BACKGROUND ON INNOVATION IN EUROPE

Information prepared for the European Council,
4 February 2011

Contents

Fierce global competition

The EU faces a significant innovation gap

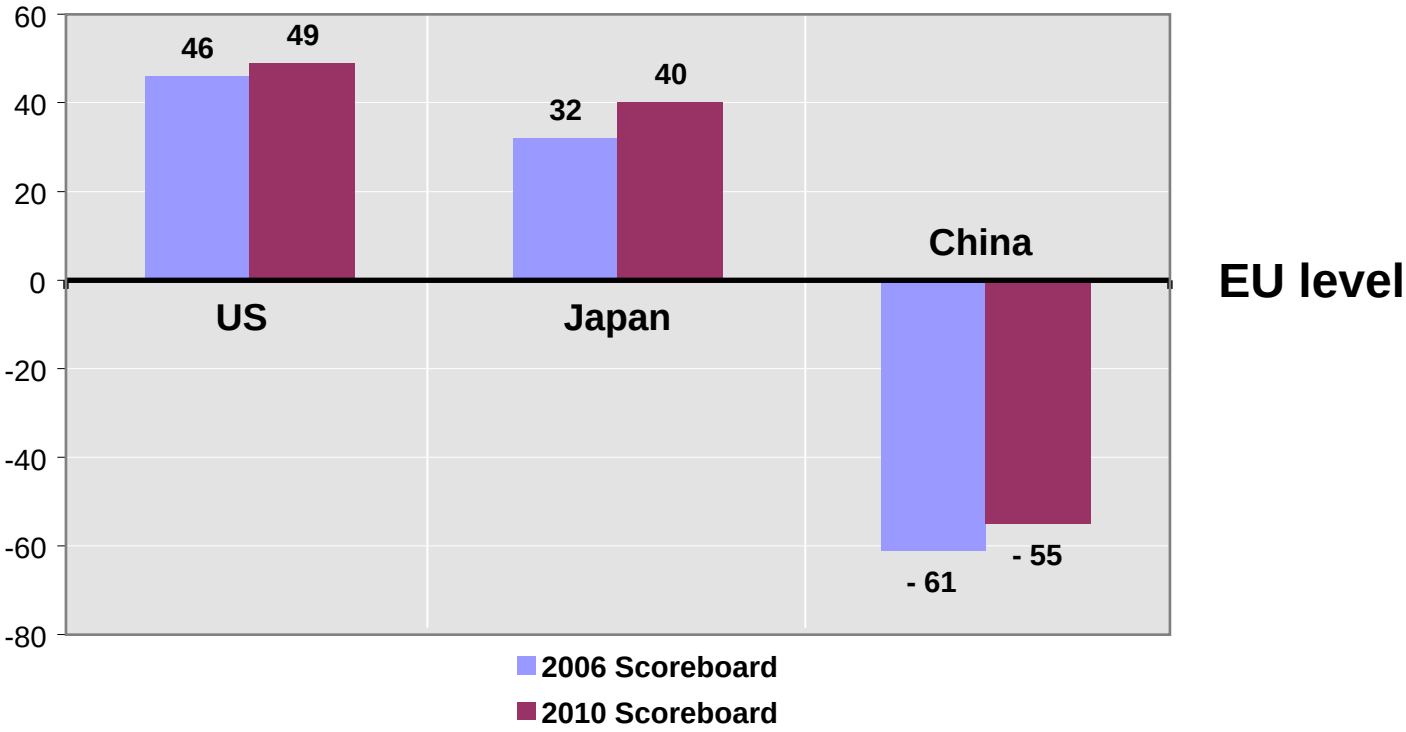
	EU-27	US	Japan
New doctorate degrees (per 1000 population aged 25-34)	1.4	1.6	0.9
Tertiary educated population (% of population aged 25-34)	34	42	54
Expenditure on R&D (% of GDP)	2.0	2.8	3.4
Public-private joint publications (per million population)*	36	70	56
Patents invented (per billion GDP in PPS €)**	4	4.3	8.3
Medium-high- and high-tech product exports (% of total product exports)	47	59	75
Licence and patent revenues from abroad (% of GDP)	0.2	0.63	0.53

** Number of scientific publications with at least one author from a public research institution and one from the private sector*
*** Patent Cooperation Treaty patent applications by residence country of inventor*

Source: European Commission, Innovation Union Scoreboard 2010, http://www.proinno-europe.eu/metrics

US and Japan outpace the EU in research and innovation performance…

Research and innovation performance: US, Japan and China compared to EU

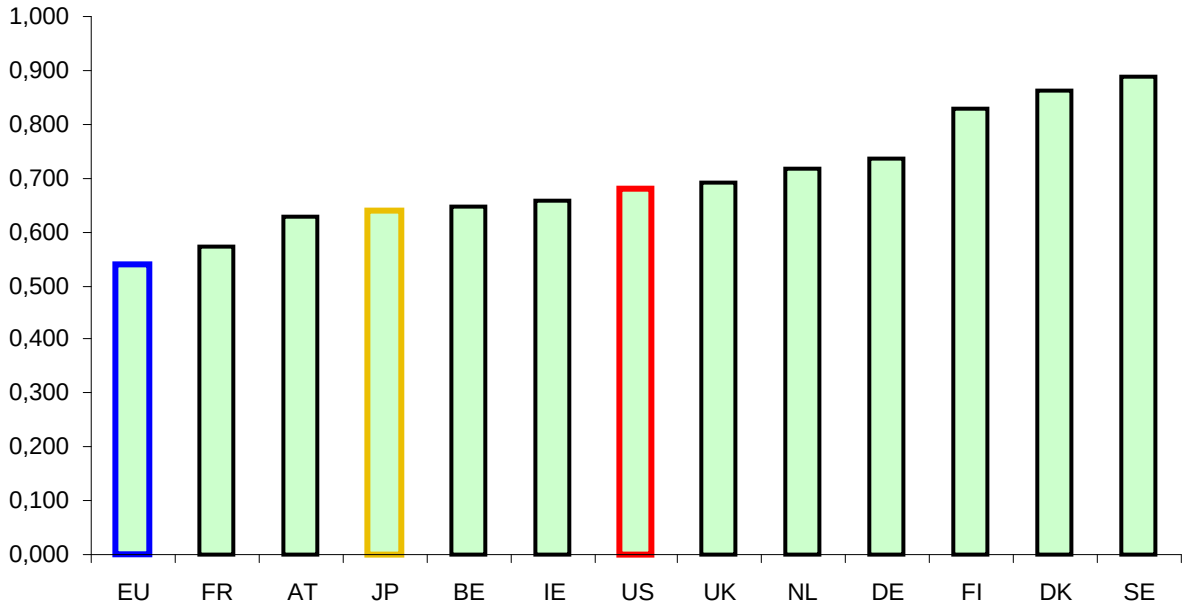


Based on the Innovation Union Scoreboard, the US is steadily performing nearly 50% better than EU27. China is still 55% below EU27 but is catching up.

Source: Innovation Union Scoreboard 2010, http://www.proinno-europe.eu/metrics

… but some of the best performing countries are to be found in Europe

Research and innovation performance: best performing European countries compared to world leaders

