EU R&D Intensity Targets of 3%: Implications for the EU and the US

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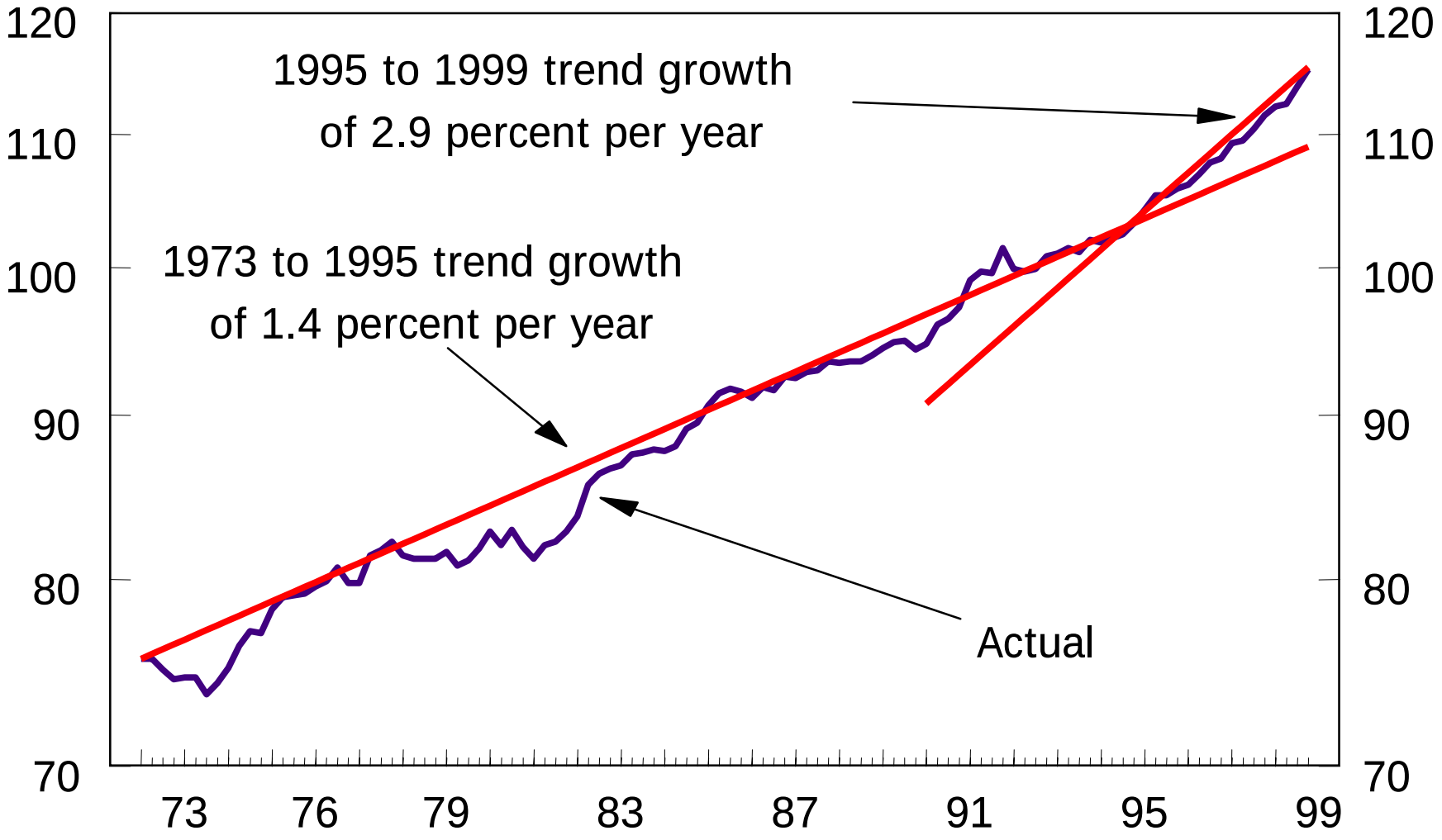
Why more R&D?

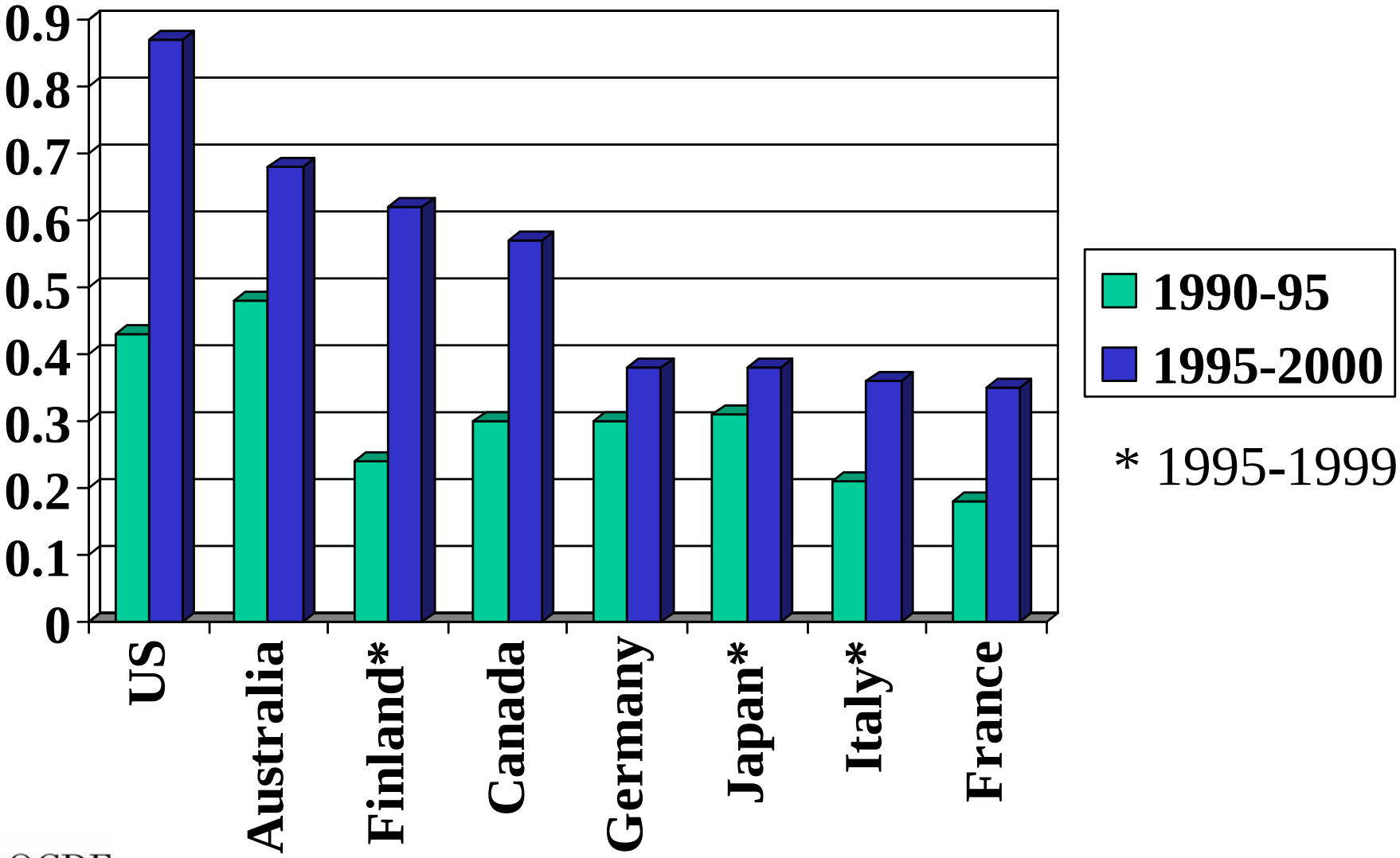
- Growth in the 1990s: US, FIN
- S&T coming of age
- Economic impact
- not a new issue

