

# The U.S. – Still Reigning Supreme?

## ACA Annual Meeting 2014

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# The U.S. – Still Reigning Supreme?

U.S. Performance (*NSF, 2012*):

‘..In most broad aspects of S&T activities, the United States continues to maintain a position of leadership.

But it has experienced a gradual erosion of its position in many specific areas...’

Reason:

- ‘...- the rapid increase in a broad range of Asian S&T capabilities (mainly China)
- the effects of EU efforts to boost its relative competitiveness in R&D, innovation, and high technology....’

‘...Much of the EU's high-technology trade is with other EU members. EU research performance is strong and marked by pronounced EU-supported, intra-EU collaboration. The EU is also focused on boosting the quality and international standing of its universities....’

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in higher education and R&D...

## Shanghai Ranking

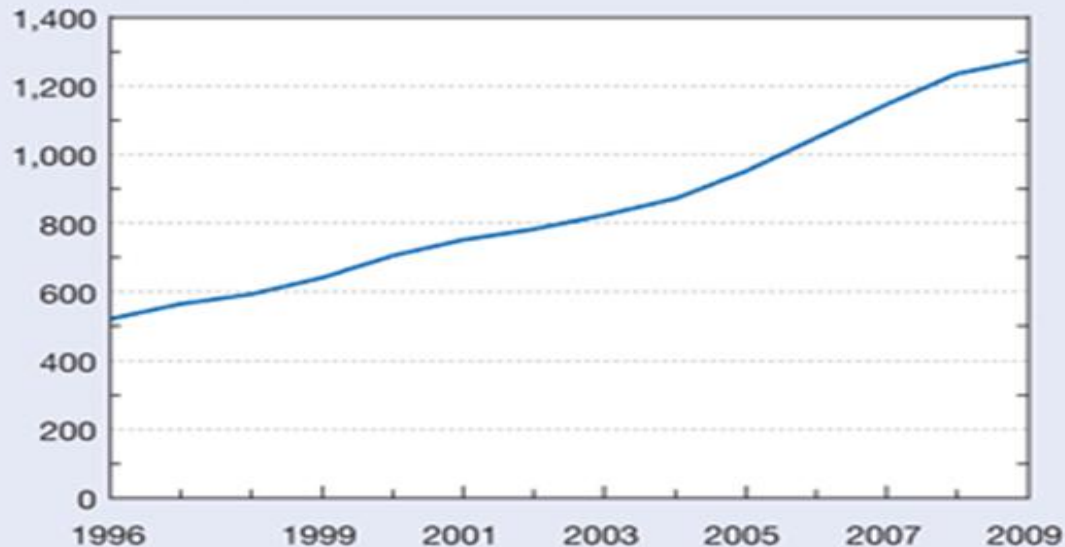
share of US universities 2013: 52 of top 100 (and 18 of top 20...)  
compared to 2003: 58 of top 100 (and 15 of top 20....)

Top 100 share of others 2013: UK 9; CDN, D, F, SUI, 4 each;

# The U.S. – Still Reigning Supreme?

Figure O-1  
Estimated R&D expenditures worldwide: 1996–2009

Dollars (billions)

