

European Deep Science Technologies:

The time for Science Equity is now

January, 2024

Index

- 01 Innovation: An imperative for the EU
- 02 Deep science: A key domain of disruptive innovation, and essential to climate change solutions
- 03 Science Equity: A critical opportunity for funding deep science
- 04 Policy actions for Europe: A discussion

01

Innovation: An imperative for the EU

The EU's deploys a three-pillar strategy to today's mounting challenges

TECTONIC SHIFTS



Geopolitical tensions



Climate change



Aging



Disruptive technologies



Inequality



CHALLENGES AND UNCERTAINTIES

International conflict

Geoeconomic fragmentation

Rising populism

Protectionist impulses

Interventionist impulses



THREE-PILLAR STRATEGY



SUSTAINABILITY



COMPETITIVENESS



RESILIENCE

Innovation plays a pivotal role in the EU's three-pillar strategy

In 2021, the **EU** launched *Horizon Europe*



€95.5 bn budget,



to boost **innovation**

of which >€26 bn go to
disruptive innovation*



from 2021 to 2027

An effort that **complements a broad range of EU initiatives** geared towards research and innovation

Source: Horizon Europe ([link](#))

* €16 bn budget to the ERC [↗](#) plus €10 bn budget to the EIC, [↗](#)

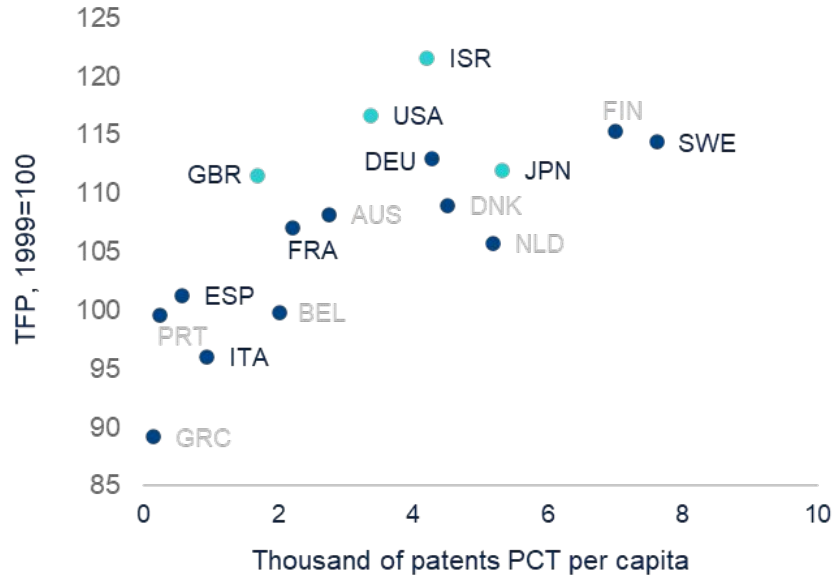
HORIZON EUROPE

Other Union Programmes, including

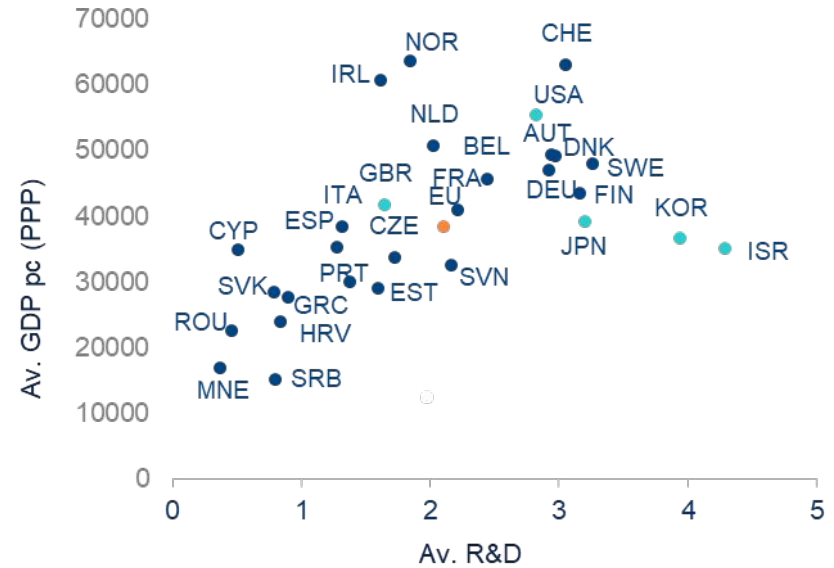
Common Agricultural Policy	Invest EU	ESF+	Innovation Fund
External instrument	LIFE	Digital Europe	Internal Security Fund Instrument for Border Management
Maritime & Fisheries Fund	EU4 Health	Space Programme	Single Market Programme
Connection Europe Facility	ERDF	ERASMUS+	Single Market Programme
Just Transition Mechanism		Creative Europe	Recovery and Resilience Facility

This is an economically sensible approach: Innovation drives productivity and long-term growth

PCT PATENTS AND TOTAL FACTOR PRODUCTIVITY (TFP)
(THOUSAND PATENTS PCT PER CAPITA AND TFP INDEX - 2019)



RESEARCH AND DEVELOPMENT EXPENDITURE AND GDP PER CAPITA - DEVELOPED ECONOMIES
(% GDP AND PER CAPITA PPP TERMS - 2019)



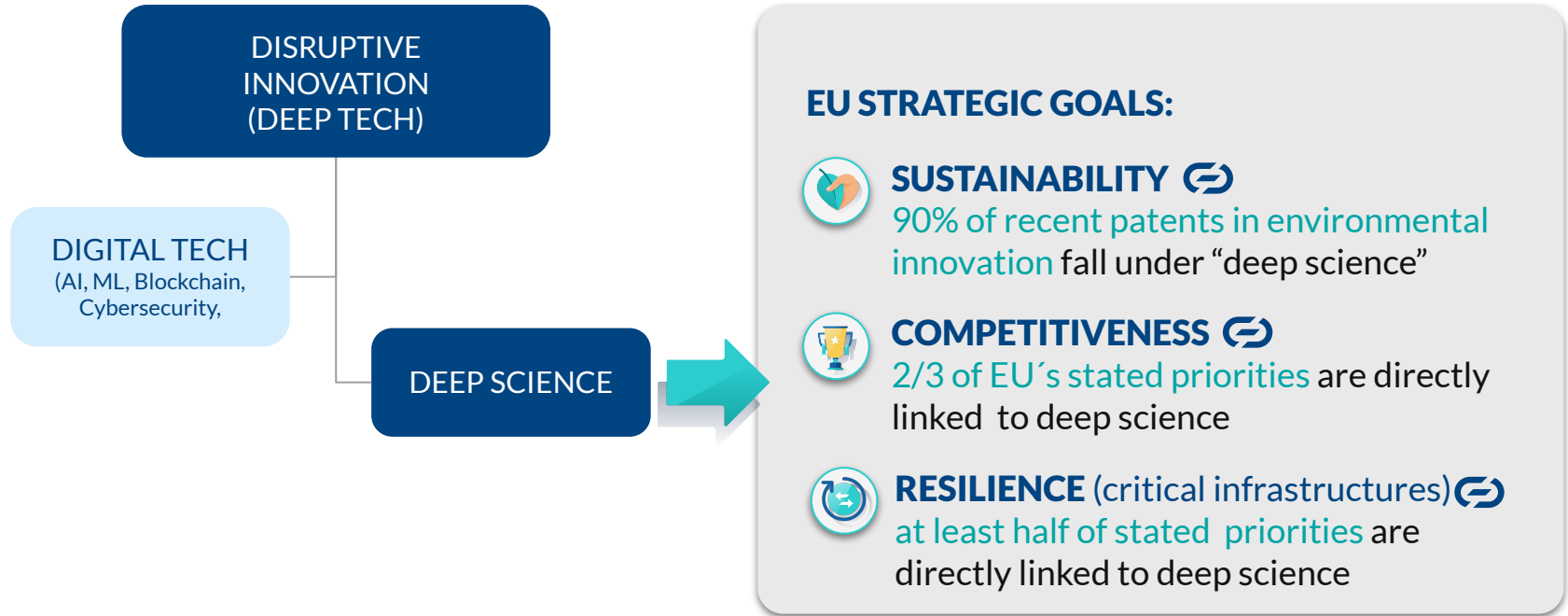
Notas. Gross domestic expenditures on research and development (R&D), expressed as a percent of GDP. They include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development. Para el gráfico de la derecha se ha eliminado Luxemburgo. Para el gráfico de la izquierda se han eliminado aquellos países con más del 10% del GDP proveniente del ingreso del petróleo.

02

Deep science:

**A key domain of disruptive
innovation, and essential
to climate change solutions**

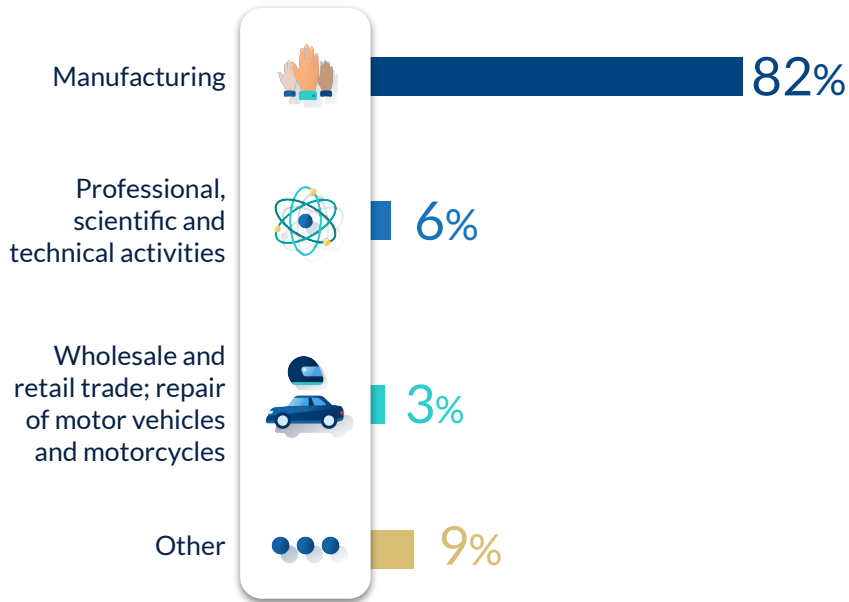
Coining a new term for a known concept: Deep science, an innovation domain that is essential for EU strategic goals



Deep science is most critical for the EU high-tech manufacturing

DEEP SCIENCE PATENTS: STRUCTURE BY NACE SECTOR

(%)



- Manufacturing firms remain pivotal in pulling business R&D.
- The European manufacturing sector has historically driven total factor productivity (TFP) growth - outpacing that of the overall economy.
- The EU is one of the world's largest trader of manufactured goods - surpassing the US. ↻
- While the tradability of manufacturing and its role in driving domestic services underscore its significance in enhancing EU competitiveness.

