

Real science, reliable knowledge and the complementarity of “open science” and property knowledge

How may EUROPE lead the way to Lisbon?

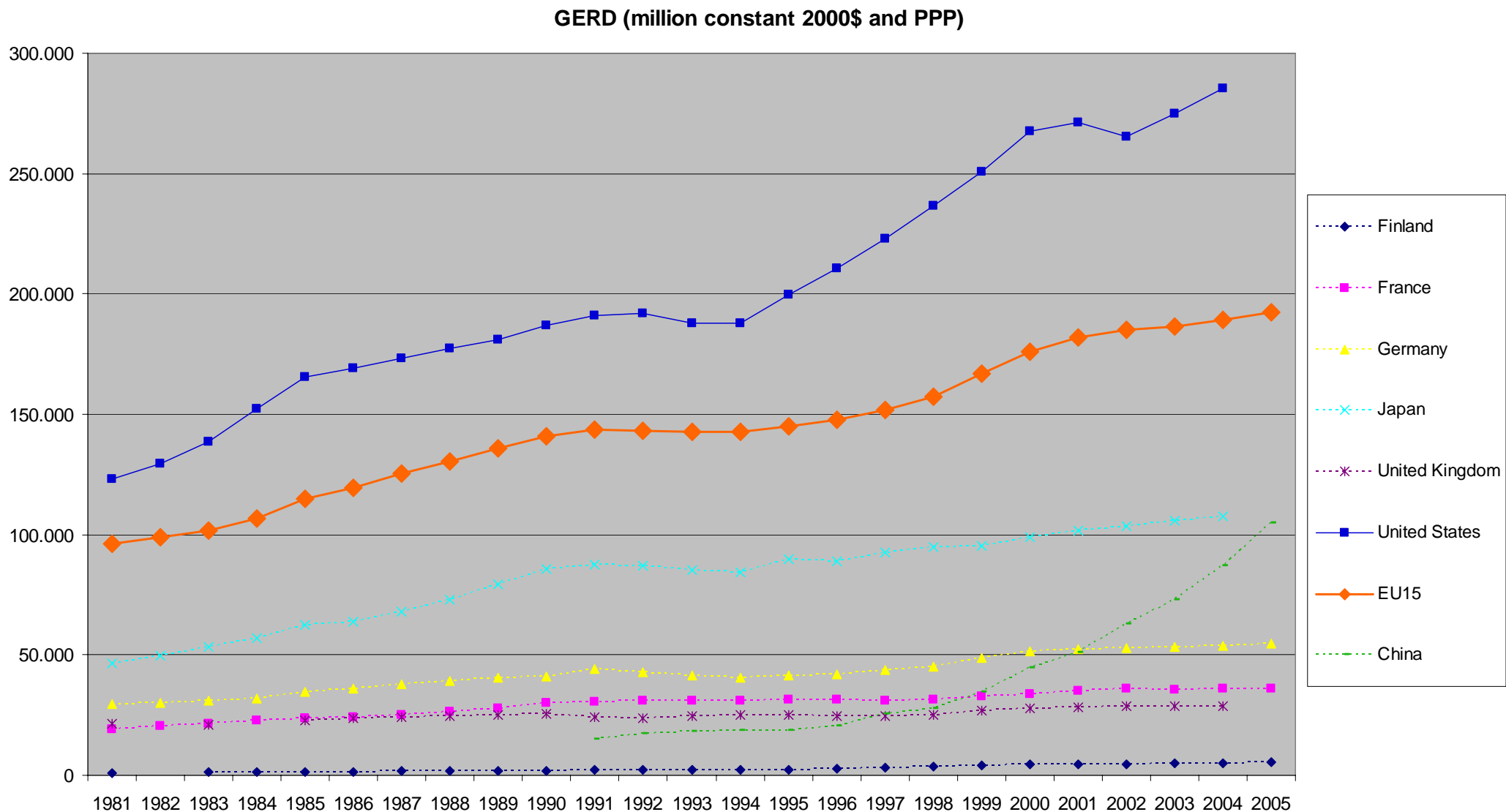
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Some forty years after John Ziman launched the discussion on *Public Knowledge* and thirty years after his work on *Reliable Knowledge*,

...is it still true that to appreciate the significance of scientific knowledge, one must understand the nature of science as a complex whole?

