Missing Productivity, Innovation, Growth

Europe facing an Existential Challenge

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Diagnosing EU's competitiveness problem

- **EU GDP *per capita* has remained stable at two-thirds of the US level**
- **Labour productivity and total factor productivity growth have trailed the US since the 1990s.**
- **Some (a lot) of this is attributable to slower IT adoption and lower IT capital.**
- **Private R&D expenditure in the EU is far lower than in the US.**
- **The EU also trails the US and, increasingly, China, in patents in frontier technologies.**
- **EU still leads the US, but lags China, on green technology market share.**

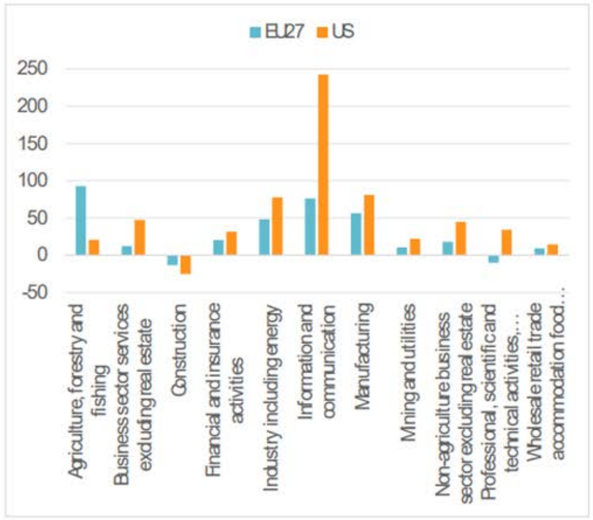
- **The EU faces supply-side disadvantages relative to the US: higher energy costs and a fragmented internal market.**

Pinkus, D, J. Pisani-Ferry, S. Tagliapietra, R. Veugelers, G. Zachmann, J. Zettelmayer (2024) *Coordination for EU Competitiveness*, EconPol Forum, CESifo, Vol 25 (03).

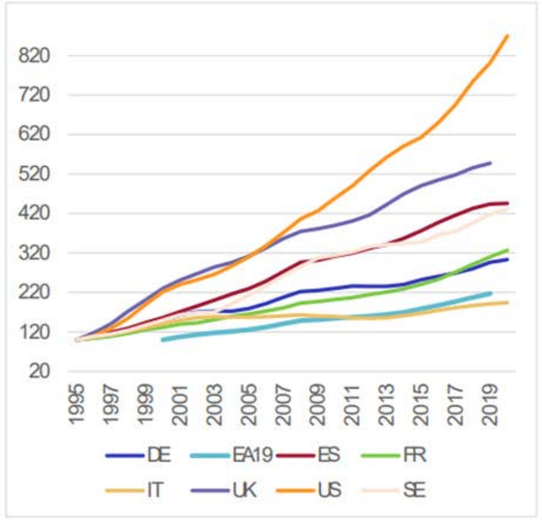
IT productivity and investment

- Both for US and EU labour productivity growth has been fastest in the manufacturing and IT sectors but at a much lower rate in the EU
- EU has also accumulated less IT capital than the US

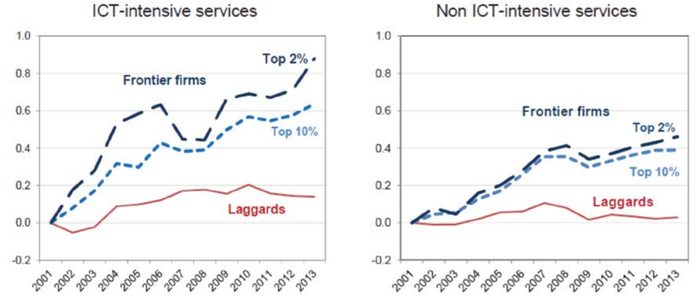
3.1. Cumulative labour productivity growth by sector, 2000-2021 (percent)



3.2. Real IT-related capital stock (index, 1995=100)



- Criscuolo (2021) shows that productivity divergence between high and low productivity firms in Europe has widened more in digital intensive sectors



Frontier firms pushing forward; laggard firms falling behind

- Frontier firms are the bigger, incumbent, more innovative, digital technology users
- Especially in digital services

EU (countries) missing share of frontier firms in digital services and beyond?

