Assessing technological dependencies of the EU

Claudio Cozza

University of Naples "Parthenope"

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Outline

- Definitions of “Technology Dependency” and other related concepts
- The EU legal perspective: economic tools to protect sovereignty
- Different ways to assess Technology Dependency
- Technology and R&D of EU top firms
- Conclusions and policy proposals

What do we mean with «technological dependency»?

- Not simply a matter of «a definition»
- Several interrelated definitions needed: Strategic Sectors, Strategic Dependence/Autonomy, Technological Dependency, Technological Sovereignty etc.

Assessing the viewpoint:

- From a **simplistic subjective** perspective: economic tools as a subset of geopolitical strategies
- To an **objective** perspective: **Which** are the relevant **technologies** creating dependencies? How do we identify them?
- Through a new **subjective** (**private**) perspective: Which are the **actors** creating/directing such a **dependency**? Where are they coming from?

Some definitions: only abstract words?

Technological sovereignty is

- «the capability and the freedom to select, to generate or acquire and to apply, build upon and exploit commercially technology needed for industrial innovation» (Grant, 1983)
- «the ability of a state or a federation of states to provide the technologies it deems critical for its welfare, competitiveness, and ability to act, and to be able to develop these or source them from other economic areas without one-sided structural dependency» (Edler et al., 2020)
- «the ability to generate technological and scientific knowledge independently or to use technological capabilities developed elsewhere through the activation of partnerships deemed reliable» (Cerra & Crespi, 2021)

(EU) **Strategic autonomy** «refers to the capacity of the EU to act autonomously – that is, without being dependent on other countries – in strategically important policy areas» (European Parliament Briefing, 2022)

Some definitions (2)

Indeed, reality is a matter of EU **funding**

Ursula von der Leyen, February 2023: “the concept of the sovereignty fund is that we need a European structural response on how to address and support these key technologies […] no country, no EU member state is an island, not even one”

For this **European Sovereignty Fund**, originally 53% was notified by Germany, while France share was 24%. Italy, due to its debt constraints, only requested approval for about 7% of the total. In short, almost 85% in just three (large) industrial countries. Not an island, but a small archipelago!

However, the idea of a European Sovereignty Fund was then rejected by Germany and the Netherlands, among others, and the proposal was hollowed out and diverted to a much more modest **Step (Strategic Technologies for Europe Platform)**

The result is a policy still fragmented into twenty-seven competing micro-designs that puts the EU at risk of ‘strategic dependence’. Or of **Weaponized Interdependence** (Farell and Newman, 2019)

Some definitions (3)

However, there is an overemphasis on geo-political/country level issues:

- «Globalization has transformed the liberal order, by moving the action away from multilateral interstate negotiations and toward networks of private actors» […] «the United States has also systematically exploited the panopticon effect to great benefit and has been able to do so even when its allies have formally objected. […] benefiting countries such as the United States or where states were limited to employing the tools of national markets and bilateral pressure» (Farell and Newman, 2019)

In the 2022 US report "Mid-decade challenges to national competitiveness" by think-tank SCSP (Special Competitive Studies Project, private foundation chaired by Eric Schmidt, former Google CEO), the EU is mentioned less than 10 times; and it is stated that:

- «Strategic competition between the United States and the People's Republic of China is the defining feature of world politics today. The epicenter of the competition is the quest for leadership and dominant market share in constellation of emerging technologies that will underpin at thriving society, growing economy and sharper instruments of power […] The US should leverage its leadership across the Quad, the AUKUS and the US-EU Trade and Technology Council and bring together allies from the Americas, Europe and the Indo-Pacific into global partnership»

The EU chooses (has to) the legal perspective, instead of the technological/capital accumulation

- A key role is played by the European Union and its ‘rules’ (directives and regulations): in contrast to large capital based in the US or China, there is never any talk of the existence of **European companies**, i.e. the formation of a European-based capital. Productive dwarfism, which for decades characterised the economy of the Old Continent, is now **ideological dwarfism**
- The strategic use of “golden power” again reflects fragmentation among EU countries: an example concerned US Intel as to whether and where to make a new investment in the microchip sector between **Germany**, France and Italy. A **clash between EU countries** started, also because the European Chips Act liberalises state aid and allows those countries to finance around 40% of Intel's investment (which without these subsidies would have remained in the United States)
- These tools are an attempt to reply to the **US IRA**, but with less strength

Why? The EU is dependent on foreign technologies

The case of Italian public administration: in the recent tender to create the national cloud for the Italian PA, ‘the contenders were all European (Fastweb and Aruba on the one hand, Leonardo, TIM, Sogei and CDP on the other), but the technologies fielded were those of Amazon, Microsoft, Google and Oracle’.

The EU might guarantee itself ‘digital sovereignty’ in three ways:

- development of own technology
- availability of human expertise
- control of information

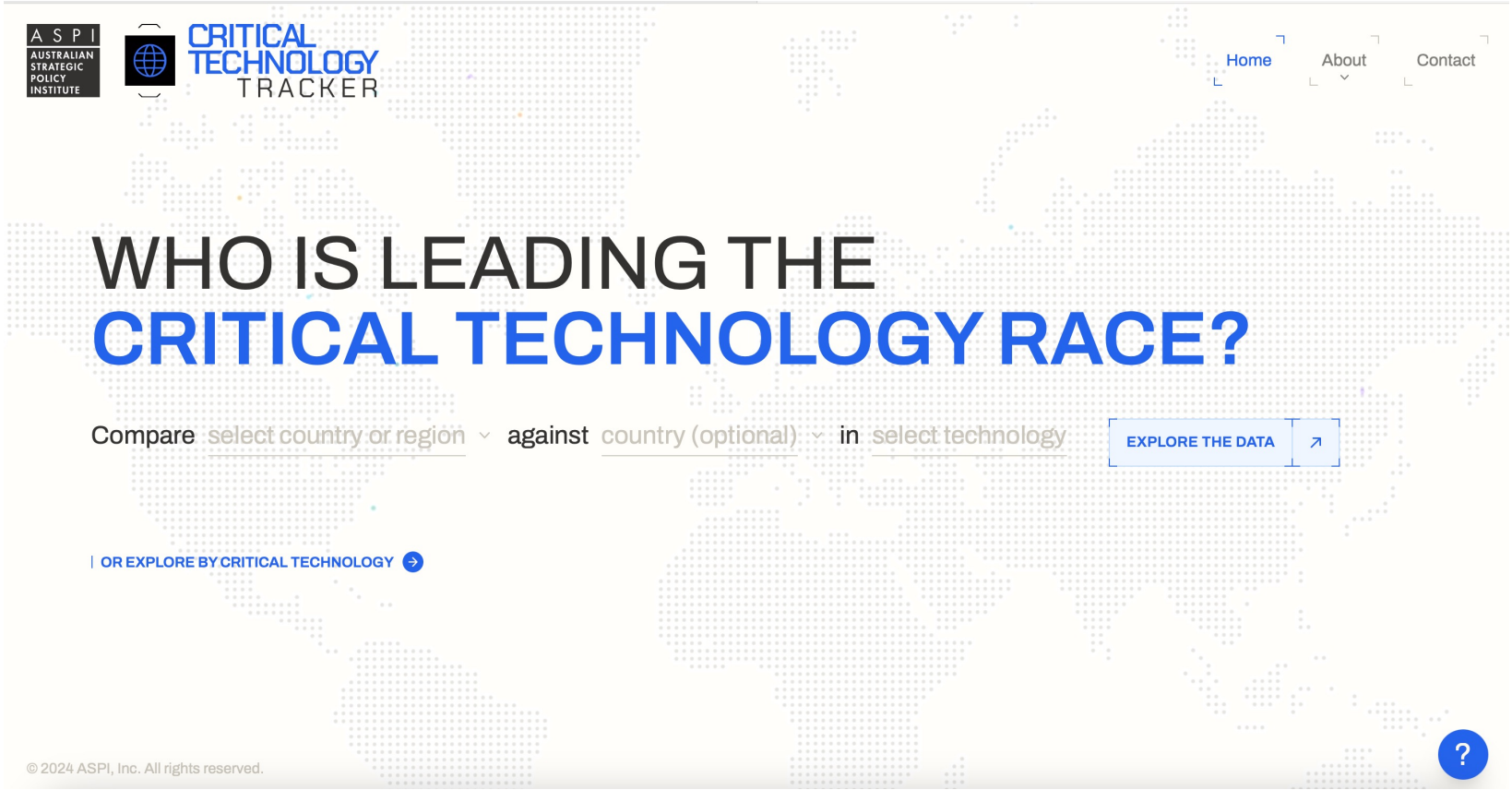
The EU has decided to quickly practise the third road, against Digital Giants from both the US and China. Via a ‘direct control over data and information’, accelerating the process already underway of European directives and regulations (NIS Directive, Cybersecurity Act, Digital Service Act, Data Governance Act and Artificial Intelligence Act) aimed at curbing the domination of non-European private actors.