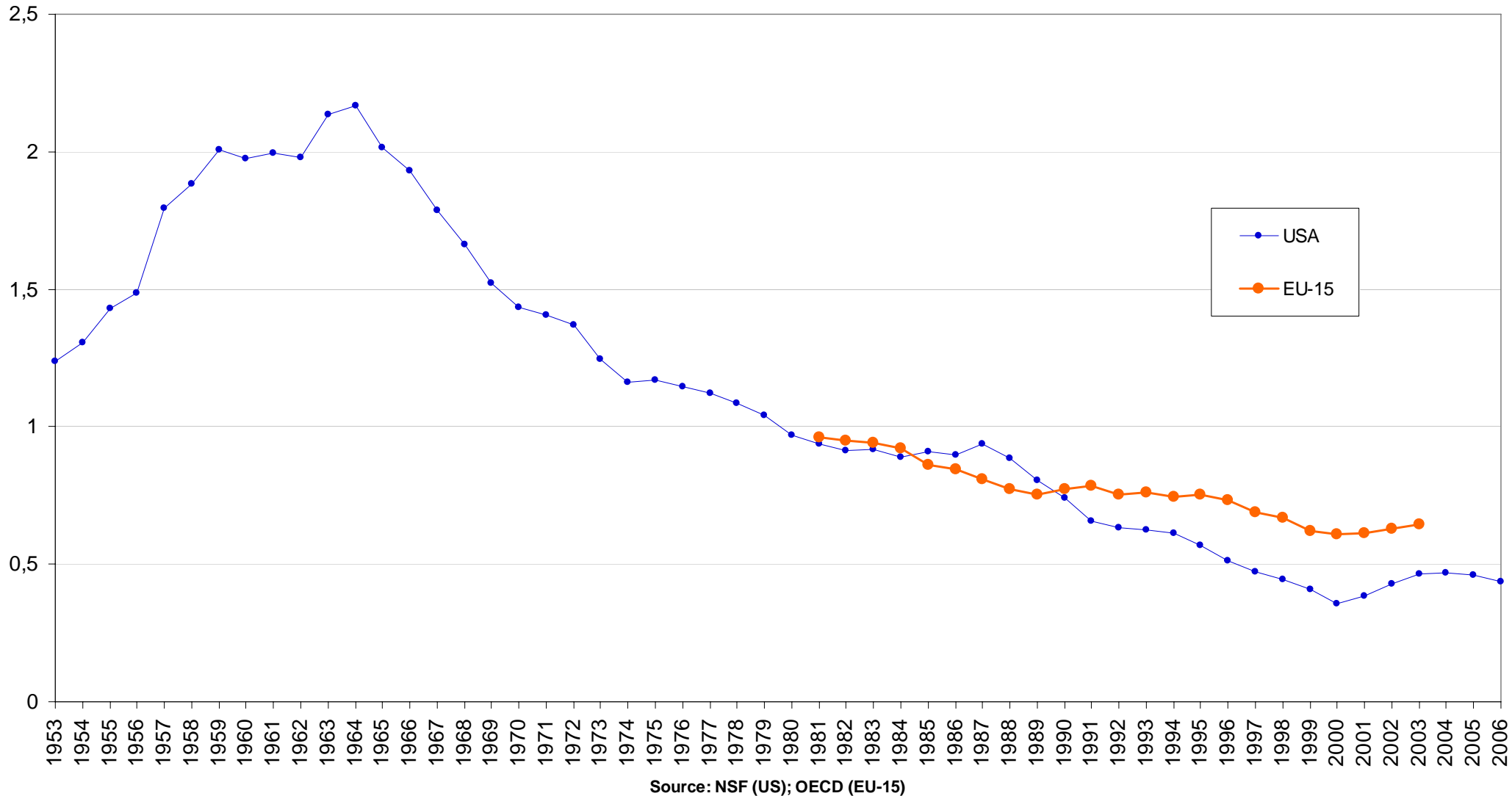
The Perception - 1: The continuous increase in the “gap” with US



The gap on the gross expenditure on R&D between US and EU is increasing, although EU15 has doubled its GERD over the last 25 years

The Perception - 2: **A Long-lasting and persistent trend**

Ratio of Government to Industry Expenditure on R&D



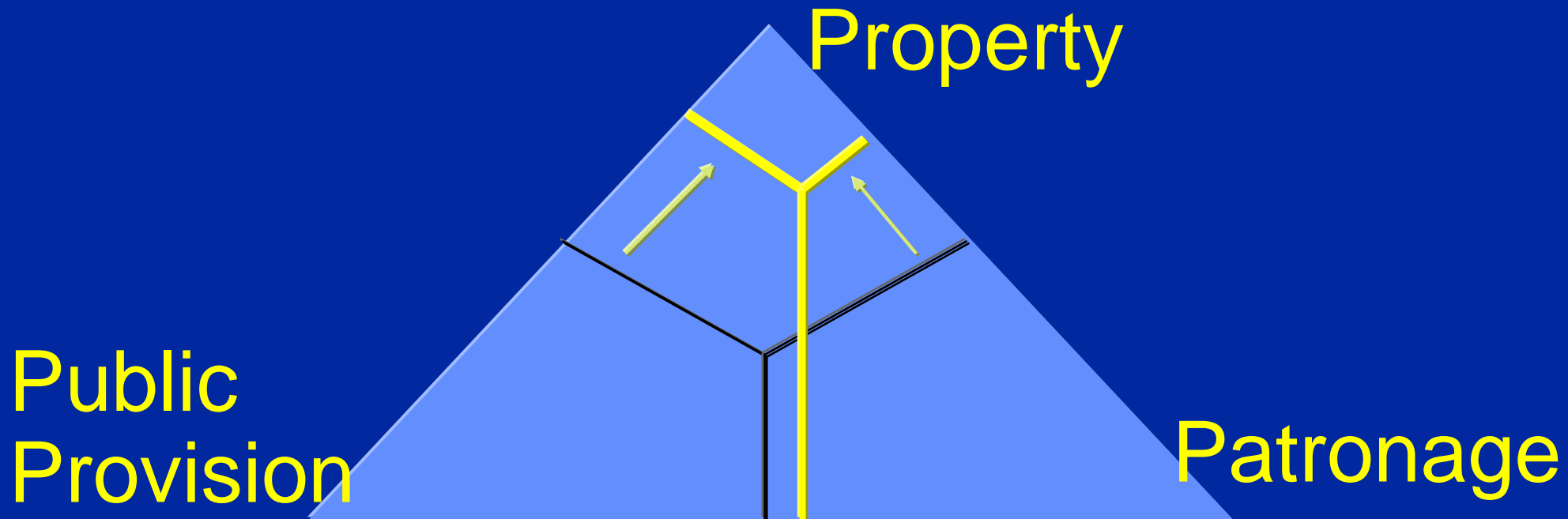
Source: NSF (US); OECD (EU-15)

There is a persistent and long decreasing trend in the ratio of public vs. private expenditure in EU and US

A serious threat: “*the tragedy of the commons*”

...Paul David(1993; 2000); Dasgupta & David (1994)

“ill-considered” public support for expanding legal means of controlling access to information for the purpose of extracting **private economic rents** is resulting in the “over-fencing of the public knowledge commons” in science and engineering...



The need for open, collaborative research?

Analysis suggests that, at least in the case of EU 15 and the US, but increasingly in the OECD as a whole, the “pendulum” is swinging towards private incentives.

Does this corresponds to the current economic and political demands of our time?