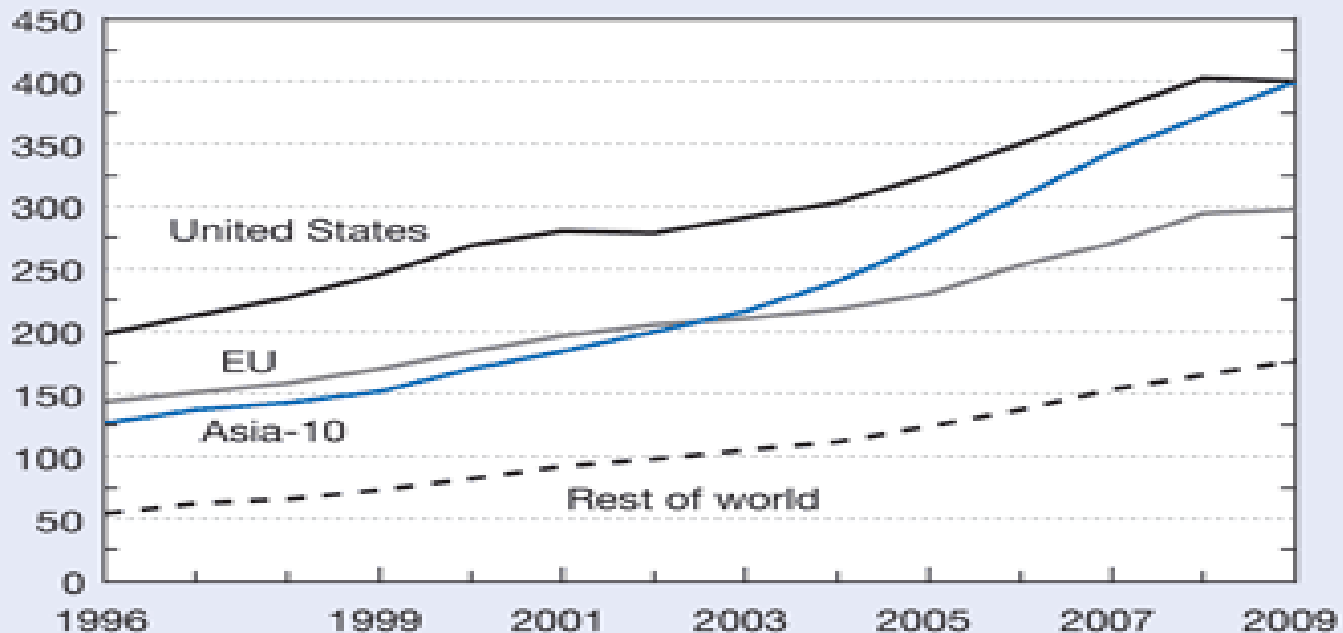


SOURCES: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2011) of Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (2011-1 and previous years) and United Nations Educational, Scientific and Cultural Organization Institute for Statistics, <http://stats.uis.unesco.org>.

*Science and Engineering Indicators 2012*

Figure O-2  
**R&D expenditures for United States, EU, and 10 Asian economies: 1996–2009**

Dollars (billions)