US Productivity in Nonfarm Business Sector
Index 1992 = 100



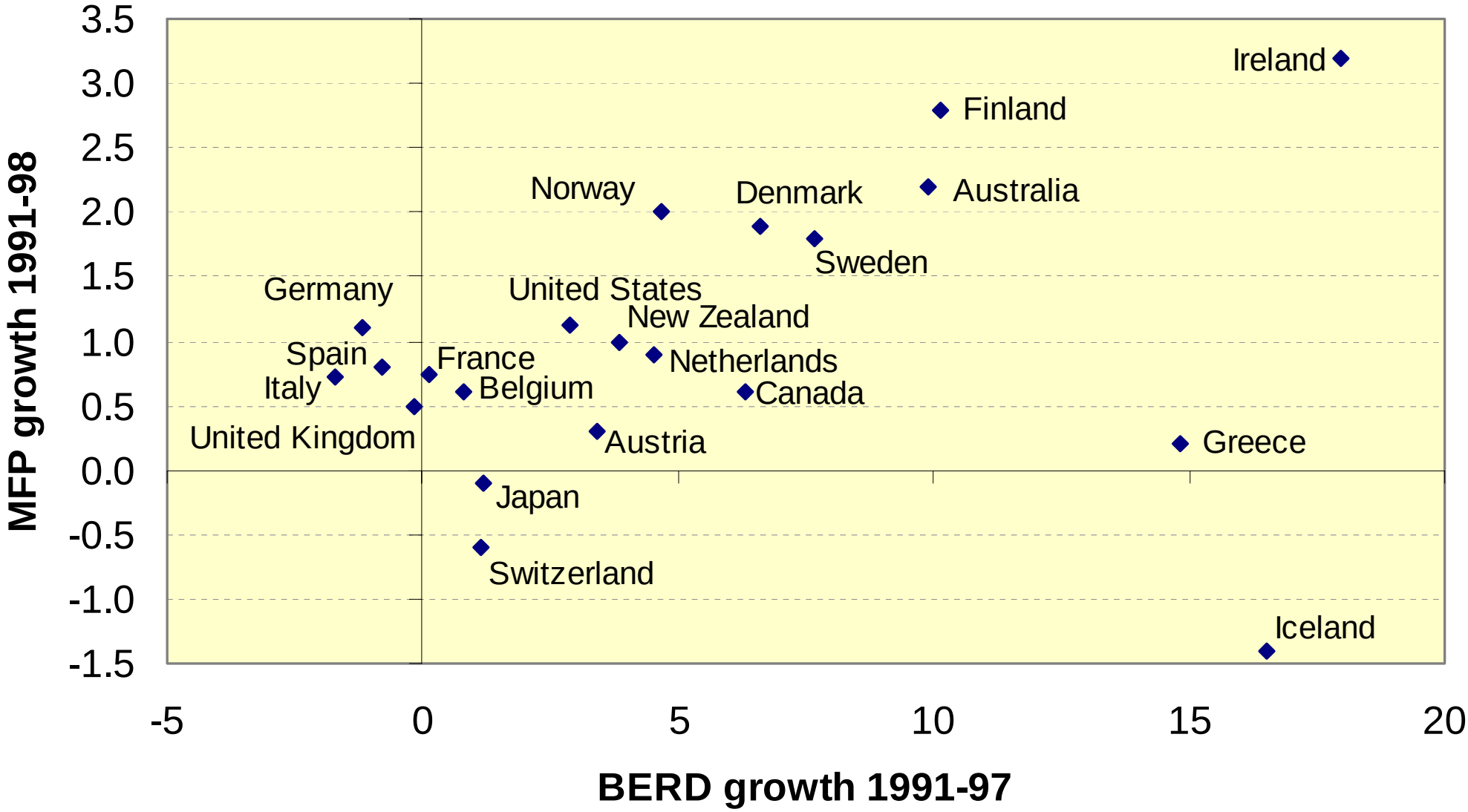
Source: OECD

ICT Contribution to GDP growth

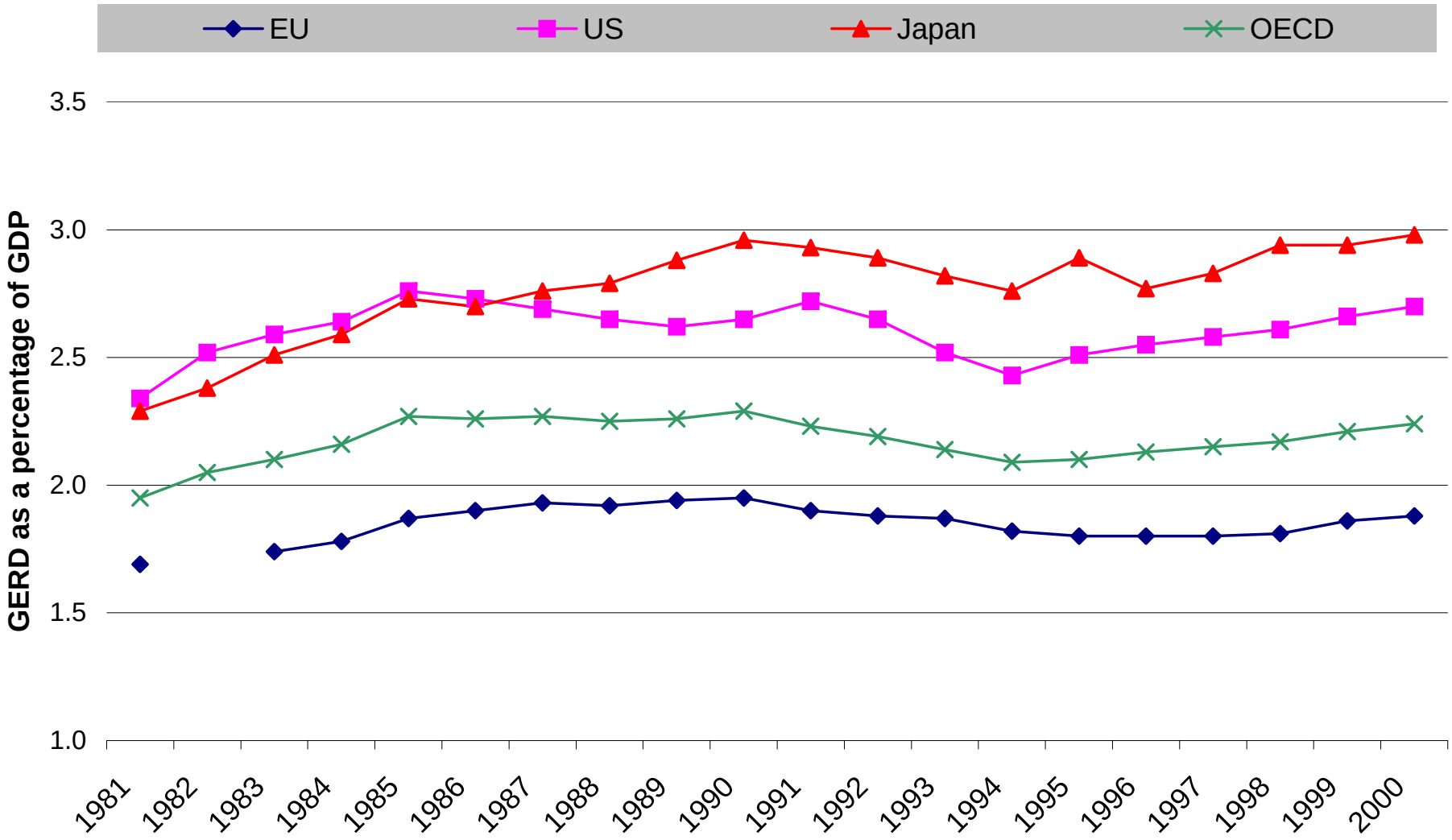


* 1995-1999

Links between productivity growth and business expenditures on R&D



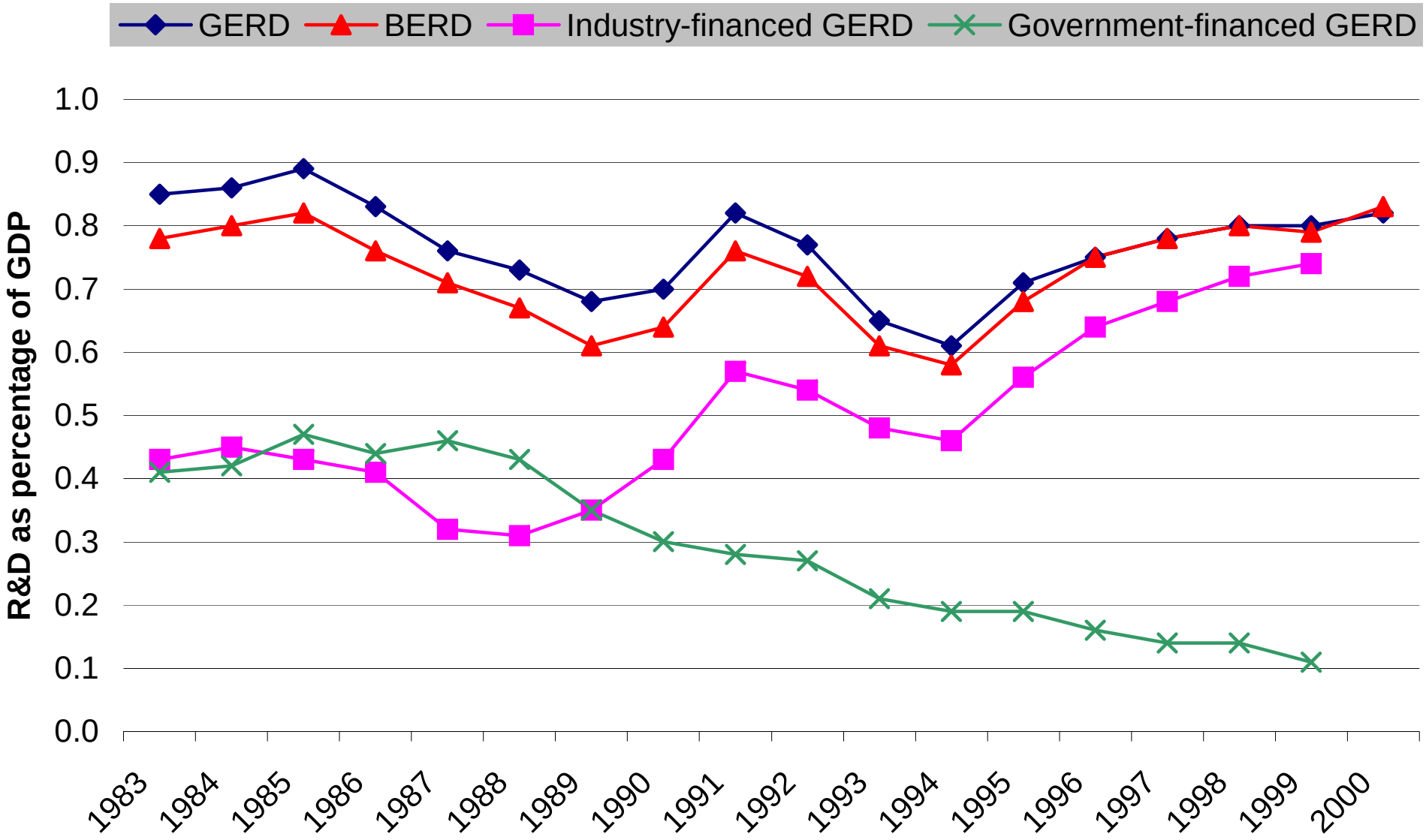
Trends in R&D intensity, 1981-2000



Source: OECD, MSTI database, May 2002.

Gaps in R&D intensity between the US and EU

Percentage point difference in R&D as a share of GDP



Increasing use of R&D targets in OECD countries/regions

Country/region	Current R&D intensity	R&D target	Target date
European Union	1.88%	3.0% of GDP	2010
Austria	1.86%	2.5% of GDP	2005
Canada	1.93%	Top 5 on OECD	2010
Hungary	0.81%	OECD average	2006
Korea	2.68%	5% of total government spending	2002
Norway	1.46%	OECD average	2005
Spain	0.96%	1.29% of GDP	2003

Source: *OECD Science, Technology and Industry Outlook 2002*.

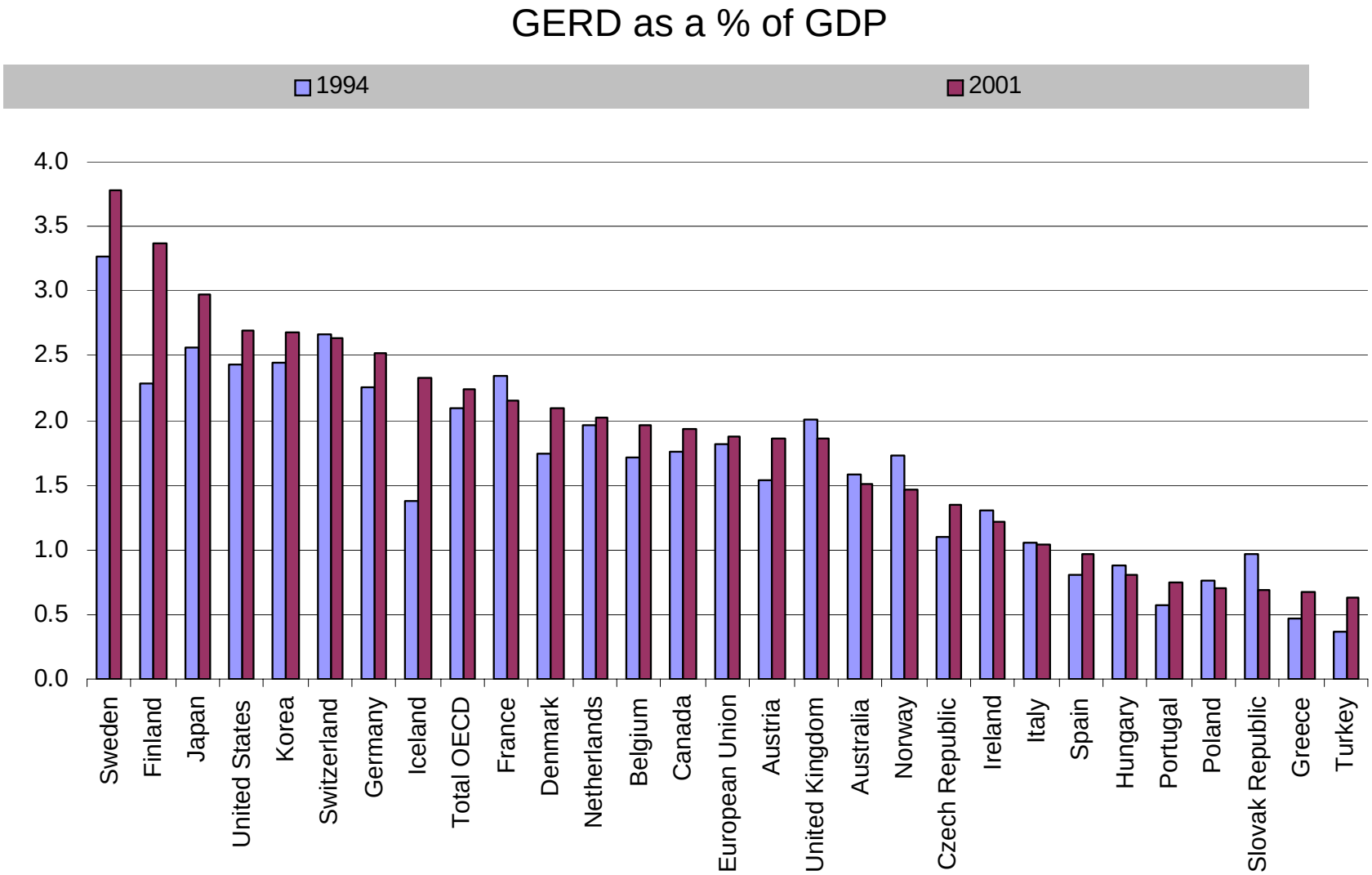
EU Barcelona Target

"[o]verall spending on R&D and innovation in the Union should be increased with the aim of approaching 3% of GDP by 2010. Two-thirds of this new investment should come from the private sector."