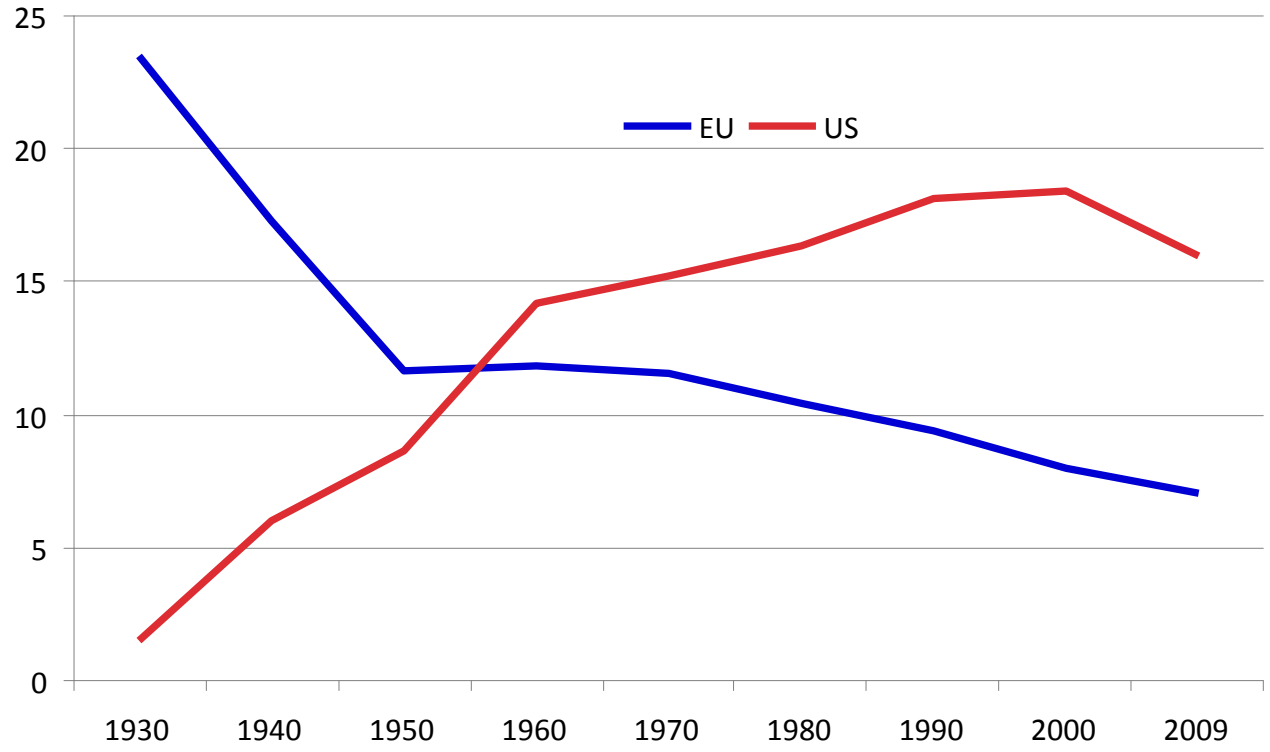


Note: the index used for comparison in this chart is based on a set of 12 indicators

Source: Innovation Union Scoreboard 2010, http://www.proinno-europe.eu/metrics

EU's historical leadership in top-level science has eroded

Nobel Prize winners in Physics, Chemistry and Physiology/Medicine

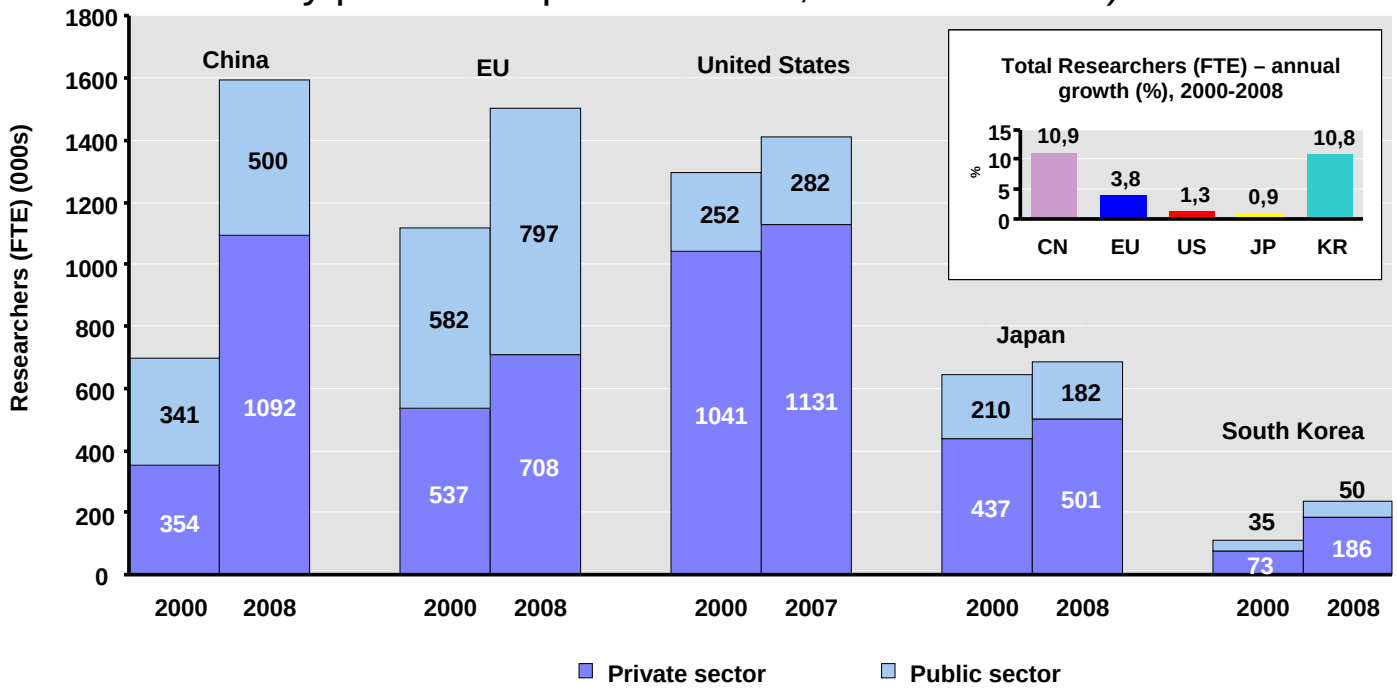


Source: European Commission elaboration based on data source Jürgen Schmidhuber, 2010

China has taken over EU's lead in the number of researchers

Number of researchers

(in thousands, full-time equivalent, broken down by public and private sector, 2000 and 2008)

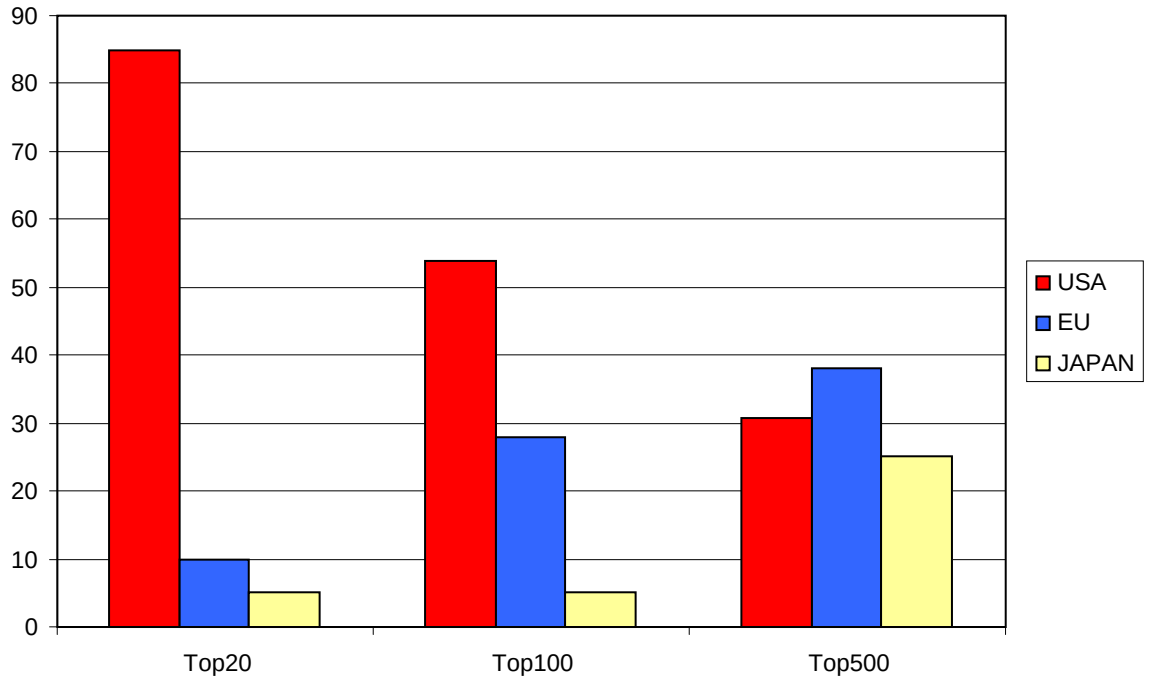


In 2008, China employed about 1.6 million researchers, compared to about 1.5 million in the EU. Trends over time and differences in the share of the private and public sectors are also significant.