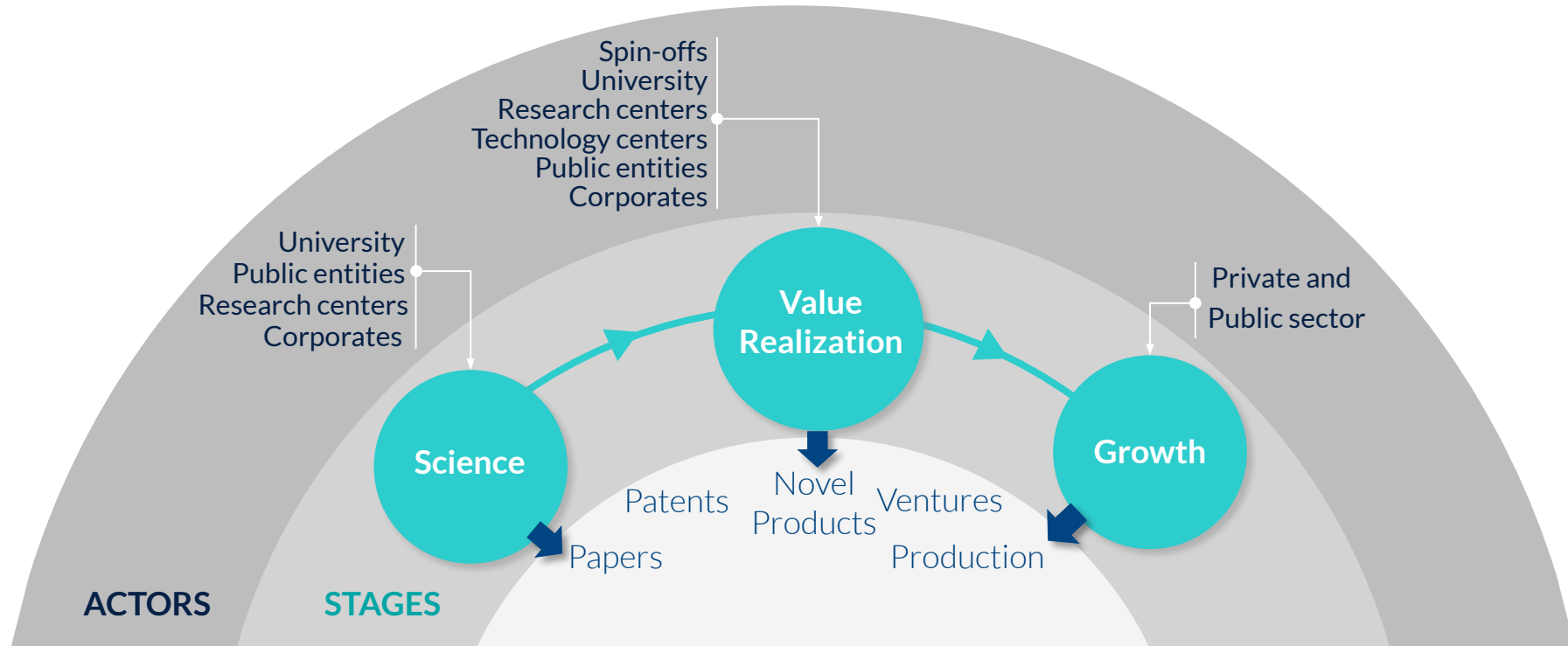
EU and USA data.

Source: OECD. [Patents Statistics](#). PCT patent applications based on priority date and by applicant's country of residence.

*

Deep science is a complex process involving many actors and several stages

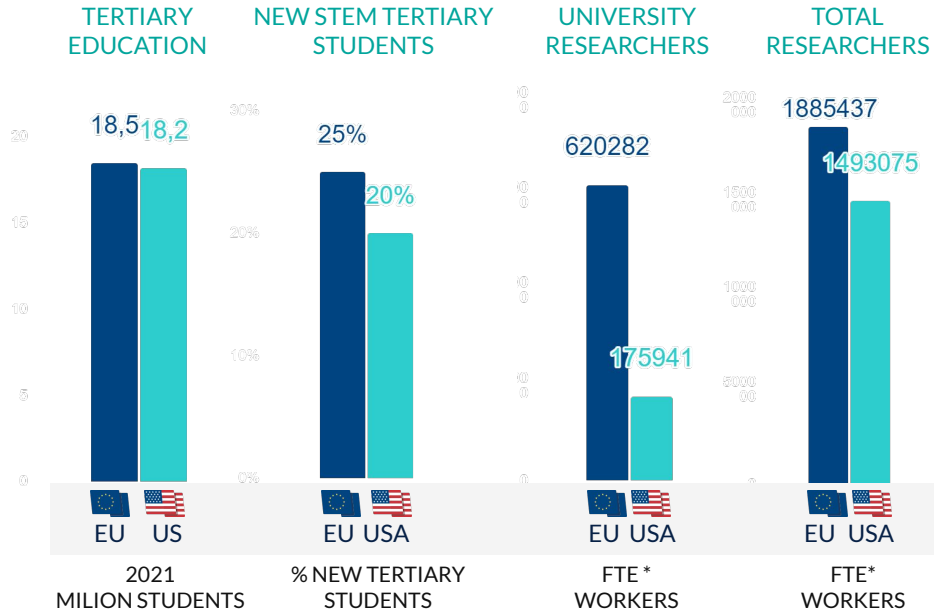
It starts with scientific research and only succeeds with actual growth



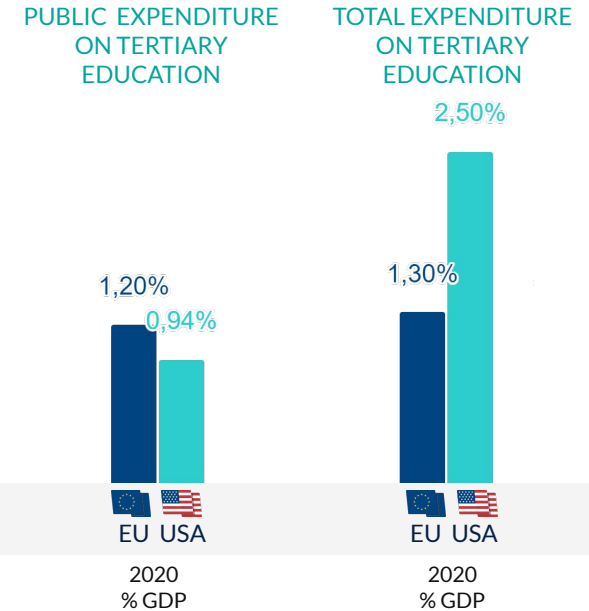
In Science, the EU starts strong, owing to its vast pool of talent

TALENT - EU vs US

SIZE OF HUMAN CAPITAL



MONEY INVESTED IN HUMAN CAPITAL



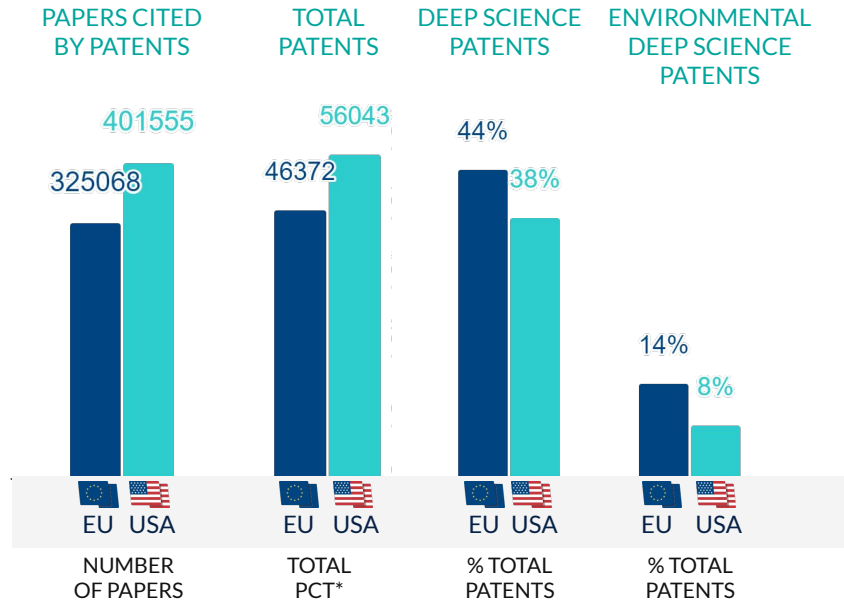
*FTE: Full time equivalent

Source: BBVA Research from OECD data.

