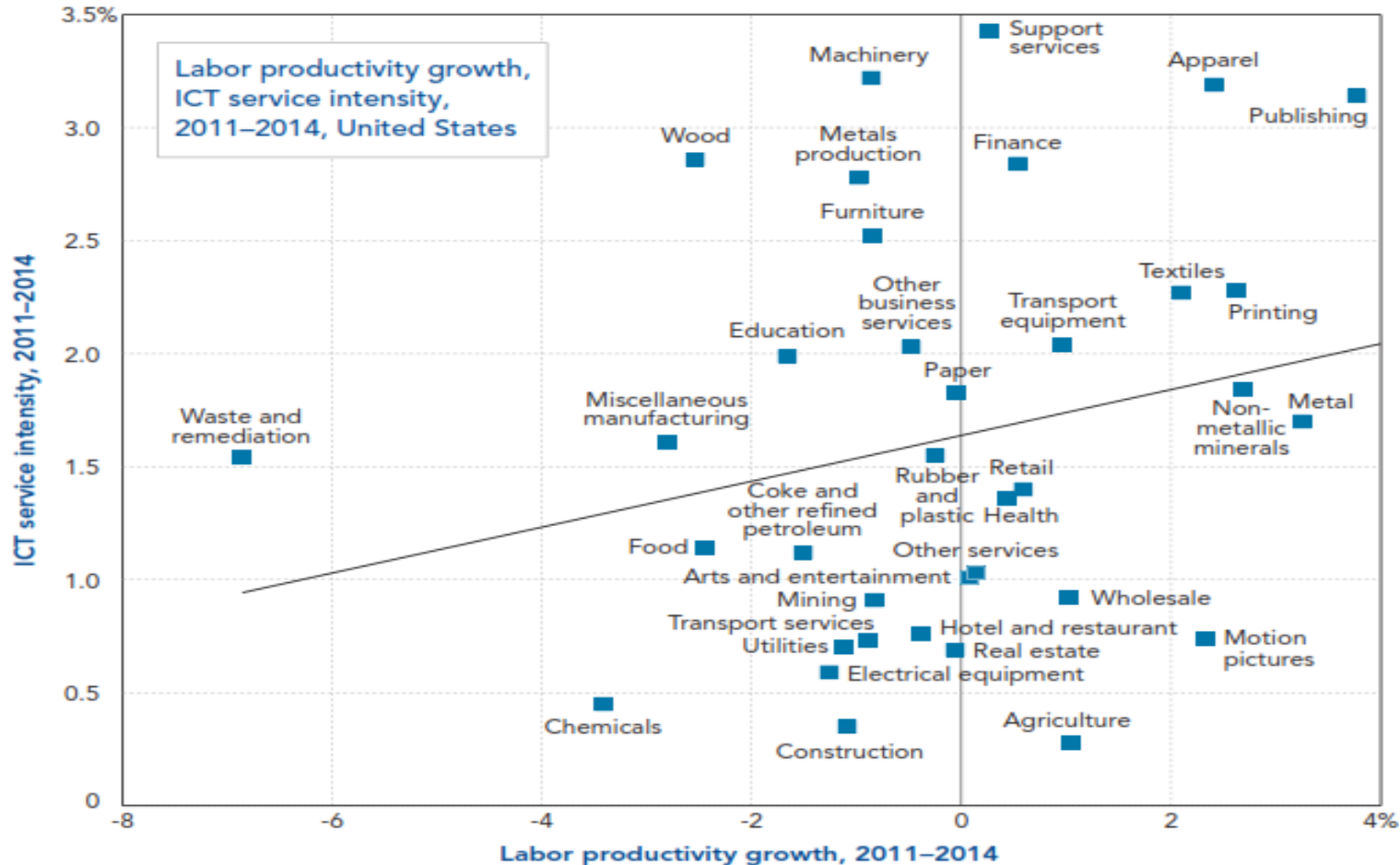
Computer services and ICT investment as a % of GDP



Source: Bureau of Economic Analysis; Eurostat; German Statistical Authority; EUKLEMS; The Conference Board