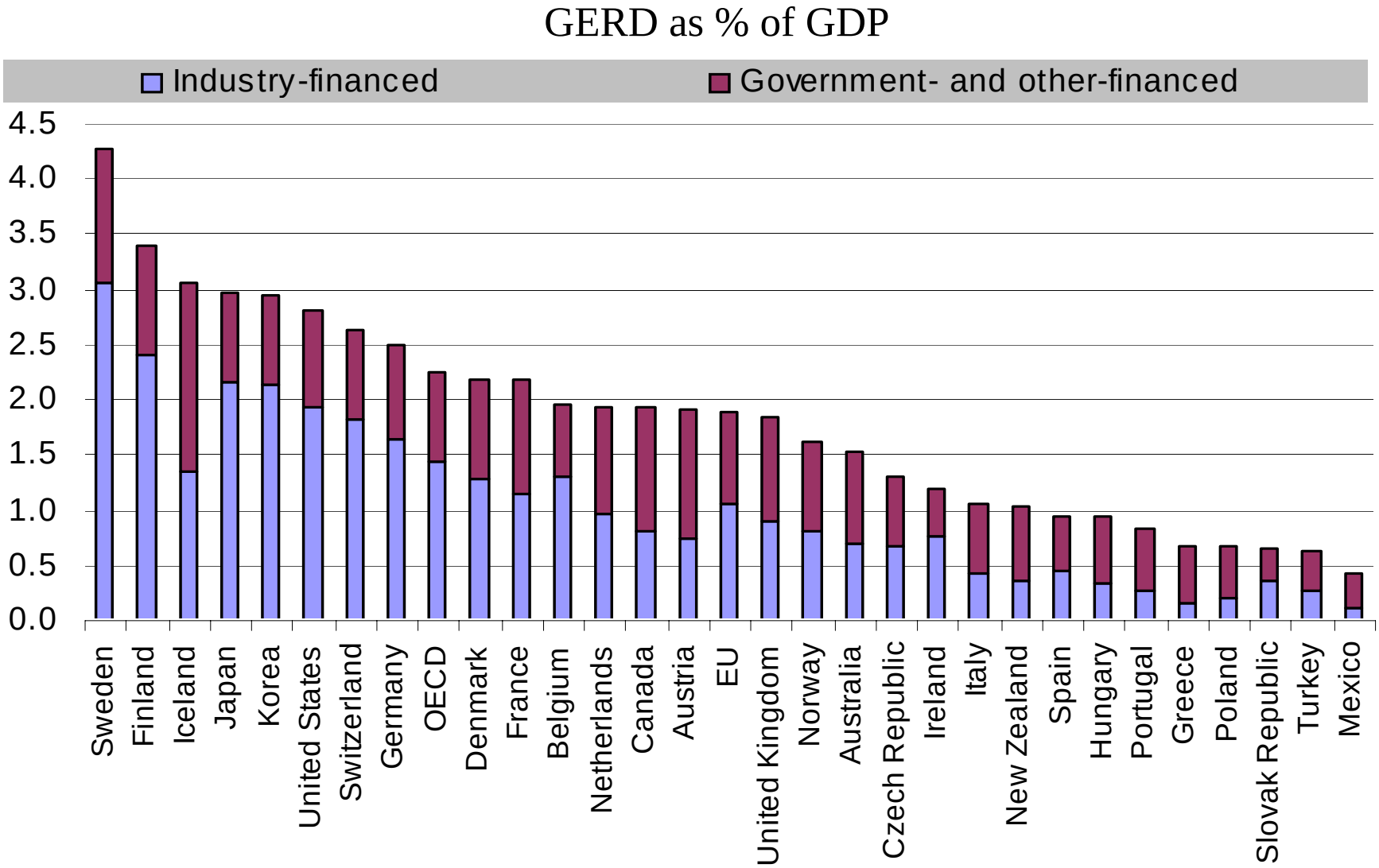
European Commision, "Presidency Conclusions: Barcelona European Council, 15 and 16 March 2002," SN 100/02, Brussels

Profiles of current R&D Intensive countries

R&D intensities across the OECD, 1994 and 2001[1]



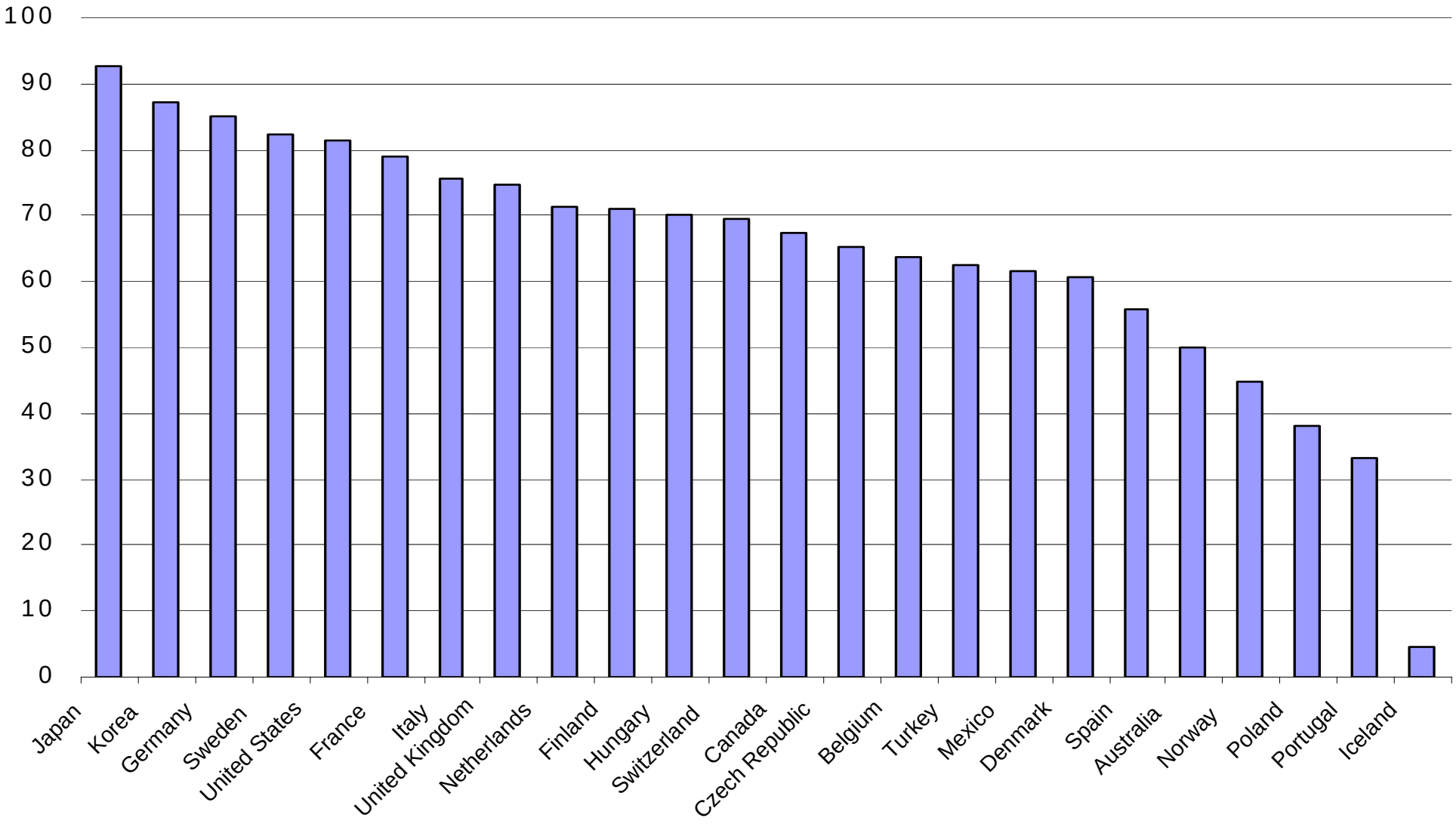
R&D intensities across OECD (2001)



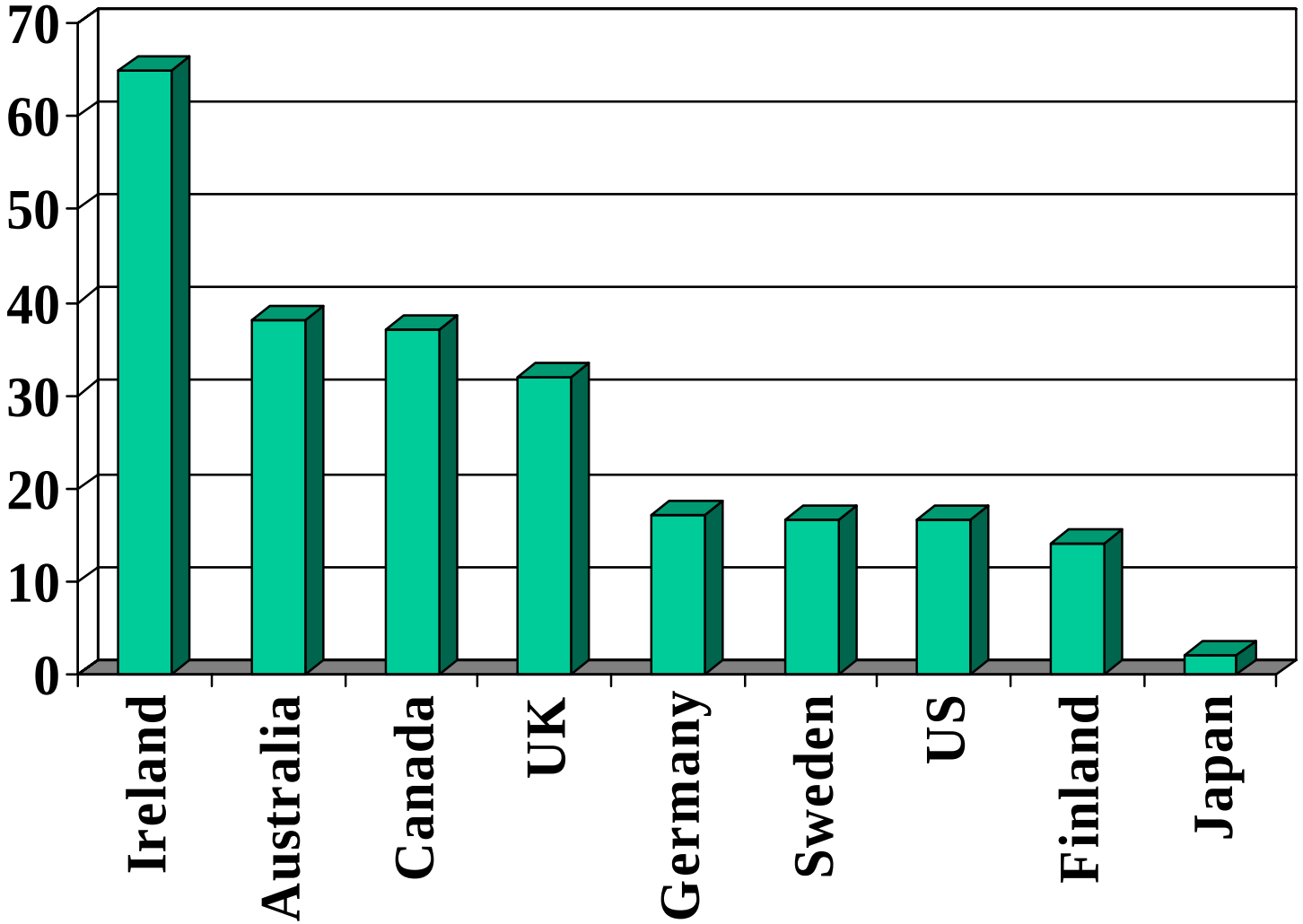
Note: Nearest available year.
Source: OECD MSTI Database, May 2003

Share of R&D performed by large firms (500 or more employees)