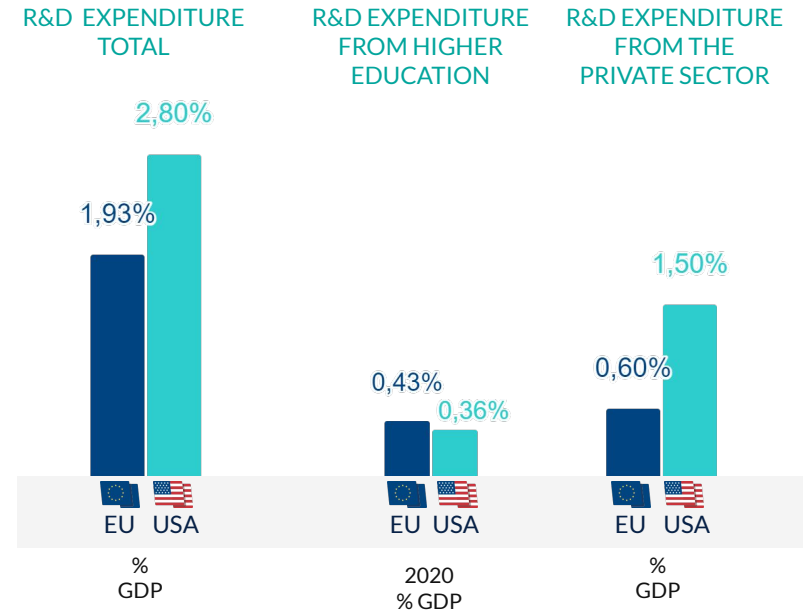
A pool of talent that consistently delivers cutting-edge scientific advancement

SCIENCE - EU vs USA

AMOUNT OF PAPERS AND PATENTS



R&D EXPENDITURE



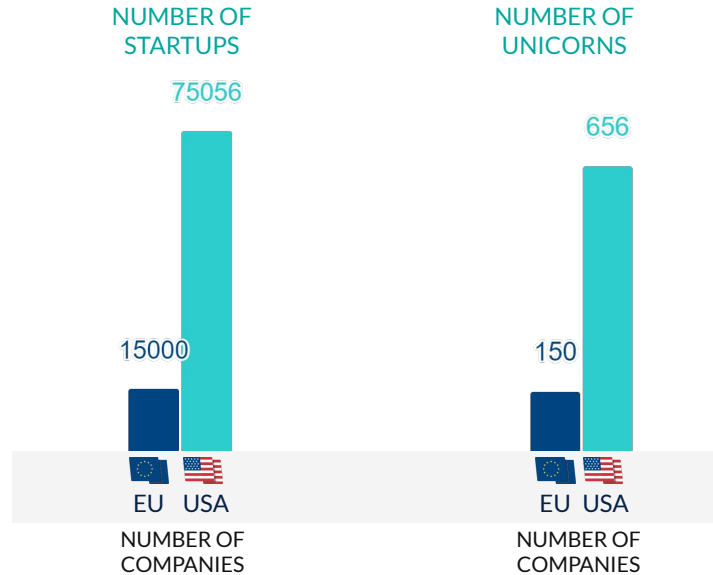
(*) PCT: Patent Cooperation Treaty.

Source: BBVA Research and BeAble Capital from OECD data.

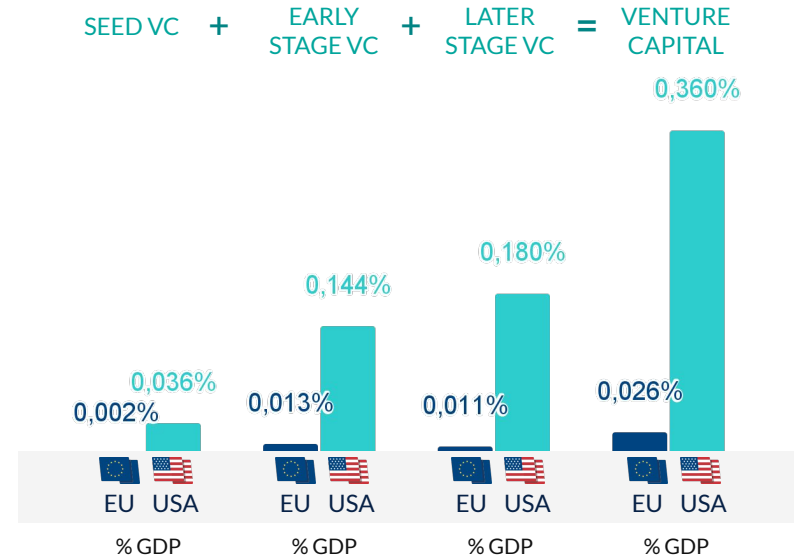
Yet in Value Realization, the process falters

VALUE REALIZATION - EU vs USA

NUMBER OF STARTUPS



FUNDING OF STARTUPS



Weak Value Realization hurts Growth ... and the EU's sustainability goals

GROWTH - EU vs USA

REAL GDP GROWTH TWO
FIRST DECADES OF THIS
CENTURY (ANNUALIZED)



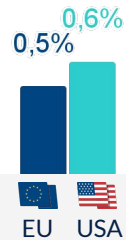
EU USA
%ANNUAL
GROWTH

USD GDP GROWTH
VS
EU (ACCUMULATED
1999-2019)



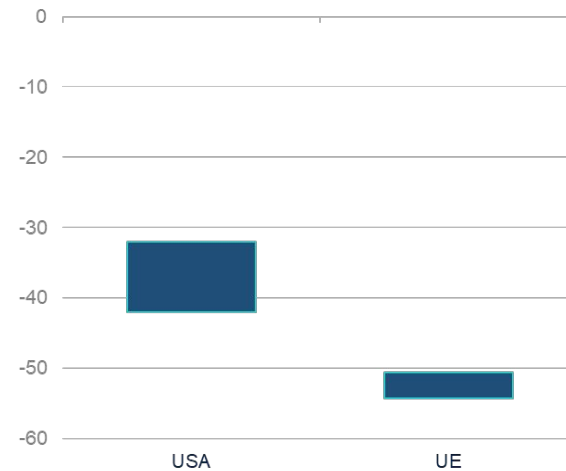
EU USA
GDP
GROWTH

TOTAL FACTOR
PRODUCTIVITY (TFP)
1999-2019



EU USA
TFP
GROWTH

US, EU. FORECAST OF GHG EMISSIONS REDUCTIONS FOR 2030
(PP, RANGE)



Source: [BBVA Research](#), [Rhodium Group](#), and [Climate Action Tracker](#).

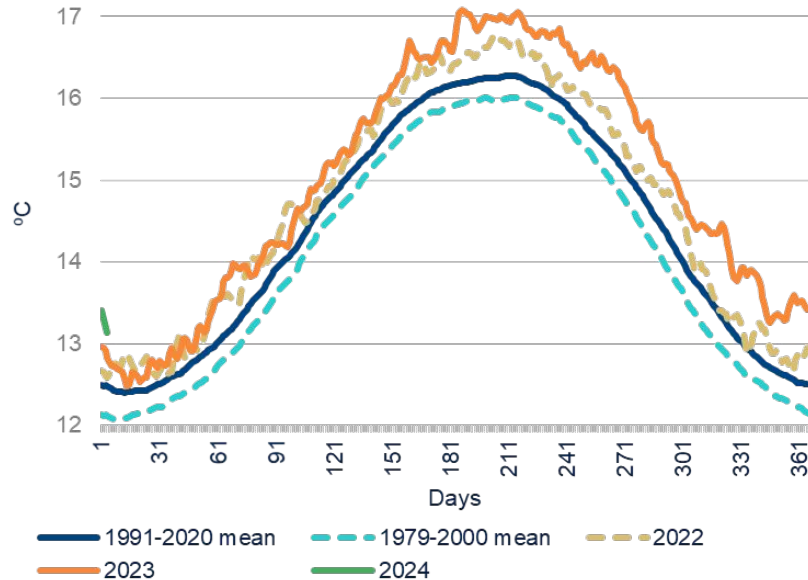
Source: BBVA Research from OECD data.

Over the past decades, the EU has lagged behind the US while, looking forward, faces the challenge of climate change.