Source: Eurostat, OECD

US leads top universities ranking

% in the top university institutions of the 2010 Shanghai list

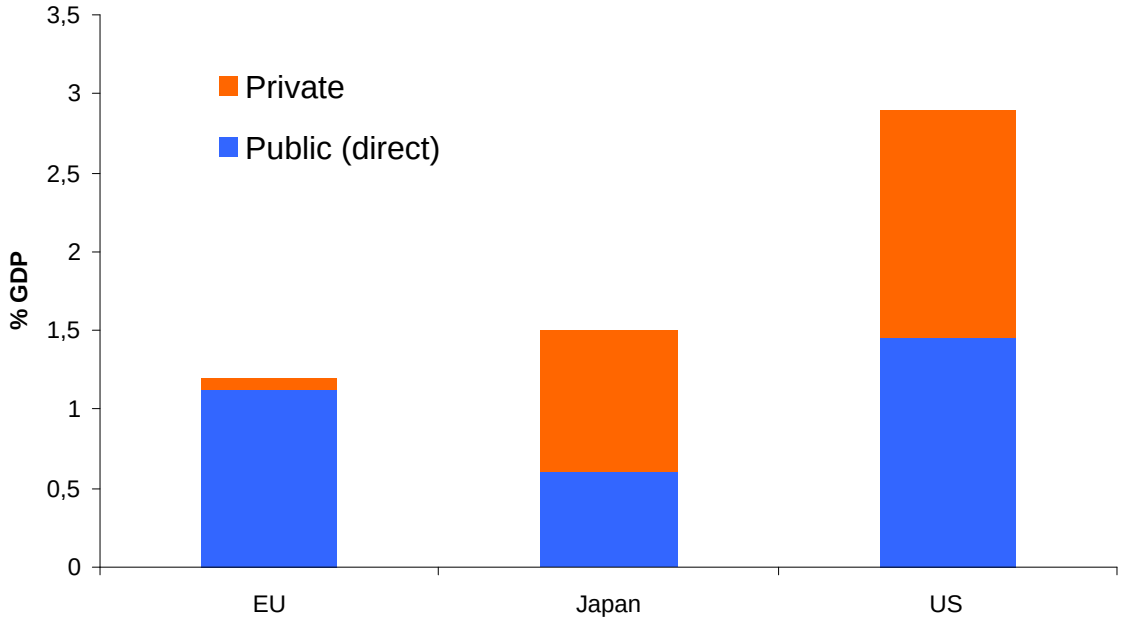


While the EU has almost 40% of the universities in the top 500 of the Shanghai ranking, the top end is clearly dominated by the US (17 of the top 20 institutions are located in the US).

Source: Shangai list

Our trading partners invest more in higher education

Expenditure on tertiary education (% GDP)

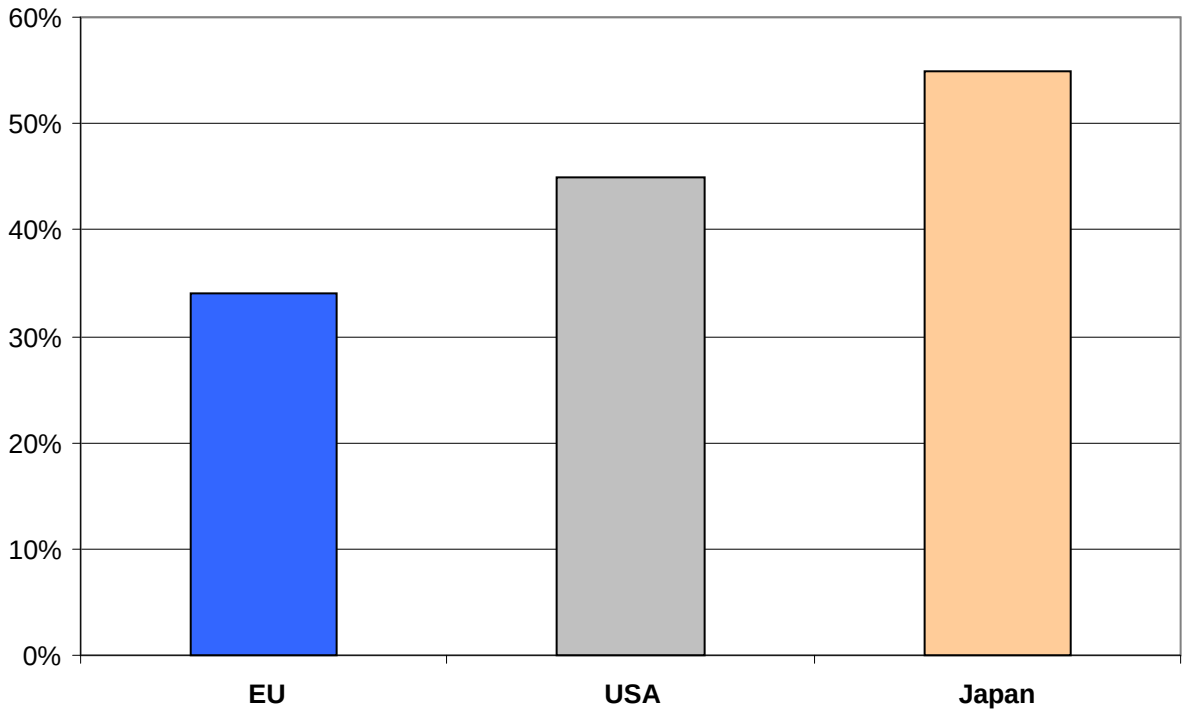


Total spending on tertiary education in the EU (as a % of GDP) is less than half the US level, mainly as a result of lower private spending in Europe.

Source: European Commission

Access to tertiary education is also broader

Share of population aged 25-34 with tertiary education

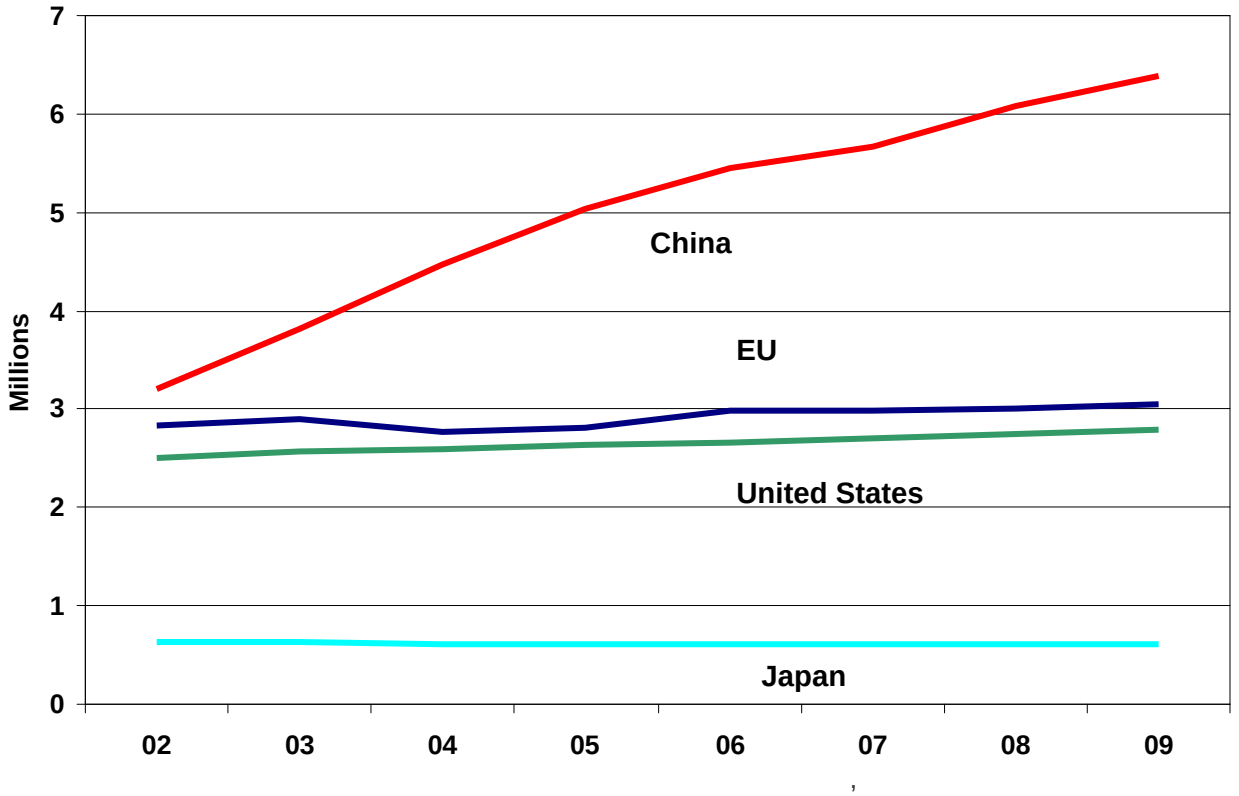


Today in the EU, one person in three aged 25-34 has completed a university degree, compared to more than 50% in Japan and 40% in the US.