Percent of total business R&D expenditures



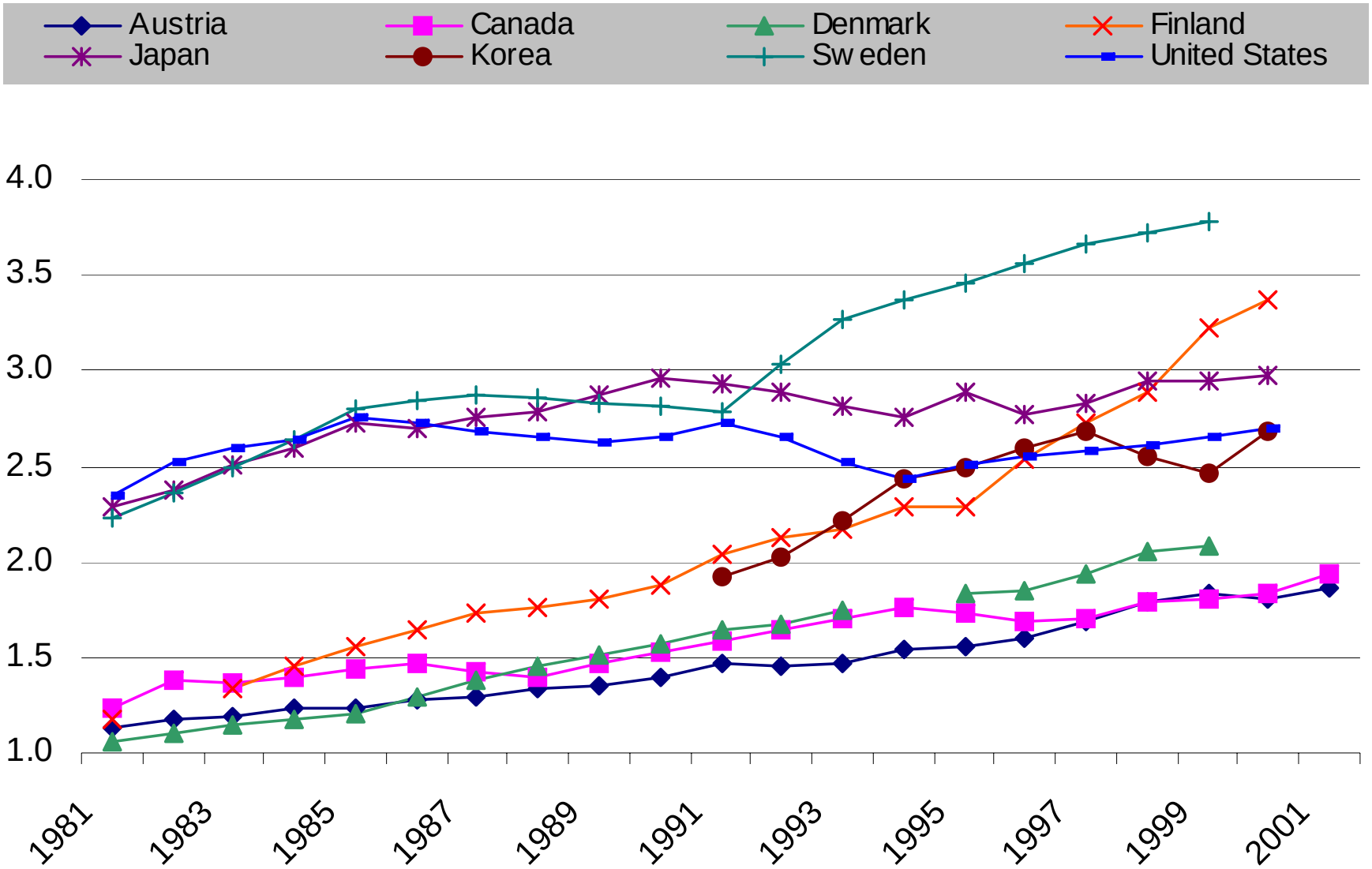
Share of Foreign Affiliates in Manufacturing R&D



Profiles of countries that have experienced a growth spurt in R&D intensity

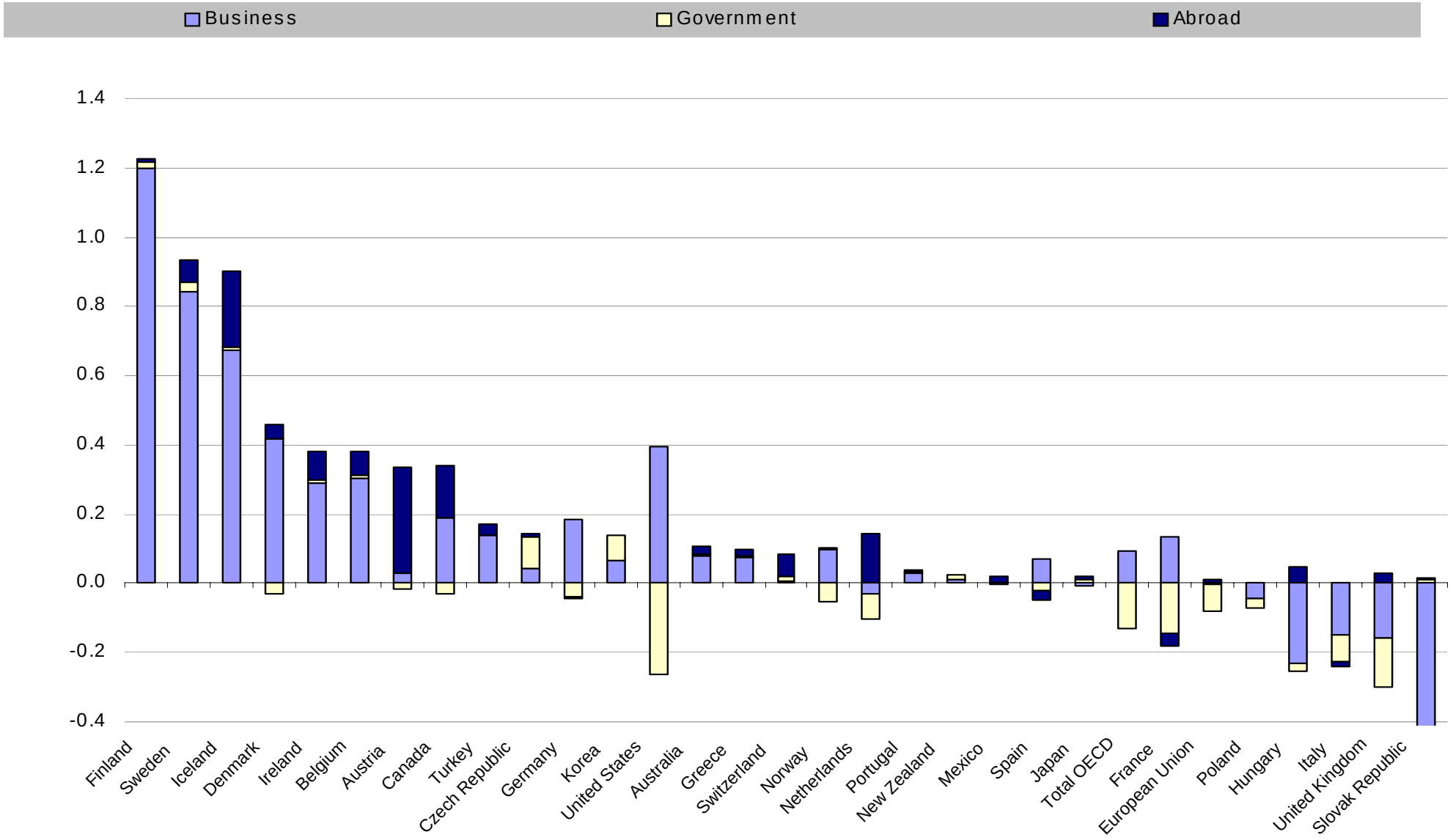
Countries with fast growth in R&D intensity 1981-2000

GERD as a % of GDP



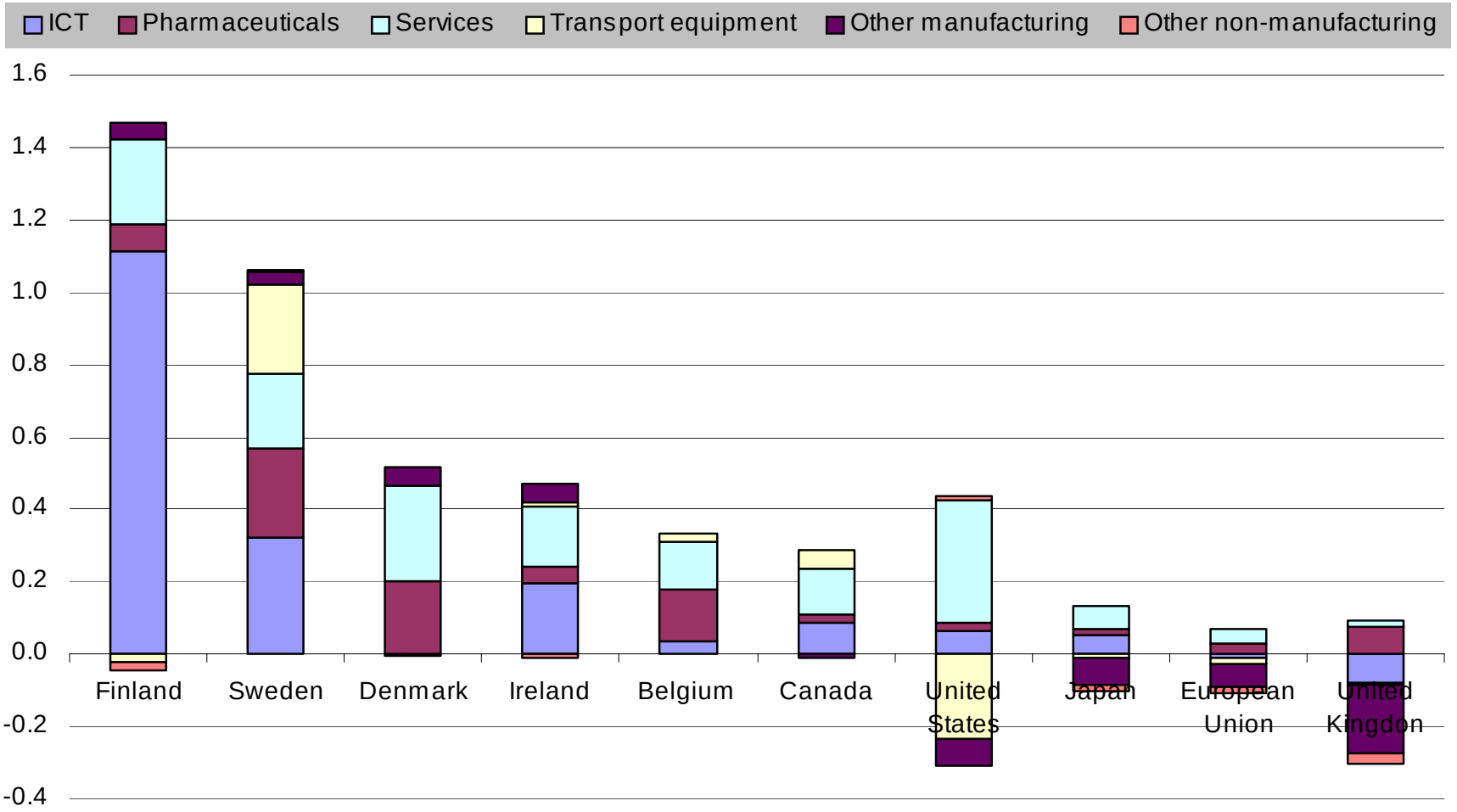
Increase in BERD intensity by source of funds, 1990-2000[1]