Such a control should be Europe's big bet to preserve its sovereignty and limit digital colonisation

Moving to an **objective** perspective

First type of strategy: pre-defining a set of critical technologies and then assess the relative strengths/weaknesses of the EU against the rest of world

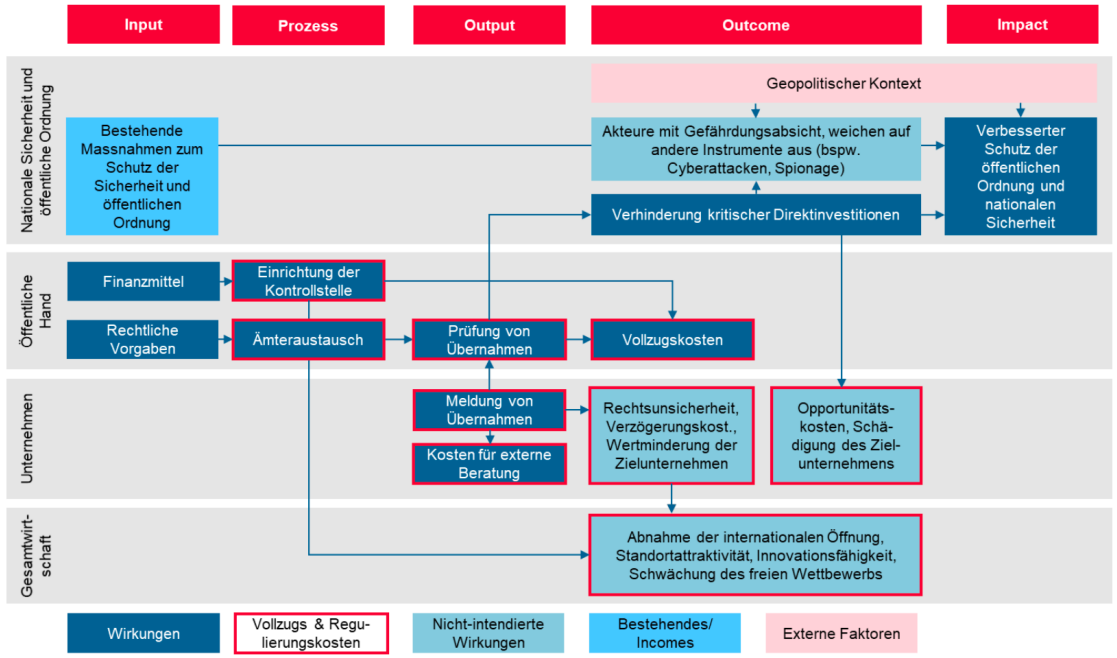
Example: https://techtracker.aspi.org.au



Different types of operationalisation: a matter of **innovation** and **internationalisation**

- **Policy-oriented operationalisation**: attraction of selective FDI, protection from hostile M&A (to access technology) after listing the key sectors
- It is the case of the recent Swiss Investment Screening Act (the "**D-ISA**")
- «The D-ISA intends to introduce sector-specific investment control in Switzerland to prevent takeovers of Swiss companies operating in critical sectors by foreign state-controlled investors (public or private investors that are directly or indirectly controlled by a state) if these takeovers endanger or threaten public order or security in Switzerland»

Abbildung 2: Wirkungsmodell



Quelle: Eigene Darstellung

Details can be found in: Meyer & Braun (2023): «RFA zum Entwurf des Investitionsprüfgesetzes»

Different types of operationalisation (2)

- **Research-oriented operationalisation**: granular mapping of technical components → analysis in terms of trade flows and patents (a recent example concerning the photovoltaic supply chain can be found in Caravella et al., 2024)