Source: European Commission

China is enrolling more students than EU, US and Japan combined

Number of undergraduate students (million)

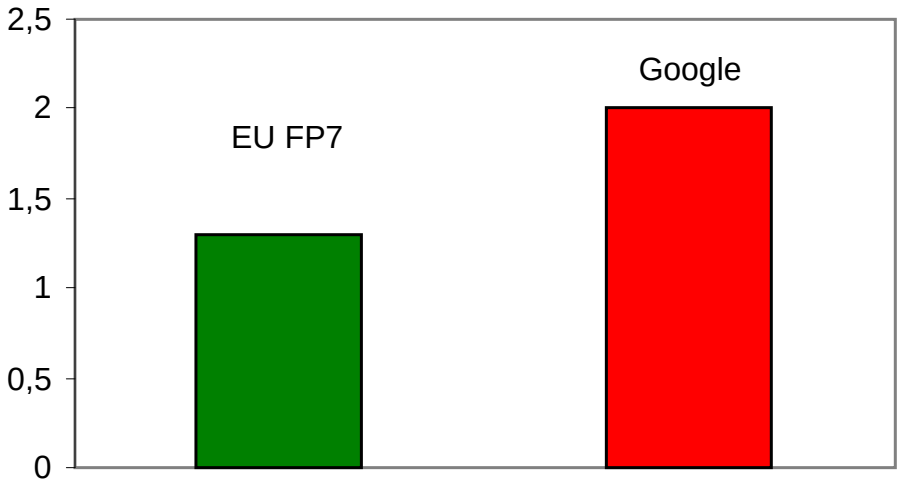


Figures for 2008-2009 for EU+US+JP are estimates

Sources: Eurostat, National Statistics of China,

Private global actors are setting the pace

Investment in ICT R&D in 2009 (€ billion)



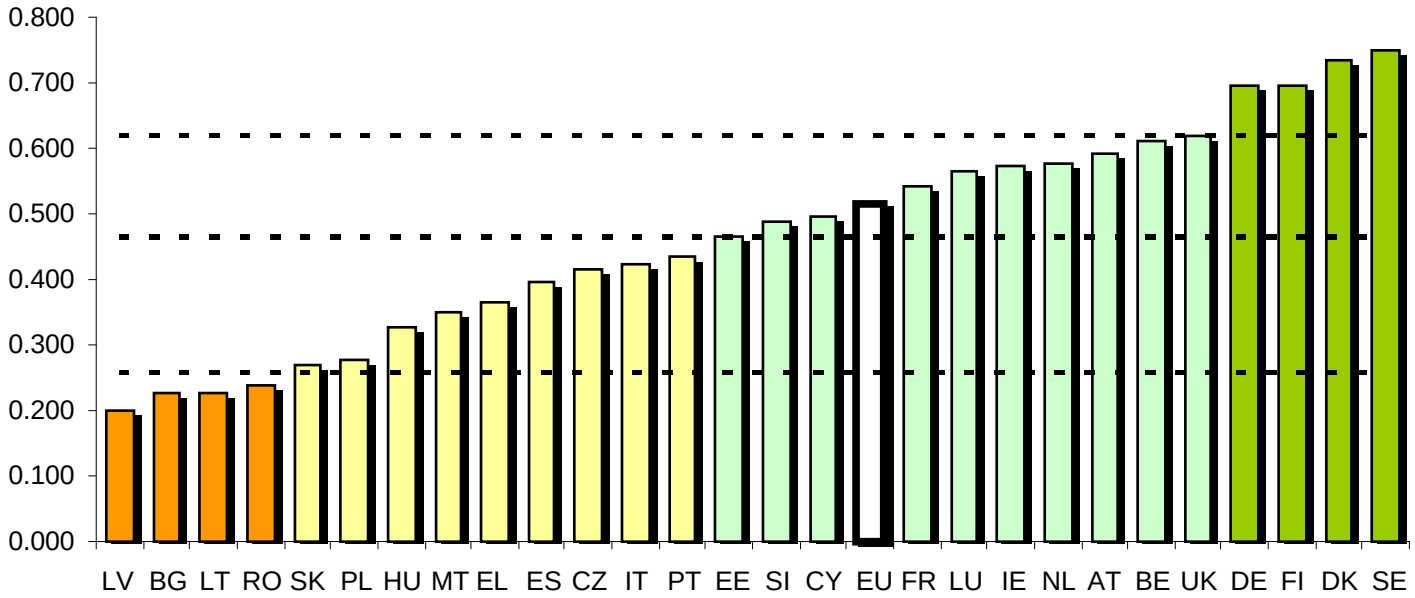
The EU Framework Programme for Research (FP7) invests about € 1.3 billion in ICT R&D every year. In 2009, Google alone invested $ 2.843 bn (or € 2 bn) in R&D.

Source: European Commission

EU challenges

Strong variation in performance across Member States

Research and innovation performance: EU Member States



Note: the index used for comparison in this chart is based on a set of 24 indicators

Source: Innovation Union Scoreboard 2010, http://www.proinno-europe.eu/metrics

National R&D targets vary significantly

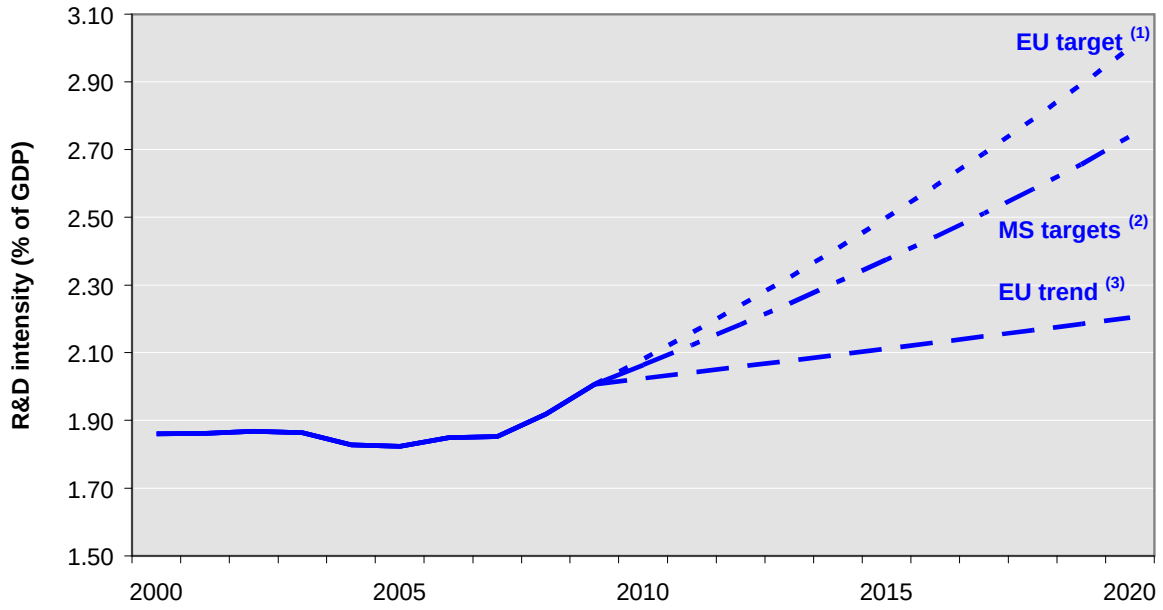
R&D intensity targets (% GDP) put forward in the draft National Reform Programmes (Nov. 2010)

Country	National target by 2020 (MS proposal)	Country	National target by 2020 (MS proposal)
BE	2.6-3	**LT**	1.9
BG	1.5	**LU**	2.6
CZ	2.7	**HU**	1.8
DK	3.0	**MT**	0.67
DE	3.0	**NL**	-*
EE	3,0	**AT**	3.76
IE	-*	**PL**	1.7
EL	2.0	**PT**	2.7-3.3
ES	3.0	**RO**	2.0
FR	3.0	**SI**	3.0
IT	1.53	**SK**	0.9-1.1
CY	0.5	**FI**	4.0
LV	1.5	**SE**	4.0
		UK	-*