Climate change is an undeniable global challenge that is already unfolding

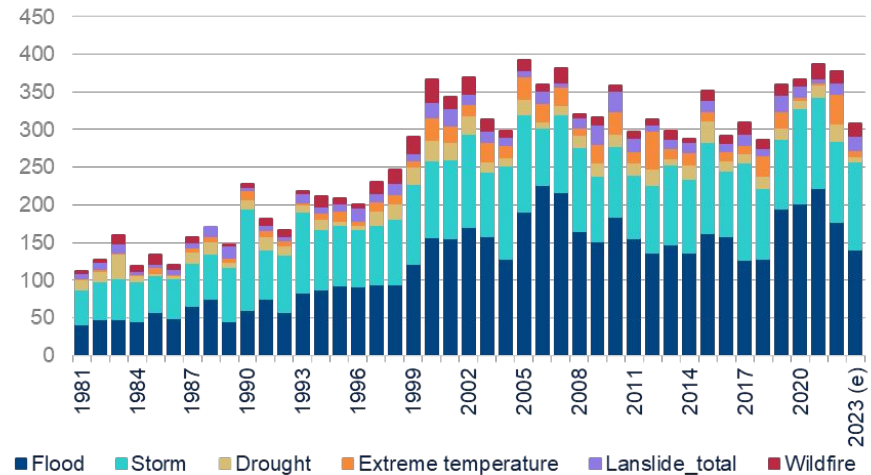
TEMPERATURE, 1979-2024

GLOBAL AVERAGE in °C



CATASTROPHIC CLIMATE-RELATED EVENTS

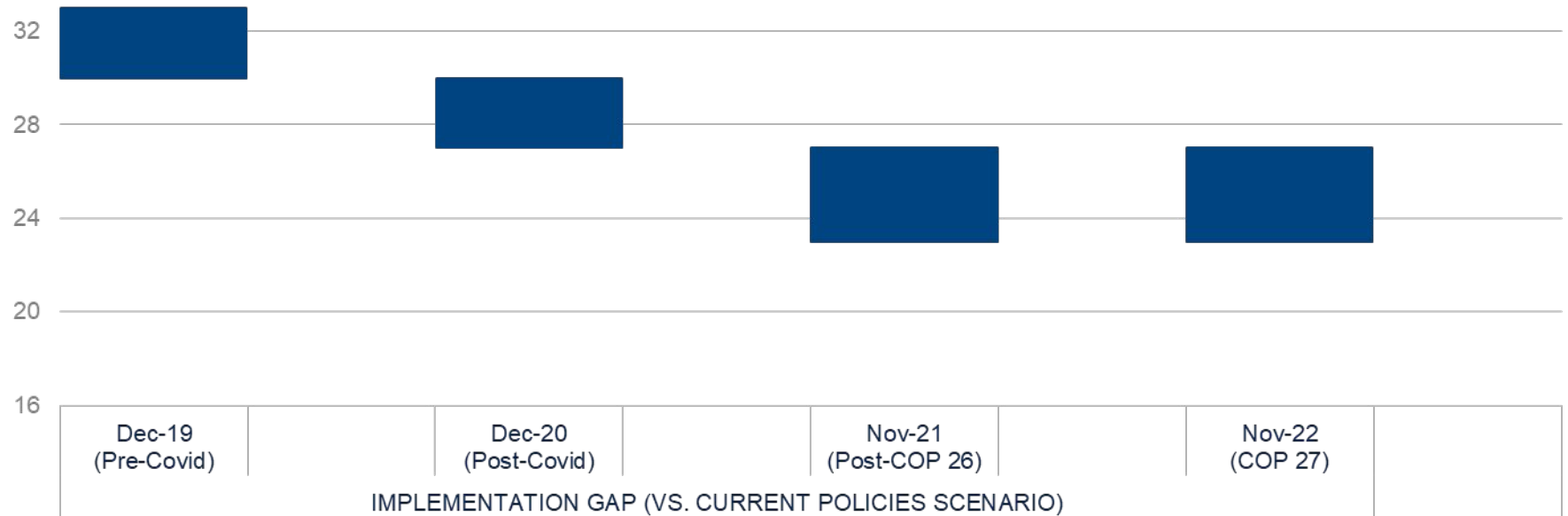
GLOBAL COUNT 1980-2023(e)



It has been confronted with progressively ambitious policies ... that continue to fall short

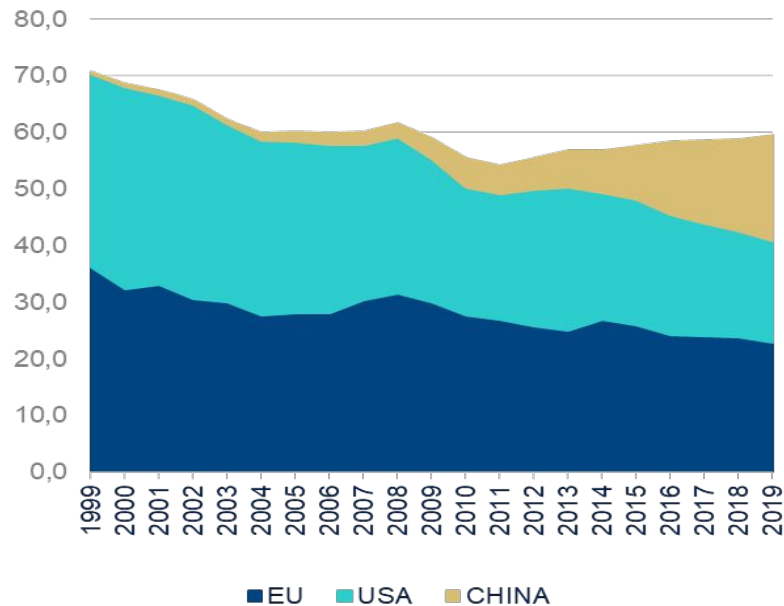
WORLD. IMPLEMENTATION GAP FOR NET-ZERO GOAL

(2030 GAP, GTCO2E). WORLD



Technology and innovation are thus essential, and the EU is a World leader

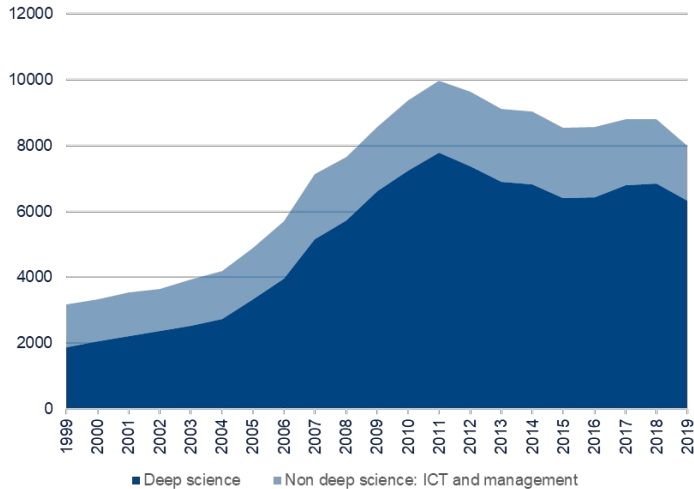
ENVIRONMENT PATENTS (PCT): EU, USA AND CHINA % WORLD ENVIRONMENT PATENTS



- The EU has been a pioneer in recognizing environmental challenges and conducting research in this area.
- It has consistently held a leading role in environmental patents for decades.
- However, China is making strong inroads into this field, having surpassed the US in recent years.

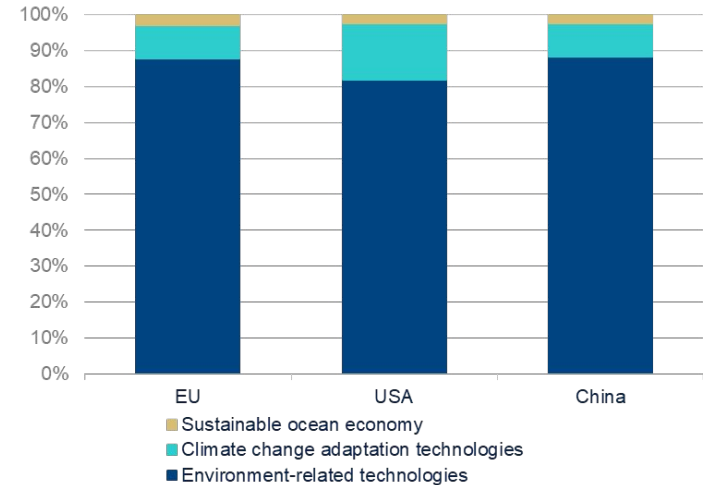
Deep science is thus the key to achieving sustainability goals ... without compromising growth

EU ENVIRONMENT PATENTS NUMBER PCT PATENTS



Source: BBVA Research and BeAble capital from [Patents Statistics](#). PCT patents based on priority date and applicant's country of residence.

DEEP SCIENCE. ENVIRONMENTAL PATENTS %, NUMBER PCT PATENTS 1999-2019



Source: BBVA Research and BeAble capital from [Patents Statistics](#). PCT patents based on priority date and applicant's country of residence.

Environmental innovation fosters growth mainly through cheaper energy and more efficient production processes (medium-long term)

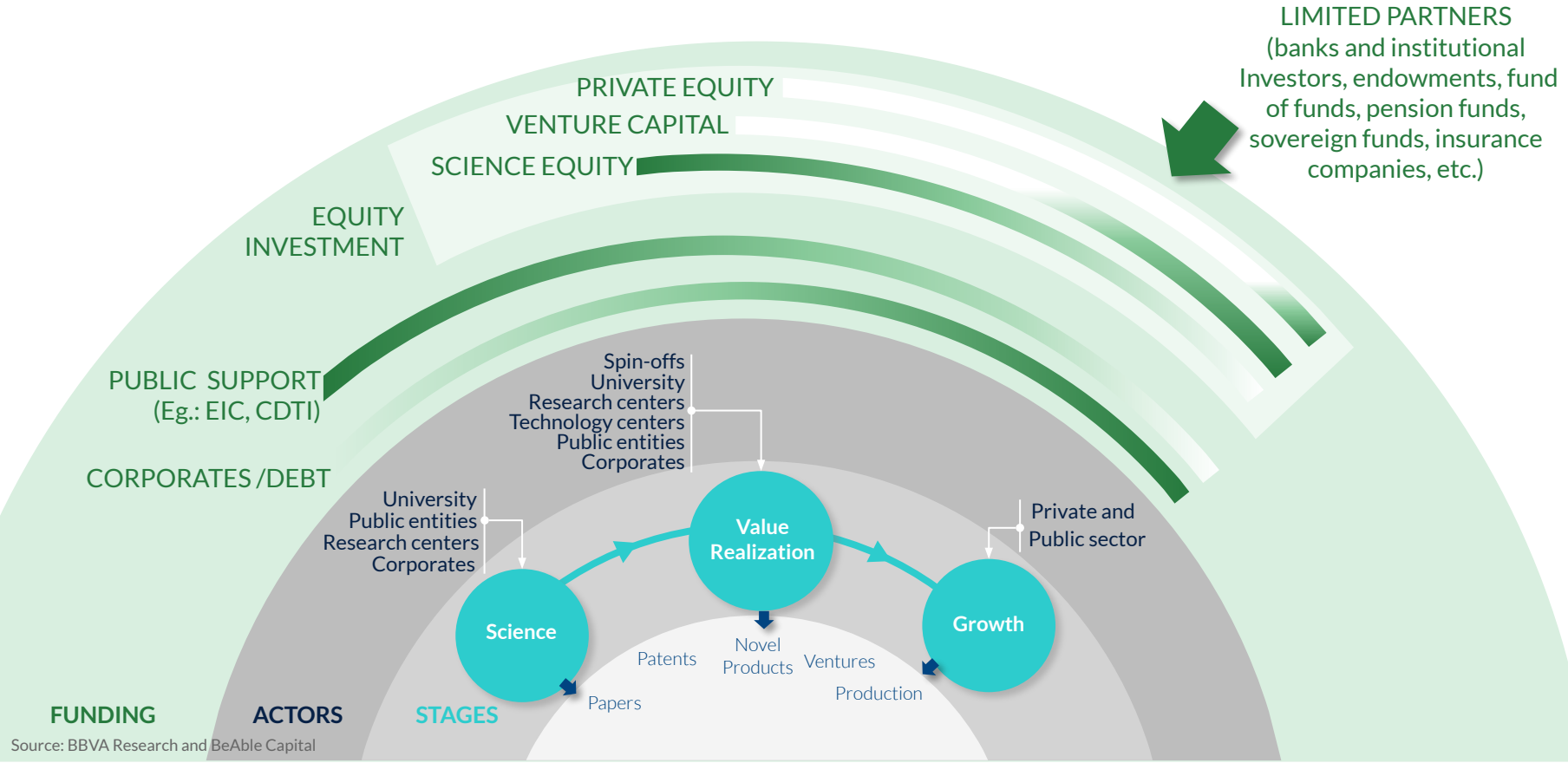
03

Science Equity:

A critical opportunity
for funding deep science

Deep science involves many funding ecosystems, along its three stages

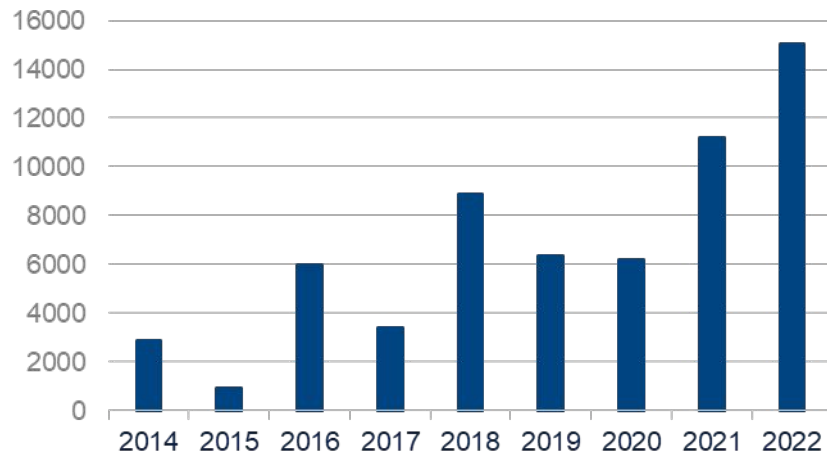
And specialized equity investors play a pivotal role in the success of value realization



Value realization has surged: attracting funding and spurring job creation

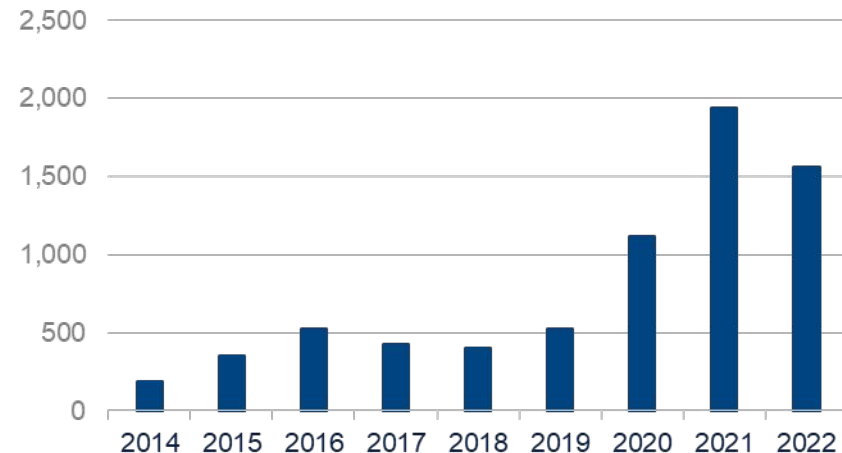
FUNDING OF DEEP SCIENCE SPIN-OFFS

(MILLION DOLLARS RAISED BY DS SPIN-OFFS)



JOB IN DEEP SCIENCE SPIN-OFFS

(THOUSANDS OF PEOPLE EMPLOYED BY DS SPIN-OFFS)

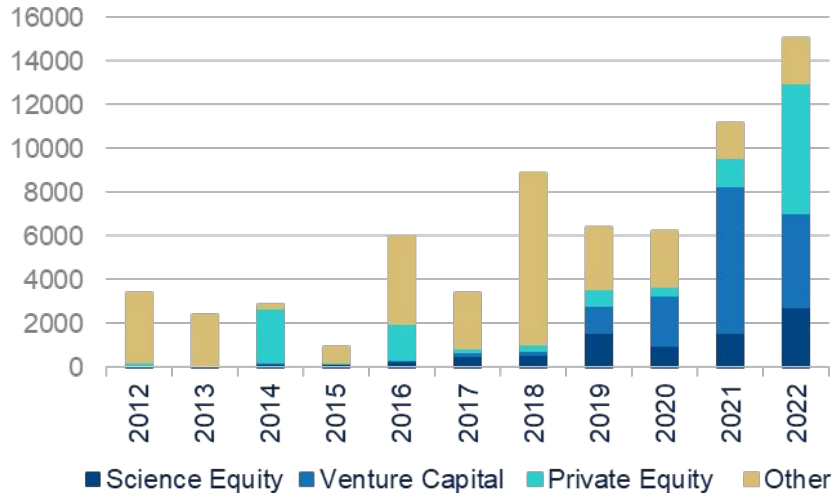


Source: BBVA Research and BeAble Capital from PitchBook Data, Inc. Data has not been reviewed by PitchBook analysts

Annual funding after Covid averaged USD 13 billion (2021-2022), more than doubling pre-Covid funding. This was accompanied by a significant rise in (higher-skill) jobs within the Deep Science ecosystem (representing up to ~1% of EU total jobs).

Equity investment has dominated the recent surge in funding ... especially in the form of venture capital and private equity

EU FUNDING IN DEEP SCIENCE SPIN-OFFS (2012-2022, MILLION DOLLARS)



Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc.
Data has not been reviewed by PitchBook analysts

FUNDING

1 EQUITY INVESTMENT (public and private)

Science Equity

Venture Capital

Private Equity

2 GRANT ASSISTANCE

3 DEBT FINANCING

4 NON-INSTITUTIONAL INVESTMENT

i Three stages of equity investment:

SCIENCE EQUITY > Novel enterprises

VENTURE CAPITAL > Established initiatives

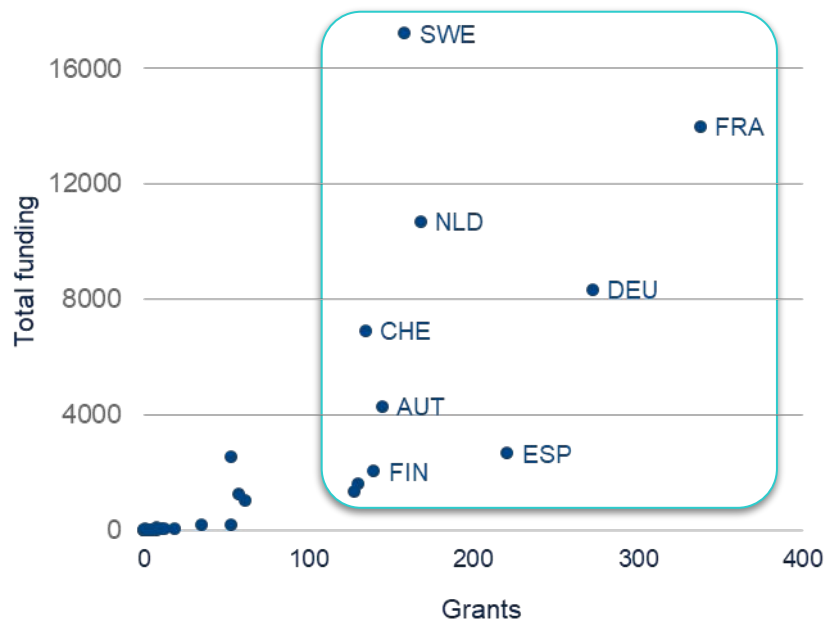
PRIVATE EQUITY > Consolidated initiatives

To sustain deep science, funding early stages of value realization is crucial.

Grants are critical but fall short

GRANTS AND EQUITY FUNDING RAISED BY DEEP SCIENCE

2012-2022 (MILLION DOLLARS)

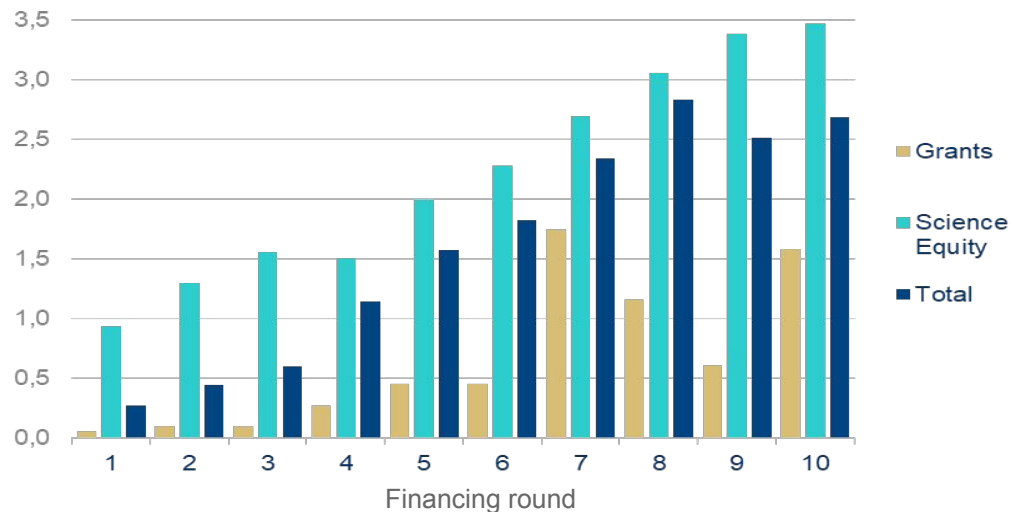


- Public institutions have traditionally allocated resources to Deep Science through grants.
- But a robust "grant ecosystem" while crucial, is constrained by its smaller scale compared to the "equity ecosystem" ... and by its limited direct connection to it.