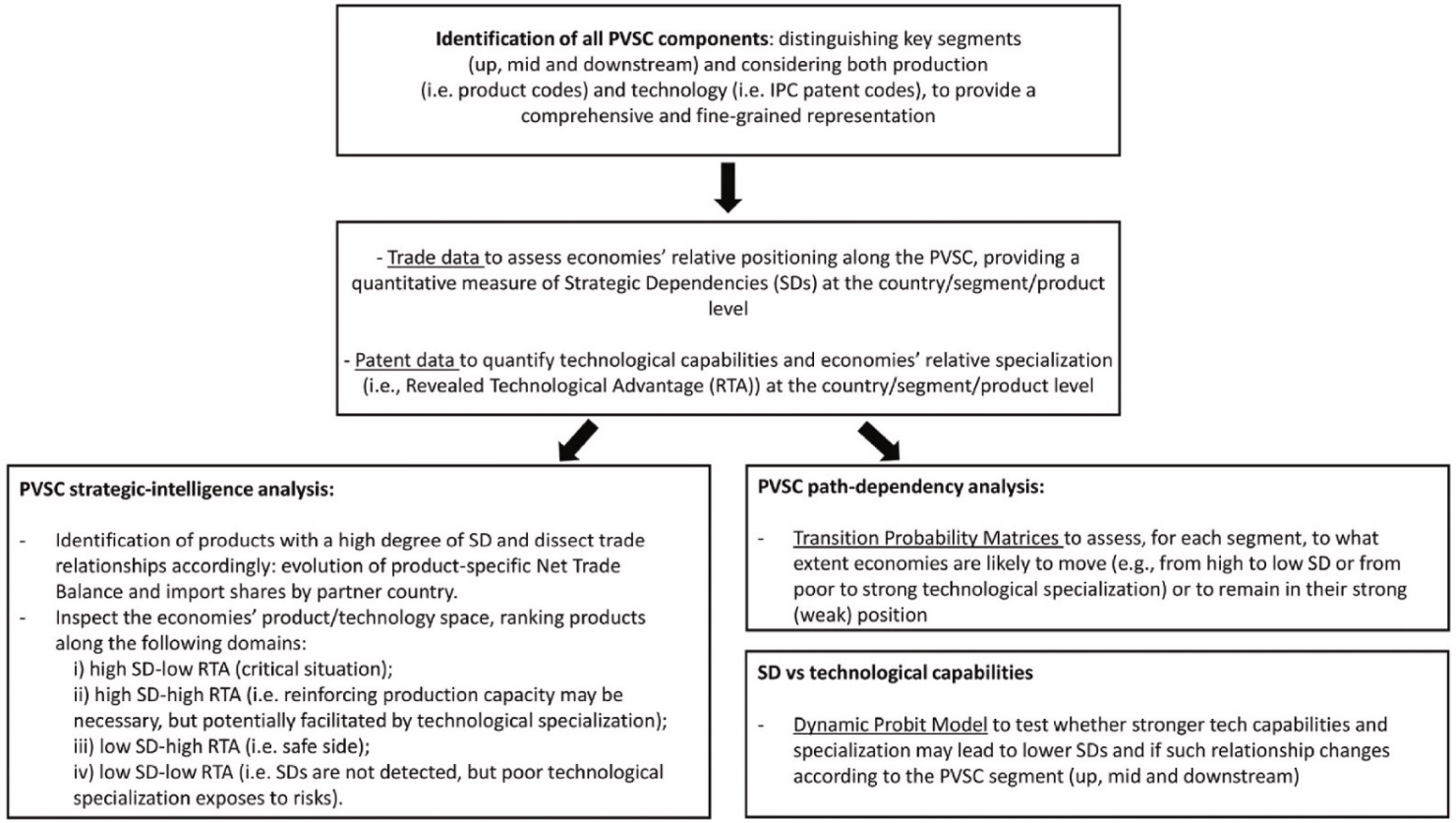


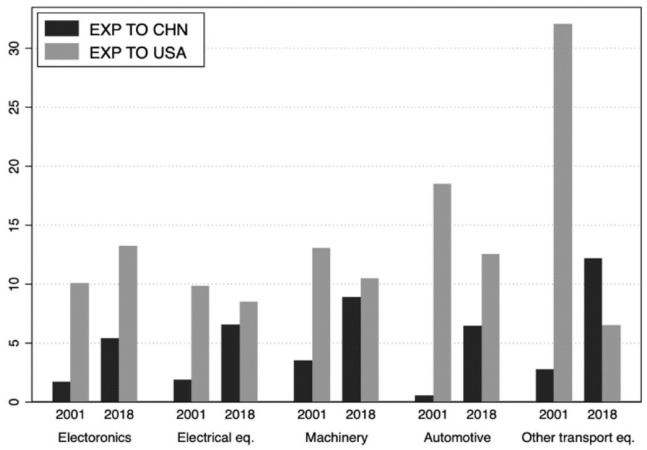
Fig. 1. TS and SDs along the PVSC: analytical steps.

A comprehensive approach

Another, more comprehensive approach, of the same research team can be found in Guarascio et al. (2024, forthcoming on Review of Keynesian Economics). The empirical assessment of EU structural vulnerability should consider:

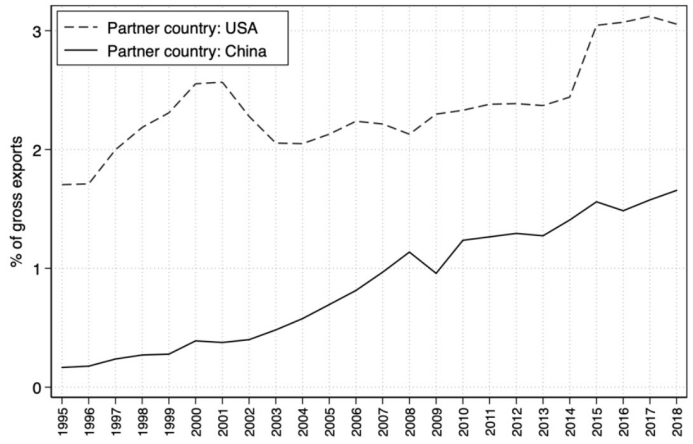
- **Demand-side** measures, such as export dependency, content of exports and the role of the US and China
- **Supply-side** measures, such as import dependency and indexes of participation in Global Value Chains
- A focus on **technology** (patent data) and on **critical raw materials**

Figure 2. The share of China and the US in German exports of final goods in key sectors



Source: Authors' elaboration based on the OECD's ICIO tables.

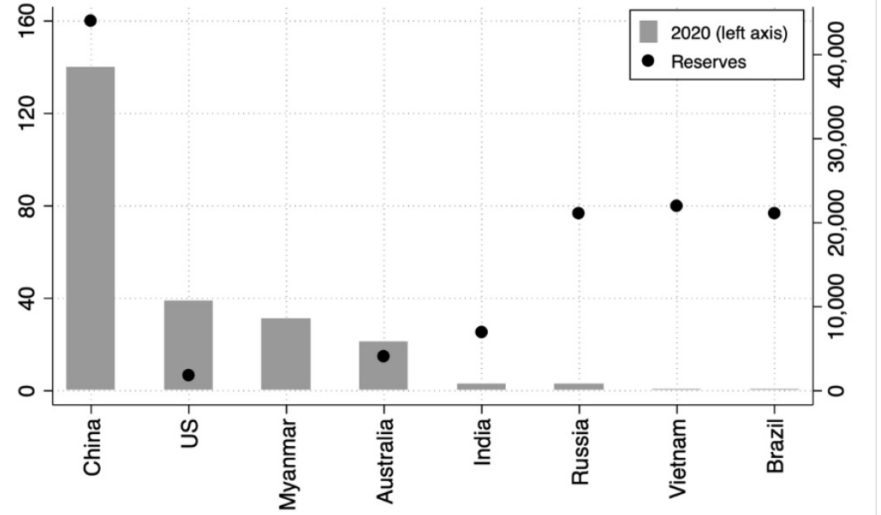
Figure 4. Backward participation in GVCs, EU27



Source: Own elaborations based on the OECD TIVA database.