Percentage point increase in BERD as a share of GDP



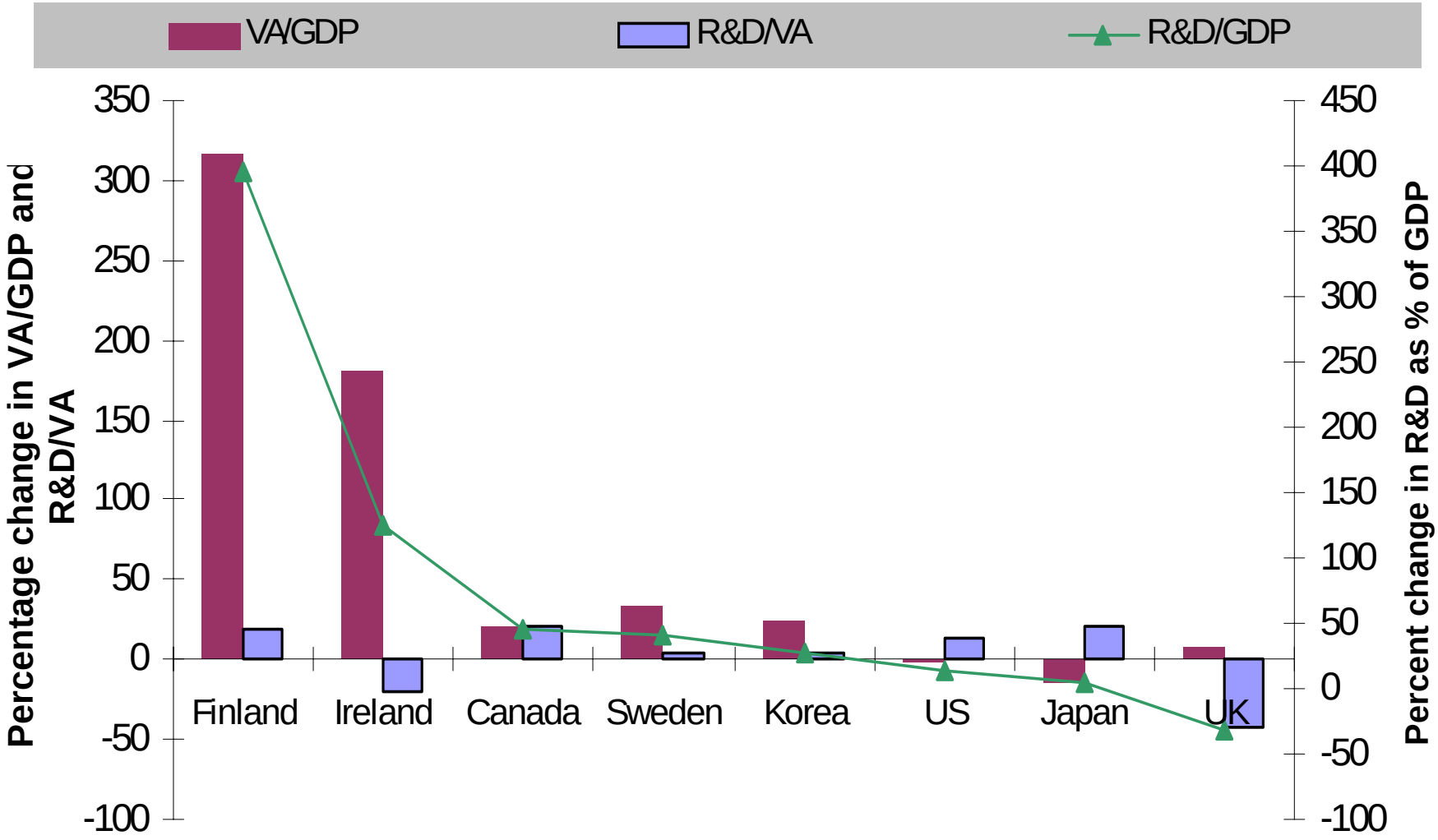
R&D growth driven by industry structure

Percentage point increase in business R&D intensity as a share of GDP by industry sector, 1990-2000

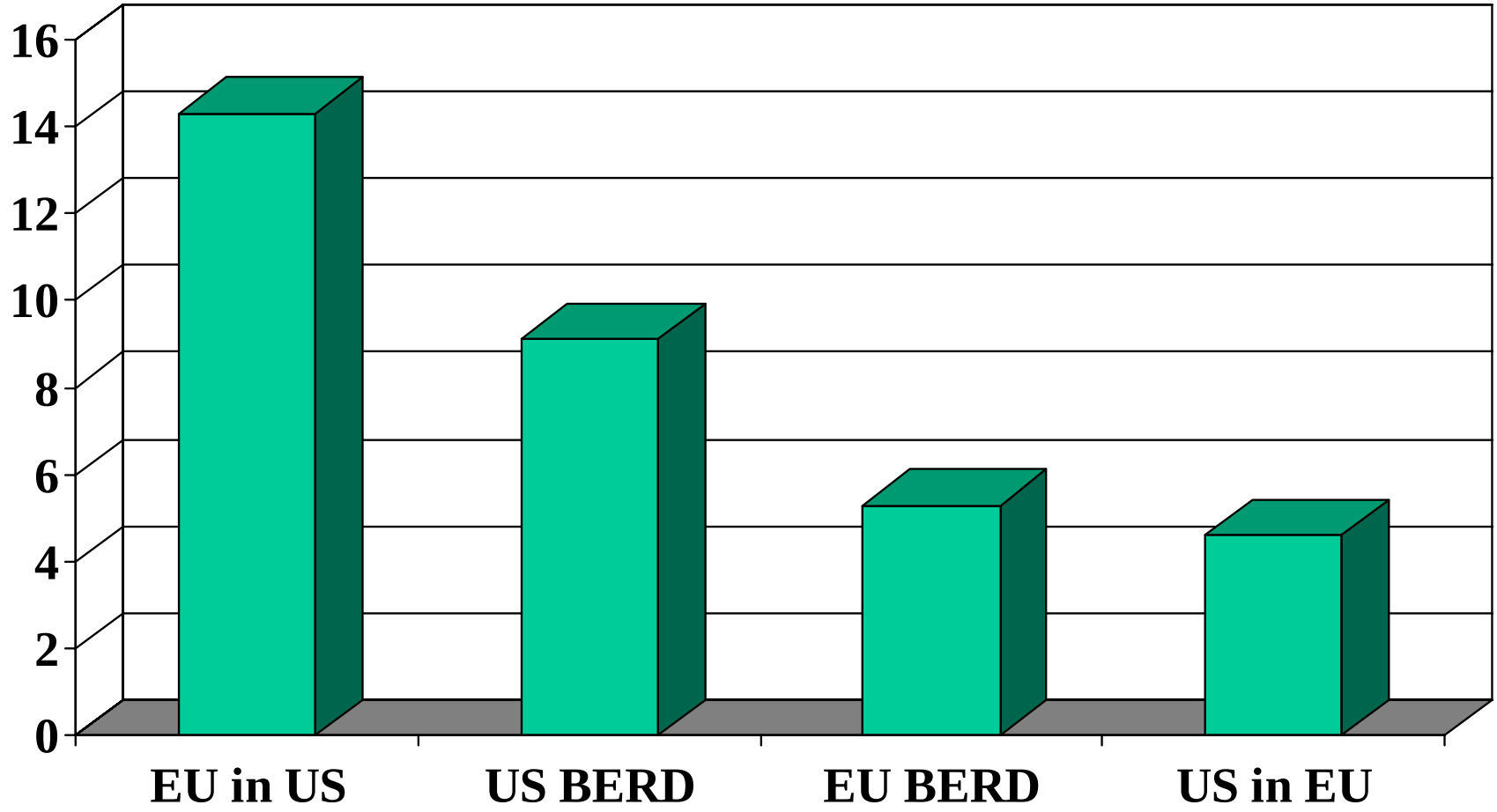


Market growth a primary driver of R&D

Percentage growth in VA/GDP, R&D/VA and R&D/GDP in ICT manufacturing sector, 1990-1999.



1994-98 AAGR of R&D by Foreign Affiliates in EU and US[1]

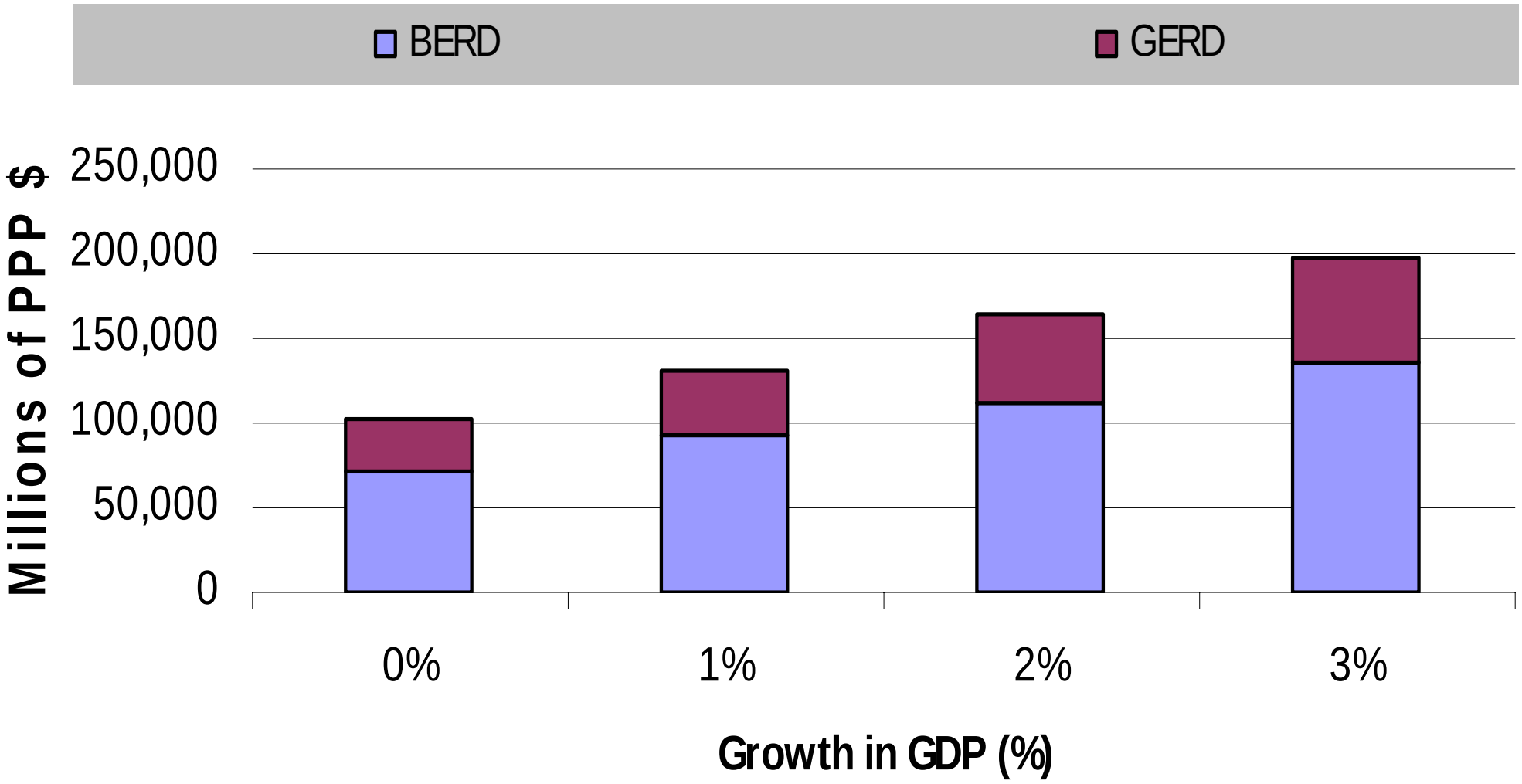


1. Majority and minority owned affiliates.

Implications: what *if* the target was obtained?