The Innovation Challenge

Gap with US is in private funding, less in public funding being less able to leverage private funding)

Trends in R&D spending (2015/2022)	EU27	US	China	EU27-US Gap
Spending on Research and development (% of GDP)	2/2.2	2.8/3.5	1.9/2.4	**71%/63%**
Government-financed R&D (% of GDP)	0.64/0.66	0.69/0.69	0.44/0.46	**93%/97%**
Business performed R&D (% of GDP)	1.28/1.41	2.02/2.68	1.58/1.87	**63%/52%**

Sources: Own calculations based on OECD, Main Science and Technology Indicators; National Science Foundation, Science&Engineering Indicators

Gap with US in science has been caught up (EU29); Problem is “European Paradox”: turning scientific excellence into innovative performance

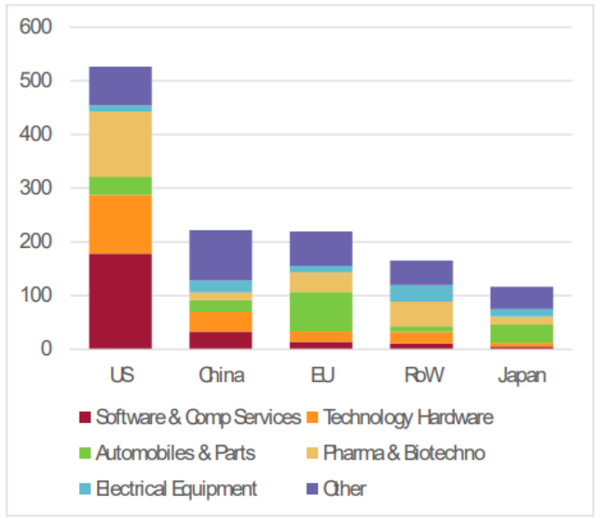
Trends in Scientific performance (2015/2022)	EU27	EU29	US	China	EU27-US (=100) Gap
Share of World top 1% most-cited publications (All fields) (%)	23/19	33/26	33/22	12/25	70/87
Share of World Top 100 Universities (%)	19/18	33/31	48/37	2/11	40/49

Sources: National Science Foundation; Academic Ranking of World Universities (Shanghai Ranking); NB: Because of “whole count” of co-publications, country/region shares of world publications don’t have to sum to 1. “whole count” rather than “fractional count” is used to avoid penalizing international co-publications.

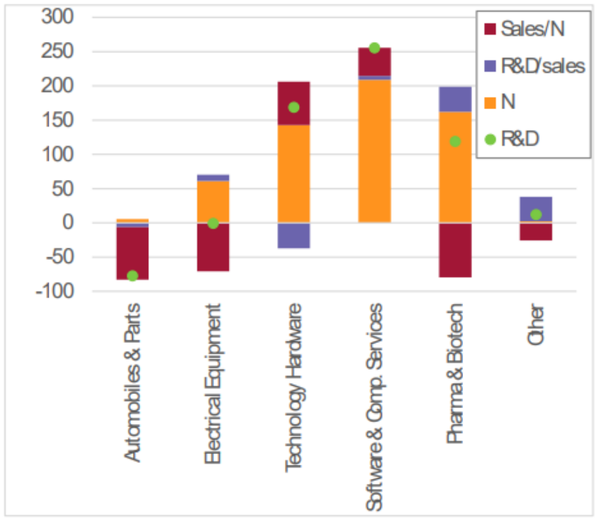
Corporate R&D in high/medium tech sectors

- US firms far outspent others: In Tech Hardware; in BioPharma, but most clearly in Digital Services
- EU stronghold in Automobiles

4.1. Sector and total R&D spending (€ billion)



4.2. Drivers of US-EU differences in R&D (percent)



Sources: 2023 EU Industrial R&D Investment Scoreboard European Commission, JRC/DG R&D.

Compared to the US, and more recently China, the EU fails to host new innovators that can grow to leading large scale, especially in digital sectors but also in other digital/AI using sectors, like pharma and automobiles,

Young Persistency in digital/tech R&D leadership

Sectoral Top Decile Scoreboard Firms			
Scoreboard ranking 2022 (2018)			
	US	**EU**	**CN**
ICT			
	1 Alphabet (2)	34 SAP (40)	6 Huawei (5)
	2 Meta (15)	38 Siemens (20)	19 Tencent (61)
	3 Microsoft (4)	47 Nokia (27)	22 Alibaba (51)
	4 Apple (7)	49 Ericcson (43)	
	8 Intel (6)	64 ASML (119)	
	20 Oracle (24)	111 NXP (109)	
	21 Qualcomm (29)	113 Infineon (153)	
	26 Nvidia (94)	123 Schneider (154)	
	32 Cisco (25)	150 STMicro (129)	
	37 IBM (32)	175 Spotify	