Note: The share of Foreign VA embedded in the EU27's exports by partner country

Figure 9. REEs mine production and reserves, 2020 (thousand



A comprehensive approach (2)

The authors identify four drivers of Europe's structural vulnerability:

- The German-centred **export-led growth model**, with the priority on **costs reduction** (wage moderation, less public investment/innovative public procurement and consequent low innovation efforts, Eastward expansion)

- Internal **demand repression**, with poor room for demand-pull effects and consequent even lower innovation

- Fallacious economic policy set-up, with **EU pro-cyclical fiscal framework, no State Aid rules**

- **Core-periphery divide** increased by the previous factors

A comprehensive approach (3)

The authors then suggest opportunities and risks in the new EU industrial policy:

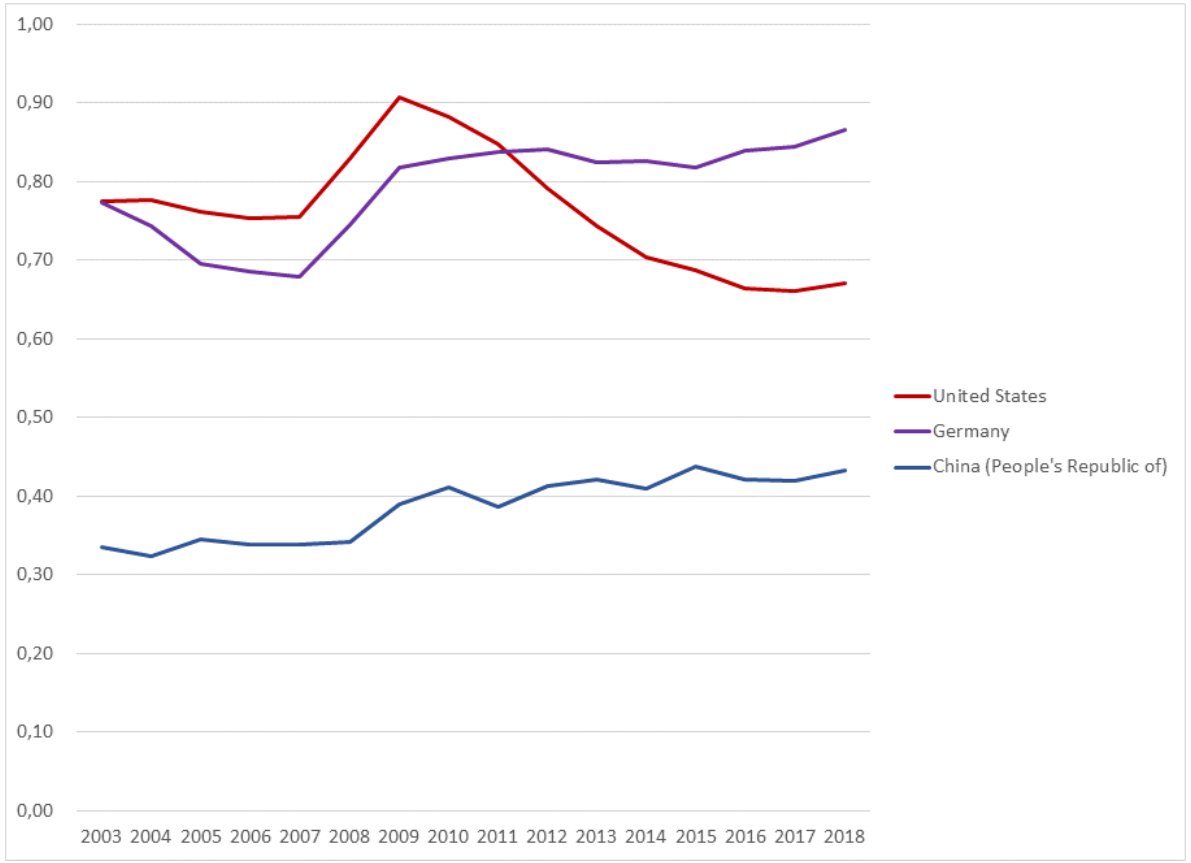
- The «new agenda is based on **three pillars**: diversification of sources of supply, incentives to encourage public investment and industrial joint ventures, and constant monitoring of the areas of greatest dependency and vulnerability»

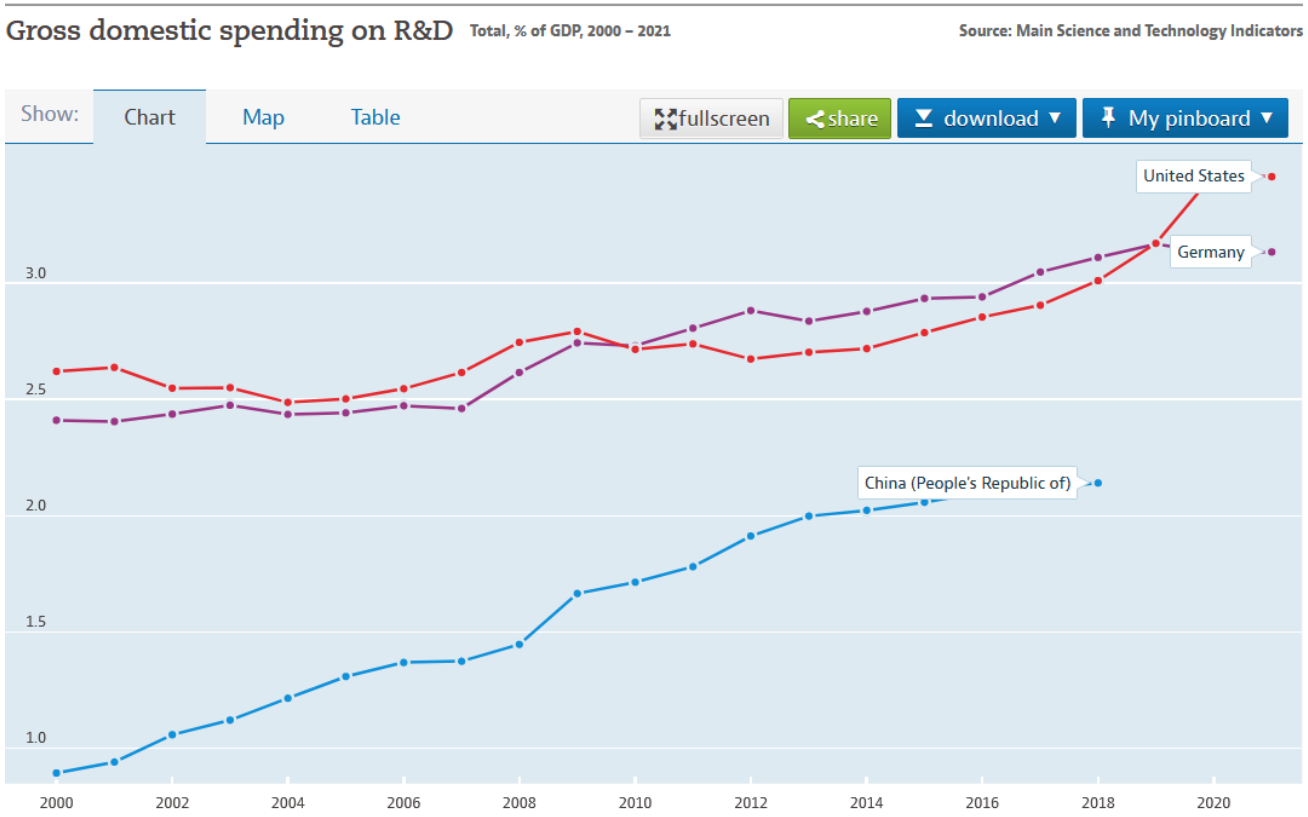
- Despite the idea of going back to vertical/selective policies, the new agenda **still** relies to a great extent on a **'horizontal approach'** to industrial policy