- Overall expenditures on R&D;
- The geographic distribution of R&D; and
- Associated human capital requirements

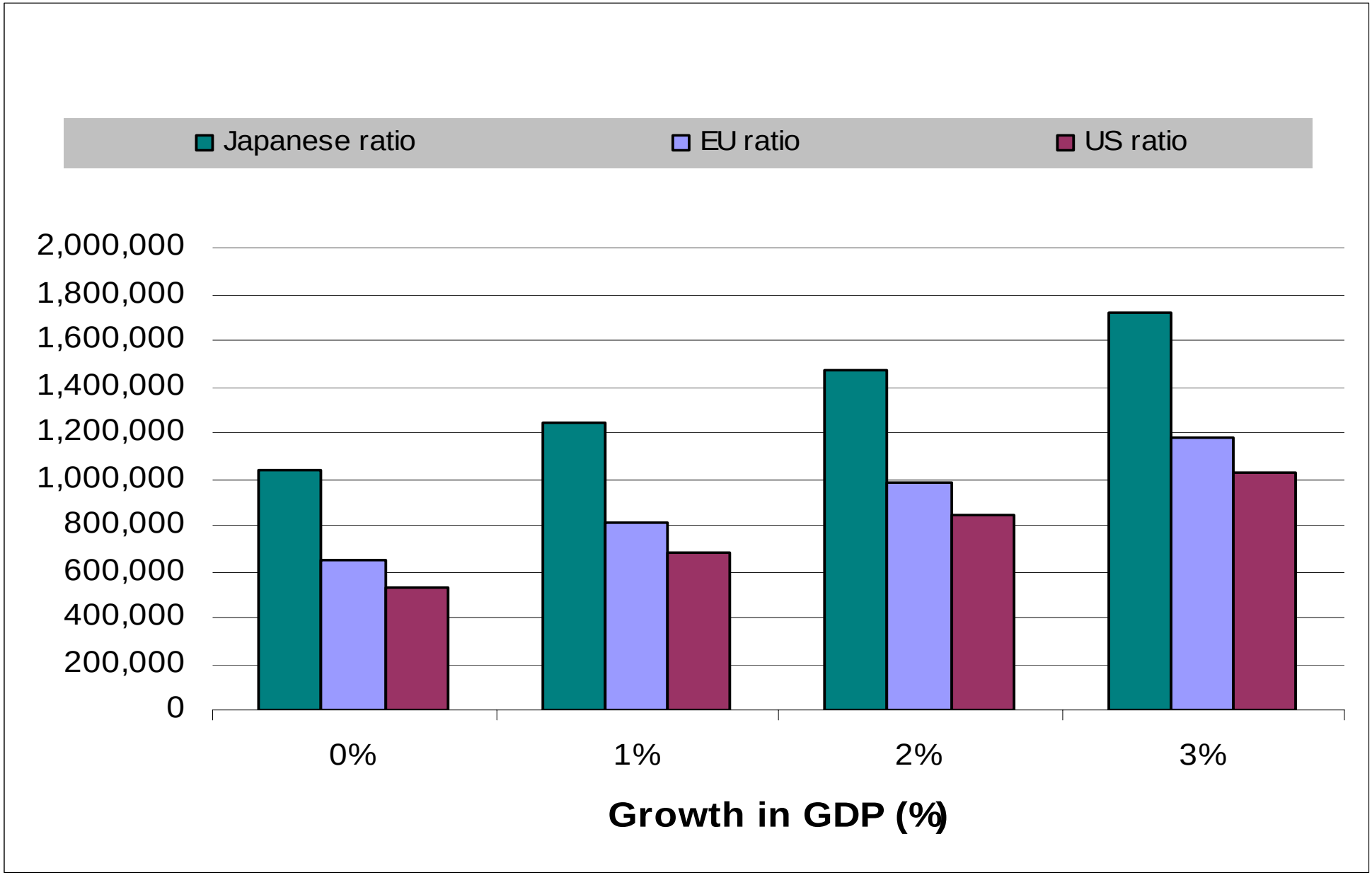
Estimated growth in R&D funding needed to meet EU targets in 2010



Implications for geographic distribution of R&D

- Range of R&D intensities in EU countries:
  - Sweden = 4.27% (2001)
  - Greece = 0.64% (2001)
  - 3 countries (Germany, France, UK) account for 64% of EU GERD and 60% of government R&D expenditures
- Range of R&D intensities in the US:
  - New Mexico = 6.43% (1999); Wyoming = 0.38% (1999)
  - Large states: California = 3.90; Texas = 1.81
  - 3 states account for one-third of US GERD and 46% of federal government R&D funding

Additional Researchers Required

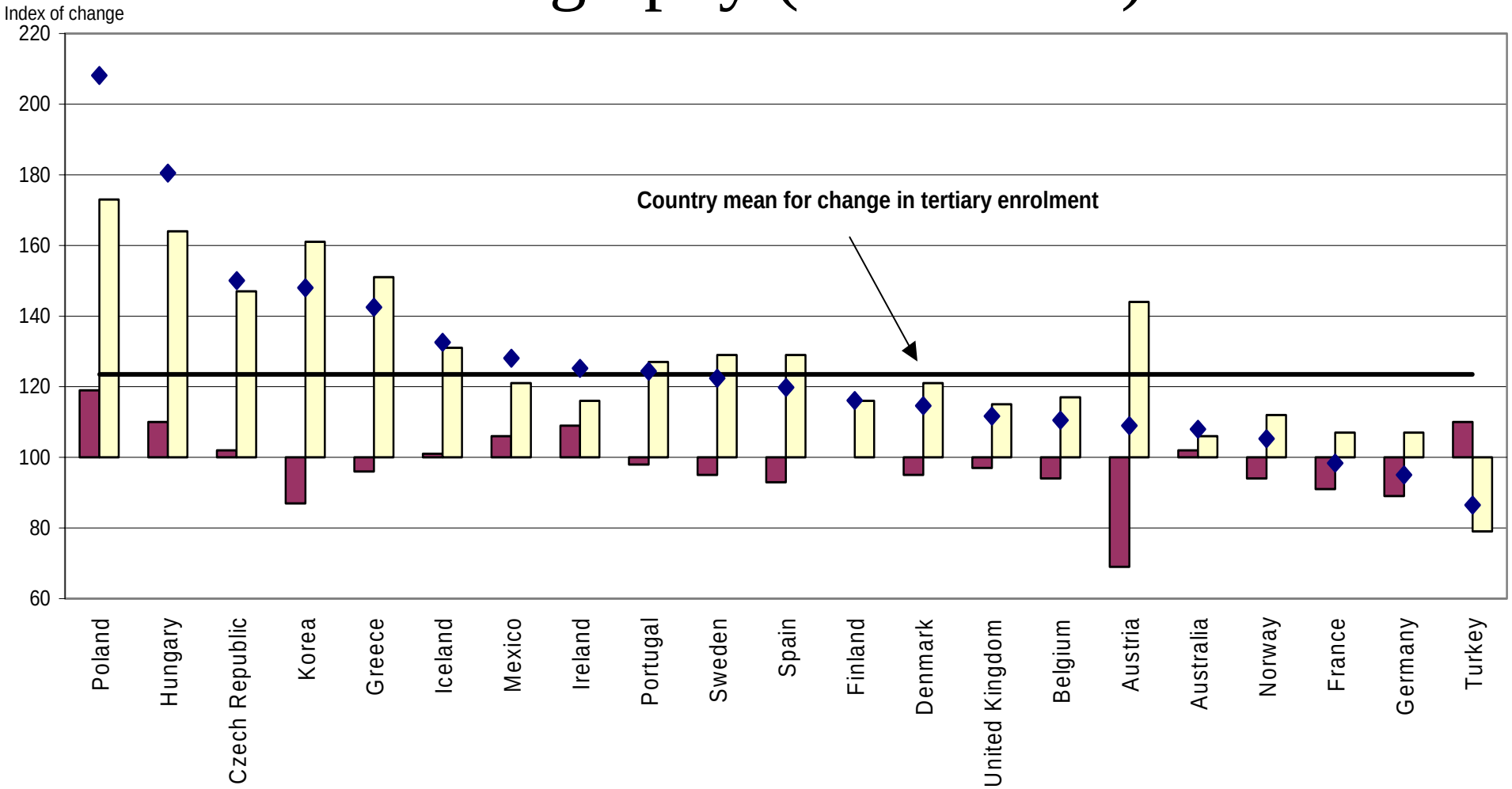


Increasing human resources in research in the EU : Challenges

- *An ageing population*
  - *Massive retirement of researchers in the public sector (example of France)*
  - *Smaller cohorts entering higher education*

- *A declining interest in science studies and scientific careers*

Change in the number of tertiary students in relation to changing enrolment rates and demography (1995-2000)



Declining interest in science

- *There have been signs of a less propensity to graduate in S&E fields since the second half of the 1990's, especially at PhD level.*
- *S&E university degrees have dropped by 10% in Hungary, 11% in Germany and 23 % in the Netherlands → the decrease has been higher in science than in engineering.*
- *Science degrees have dropped by 14% in Italy and by 24% in Austria.*

Number of new PhD awarded

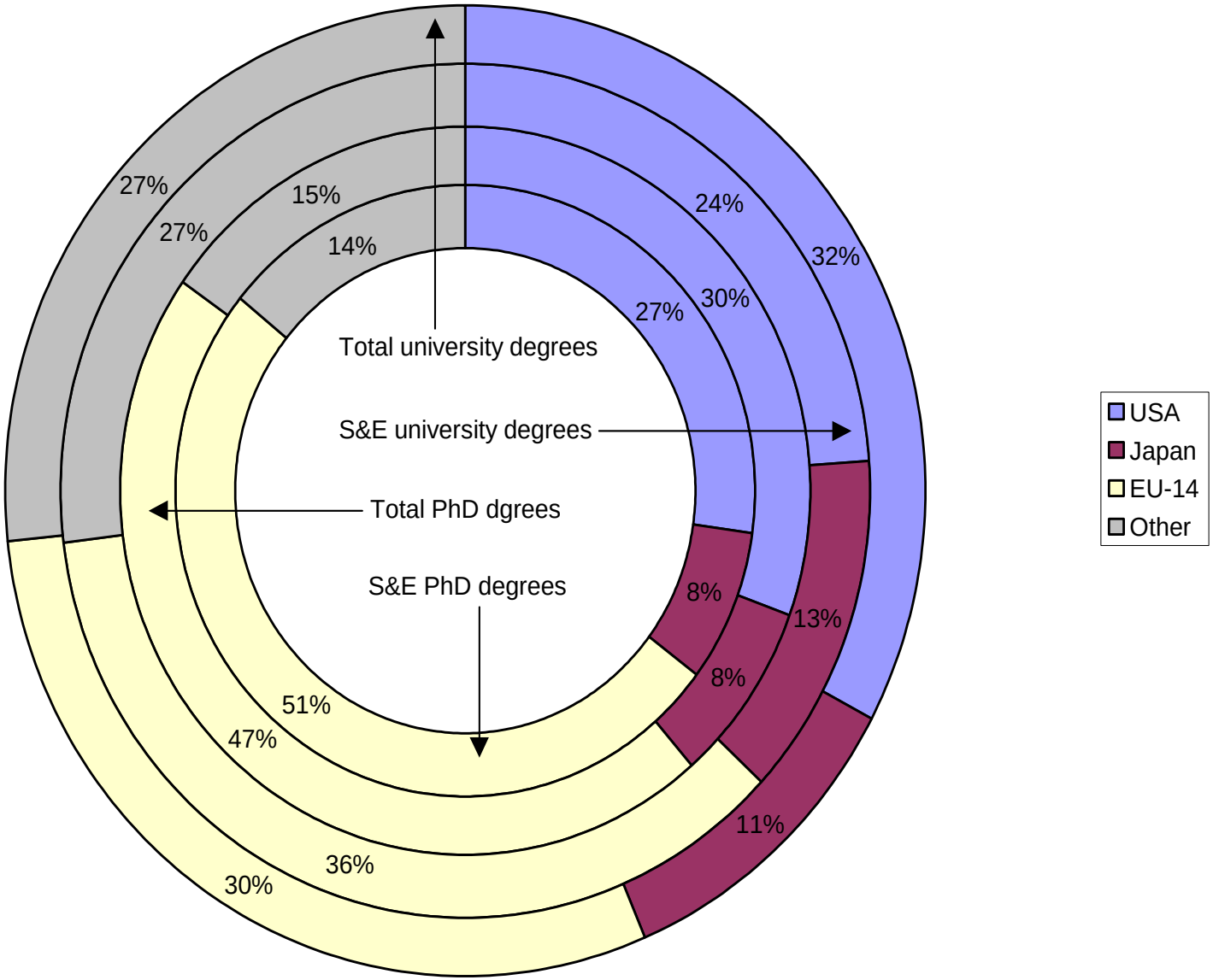
	Science and engineering			of which: Science		
		2000-1998			2000-1998	
	2000	Absolute change	Percentage change	2000	Absolute change	Percentage change
Australia	1566	52	3.4	1090	86	8.8
Austria	752	6	0.8	412	-40	-8.8
Canada	1481	-141	-8.7	902	-65	-6.7
France	5679	-975	-14.7	4759	53	1.1
Germany	9820	340	3.6	7378	55	0.8
Hungary	297	-253	-46.0	194	-164	-45.8
Ireland	282	-8	-2.8	233	-9	-3.7
Italy	1476	-85	-5.4	759	-33	-4.2
Japan	4744	926	24.3	1754	370	26.7
Korea	2515	549	27.9	861	253	41.6
Spain	2169	-63	-2.8	1761	-9	-0.5
Sweden	1530	175	12.9	689	-35	-4.8
Switzerland	1111	-55	-4.7	851	-26	-3.0
Turkey	636	-86	-11.9	304	-120	-28.3
United Kingdom	6112	267	4.6	4265	417	10.8
United States	16287	-1375	-7.8	10768	-549	-4.9