**Note: no targets for IE, NL and UK*
Source: European Commission

If delivered, national targets will push up R&D investment close to the 3% EU target…

EU-27: R&D intensity projections



(1) *EU target of 3% for 2020*

(2) *EU aggregate of Member States targets for 2020*

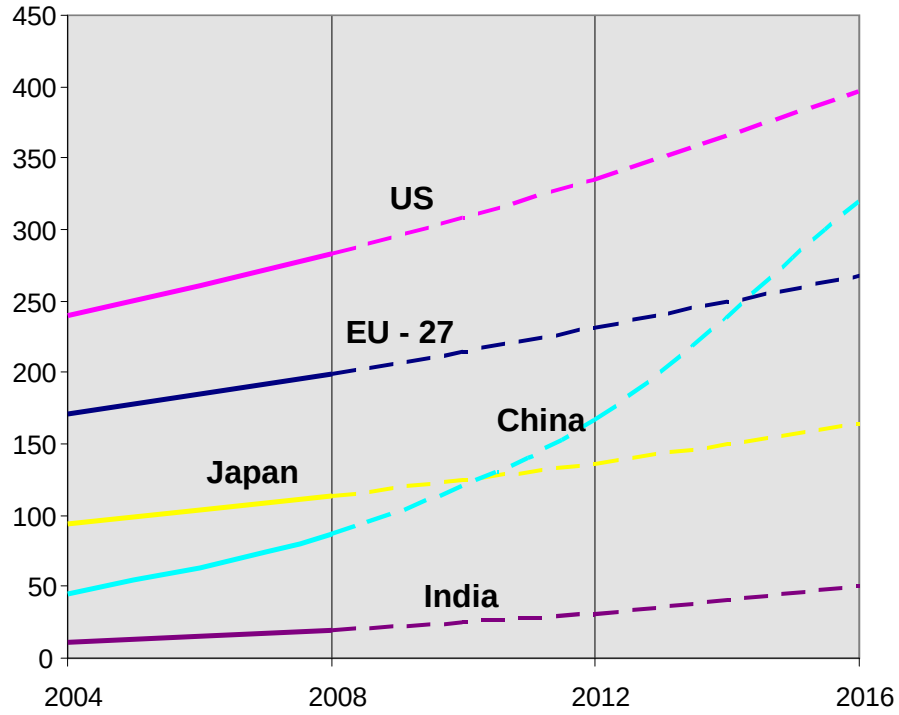
(3) *EU trend based on average annual growth in R&D intensity 2000-2009*

Source: European Commission

… but such an increase remains modest compared to global trends

Evolution of world R&D expenditure in real terms

€ billion in PPS at 2000 prices and exchange rates, 1995-2008 (China excluding Hong-Kong)

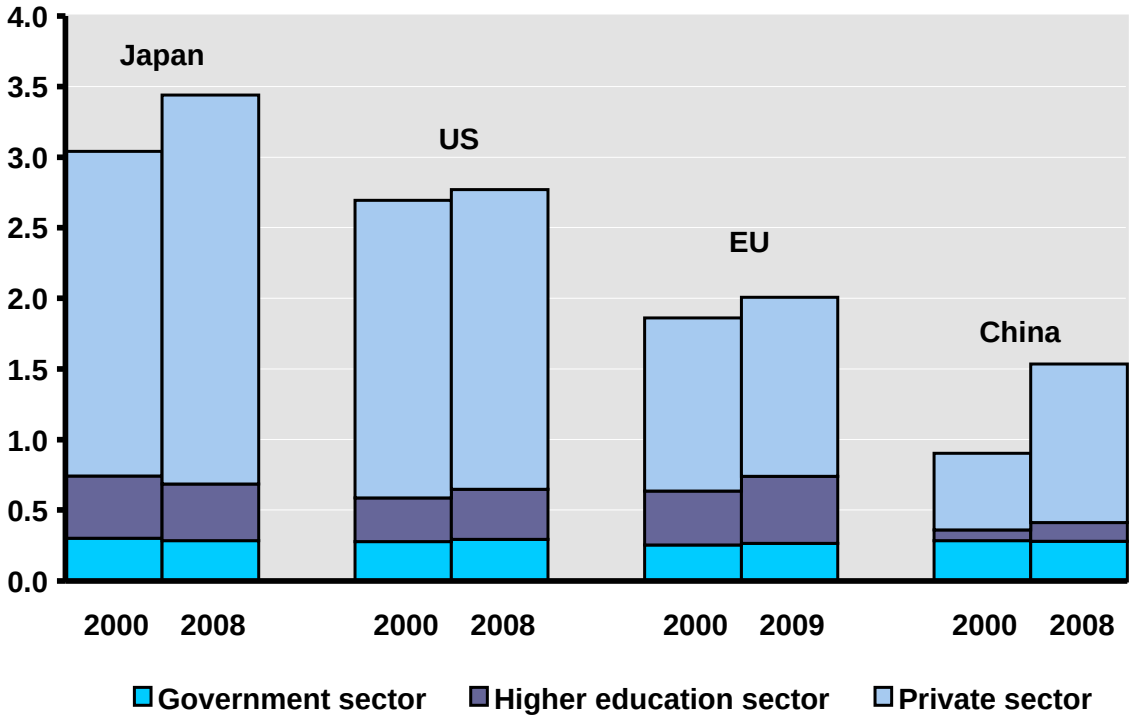


The US spends most on R&D whilst emerging economies are quickly catching up. On current trends, China is set to overtake the EU by 2014.

Source: European Commission

Lagging private R&D explains a large part of the EU gap

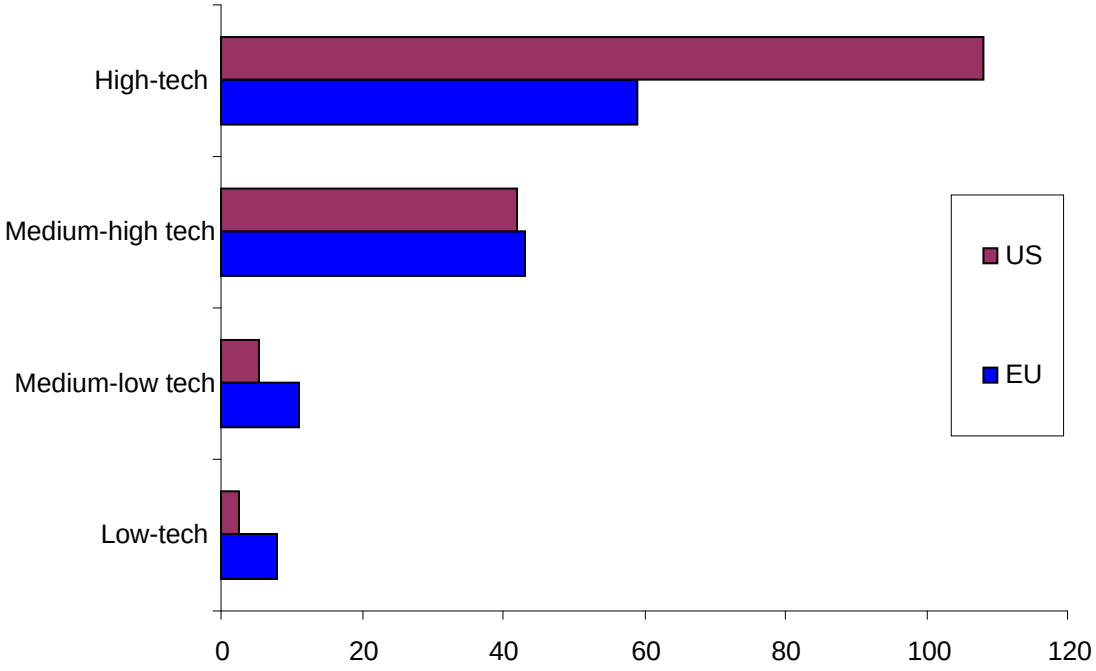
R&D expenditure (% GDP) broken down by sources



Source: Eurostat

High-tech sectors drive R&D investments…

R&D spending (€ bn) and industrial structure (2008)

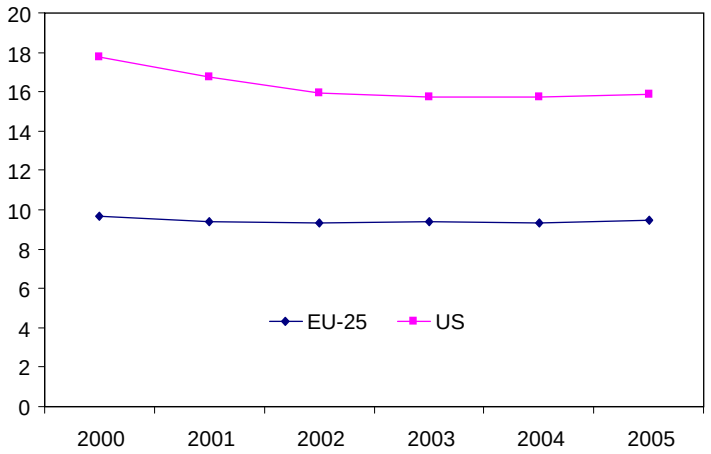


Differences in sectoral composition explain half of the total gap in R&D intensity between the EU and the US.