Based on EC-JRC Scoreboard of world largest R&D spending firms

New EV and old ICE R&D leadership in automobiles

Cars	US	EU	CN
	13 GM (18)	6 VW (3)	70 Saic
	24 Ford (14)	18 DB Mercedes (10)	82 BYD
	68 Tesla	25 BMW (17)	

Young Persistency in Health R&D leadership US vs EU

Health	US	EU
	10 J&J (9)	29 Sanofi (21)
	11 Merck US (11)	31 Bayer (23)
	12 Pfizer (16)	41 Boehringher(43)
	15 BMS (26)	65 Novo Nordisk (68)
	27 EliLily (38)	
	35 Abbvie (33)	**169 BioNTech**
	45 Gilead (49)	
	50 Amgen(47)	
	57 Renegeron	
	80 Abbott (75)	
	94 Vertex (162)	
	96 Moderna	
	106 Biogen (109)	

EU's position in frontier technologies: AI

5.2. Patents in frontier technologies
(percent of 'world class' patents filed)

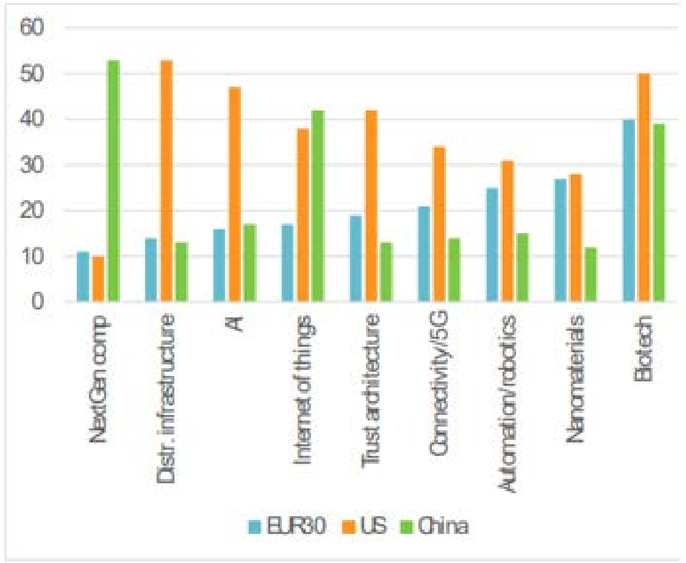
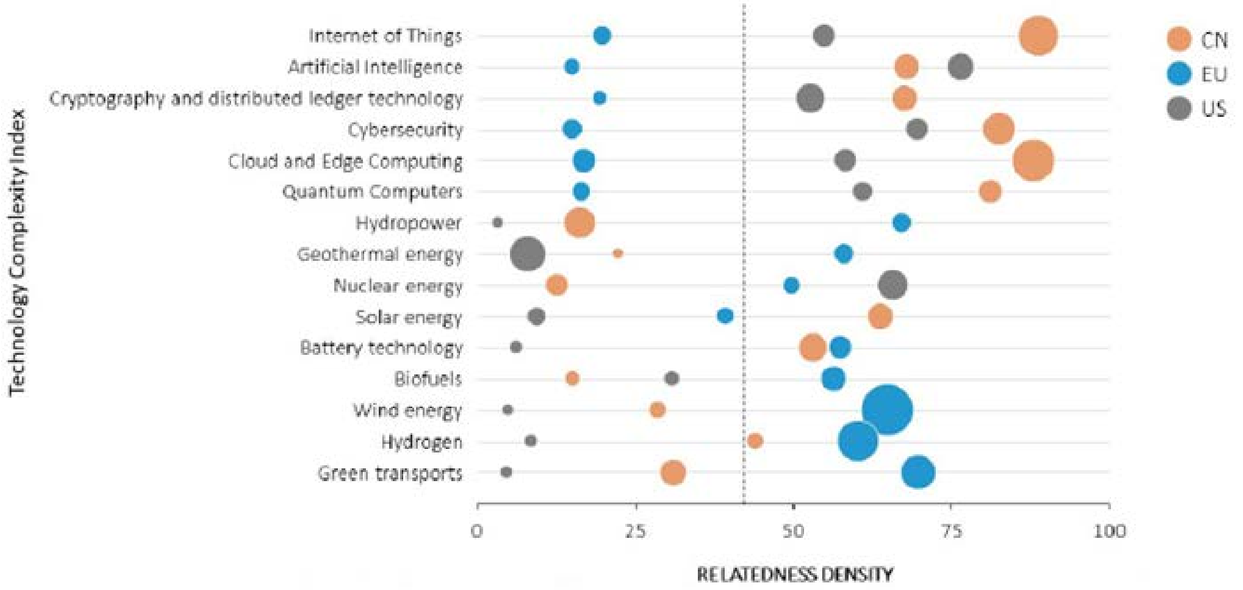