Increasing human resources in research in the EU :

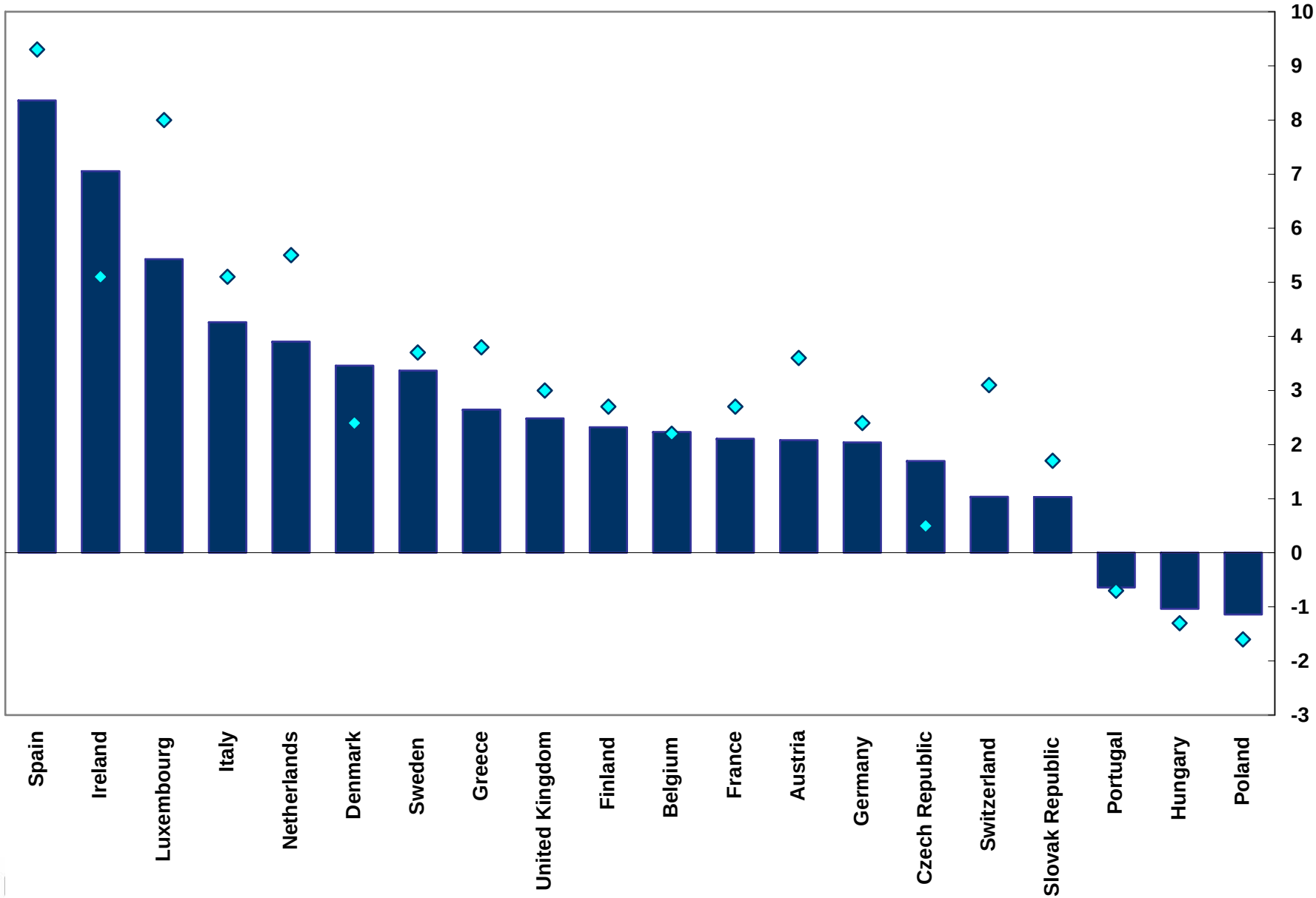
Opportunities

- *The EU trains more scientists and engineers than the United-States*
- *Women S&T and research employment is growing faster than men's*
- *The EU benefits from an increased international mobility of students*

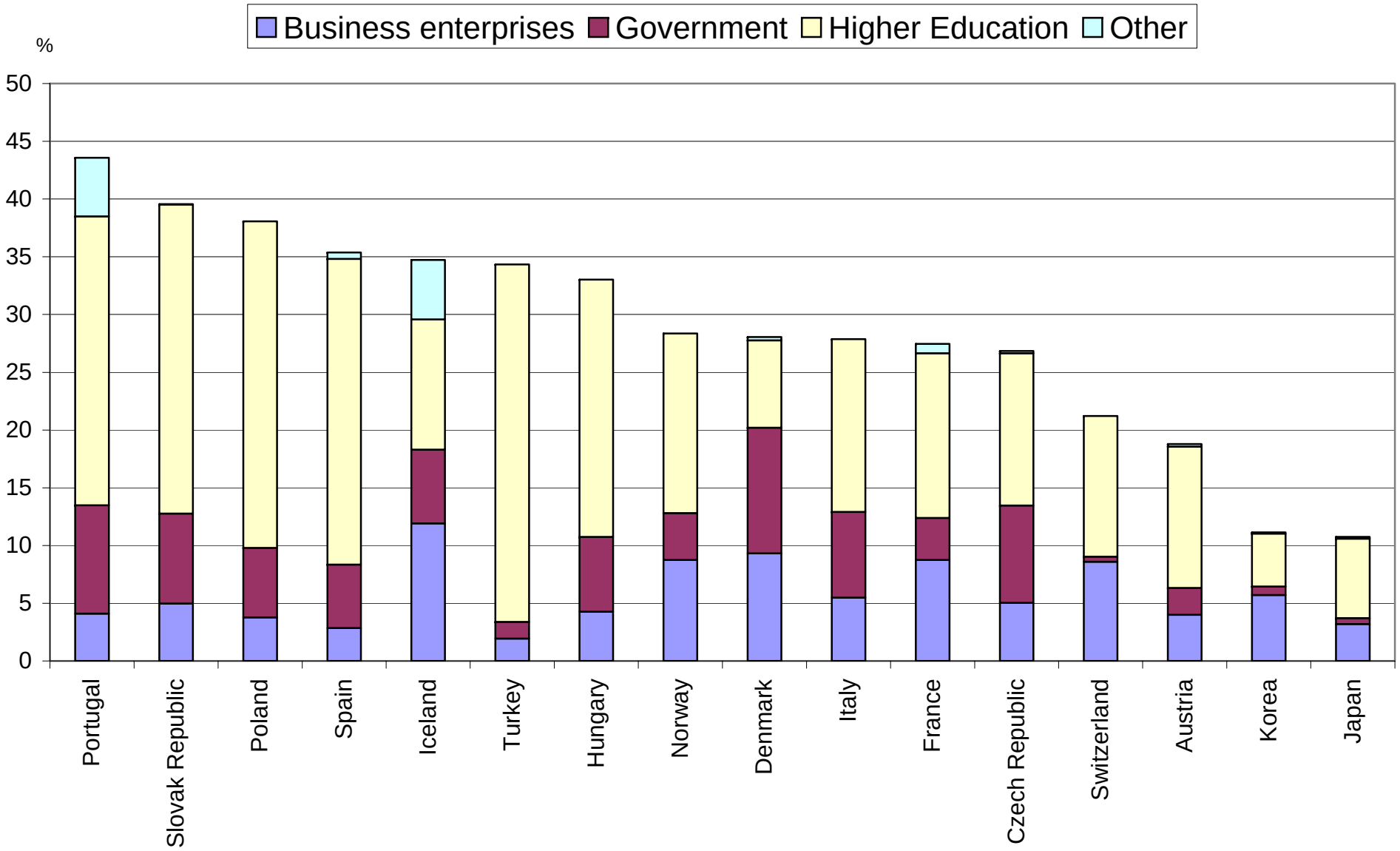
Regional breakdown of OECD university graduation flows (2000)



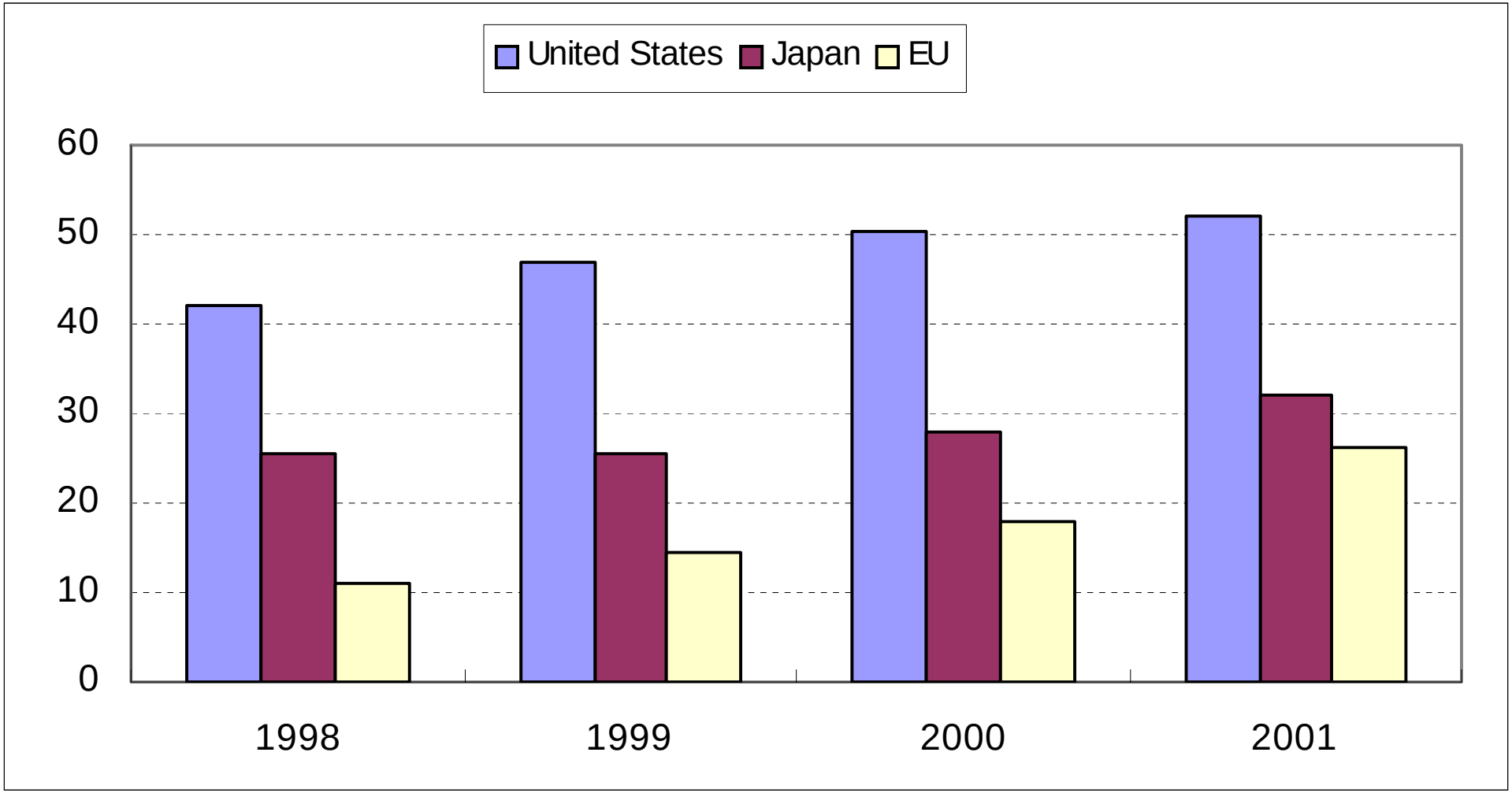
Annual growth of scientific and technical occupations