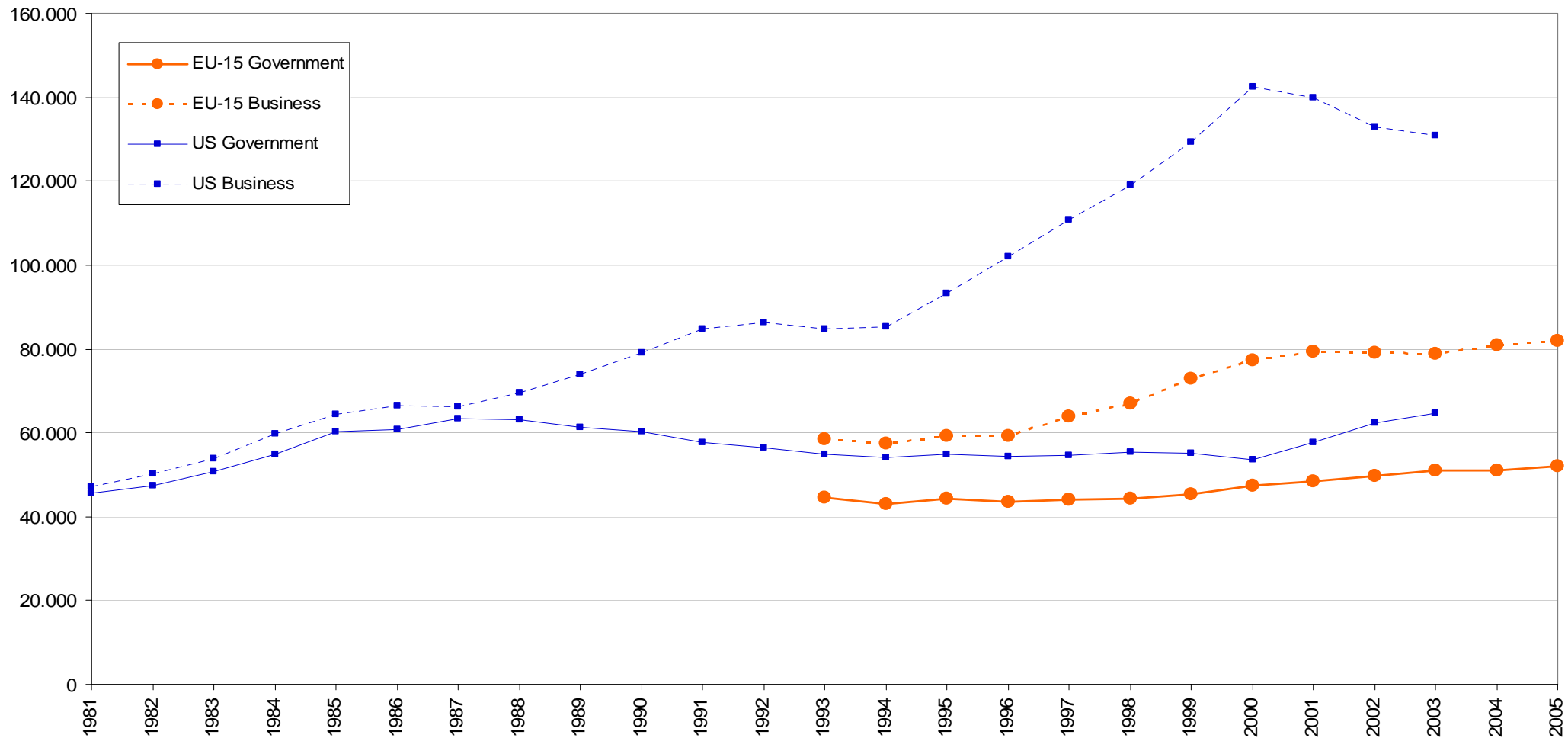
➤ Mostly an empirical question:

- Is the balance adequately meeting the **social and economic demands** for new science and technology, as expressed by economic and political expressions?
- Is the balance adequately facing not only our current demands, but making the **investments needed** to meet the challenges of the future?

...see, for example, Paul Rommer (2000); Paul David (2006)

Looking at History: Europe vs US

EU-15 R&D Expenditure by source of funds (millions of PPS at 1995 constant prices)