Table 4: Science and Technology Performance in AI

	EU27	US	China	EU27-US (=100) Gap
Share in AI related World publications 2022)	15	10	34	146
Share in World AI Patents (2000-2022)	5	22	48	23

Source: Own calculations NSF/PATSTAT: NB: numbers only cover granted international patent families. The technology-level analysis of international patent family data from the European Patent Office's Global Patent Index database covers years since 2000 with AI patents granted.



Source: DG RTD, SRIP (2024)

The challenge for EU Competitiveness

With the US, and more recently China, hosting most of the new R&D leaders, especially in digital sectors but also in other sectors, the weaker creative-destruction power of the EU corporate R&D system and its missing scale and incumbency advantages in digital could contribute to a structural shifting regional R&D pattern to Europe's detriment.

Some unique EU wide large scale firm level survey evidence from EIB on digital technology investments (past, current, future)

- Veugelers, R., D. Rückert, C. Weiss (2019) 'Bridging the divide: new evidence about firms and digititalisation' Bruegel Policy Contribution no 17, Bruegel, Brussels

What we find:

Digital polarization:

Firms without past digital investments significantly less likely to plan digital investments in future

Persistently non-digitally active firms versus frontrunners.

Old-small firms are particularly likely to be persistently non- digitally active.

No evidence for EU large manufacturing firms significantly behind US; EU has more persistent laggards among its old SMEs in services

Persistently non-digitally active firms are significantly less likely to have employment growth, be innovation active and have lower mark-ups

Truly non-digital firms are less likely to see (major) obstacles for digitally investing

NB: Access to skills always scores highest as obstacle, followed by uncertainty and in the EU by business regulations

One exception: access to (external) finance for EU SMEs (esp young)

A strategy for competitiveness

An **open, competitive single market** is the EU's most important tool for providing incentives to innovate and to deblock access to finance, skills… : Single Market, Competition Policy, Trade Policy

<u>Plan A</u>: deepen the single market;

Single market has become more existential than in the past, because of

- the increasing importance of scale in the digital economy;
- the insurance effect provided by the single market in the face of greater external security threats and protectionism outside EU.

Ideas of action a.o. : 28th regime allowing (digital) start-ups to fast scale up by operating across EU markets

In complement with
<u>Plan B</u>: Coordinate/cooperate for competitiveness
in areas that offer the greatest gains on a sector-by-sector basis, supported by some EU-level funding

Ideas of action a.o.:

EU ARPA's for missions
Top-ups to national support for pan-EU projects: IPCEIs topped up
Top-ups for joint pan-EU green and defense innovative procurement
Intra-EU mobility for high-tech skills (NZIA Erasmus, Marie Curie Mobility Schemes and dedicated Horizon actions).

Thank you!