Women researchers as a % of Total (by sector of employment)



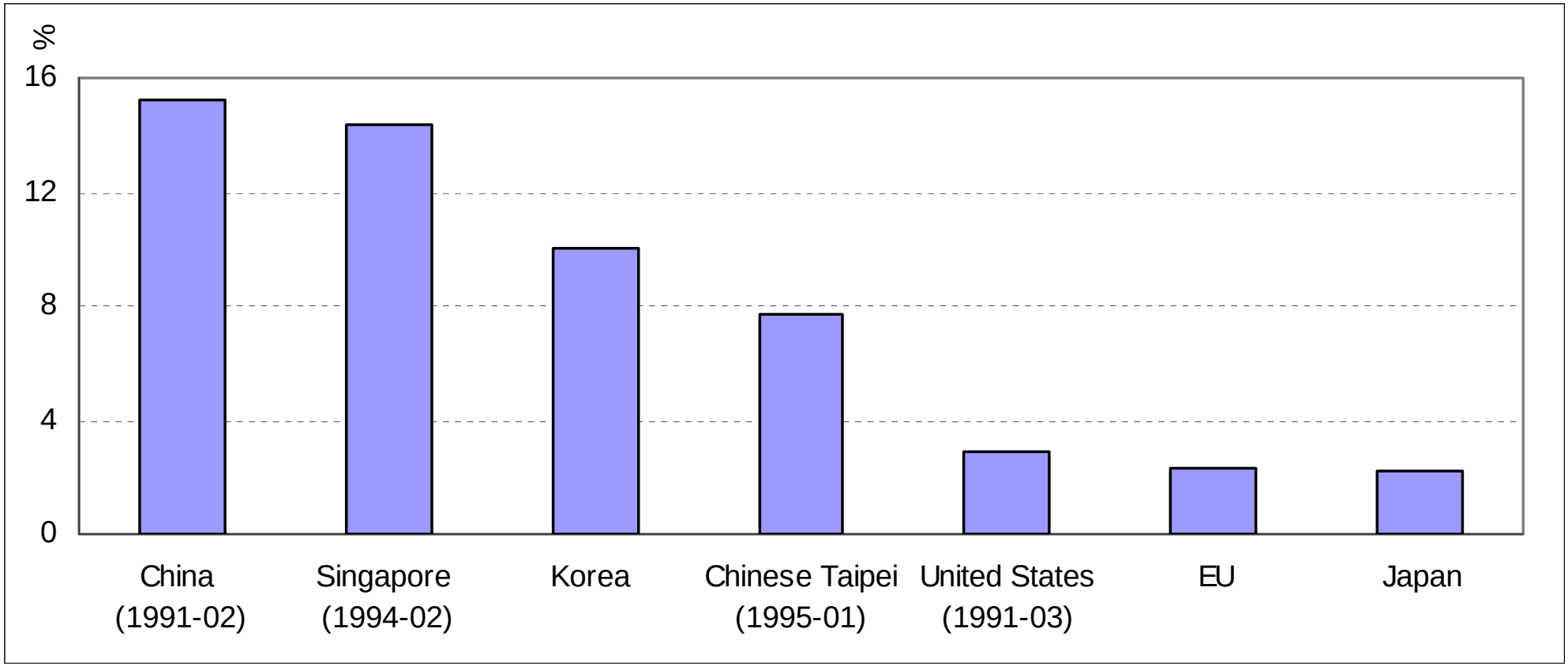
Number of Chinese students enrolled in tertiary education in the United States, Japan and the EU, thousands



Concurrent Factors Shaping the Global Environment for R&D

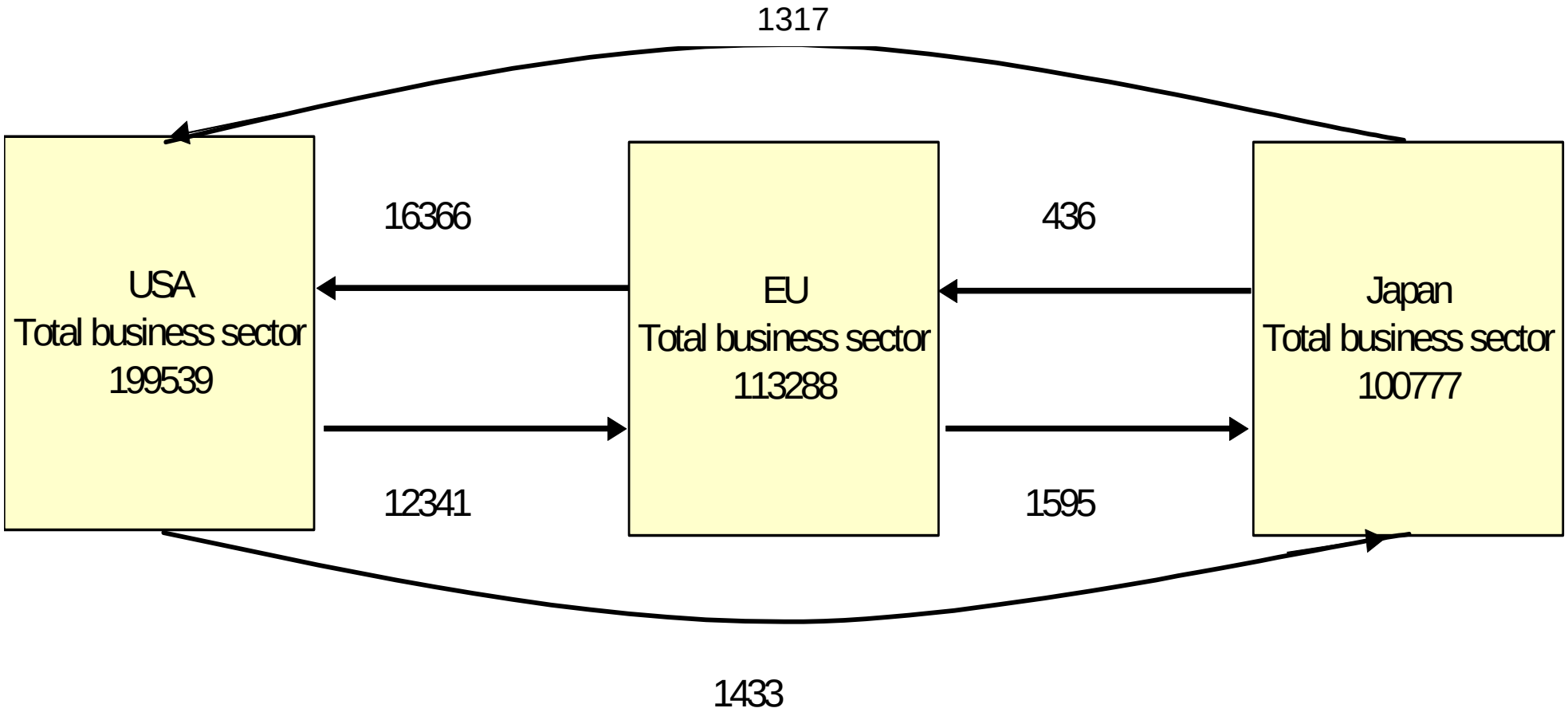
- RoW
- MNEs
- 9/11

Growth of R&D expenditure, annual average growth rate 1991-2001 (based on national currencies in constant prices)



Flows of R&D funding between EU, US & Japan

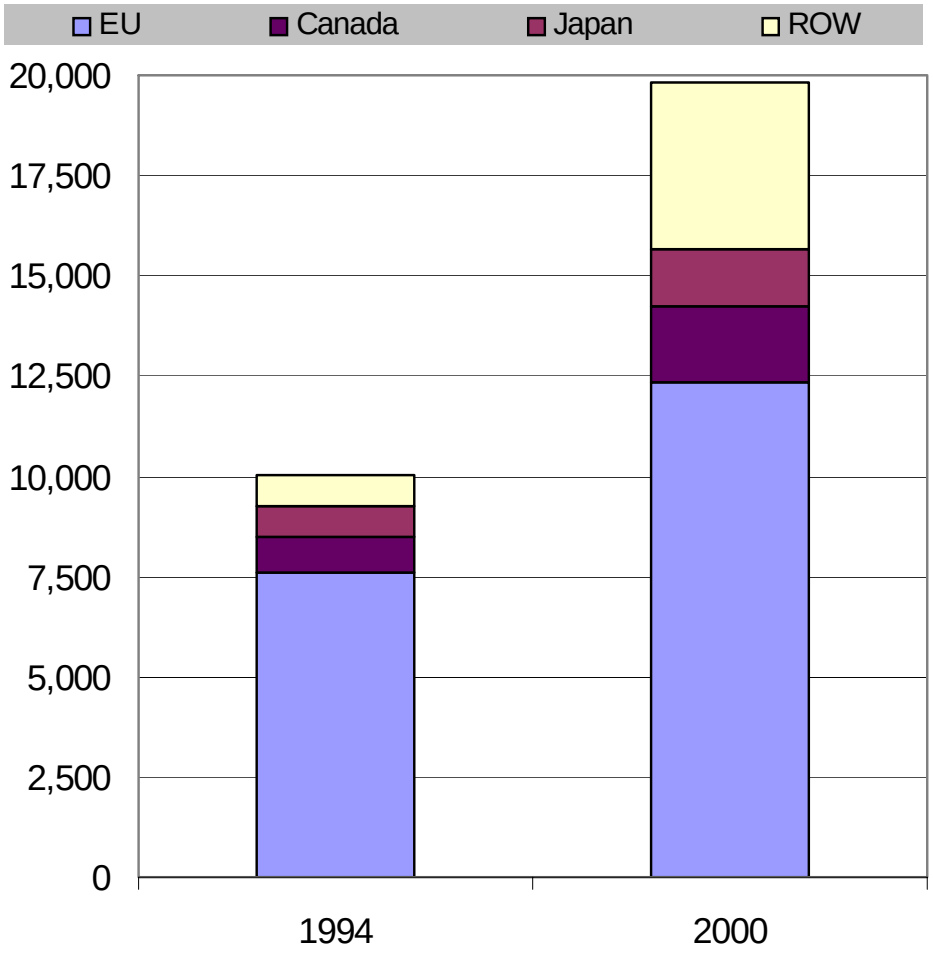
2000, Millions of PPP $



Source: OECD, Activity of Foreign Affiliates database and Secretariat estimates.

Changing regional balance of US outward R&D investments

Outward R&D investments, US$ millions



Source: OECD, AFA database and Secretariat estimates, January 2004

- Little change in total outward investment as a share of industry financed R&D (10.1% in 1994; 10.8% in 2000)
- Outward investments growing in all major regions (in nominal terms)
- Growth fastest in "rest of world" (5X)
  - China US$ 506M in 2000 compared to 5M in 1994
  - Singapore US$ 548M in 2000, compared to <50M in 1994
- Motor vehicles, Radio/TV/Comms, Computing equipment and non-pharmaceutical chemicals are largest components

Implications for the US

+

- EC spillovers

-

- Increase competition for foreign HRST
- Need to develop indigenous supply (women, minorities)
- Short term, MNEs will move

Future Work

- HRST
  - Head count (demographic)
  - International Mobility
    - CDH
- Globalisation
  - MNEs
  - Patents

Implications for Structural Reform

- Cultivate, attract and retain high-tech firms / industries
- Capitalise on fundamental R&D
- Cultivate, attract and retain high-skilled
- Address distributional issues

More information:

www.oecd.org/sti/statistical-analysis

Meeting of the OECD Committee for Scientific and Technological Policy at Ministerial Level 29-30 January 2004

www.oecd.org/cstp2004min

STI Working Paper 2003/8: Targeting R&D: Economic and Policy Implications of Increasing R&D Spending

www.olis.oecd.org/olis/2003doc.nsf/linkto/dsti-doc(2003)8

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