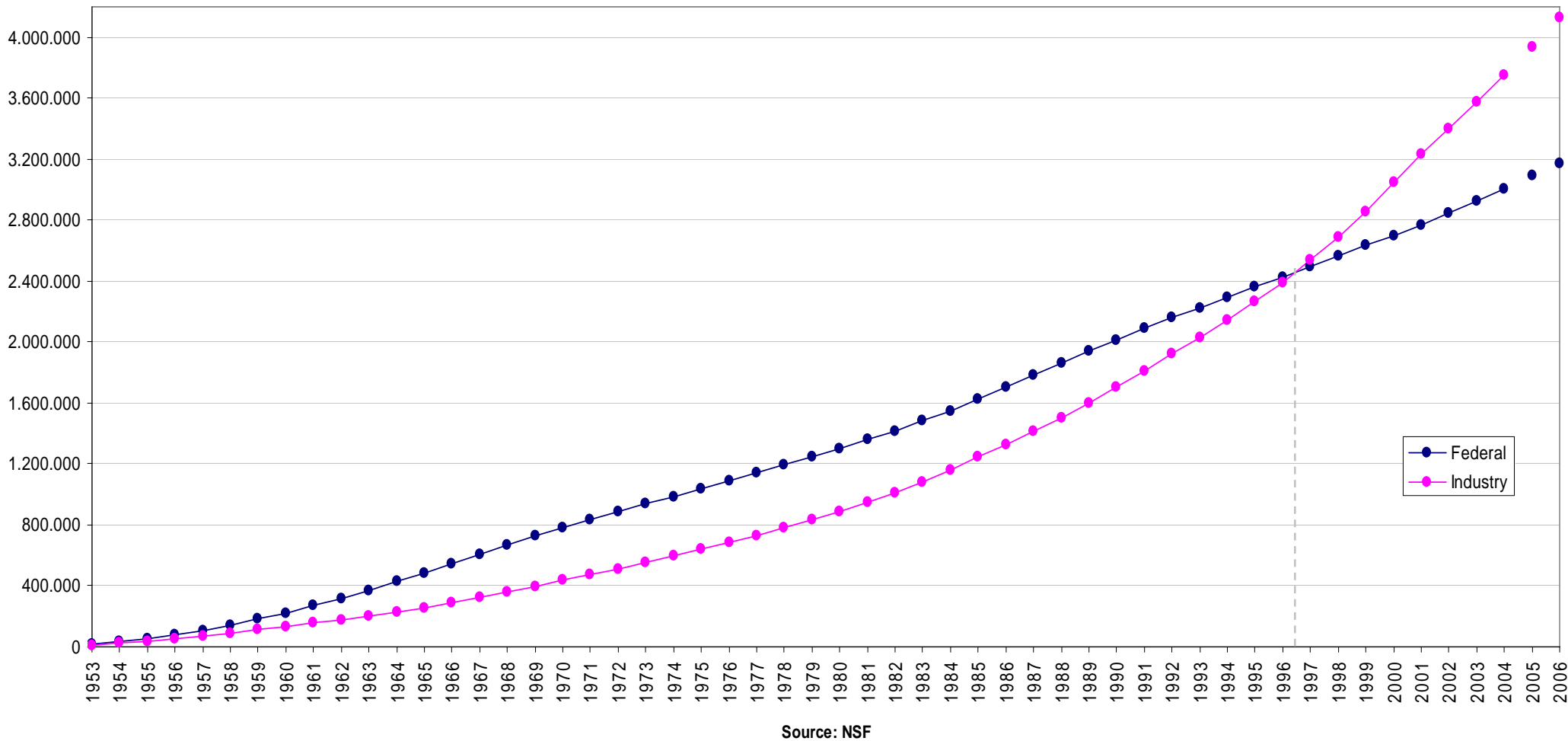


Source (Eurostat)

Private spending on R&D in EU15 has remained stable since 2000 at around 80 billion and has not followed the related American increase during the 90's. Public spending has just slightly increased.

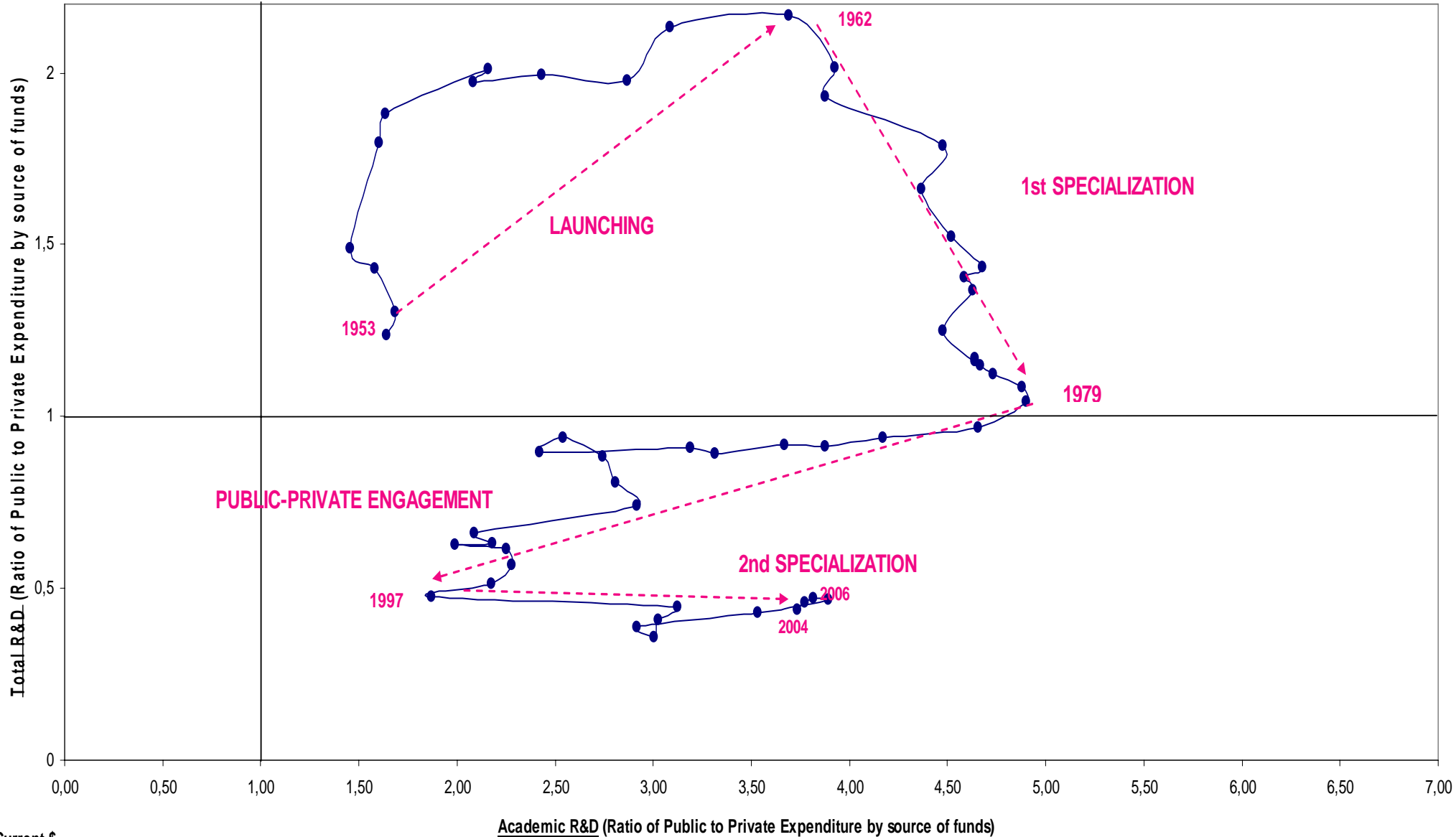
The Historical Analysis: US in cumulative terms

US R&D cumulative Expenditures by source of funds: Public and Private (Mio constant 2000 \$, since 1953)



BUT, in cumulative terms, the US public support is only now being surpassed by the private support to R&D. The “integral” reflects long-lasting investments in basic science, equipment and institutions such as the modern US research university, on which both private and public R&D depends, namely to train people.