Science equity emerges as a major and efficient funding source of those early stages

MEDIAN FUNDING RAISED BY ROUND (2012-2022)

(MILLION DOLLARS)



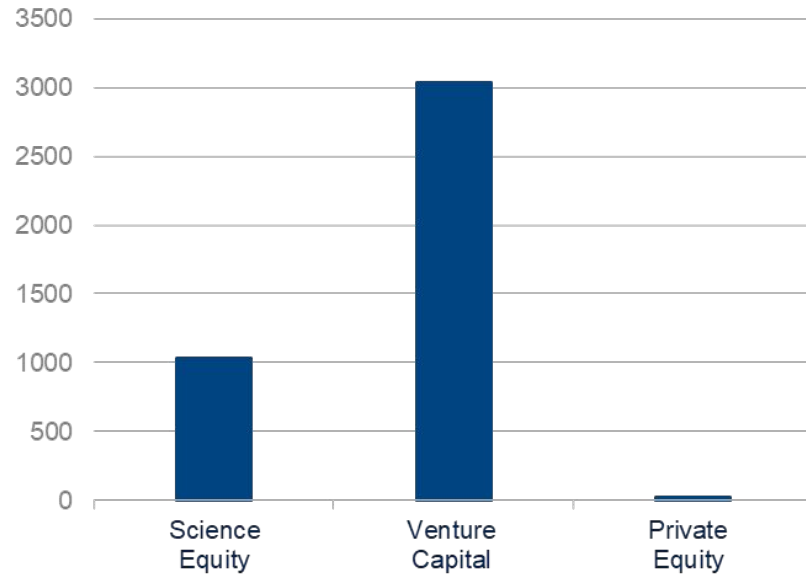
Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc. Data has not been reviewed by PitchBook analysts

Grants are a good signaling mechanism, but it is Science Equity that allocates larger and more efficient funds that allow enterprises to focus their early-stage efforts on their projects... rather than on managing recurrent financing needs.

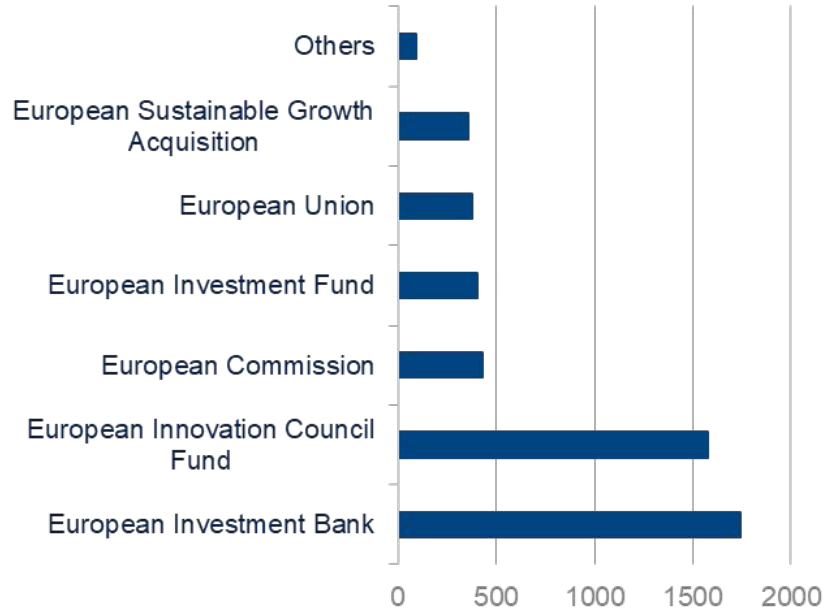
EU institutions are investing in the equity ecosystem of deep science

DEEP SCIENCE EQUITY INVOLVING EU-LEVEL PUBLIC INSTITUTIONS, 2012-2022 (MILLION DOLLARS)

BY TYPE OF EQUITY INVESTMENT



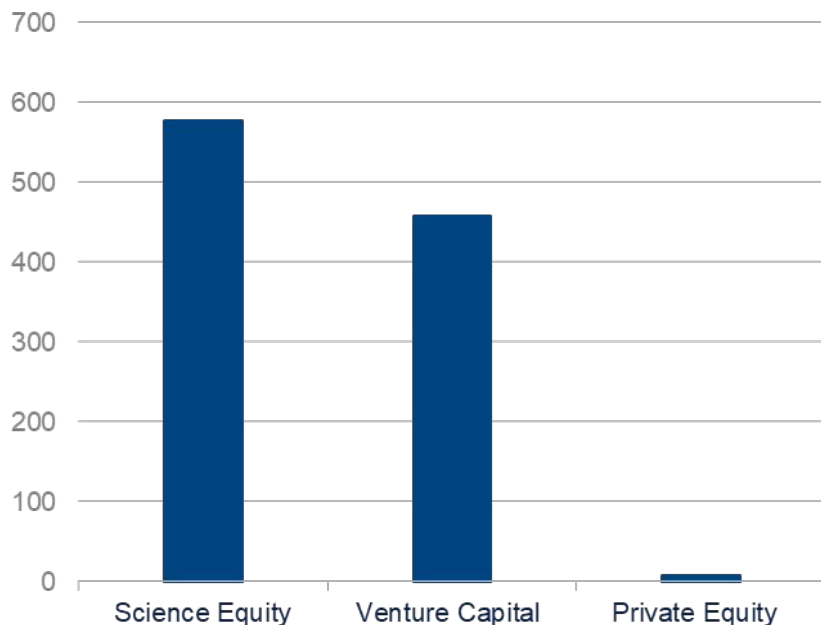
BY EU INSTITUTION INVOLVED



In particular, the EU launched the EIC fund to bolster science equity funding

DEEP SCIENCE EQUITY TRANSACTIONS INVOLVING THE EIC FUND

(MILLION DOLLARS, TOTAL UNTIL 2022)



Data has not been reviewed by PitchBook analysts.

Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc.

EUROPEAN INNOVATION COUNCIL (EIC)

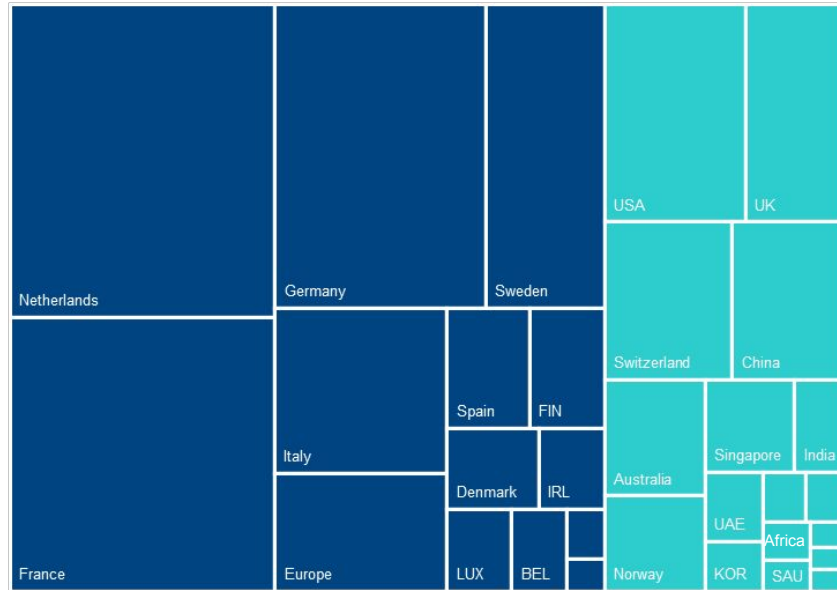
- The EIC has the mandate to be a *risk taker bridging the funding gap and scaling up of breakthrough European innovations while crowding in other investors.* 
- It has effectively steered equity investments from EU-level institutions to high-risk Science Equity.
- The portfolio companies of the EIC (and its precursors) have attracted follow-on investments of around € 10 bn (3X EIC's support to date).

Early-stage public support is crucial, given its limited appeal to foreign funding

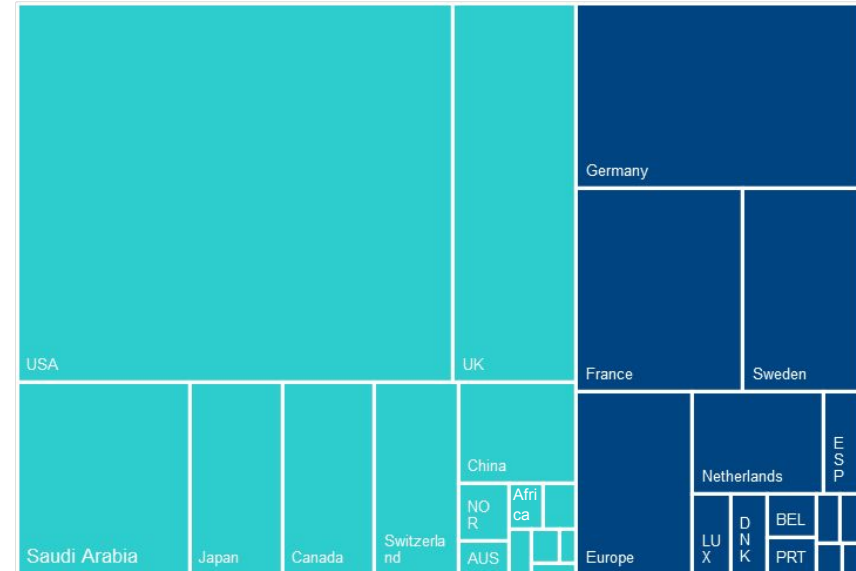
ECOSYSTEM OF EQUITY INVESTORS IN DEEP SCIENCE

(PARTICIPATION IN THE TOP 200 DEALS WITHIN THE DEEP SCIENCE ECOSYSTEM. 2012-2022, COUNTS WEIGHTED BY DEAL SIZE)

SCIENCE EQUITY



TOTAL EQUITY INVESTMENT (SE+VC+PE)



Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc. Data has not been reviewed by PitchBook analysts.