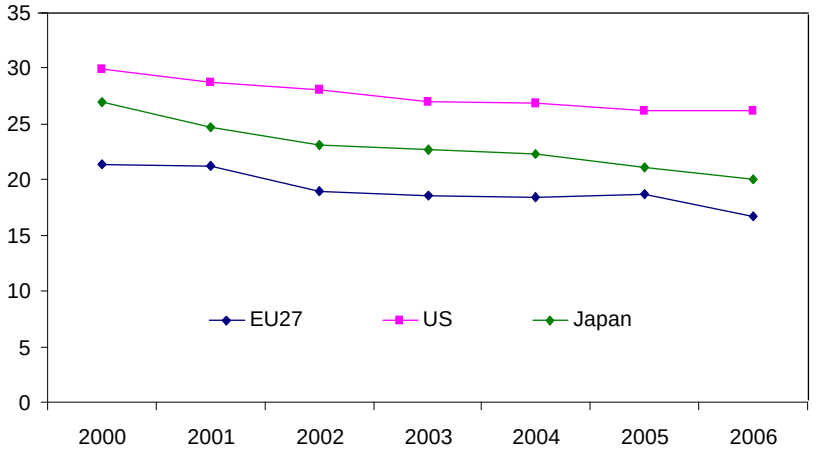
Source: European Commission

… and the EU economy is less high-tech than that of US and Japan

High-tech sectors' share in manufacturing value added



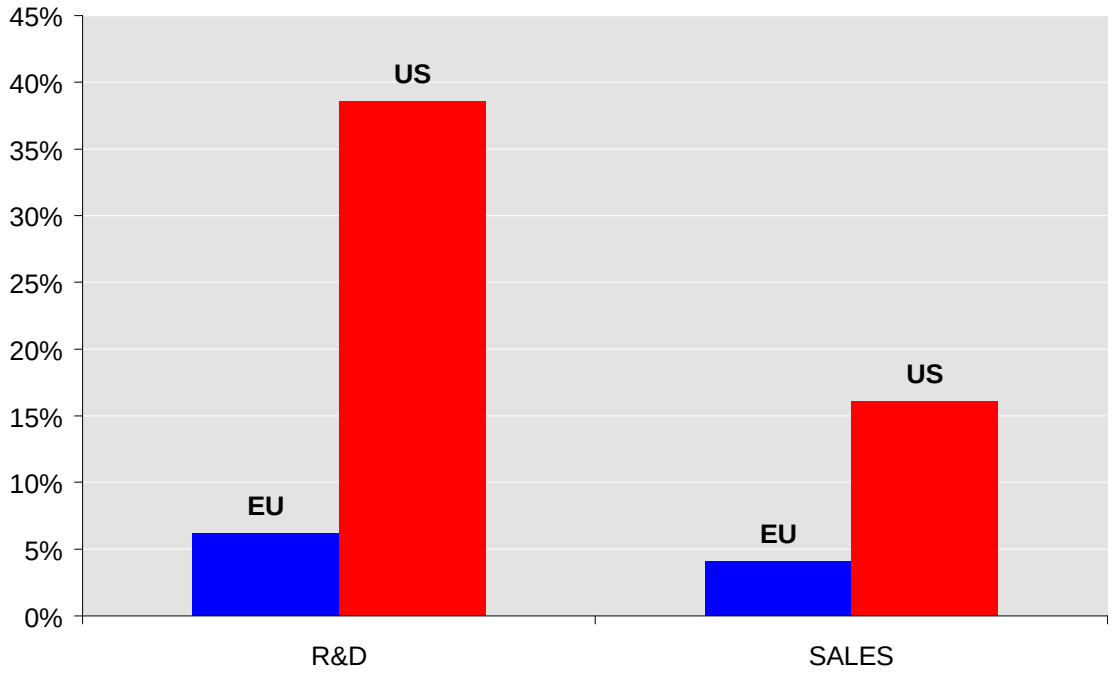
Share of high-tech exports (% of total exports)



Source: European Commission

Young innovative firms contribute less to total R&D in Europe

Contribution of young leading innovators to total leading R&D and sales (%)



Young': firms created after 1975

'Leading innovative': firms among the top 1400 R&D investing firms wordlwide

'Leading R&D and sales': R&D expenditure and sales of the top 1400 R&D investing firms worldwide

Source: EU Industrial R&D Investment Scoreboard 2010

Framework conditions for innovation

Standards & IPR are key

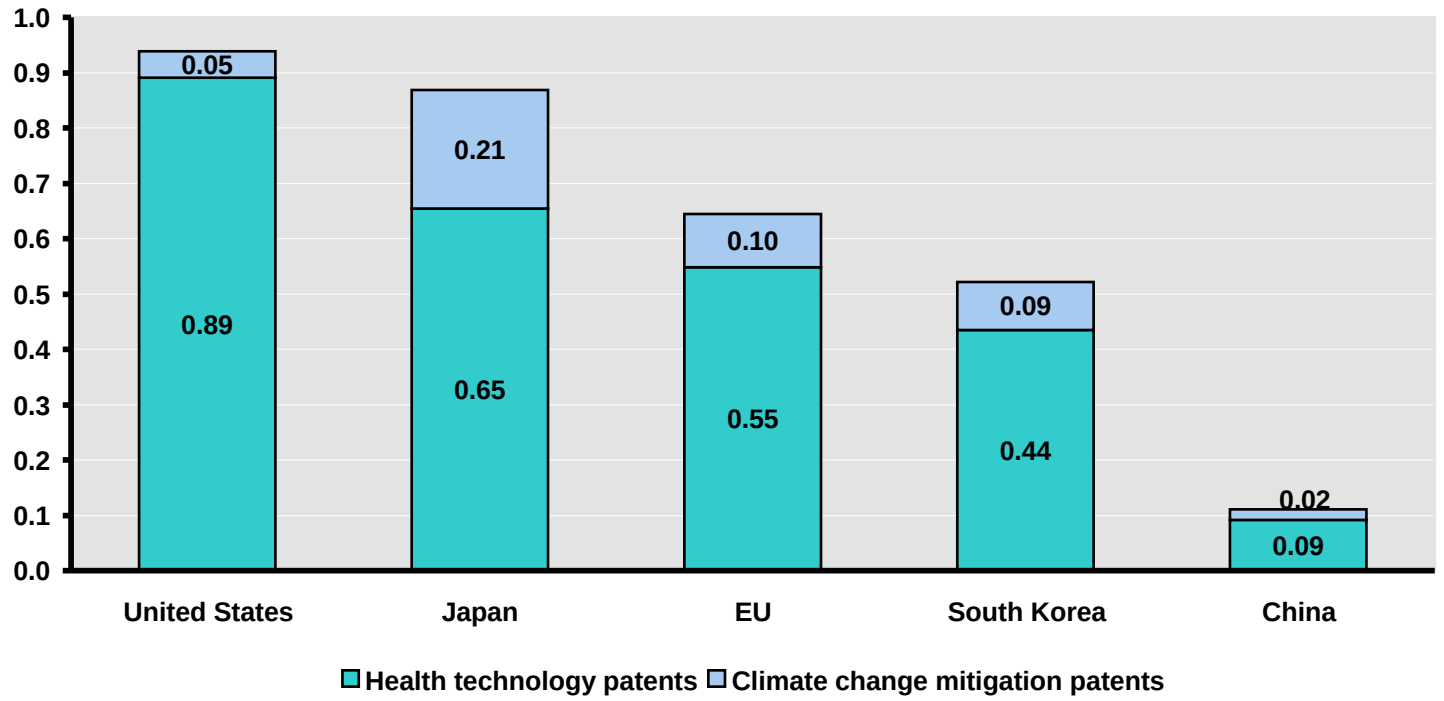
- GSM = Europe world leader
  (EU-funded R&D; common EU standard set quickly; a single legal framework)