Structural Analysis: US public / private expenditure



Global firms with the largest stock market valuation

Top 25 –European Union			Top 25 – USA		
Rank	Firm	Founded	Rank	Firm	Founded
7	BP	1901	1	ExxonMobil	1870
12	GlaxoSmithKline	1873	2	General Electric	1890
15	Total	1924	3	Microsoft	1975
17	Vodafone	1950	4	AT&T	1885
21	EDF	1884	5	Wal-Mart Stores	1962
23	ENI	1926	6	Procter & Gamble	1837
25	Sanofi-aventis	1924	9	Johnson & Johnson	1886
31	Telefónica	1924	10	Pfizer	1849
34	Siemens	1871	11	Altria Group	1847
36	Nokia	1896	13	Cisco Systems	1984
37	E.ON	1929	16	Chevron	1870
38	AstraZeneca	1926	19	IBM	1911
41	Rio Tinto	1905	20	Google	1998
44	Unilever	1874	26	Intel	1968
45	Deutsche Telekom	1871	27	Verizon	1885
53	Schlumberger	1927	28	Coca-Cola	1886
58	France Telecom	<1900	29	ConocoPhillips	1870
59	Arcelor Mittal	1882	30	Hewlett-Packard	1939
60	Anglo American	1917	32	PepsiCo	1898
64	DaimlerChrysler	1890	33	Merck & Co	1891
66	Tesco	1924	39	Oracle	1977
70	L'Oréal Group	1909	40	Abbott Labs	1888
72	ENEL	<1900	42	Home Depot	1978
73	B.A. Tobacco	1902	43	Comcast	1963
74	Suez Group	1858	46	Time Warner	1903

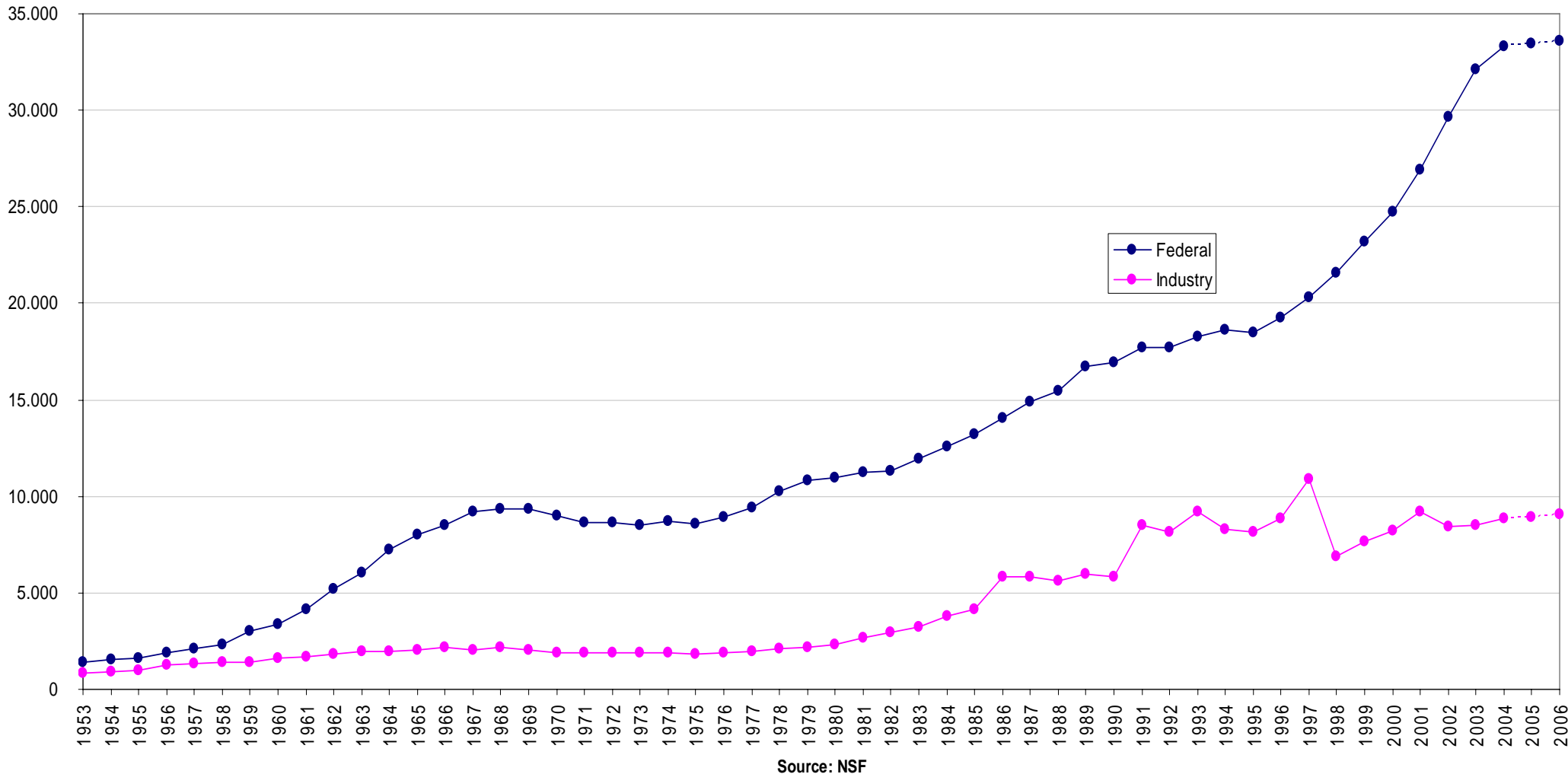
The economic space of the EU is completely dominated by old firms, with Vodafone the only one of top 25 European leaders established after 1927

In the U.S.A., by contrast, eight of top 25 firms by market valuation have been created since 1950, with five after 1975

Analysis shows the critical need for a strong investment in new knowledge and the generation of talent, from which opportunities for innovation and entrepreneurship emerge!