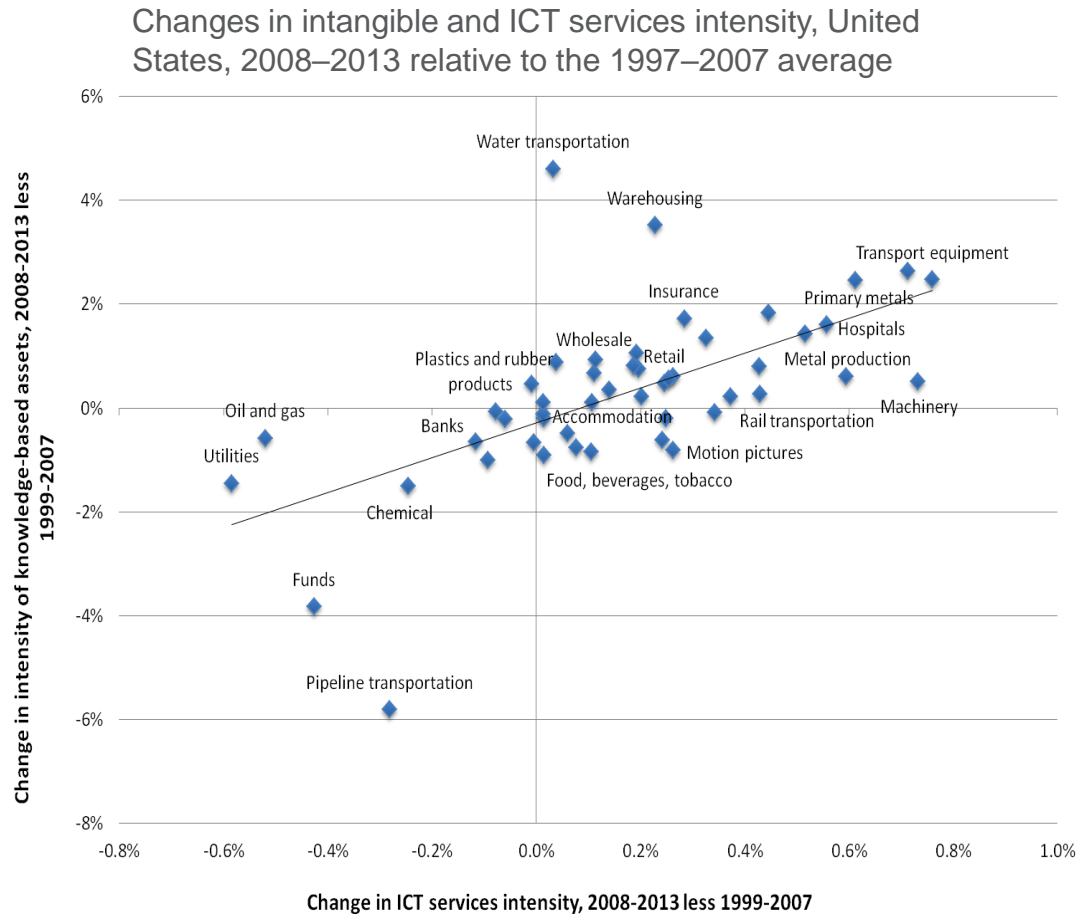
# The shift toward buying ICT services helps businesses become more productive



Source: US Bureau of Labor Statistics, and elaboration of data from the US Bureau of Economic Analysis; The Conference Board  
 Note: Changes are measured as 2007-2014 (annual average) minus 1999-2006 (annual average)



# Changes in intangible assets and ICT services are complementary



## Intangible assets by category

### 1. *Computerized information*

- Software and databases

### 2. *Innovative property*

- Research & Development (R&D)
- Other new productivity development costs (incl. expenditure to develop new industrial designs, mineral rights, artistic and entertainment originals, and new financial products)

### 3. *Economic competencies*

- Branding and customer development
- Development of new company business models and improvements in functional organizational practices (incl. payments for management and computer design and employer-provided worker training)