- The bulk of resources allocated between **infrastructures** (e.g., high-speed broadband coverage) and **fiscal incentives** for enterprises to adopt new digital technologies → these measures risk **increasing import dependence**

- Overall, **not enough resources** are allocated, vis-à-vis US and China

Usefulness and limitations of “national” data: GERD (gross R&D) vs. R&D funded by Government





Key actors: top world R&D spenders

The EU R&D Investment Scoreboard (by JRC, European Commission) provides since 2004 (reference year: 2003) the ranking of top world R&D spenders, that is top multinational corporations.

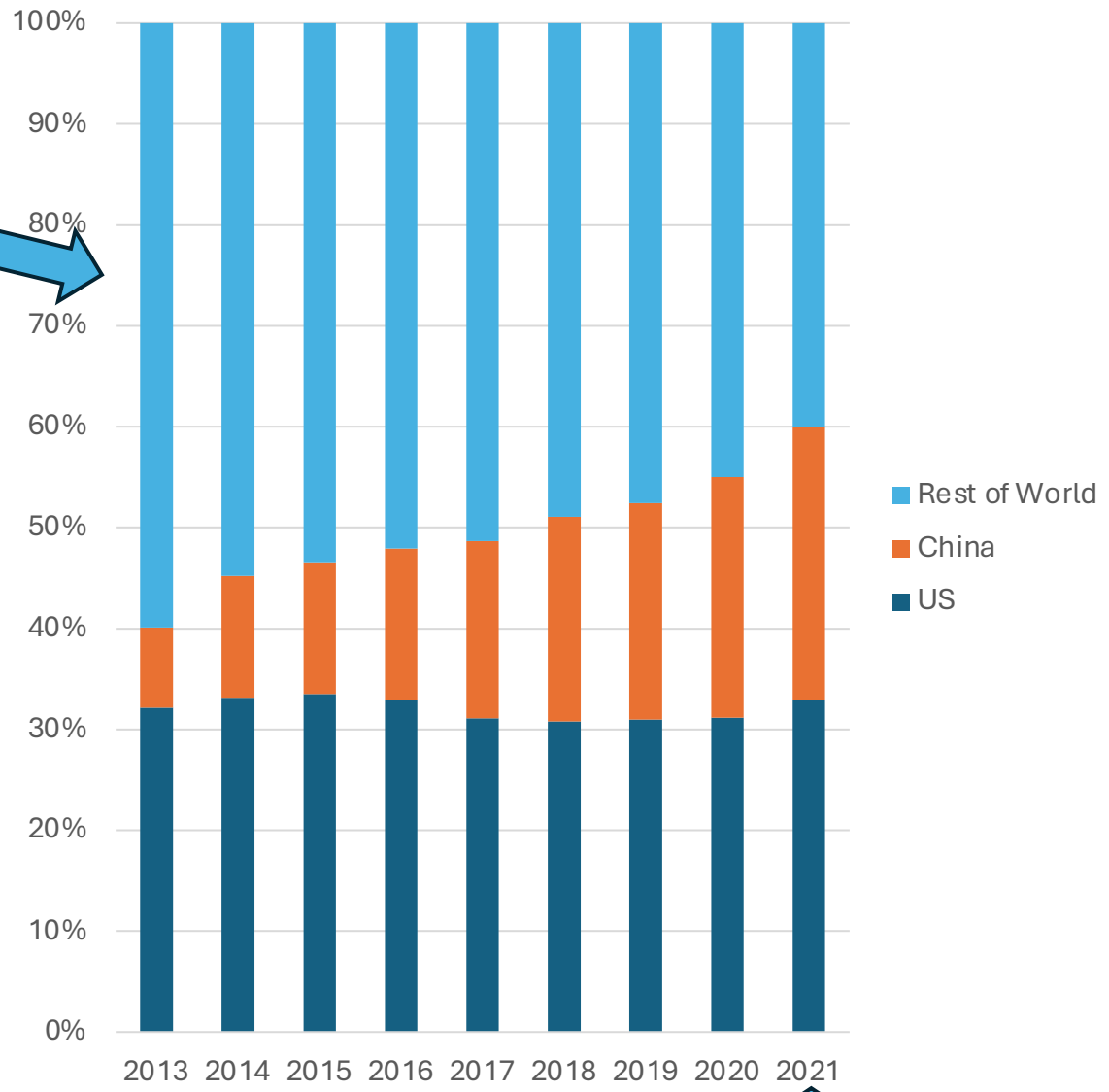
In the first editions, EU corporations were in a separate list as compared to non-EU ones. Since 2011 the JRC provides a global ranking. If we compare the US and China over the 2003-2009 time span, we obtain the following evidence.

	% of corporations in the list of **non-EU** ones		% of their R&D spending over total R&D of **non-EU** corporations	
Reference year	**US**	**China**	**US**	**China**
2003	58%	0,4%	57%	0,2%
2004	57%	0,4%	55%	0,3%
2005	**59%**	0,6%	**59%**	0,4%
2006	56%	0,8%	**59%**	0,5%
2007	54%	1,0%	57%	0,5%
2008	53%	1,5%	53%	0,9%
2009	50%	**2,1%**	49%	**1,9%**

In 2013: 633 EU corporations, that is 25% of World total and 42% of Rest of World