Structural Analysis: **US BASIC R&D**

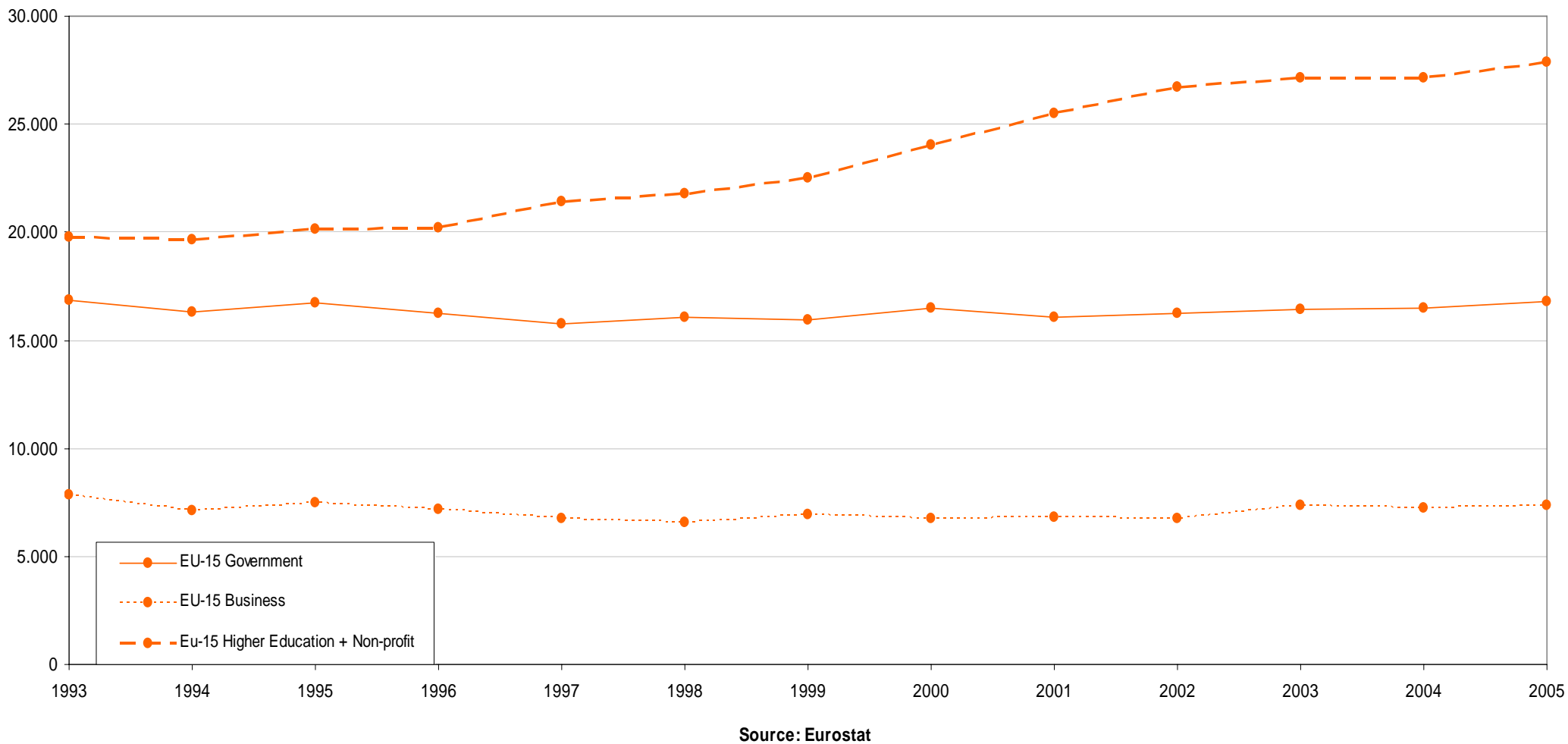
US Expenditure on Academic R&D by source of funds (Mio constant 2000 \$)



...in fact, the “public” has not retreated from funding *basic* R&D, which has increased again since mid 90’s. It has also pushing upwards private spending on basic R&D

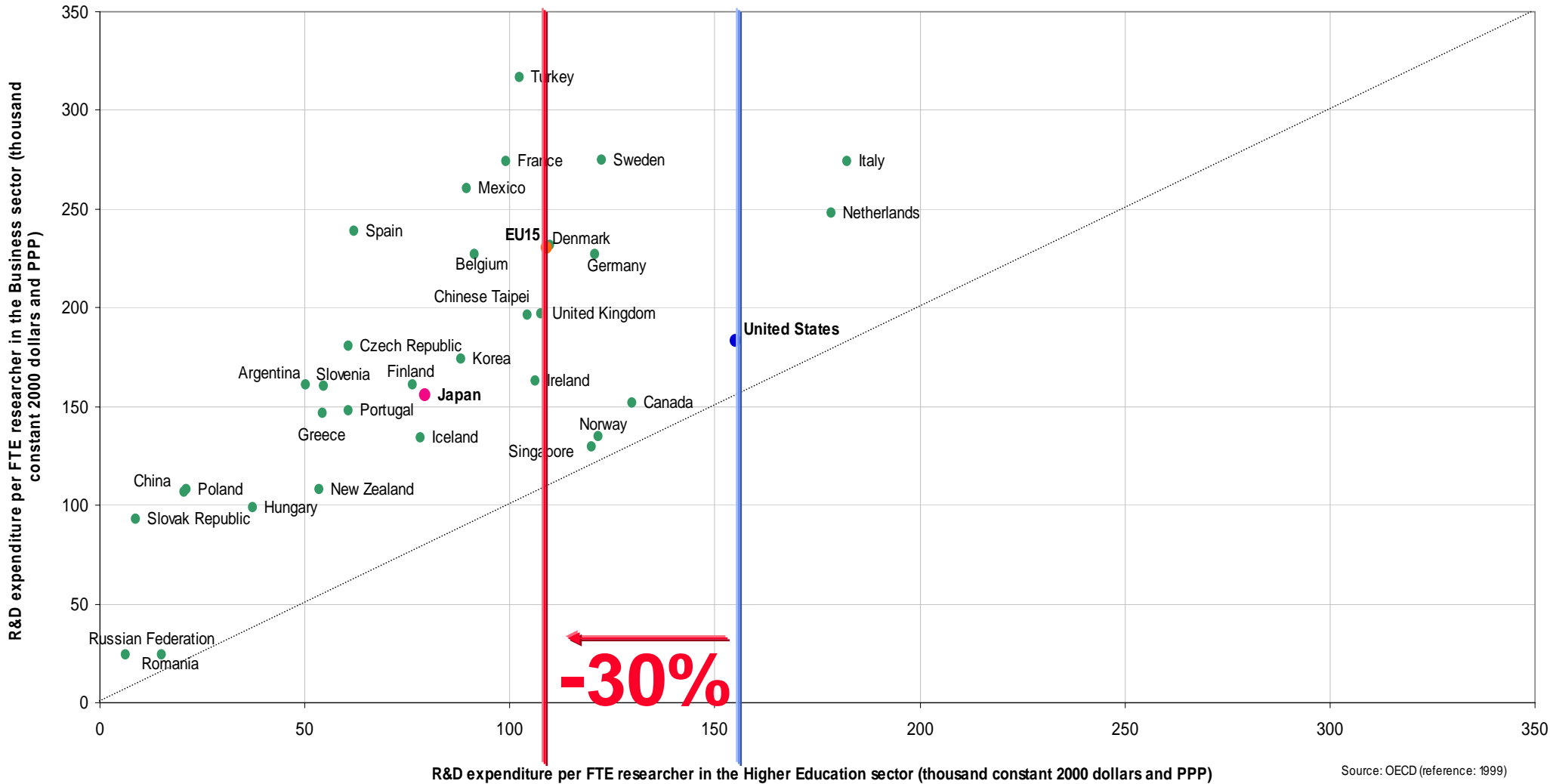
EUROPE: Which allocation of Public funding?