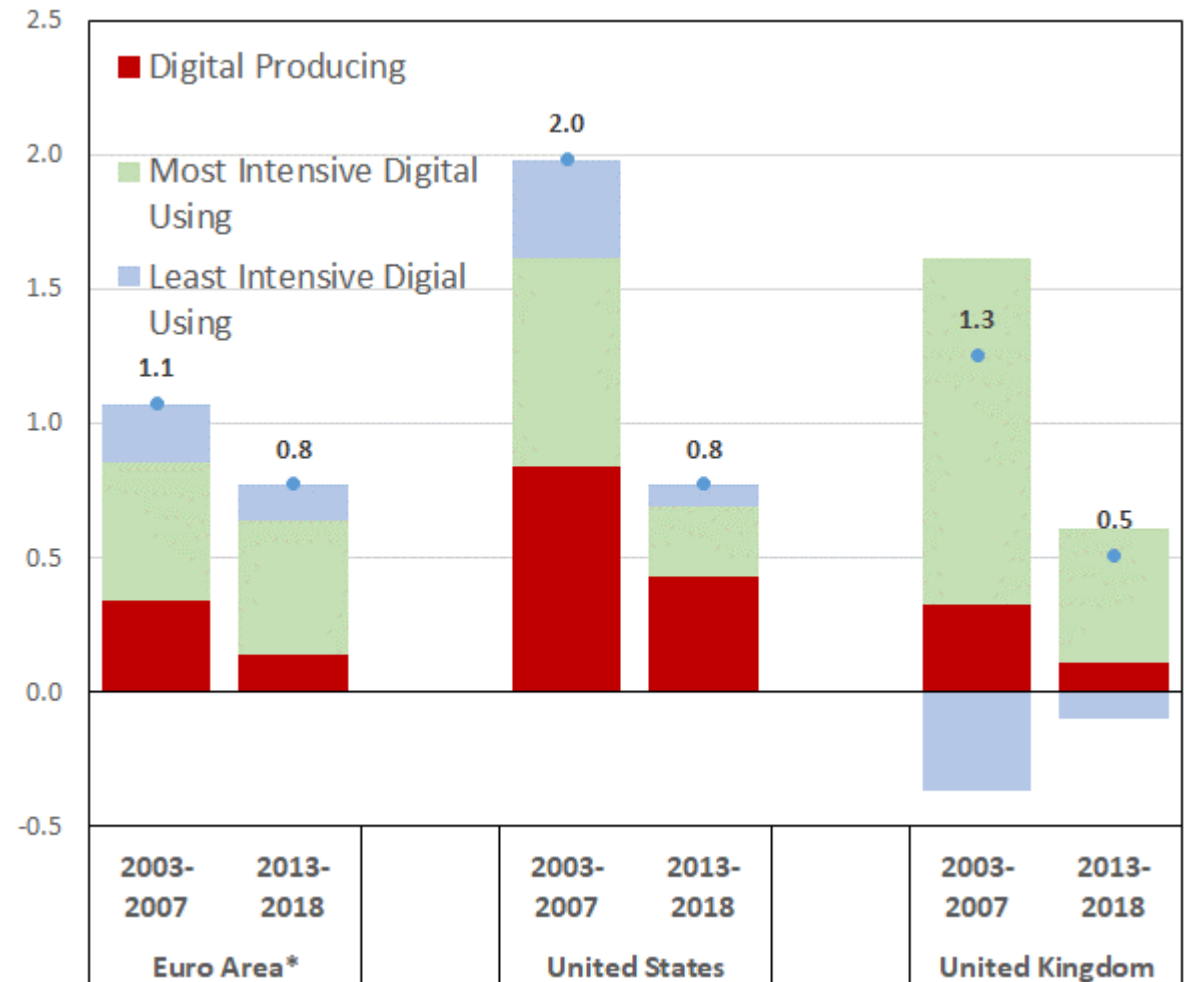
# While digital intensive-using industries contribute relatively more to productivity growth, it adds to the slowdown in absolute terms