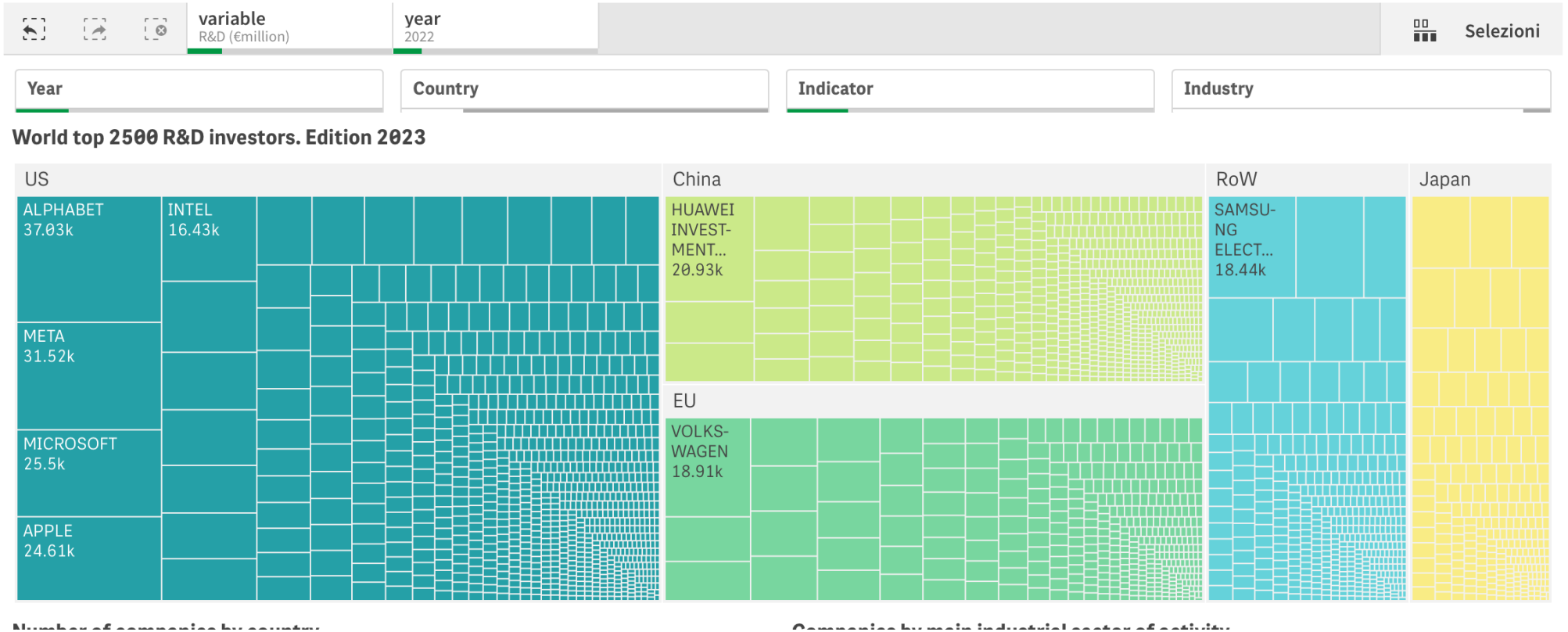
R&D spending of top EU 361 in 2021 is 192 billion euros, it was 155 billion euros in 2013

2.500 Top actors: what about the EU?



In 2021: 361 EU corporations, that is 14% of World total and 36% of Rest of World

EU Industrial R&D Investment Scoreboard (World 2500)

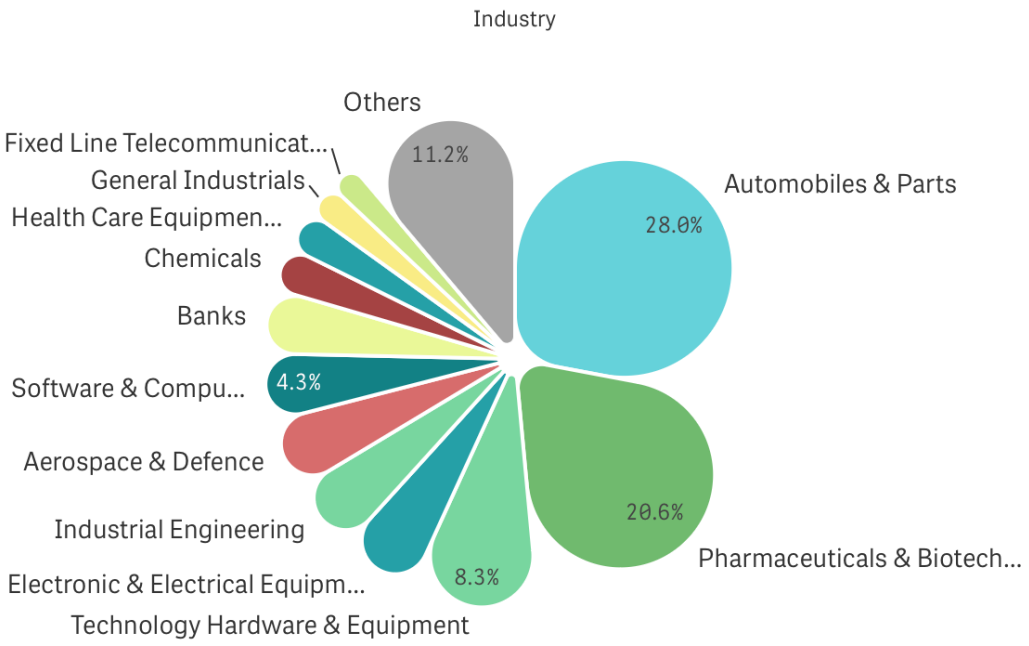


Last available data

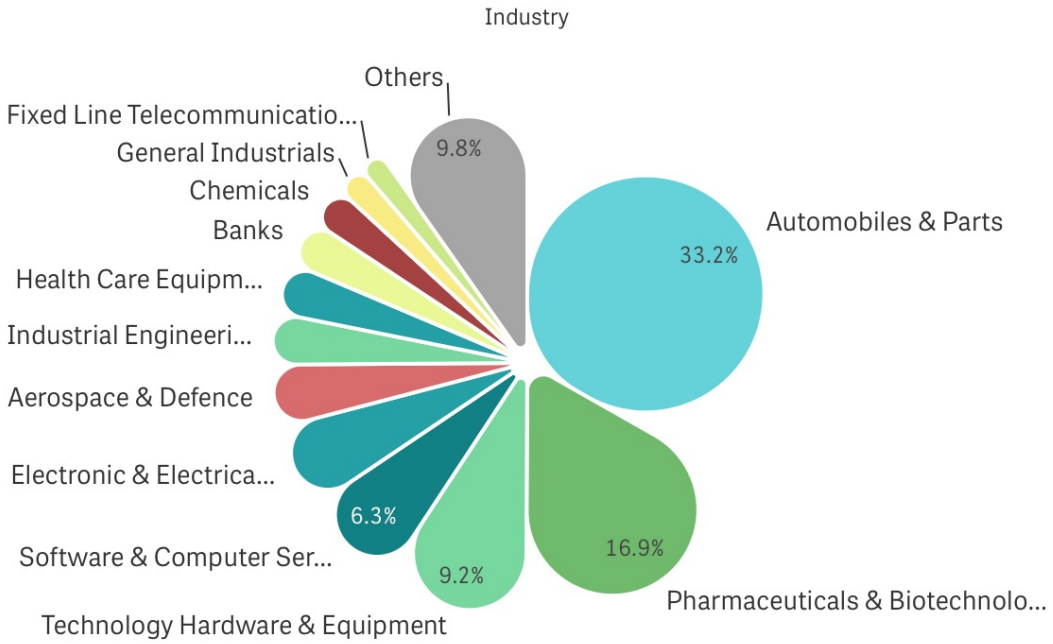
at https://iri.jrc.ec.europa.eu/data

The EU shift – in R&D Scoreboard 2016 vs. 2022 – in relevant sectors…

Companies by main industrial sector of activity.