EU-15 Government Funding for R&D (Constant 1995 PPS)



Public spending on HE has increased (in real terms) during the late 90's, but has remained stable since then and did not accompanied the US trend of the early 2000's. Also, it does not reflect the need for long-lasting investments in basic science, equipment and institutions.

Observation 1: the need to raise R&D Expenditure per researcher in EU's HE

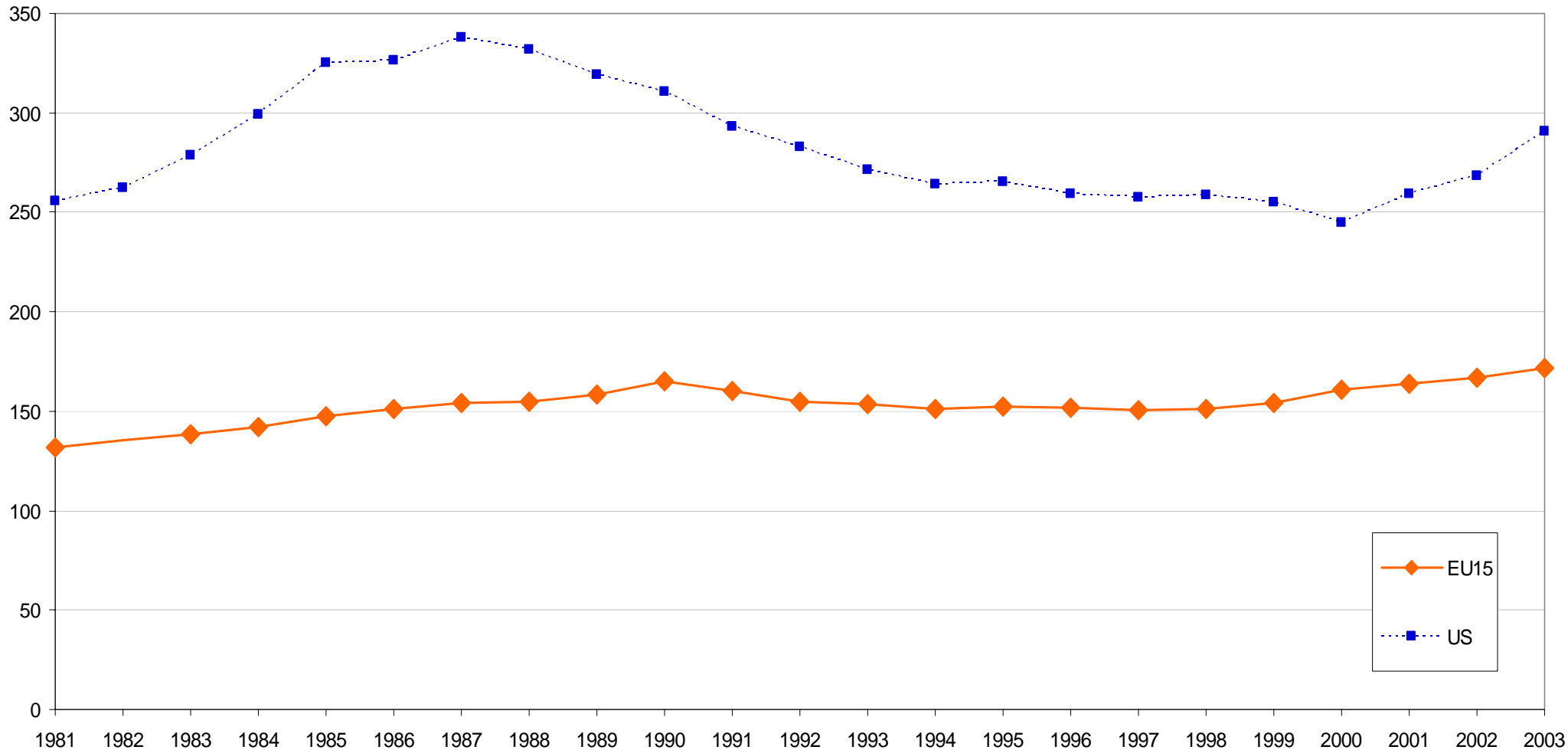


As important as aiming towards increasing the average level of investment in R&D, it is critical to have a **higher education system that distinguish itself through their ability to generate unique talent and knowledge**

Observation 2: Which volume of Public funding?