## DIGITAL INDUSTRY TAXONOMY

NACE SECTORS	Used in this study	OECD (2018)*	Van Ark et al (2016)	
A	Agriculture, forestry & fishing	LDIU	LOW	LIU
B	Mining & quarrying	LDIU	LOW	LIU
10-12	Food, beverages & tobacco	LDIU	LOW	LIU
13-15	Textiles & leather	LDIU	M-LOW	LIU
<b>16-18</b>	<b>Wood, paper, printing &amp; media</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>MIIU</b>
19	Coke & petroleum products	LDIU	M-LOW	MIIU
20-21	Chemicals	LDIU	M-LOW	MIIU
22-23	Rubber & plastics; non-metallic mineral	LDIU	M-LOW	MIIU
24-25	Basic metals & metal products	LDIU	M-LOW	LIU
<b>26-27</b>	<b>Electrical &amp; optical equip.</b>	<b>DP</b>	<b>M-HIGH</b>	<b>IP</b>
<b>28</b>	<b>Machinery &amp; equipment n.e.c.</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>MIIU</b>
<b>29-30</b>	<b>Transport equipment</b>	<b>MDIU</b>	<b>HIGH</b>	<b>MIIU</b>
<b>31-33</b>	<b>Other manufacturing</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>LIU</b>
D-E	Electricity, gas & water supply	LDIU	LOW	MIIU
F	Construction	LDIU	LOW	LIU
<b>G</b>	<b>Trade</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>MIIU</b>
H	Transportation & storage	LDIU	LOW	MIIU
I	Accommodation & food services	LDIU	LOW	LIU
<b>58-60</b>	<b>Publishing &amp; broadcasting</b>	<b>DP</b>	<b>M-HIGH</b>	<b>IP</b>
<b>61</b>	<b>Telecommunications</b>	<b>DP</b>	<b>HIGH</b>	<b>IP</b>
<b>62-63</b>	<b>IT &amp; information services</b>	<b>DP</b>	<b>HIGH</b>	<b>IP</b>
<b>K</b>	<b>Financial &amp; insurance activities</b>	<b>MDIU</b>	<b>HIGH</b>	<b>MIIU</b>
L	Real estate activities	LDIU	LOW	LIU
<b>M-N</b>	<b>Professional services</b>	<b>MDIU</b>	<b>HIGH</b>	<b>MIIU</b>
<b>O</b>	<b>Public administration &amp; defence</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>MIIU</b>
P	Education	LDIU	M-LOW	LIU
Q	Health & social work	LDIU	M-LOW	LIU
<b>R</b>	<b>Arts, entertainment &amp; recreation</b>	<b>MDIU</b>	<b>M-HIGH</b>	<b>MIIU</b>
<b>S</b>	<b>Other services</b>	<b>MDIU</b>	<b>HIGH</b>	<b>LIU</b>

Note: \* Based on OECD's 2013-2015 grouping. LDIU=Least digital intensive using, DP=Digital Producing, MDIU=Most digital intensive-using, M-LOW=Medium Low, M-HIGH=Medium High, LIU=Least ICT intensive-using and MIIU=Most ICT intensive -sing

Sources: Van Ark, Erumban and de Vries (2019), based on OECD (2018), Van Ark et al (2016)





## Can technology and innovation turn the tide of the global productivity slowdown?

- ***Absorption capacity for innovation is a bigger problem than technology deficit***
  - ✓ Quality of management
  - ✓ Digital skills of the workforce
  - ✓ Organizational and social innovations (collaboration, flexible teams, diversity and inclusion)
  - ✓ Innovations systems to resolve structural deficiencies at regional and local level
- ***Resolving the new productivity paradox (“unleash the fourth industrial revolution”)***
  - ✓ Improve measurement of digital output and inputs
  - ✓ Account for increases in intangible investment (short-term) and intangible output (*Productivity J-Curve*) (Brynjolfsson)
  - ✓ Improve regulatory environment to improve access to sources of growth across economy

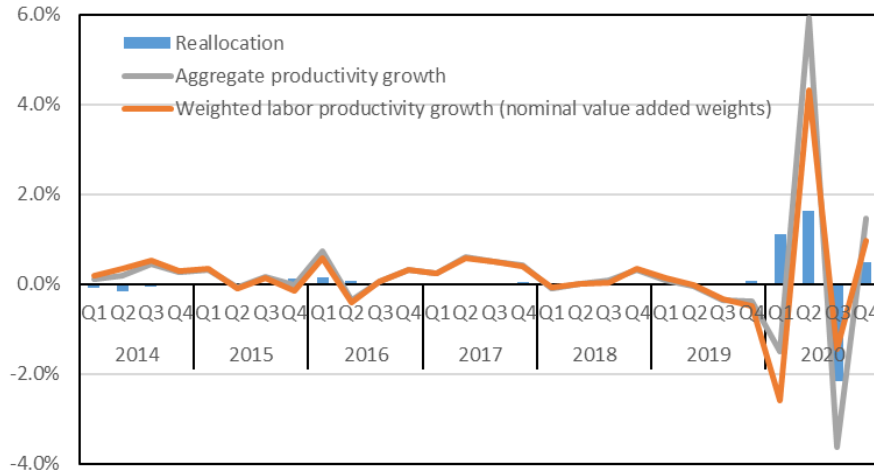
## We may be transitioning from the installation to the deployment phase of the digital transformation process ... and the transition path may not be that smooth