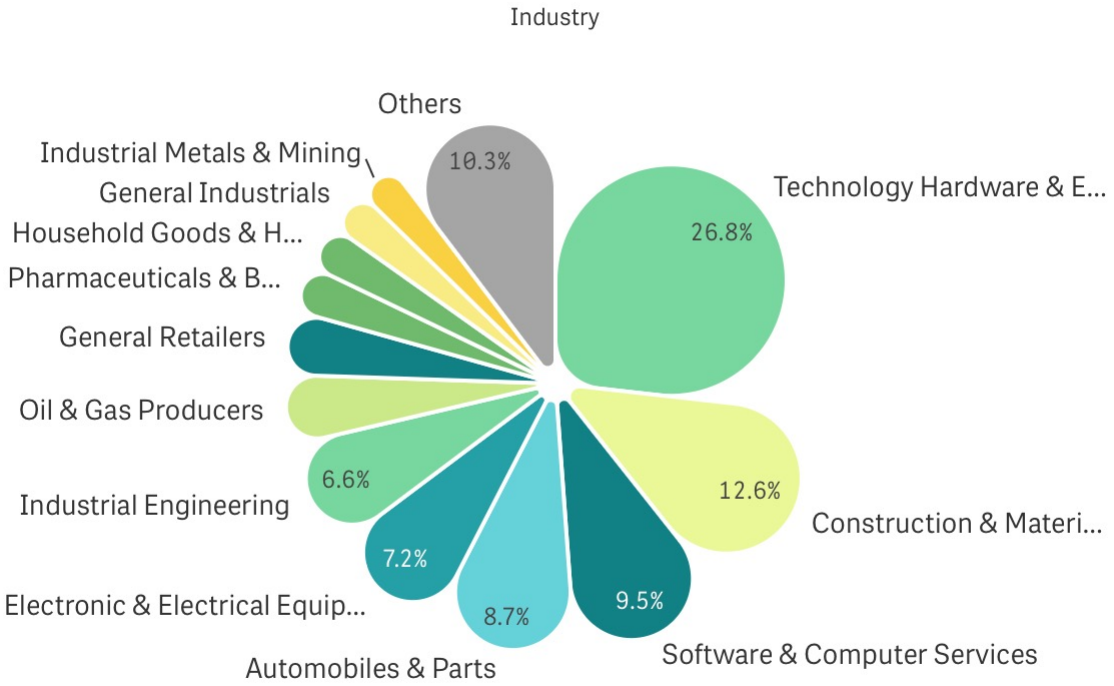


Companies by main industrial sector of activity.



Both in 2016 and in 2022, around 50% of top R&D spenders concentrated in two sectors

Companies by main industrial sector of activity.