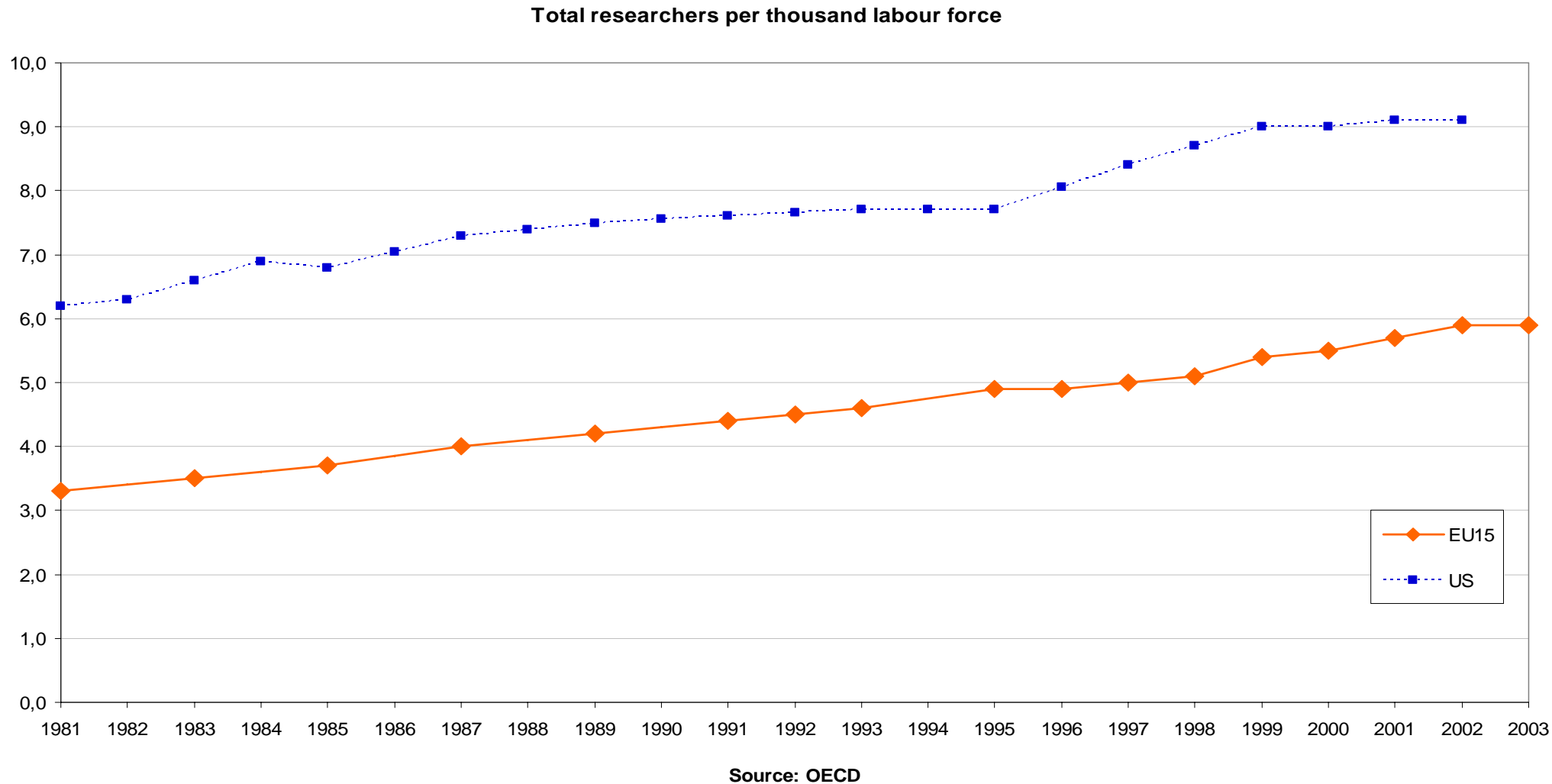
How to foster the public understanding of science in EU and raise the citizen's contribution to science?

R&D Expenditure financed by Government/inhabitant (constant 2000 \$ and PPP/inhabitant)



Source: OECD

Observation 3: the need to train and secure more researchers in EU



To fill the gap, Europe needs to train more than 500.000 researchers able to foster a modern knowledge infrastructure and drive new markets. Women remain the most obvious source for increasing human resources for science and technology in Europe.

The debate on the need to increase expenditure in R&D in Europe must consider improving our understanding of the **different nature of private and public incentives for S&T**.

“Blanket” recommendations to enhance property rights or to limit public resource allocation, based on the US experience, may be misguided.

The key message from the US history is that of a **diversity of policies** and increasing “**institutional specialization**” and clarification of the role of the private and public incentives to support S&T.

How far will Europe be able to strengthen a public funding policy for R&D that is oriented, focused, and consistent?

Does it requires:

- to be increased, and this requires strengthening the public understanding of science?
- to be oriented towards academic and basic research in a way that can foster the knowledge infrastructure?
- to provide the necessary resources (including qualified human skills) for companies to increase their own investment in science and technology?
- to foster the entrepreneurial environment and facilitate new entries in the market?

In a context of increased “brain circulation” throughout the world, how far public funding for research in EU, including that provided through the EU Framework Programme, can accommodate training of the required skilled human resources?

Graduate programs and schools with a strong international component should be able to provide the supply of adequate *transferable skills* to allow for a highly skilled labour force that is able to create and drive new markets...

...and they should also provide new careers and attract new talents!

Does it requires a common EU policy for skilled Human Resources?

Current debate has established that the progress of scientific and technological knowledge is a cumulative process, depending in the long-run on the widespread disclosure of new findings.

...is it adequate to consider that the main challenge for public policies is to keep the proper balance between open science and commercially oriented R&D based upon proprietary information?

At what level should governments foster cooperative exploratory research, which is recognized as vital for the sustainability of knowledge-driven economies, to react to the increasing demand from individuals, research units and private firms for incentives for non-cooperative, rivalry knowledge?