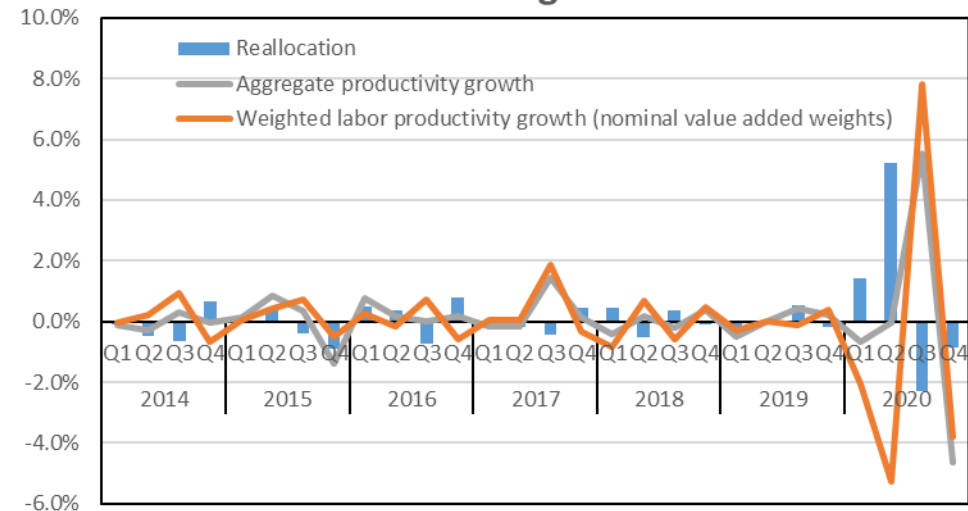
A productivity recovery post-COVID-19?

# Aggregate productivity growth in 2020 was distorted by large reallocation effects

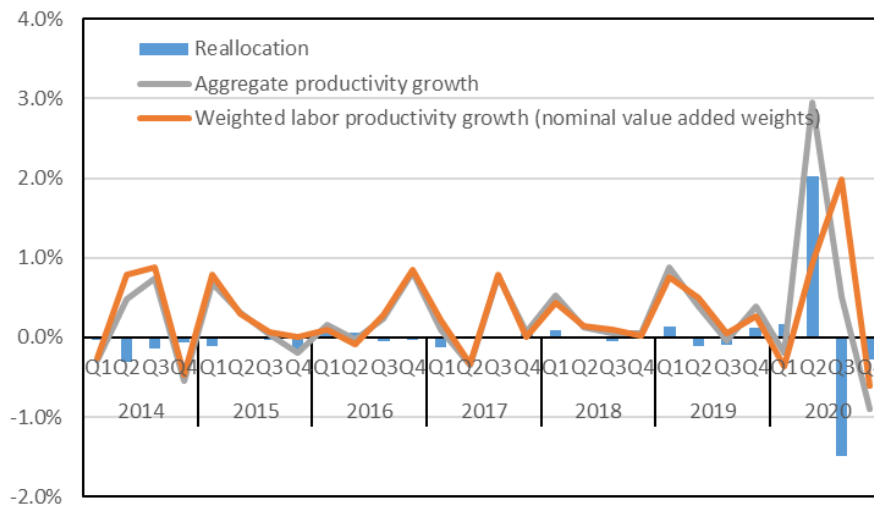
France



United Kingdom



United States



Original effect of pandemic caused a rise in aggregate productivity as less productive sectors were most strongly hit by pandemic