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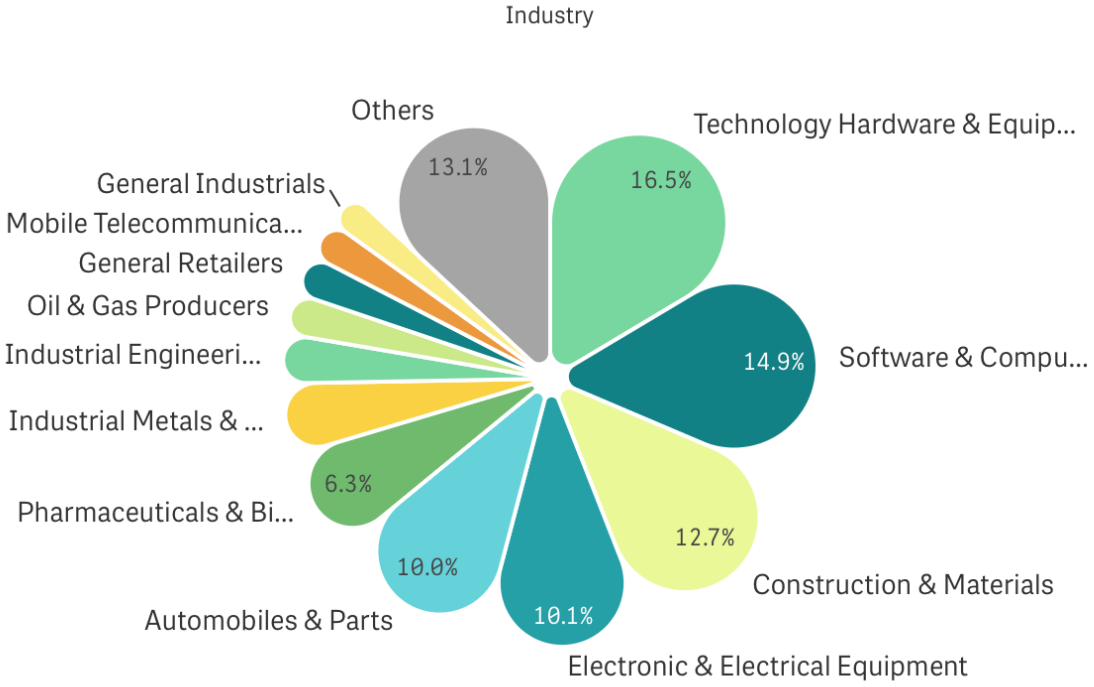
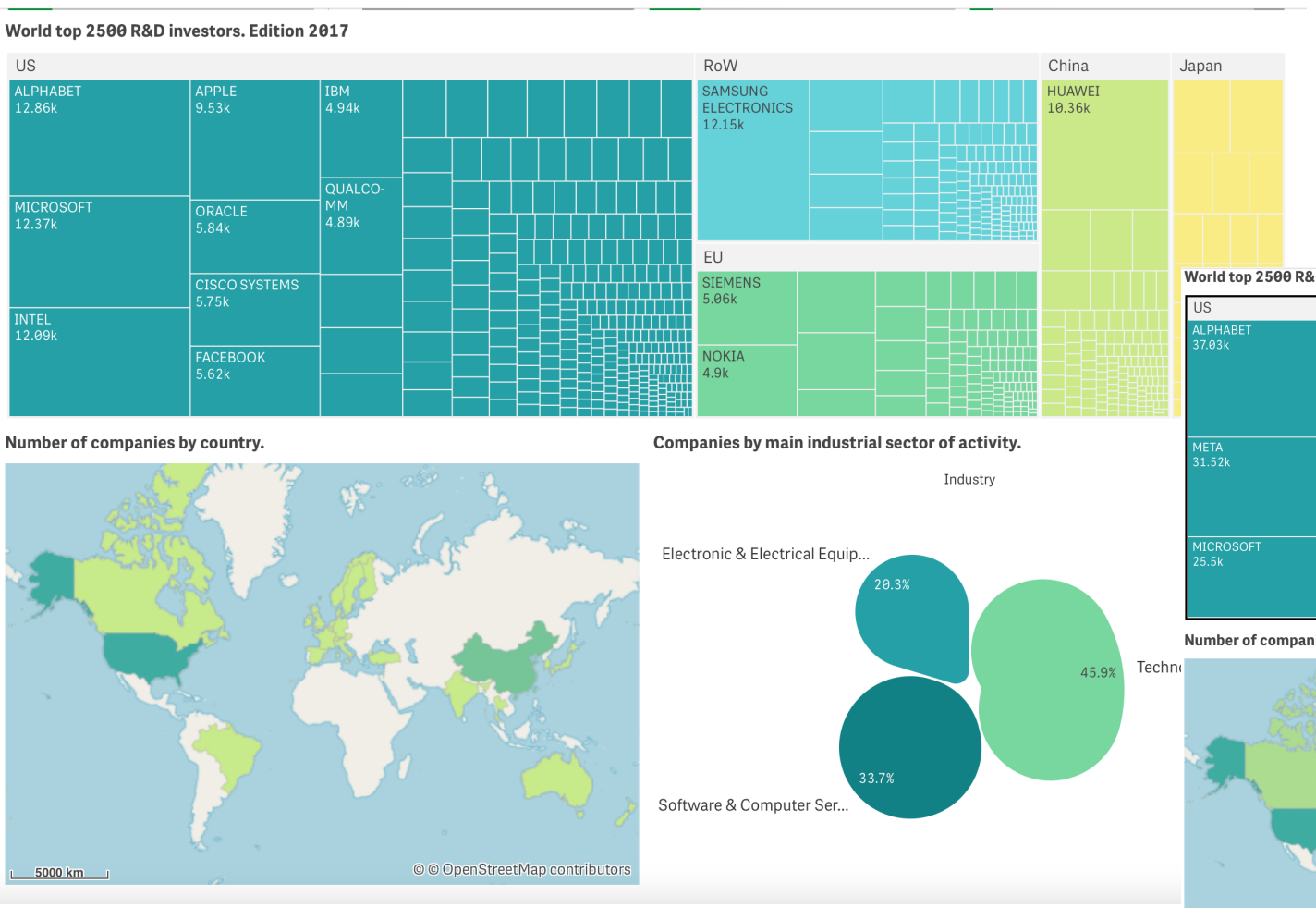
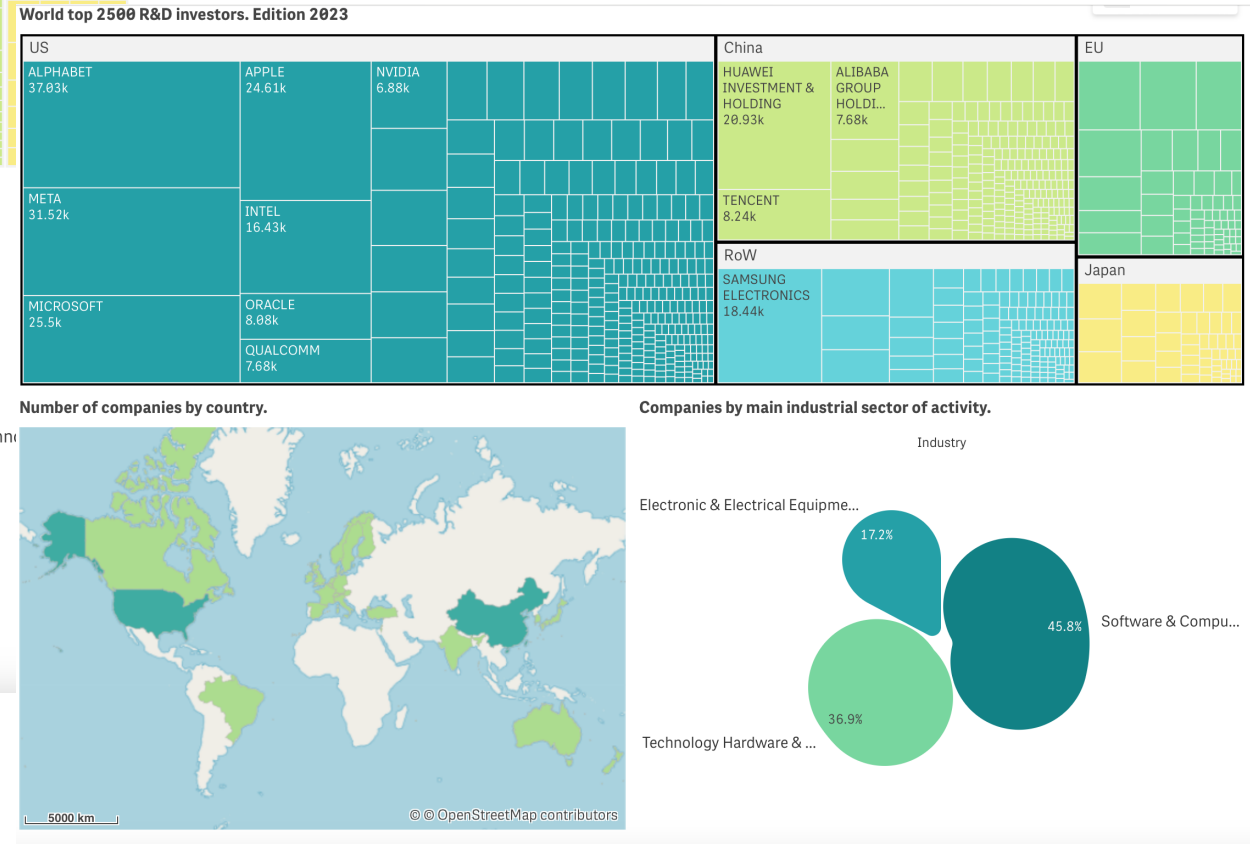


in 2016, more concentration in fewer sectors than in 2022

… as compared to China





The EU less and less active in ICT sectors (Hardware, Software, Electronics)

Conclusions and policy proposals

- What is Technological Dependency? Who is the subject? We should always start from **strategic decision making of large firms** and only afterwards look at the **strategic decisions of governments** (e.g. the US IRA or the New Productive Forces by Xi Jinping)
- There is always a **mutual relationship** between the private and the public sector, if not a "strategic dependency of the public" to private objectives

- **Clearer shift from horizontal to vertical/selective industrial policies (key sectors)**
- **Reduce the support to large firms (that already perform R&D with their own money)**
- **Direct selective policies towards SMEs with higher technological potential**
- **Identify key sectors and SMEs with evidence-based policymaking but…**
- **… also involving citizens and workers in a more democratic (and less technocratic) decision making approach**

Thank you

claudio.cozza@uniparthenope.it