- Wi-Fi = Europe follower
  (EU-funded R&D but process too slow to set an EU standard => result = non-EU, US industry-driven standard has become market leader)

- Electric vehicle

Relevance of patenting activities

Patents* filed in technologies related to societal challenges



**Patents filed through the Patent Cooperation Treaty procedure;*
Data per billion GDP (PPS€), 2007

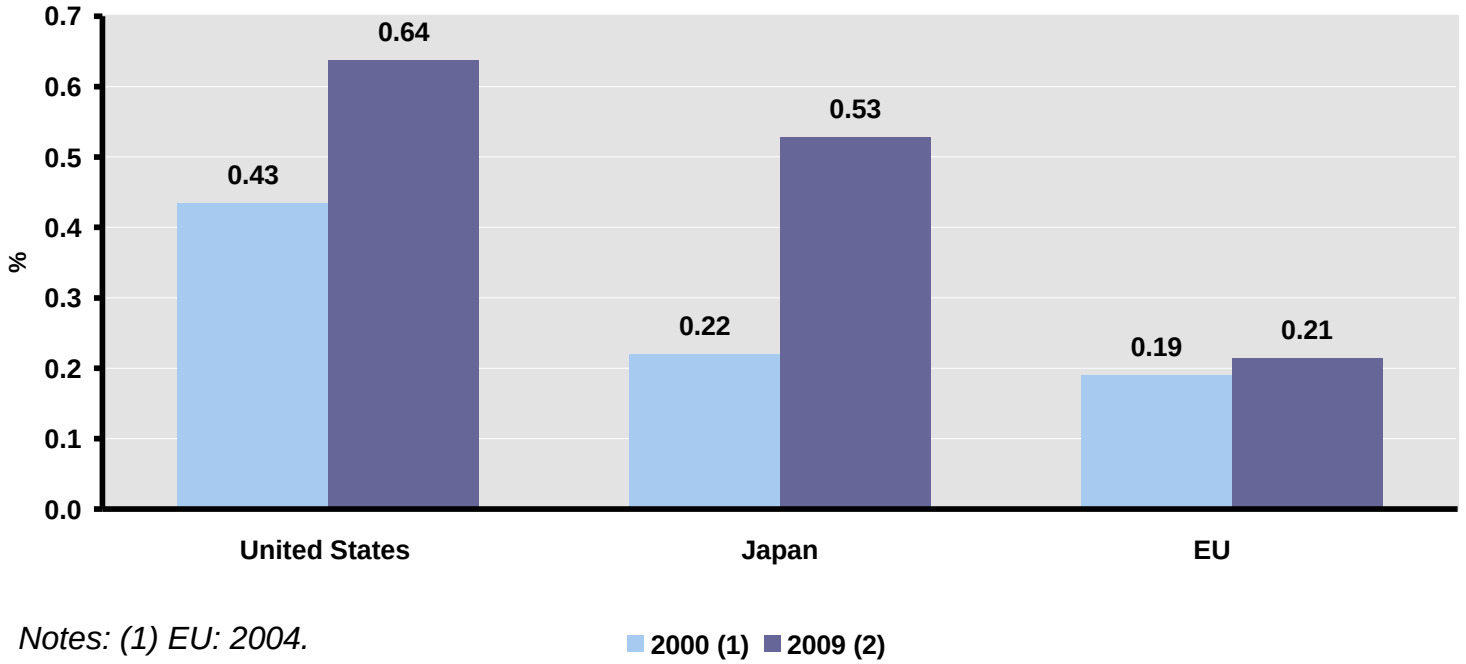
Health-related patents are largely dominated by the US and climate change mitigation technologies by Japan.

Source: OECD

Ability to profit from patents

Licence revenues in US, Japan and EU

(% of GDP, 2000 and 2009)

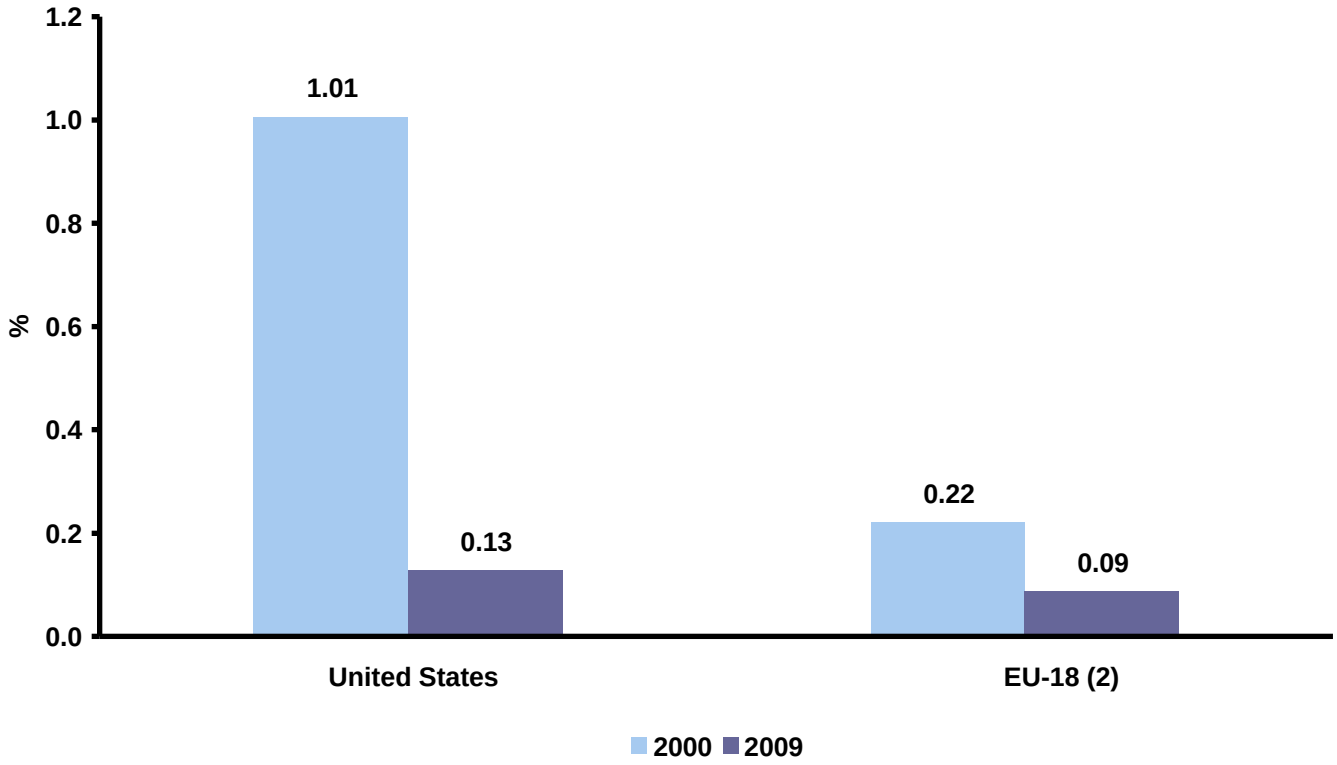


Notes: (1) EU: 2004.
(2) US, Japan: 2008.