In subsequent quarters productivity recovery may in part be depressed because less productive sectors recover

## Which factors determine productivity post-crisis?

- ***Demand recovery will lead to pro-cyclical productivity growth***
  - Sectors most affected by social distancing (hospitality & entertainment, non-essential retail) will quickly recover revenue as economies open up
  - Excess savings may be unleashed to drive consumption and support pent-up demand
- ***Productivity effects on supply side are more uncertain***
  - Productivity recovery after a crisis can be driven by churning as weaker firms exit the market
  - Strong increase in new firms, e.g. webshops, study support services, care services – can they survive the pandemic?
  - Digitization beyond COVID-19 level effect (work from home, e-commerce, etc.) may temporarily slow as normality returns
- ***Increased importance of resilience***
  - Better deal with shocks (financial crisis, pandemic, supply chain disruptions)
  - Intertemporal productivity effects of excess capacity
  - Public policy implications of negative external effects

Towards an agenda of inclusive productivity growth





## Inclusive productivity growth may contribute to improved well-being

- ***Improved access to sources of productivity growth***
  - Education, health care, housing, digital participation
  - Organizational and social innovations
  - Compensation, especially benefits (pension, health and well-being), generate better equality
- ***Good jobs of high quality***
  - Various dimensions of “good work” cause different outcomes for productivity
  - Productivity has positive impact on creation of good jobs; reverse causality differs between sectors
  - Knowledge intensive sectors create good jobs
- ***Resolve regional deficits***
  - After controlling for differences in sector structure, the density of available growth sources (skills, finance, business climate) matter most for regional divergence
  - Regional focus on continuity and diversity in supply of education and response to business needs
  - Support local and regional innovation ecosystems

# Good jobs and high productivity go together. But bad jobs and low productivity even more



**Table 1: Prevalence of evidence for different aspects of job quality in relation to productivity in existing research.**

Pay and benefits	Strong
Health, safety and psychosocial wellbeing	Moderate
Job design and nature of work	Moderate
Voice and representation	Moderate
Work-life balance	Weak
Terms of employment	Missing
Social support and cohesion	Missing

**Table 3: Individual level regression with good work indices.**

Variables	Change in productivity (%)
Terms of employment	-7
Pay and benefits	8
Health, safety and psychosocial wellbeing	-9
Job design and nature of work	8
Social support and cohesion	8
Voice and representation	14
Work-life balance	2

## Priorities for a “productive” productivity agenda

1. ***Short term (2021-2022)***: Facilitate transition out of COVID-19 crisis to limit the damage to productivity
2. ***Short-to-medium term (2021-2023)***: Strengthen absorptive capacity for (digital) technology and innovation
3. ***Medium to long term (2021-2025)***: Develop a sustainability agenda which supports productivity (mitigate climate risk, facilitate transition to non-fossil growth model, diversification of economic activity)
4. ***Long term (2021-2030)***: Realize an inclusive growth model that translates productivity into well-being across the population

# Resources

## Sources

- Bart van Ark (2016), [The Productivity Paradox of the New Digital Economy](#), *International Productivity Monitor*, No. 31, Fall, pp. 1-15. Based on The Conference Board, [Navigating the New Digital Economy](#), 2016.
- Bart van Ark, Klaas de Vries and Kirsten Jäger (2018), [Is Europe's Productivity Glass Half Full or Half Empty?](#), *Intereconomics*, Review of European Economic Policy, No. 2, March/April, pp. 53-58.
- Bart van Ark, Klaas de Vries and Abdul Erumban (2020), [How to not miss a productivity revival once again?](#), NIESR Discussion Paper No. 518. Based on [Productivity and Innovation Competencies in the Midst of the Digital Transformation Age: A EU-US Comparison, Discussion Paper 119](#), DG ECFIN, European Commission, 2019.
- The Conference Board, [Global Economic Outlook 2020](#) and [Total Economy Database 2020](#), and Abdul Erumban and Klaas de Vries,(2018), [Global Growth Projections for The Conference Board Global Economic Outlook 2019](#), Economics Working Paper, 18-01, The Conference Board.



**The Productivity Institute** is an organisation that works across academia, business and policy to better understand, measure and enable productivity across the UK.

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