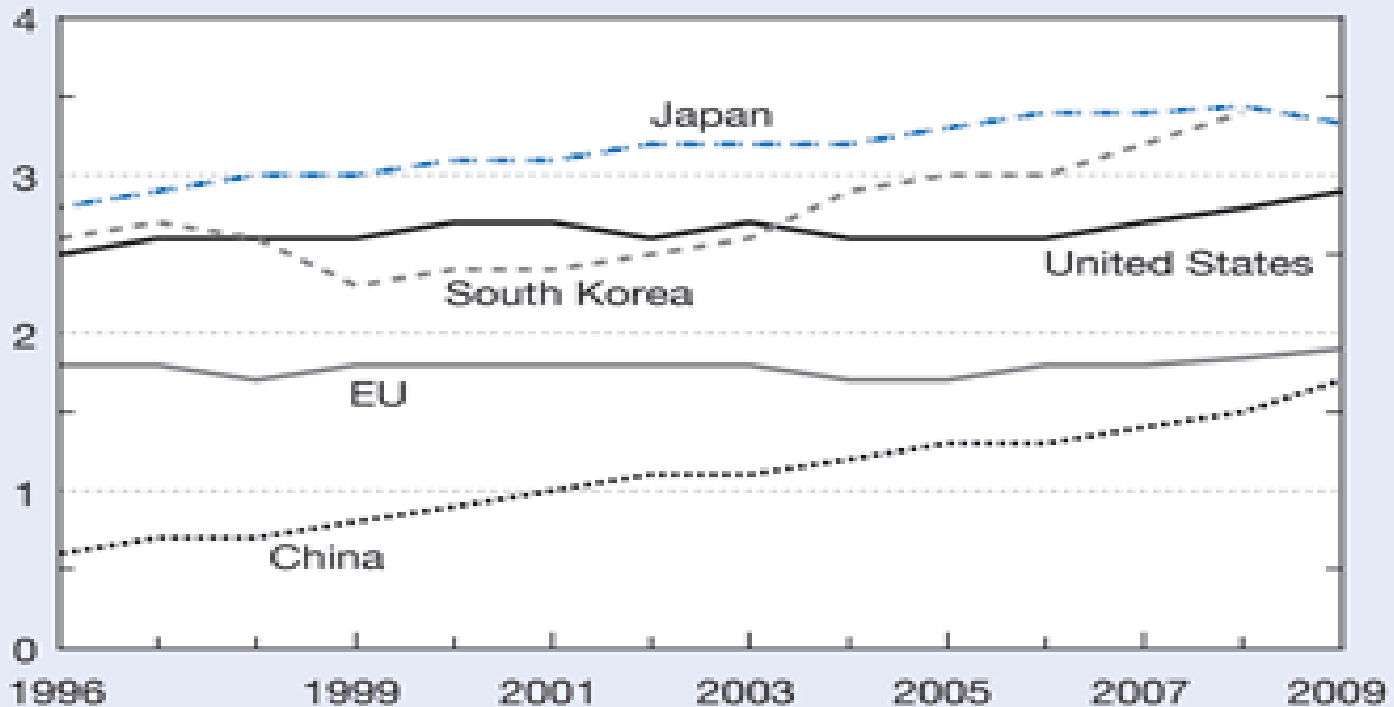


Asia-10 = China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand; EU = European Union

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2011) of Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (2011-1 and previous years) and United Nations Educational, Scientific and Cultural Organization Institute for Statistics, <http://stats.uis.unesco.org>.

Figure O-3  
**R&D expenditures as a share of economic output  
of selected regions/countries: 1996–2009**

Percent of GDP

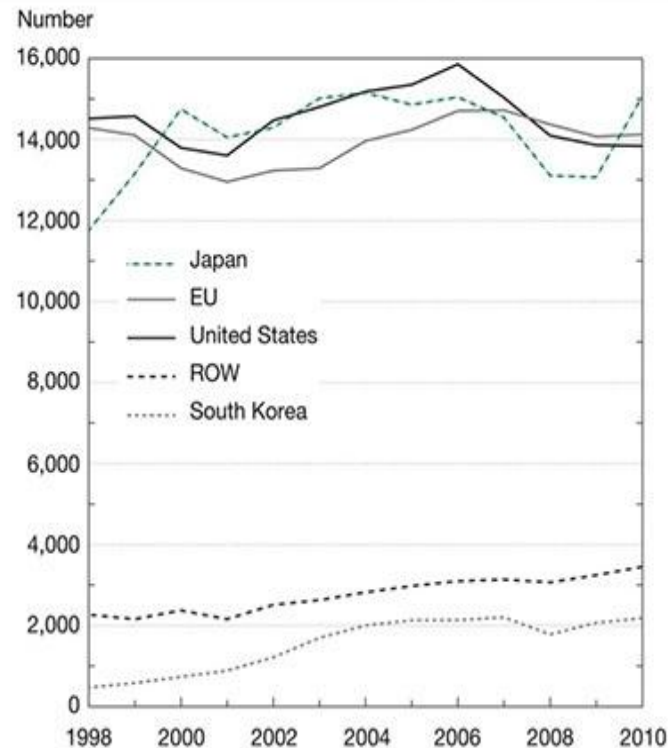


EU = European Union; GDP = gross domestic product

NOTE: 2009 data unavailable for South Korea.

SOURCE: Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (2011-1 and previous years).