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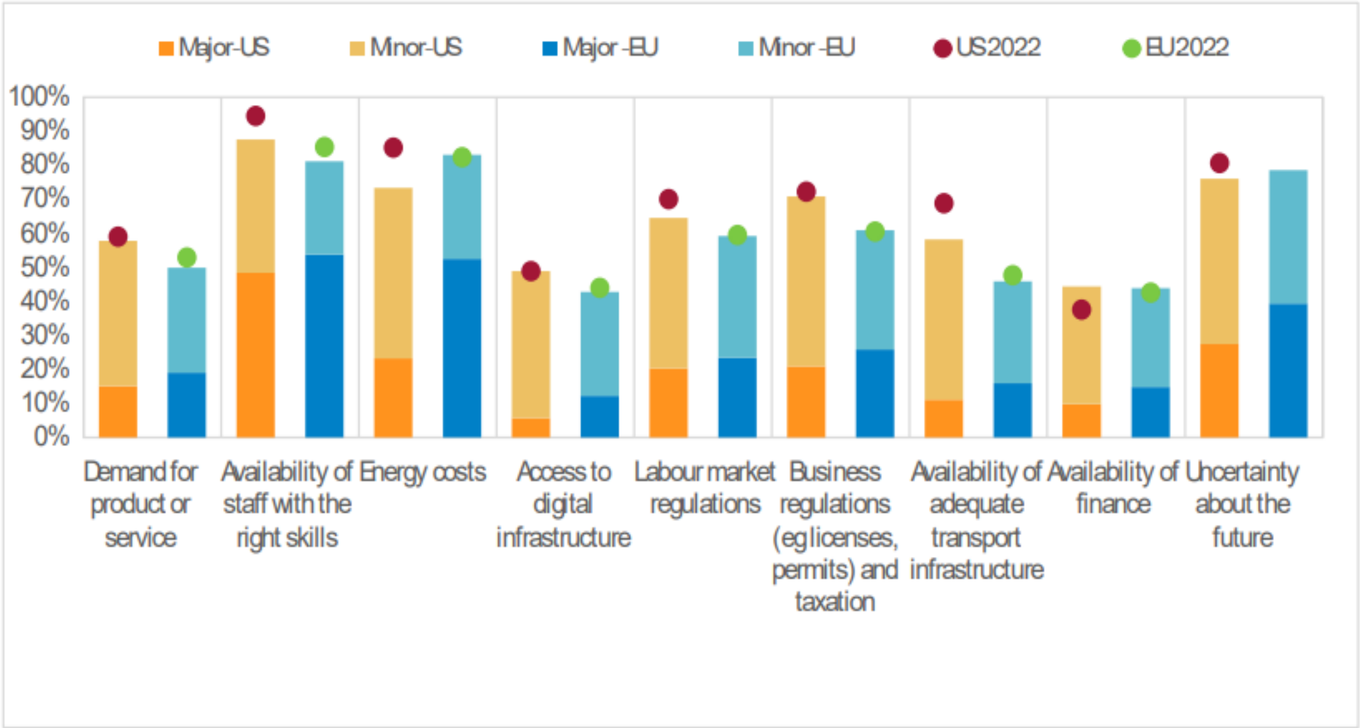
Obstacles to investment

- Energy costs and the availability of skilled staff are the most cited obstacles to investment in both the EU and US

7.1 EU-US comparison across all potential obstacles to investment, 2023

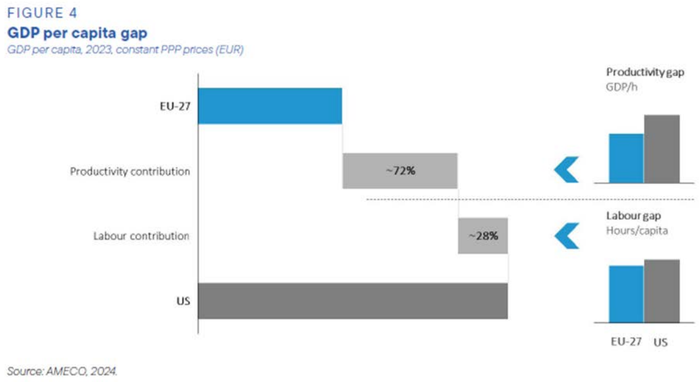


Productivity growth

EU has done consistently worse than the US since 2000, but:

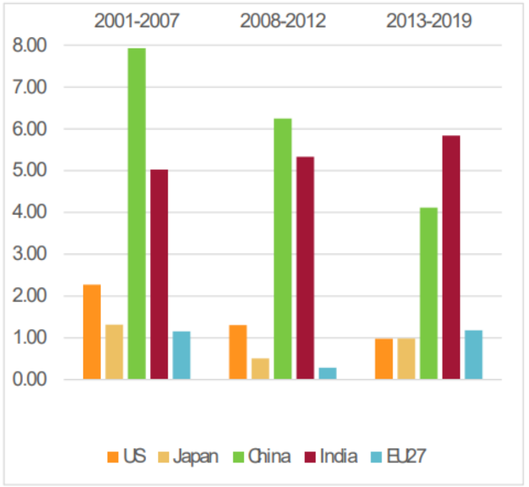
- Huge variation within the EU
- Eastern EU countries have experienced high productivity growth
- “old” EU members, with the exception of Sweden, all had cumulative productivity growth below that of the United States

- China’s TFP growth became negative in the Xi Jinping era



Draghi (2024)

2.1 Average labour productivity growth (percent)



2.2 Average total factor productivity (TFP) growth (percent)