Source: Eurostat

Availability of venture capital

Venture Capital(1) as % of GDP, 2000 and 2009

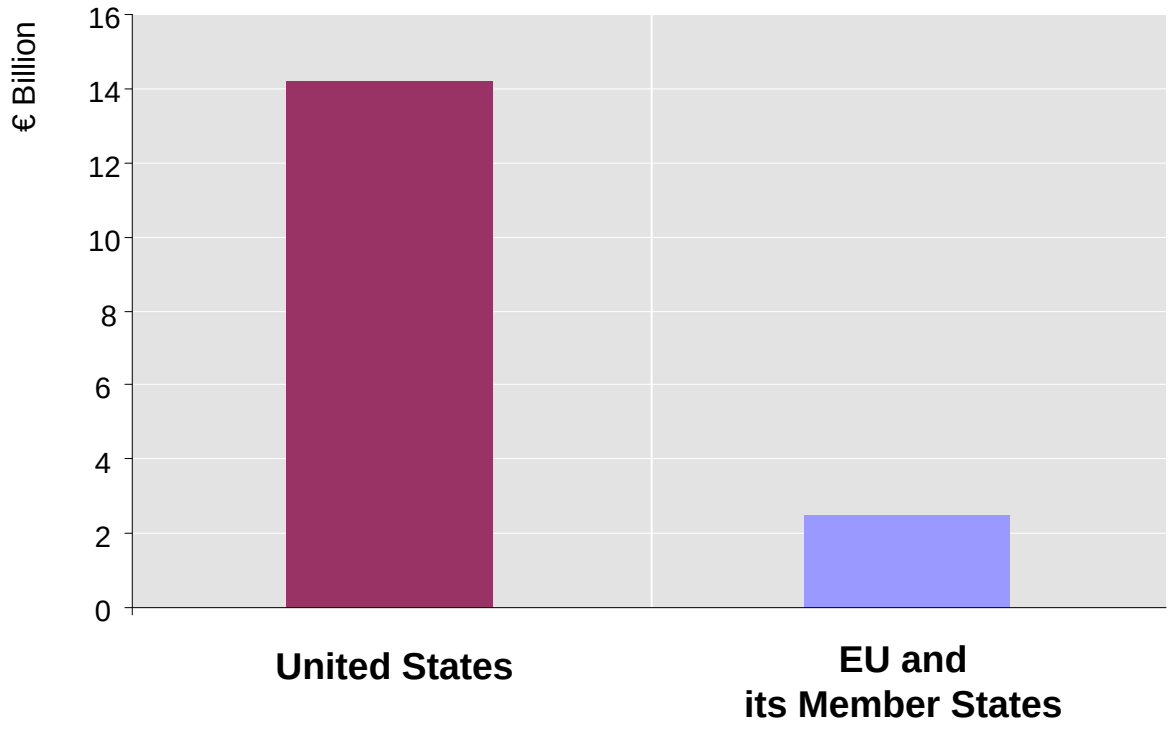


Notes: (1) Early stage, expansion and replacement venture capital
(2) EU-18 does not include: BG, EE, CY, LV, LT, LU, MT, SI, SK

Source: Eurostat

Use of procurement to boost innovation

R&D procurement expenditures in the US and EU (excluding defence, in € billion in 2007)



Source: European Commission

Innovation Union: a key flagship for Europe 2020

Background Information for the European Council, 4 February 2011

The need for a strategic approach

Our key partners and emerging economies follow a strategic approach to innovation and implement it.

A strategic approach to innovation =

- Innovation is the overarching policy objective driving all other policies (education, labour markets, skills, ICT/infrastructure, tax policy, etc.)
- Innovation policy is steered and monitored at the highest level
- Massive investments in skills, research and innovation especially through « recovery » packages

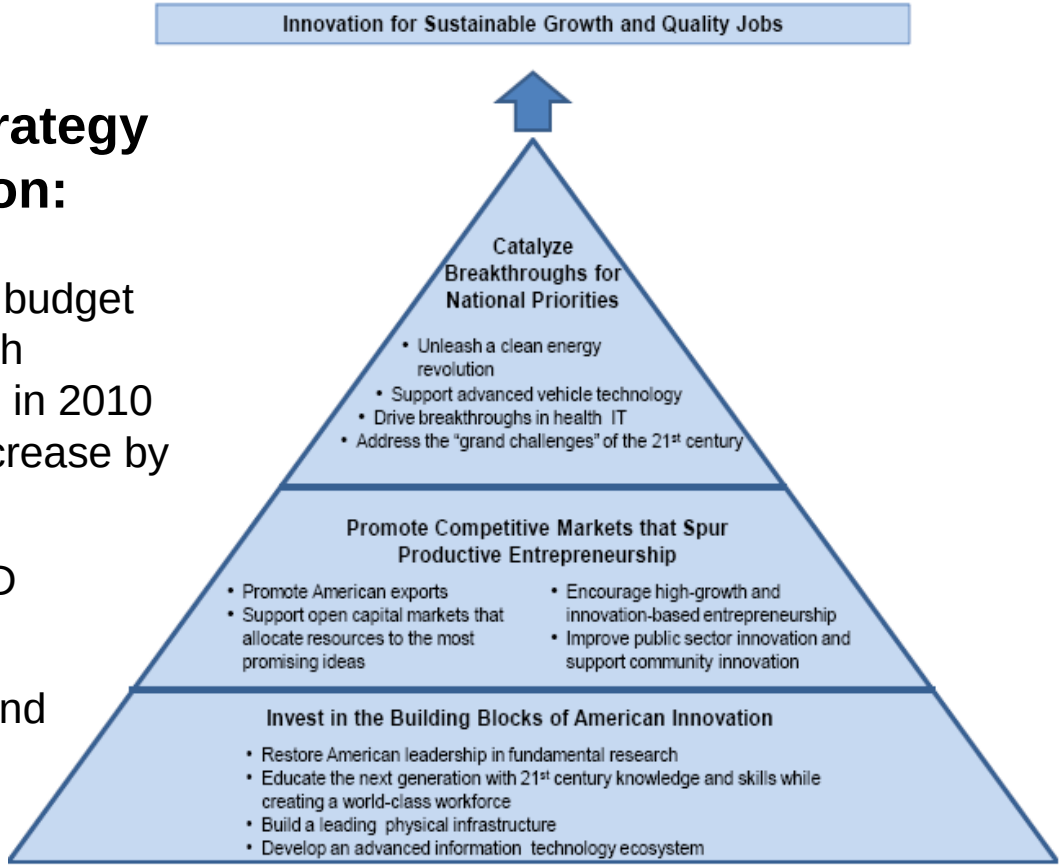
The example of the US

President Obama's Strategy for American Innovation:

⇒ increasing significantly the budget for three key basic-research agencies from $12.6 billion in 2010 to $19.5 Billion in 2016 (increase by 54%)[1]

⇒ reaching 3% target for R&D intensity[2]

⇒ focusing on key priorities and "grand challenges"



[1] http://www.ostp.gov/galleries/budget/FY2010RD.pdf
[2] http://www.aip.org/fyi/2009/049.html

The example of China

China « Indigenous Innovation Strategy »

⇒ Promote the development of technological innovation in domestic firms, leading to ownership of own core IP rights

⇒ Explore potential markets through in-house R&D activities and external knowledge acquisition

⇒ Be among the top-5 worldwide by 2020 for patents granted for domestic inventions and citations of international scientific papers

⇒ Implement the “Medium- to Long-Term Plan for the Development of Science and Technology until 2020”
- min. 60% of GDP growth
- max. 30% foreign technologies, IPR, standards

⇒ 1000 Talent programme – to get the 1000 best Chinese researchers back from the US

EU’s response: Innovation Union

A flagship initiative of the Europe 2020 strategy

⇒ Radically improving the framework conditions and reducing time-to-market

⇒ Prioritising resources around major societal challenges, i.a. through European Innovation Partnerships

⇒ Fully exploiting non-technological innovation (e.g. services, design)

⇒ Concentrating on what works, like the European Research Council, and using public funding to leverage private R&D. For example, one euro put into the EU Risk Sharing Finance Facility triggers some 30 euro of private investment.

⇒ Simplifying and streamlining EU and national research programmes, so that scientists can spend more time in the lab and businessmen expanding markets

See: **http://ec.europa.eu/research/innovation-union/index_en.cfm**

European Innovation Partnerships

- Tackle major societal challenges whilst creating new business opportunities for EU industry
- Set concrete targets (e.g. raising our citizens' healthy life years by two in 2020) behind which policy makers and the public can rally
- Join up all key players from researchers, businesses to end users and remove bottlenecks so that good ideas can be translated into successful innovative products or services
- A pilot partnership on active and healthy life has been launched. Over the last 40 years the welfare gains associated with improvements in life expectancy totalled at least 29–38% of GDP.
- Other innovation partnerships (e.g. on energy, raw materials, sustainable agriculture, water) are under consideration


EUROPE 2020