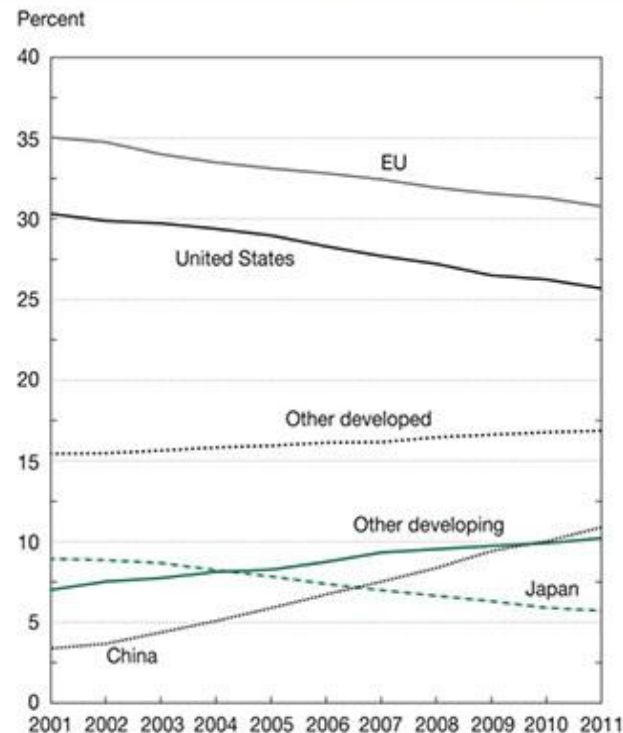
## Global triadic patent families, by selected region/country/economy: 1998–2010



EU = European Union; ROW = rest of world.

NOTES: Triadic patent families include patents applied in the U.S. Patent and Trademark Office, European Patent Office, and Japan Patent Office. Patent families are fractionally allocated among regions/countries/economies based on the proportion of the residences of all named inventors.

## S&E articles, by global share of selected region/country: 2001–11



EU = European Union.

NOTES: Article counts are from the set of journals covered by the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). Articles are classified by the year of publication, and are assigned to a country/economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis (i.e., for articles with collaborating institutions from multiple countries/economies, each country/economy receives fractional credit on the basis of the proportion of its participating institutions). Counts for all six groups sum to the world total. Data for Bulgaria, Hungary, and Romania are included with the EU and not with developing economies.



## Quality of Publications *(NSB 2014)*

‘....Data on citations per publication suggest that the quality of U.S.-authored articles has changed little over the past 10 years.

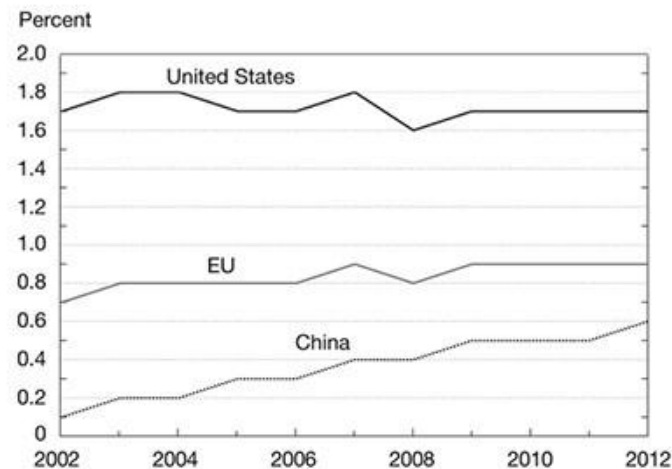
- In 2010, articles with U.S. authors were highly cited about 76% more often than expected based on the U.S. share of world articles, compared to 85% in 2000. Between 2000 and 2010, EU-authored articles improved on this indicator, from 27% less often than expected to 6% less often....’.

???

In fact, by this standard the quality of US publications has declined (relatively by 9%), and the EU have improved (relatively by 21%).

## Quality of Publications

### Share of U.S., EU, and China S&E articles that are in the world's top 1% of cited articles: 2002–12



EU = European Union.

NOTES: Article/citation counts are from the set of journals covered by the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). Articles are classified by the year they entered the database, rather than their year of publication, and are assigned to a country/economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis (i.e., for articles with collaborating institutions from multiple countries/ regions, each country/region receives fractional credit on the basis of the proportion of its participating institutions). See appendix table 5-24 for countries included in the EU, which in this figure is treated as a single country. Citation counts are based on a 3-year period with a 2-year lag (e.g., citations for 2012 are references made in articles in the 2012 data tape to articles in the 2008–10 data tapes).