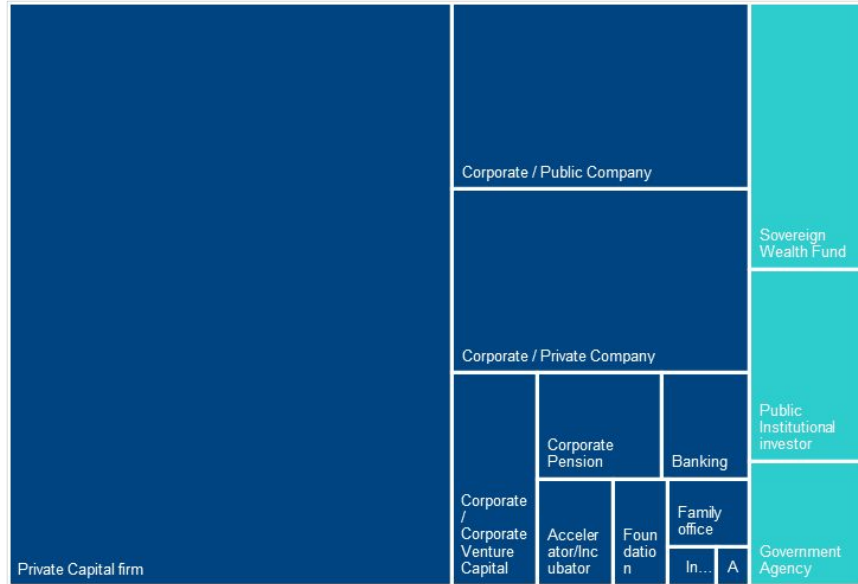
Notes: European countries: dark blue. Non european countries: light blue. Other include PRT, LTU, MOC, ISR, TWN, RUS and JPN in the left-hand side graph and SGP, BRA, UAE, ISR, IND, FIN, ITA, IRL and AUT in the right-hand side graph.

Public funding must continue complementing private investors comprehensive perspective and their expertise within the ecosystem

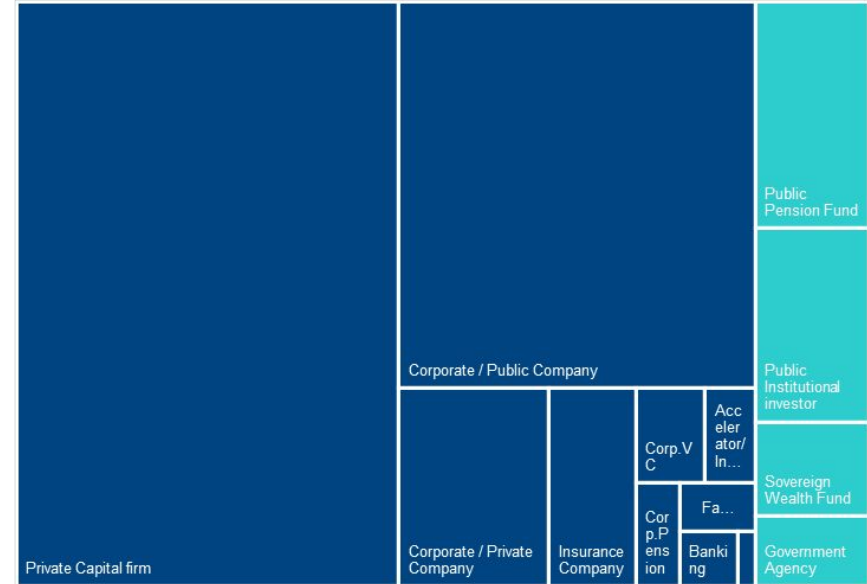
ECOSYSTEM OF EQUITY INVESTORS IN DEEP SCIENCE

(PARTICIPATION IN THE TOP 200 DEALS WITHIN THE DEEP SCIENCE ECOSYSTEM. 2012-2022, COUNTS WEIGHTED BY DEAL SIZE)

SCIENCE EQUITY



DEEP SCIENCE EQUITY INVESTMENT (SE+VC+PE)



Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc. Data has not been reviewed by PitchBook analysts.
Notes: Private investors: dark blue. Public institutional investors: light blue. Other include Investment Bank and Angel Group.

04

Policy actions for Europe: A discussion

Two policy strategies to catalyze innovation

1



Direct public funding

Participating actively in markets, focused on early stages

2

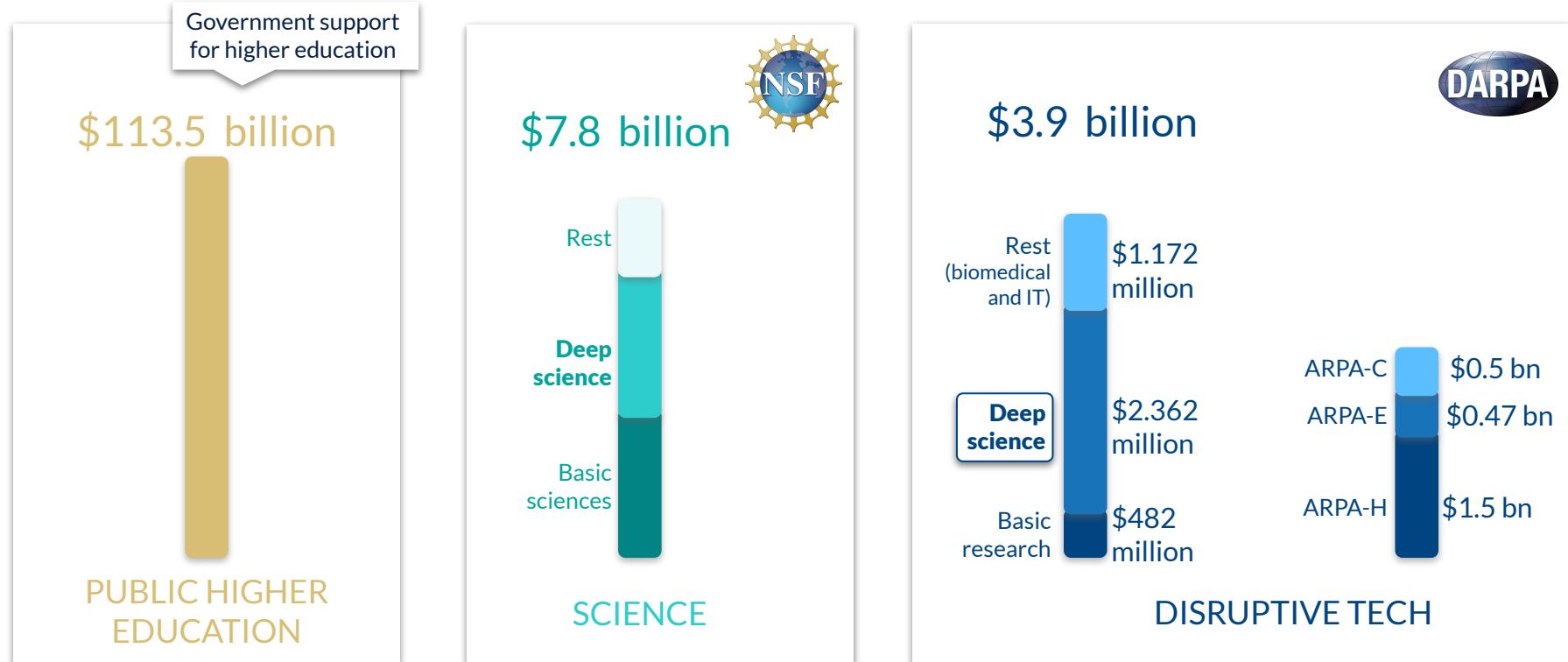


Market enhancement

Fostering competition and capital deepening (CMU)

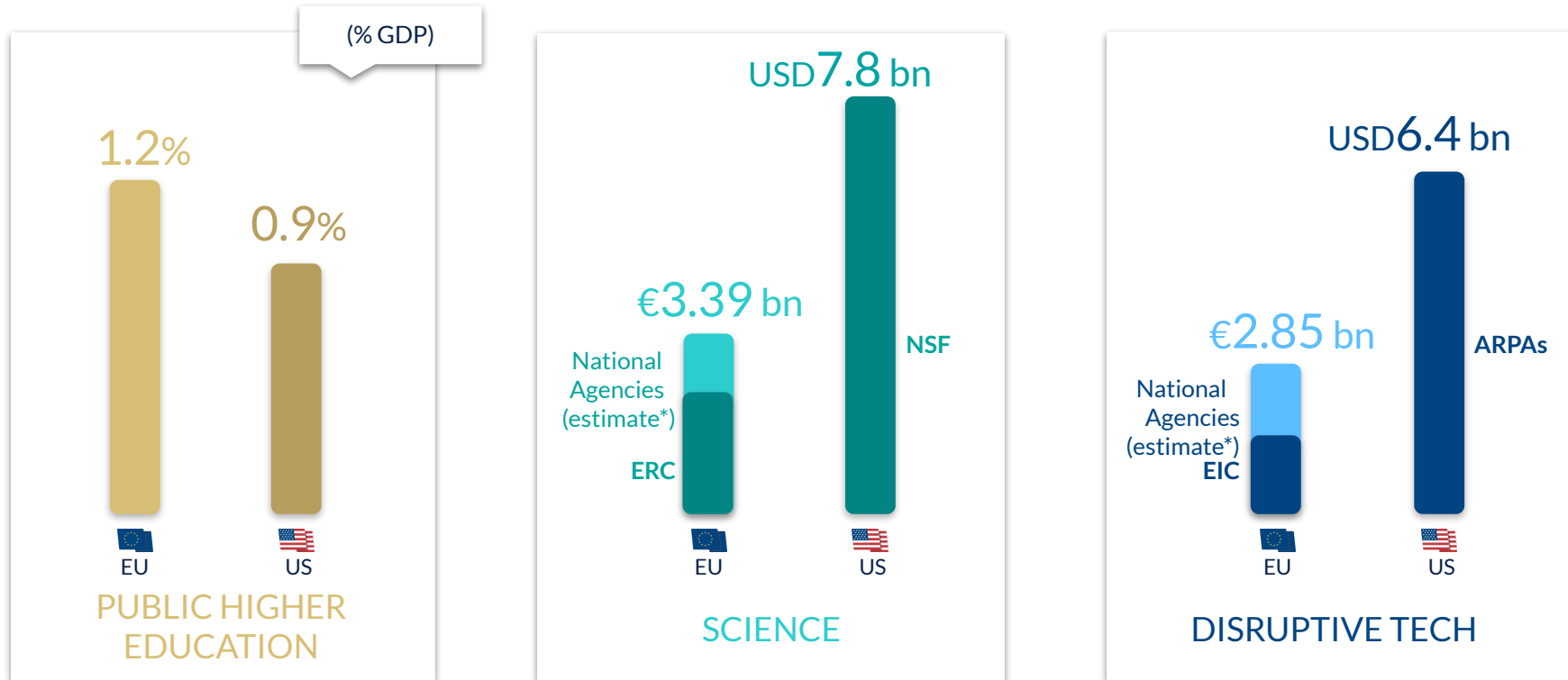
1. Direct funding:

Deep science is central for US successful innovation paradigm



1. Direct funding:

And EU policy is catching up in that regard



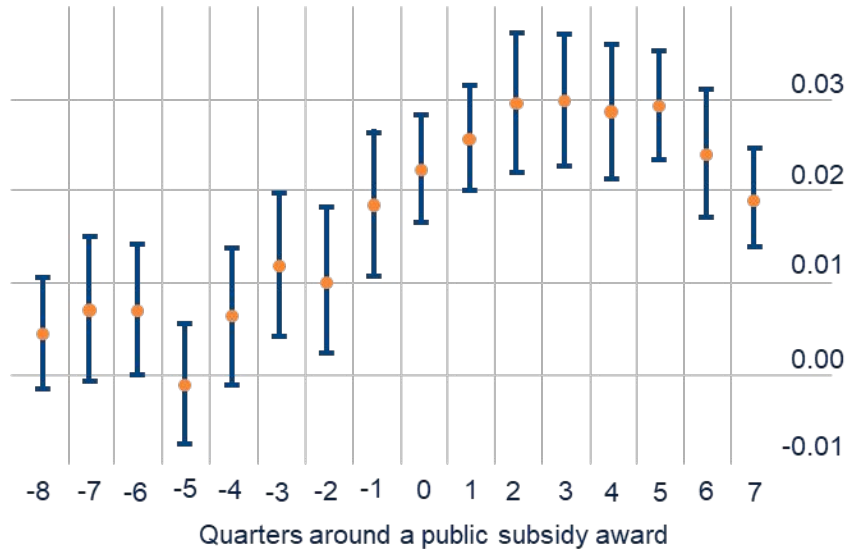
* The ERC budget of 16 billion euros is distributed over seven years, and the estimated budget from national coffers assumes Spain's effort (Agencia Nacional de Investigación, as a percentage of GDP) is representative of the EU. Similarly, the EIC budget of 10 billion euros is prorated over seven years, and the estimated budget from national coffers assumed that Spain's multiplying factor of two (CDTI) is representative of the EU.

Source: BBVA Research and BeAble Capital with OECD and national budget data.

1. Direct funding:

Public funding of science equity attracts private investments

EFFECT OF RECEIVING A SUBSIDY ON THE PROBABILITY OF RAISING VC CAPITAL ↻



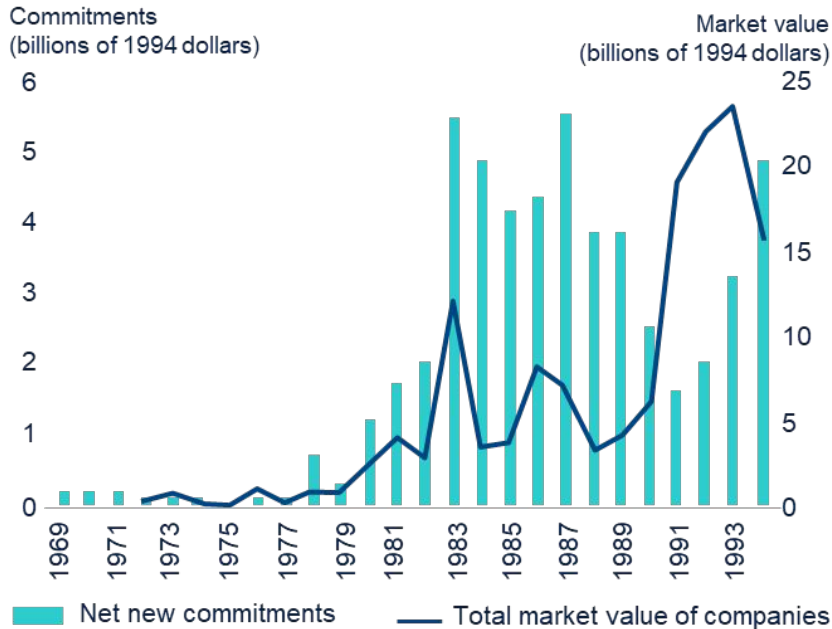
● Estimate — 90% confidence interval

- Analysis shows that **industries benefit strongly from public support in the early stages** of their high-tech innovation projects - raising the probability of obtaining patents and securing additional private capital. ↻
- The benefit fades out when supporting more established projects. ↻
- The leading role that public actors can play in the early stages of the entrepreneurial ecosystem is conferred by their readiness and capability to take on significant risks, irrespective of the business cycle. ↻



2. Market enhancement:

Designing regulations and tax structures that promote robust and sustainable equity investments

US: VENTURE CAPITAL, 1969-94 BN OF 1994 USD)



Source: See text. Annual market value of all venture capital-backed firms issuing equity in an initial public offering

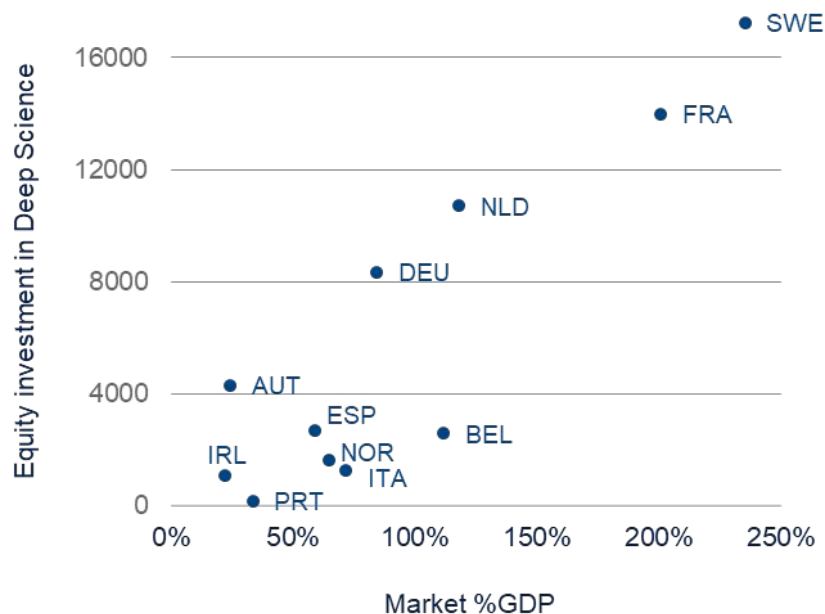
- In 1978, the US Department of Labor clarified that **investments in venture capital funds** by pension funds do **not violate the “prudent man rule”** in Employee Retirement Income Security Act (ERISA). 
- Leading **institutional investors** to “**prudently diversify**” into **venture capital funds** - minor quantities for the formers but significant for the latter.
- And there is consensus that “*tax relief for capital gains or the provision of loss relief on a more favourable basis than the baseline tax system could support the derisking of investments in young, growing and innovative businesses.*” 

2. Market enhancement:

Advancing the CMU is essential

EU: EQUITY INVESTMENT IN DEEP SCIENCE AND CAPITAL MARKETS CAPITALIZATION

(% GDP, MILLION USD)



Source: BBVA Research and BeAble CAPITAL from PitchBook Data, Inc.

EIB REPORTS SUMS UP CONSENSUS ↻

- One important factor hampering the development of early and growth-stage financing in Europe is the greater difficulty venture capital investors may have in selling successful investments to outsiders through equity markets.
- **Stock market capitalisation is much higher in the US** than in most European countries, as is IPO activity.
- European exit markets are not only smaller but **also fragmented** along national lines, reducing liquidity and venture capitalists' exit possibilities.

Main Takeaways

- ❑ Deep science is key to EU strategic goals, most notably sustainability
- ❑ Science equity is essential to address deep science's weakest link - value realization.
- ❑ Two policy levers promote science equity:
 - ❑ direct investing, particularly in early stages and
 - ❑ market enhancement (institutional investors and CMU)

Disclaimer

The present document does not constitute an “Investment Recommendation”, as defined in Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (“MAR”). In particular, this document does not constitute “Investment Research” nor “Marketing Material”, for the purposes of article 36 of the Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive (MIFID II).

Readers should be aware that under no circumstances should they base their investment decisions on the information contained in this document. Those persons or entities offering investment products to these potential investors are legally required to provide the information needed for them to take an appropriate investment decision.

This document has been prepared by BBVA Research Department. It is provided for information purposes only and expresses data or opinions regarding the date of issue of the report, prepared by BBVA or obtained from or based on sources we consider to be reliable, and have not been independently verified by BBVA. Therefore, BBVA offers no warranty, either express or implicit, regarding its accuracy, integrity or correctness.

This document and its contents are subject to changes without prior notice depending on variables such as the economic context or market fluctuations. BBVA is not responsible for updating these contents or for giving notice of such changes.

BBVA accepts no liability for any loss, direct or indirect, that may result from the use of this document or its contents.

This document and its contents do not constitute an offer, invitation or solicitation to purchase, divest or enter into any interest in financial assets or instruments. Neither shall this document nor its contents form the basis of any contract, commitment or decision of any kind.

The content of this document is protected by intellectual property laws. Reproduction, transformation, distribution, public communication, making available, extraction, reuse, forwarding or use of any nature by any means or process is prohibited, except in cases where it is legally permitted or expressly authorised by BBVA on its website www.bbvaresearch.com.

European Deep Science Technologies:

The time for Science Equity is now

January, 2024