# The U.S. – Still Reigning Supreme?

## U.S. Higher Education System

- 20 million students in 4300+ *higher ed* institutions
- 283 full research universities (EU ca. 1000) (EC EUMIDA report 2010)
- in 2009, U.S. academic institutions awarded 60.000 doctorates, (41,100 in S&E); (EU 2005: 100.000 doctorates, 40.000 in S&E)
- in EU, rate increase in doctorate degrees twice as large as in U.S.
- In U.S., international students earned 1/3<sup>rd</sup> of all S&E doctorates (57% of all engineering doctorates, 54% of all computer science degrees, and 51% of physics doctoral degrees).
- tuition and fees for colleges and universities have grown faster than median income over last decade (= 45% of 2009 S&E doctorate recipients had education-related debt)

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## U.S. Higher Education System

### administration to faculty ratio

- ‘....Across the board, the ratio of full-time-equivalent faculty members to administrators has declined sharply since 1990. Notable declines have occurred at public master’s and private bachelor’s institutions.....’
- From 2000 to 2012, new administrative positions rose by 28-percent....while the number of full-time faculty and staff members per professional or managerial administrator has declined 40 percent, to around 2.5 to 1.
- Faculty salaries were "essentially flat" from 2000 to 2012....’, whereas ‘...average compensation for the presidents at the 25 highest-paying universities increased by a third, to \$974,006.....’
- (report released by the [Delta Cost Project](#), a nonprofit, nonpartisan social-science organization whose researchers analyze college finances).

# The U.S. – Still Reigning Supreme?

U.S. universities are ,service providers‘ to students and faculty:

Child Care Center

Students Counseling Services

Disability Concerns

Employment Services

Student Dispute Resolution Services

Diversity Concerns

Equal Opportunity, Ethics and Access

Health Service

Minority Student Academic Center

Student Involvement Center

Student Legal Services

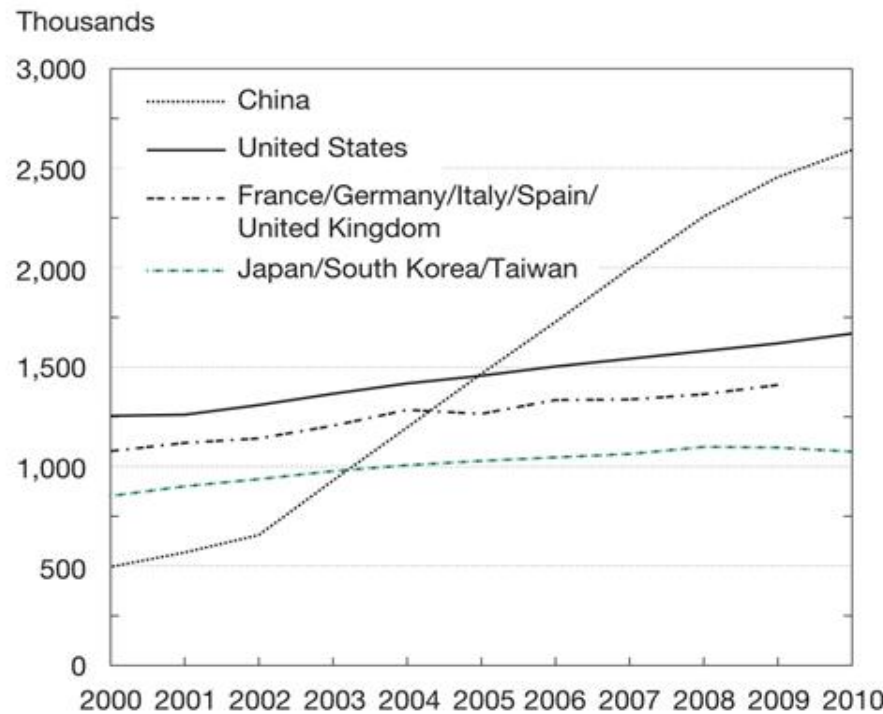
Student Newspaper

Recreation Services

Golf Course

Wellness

## First university degrees, by location: 2000–10



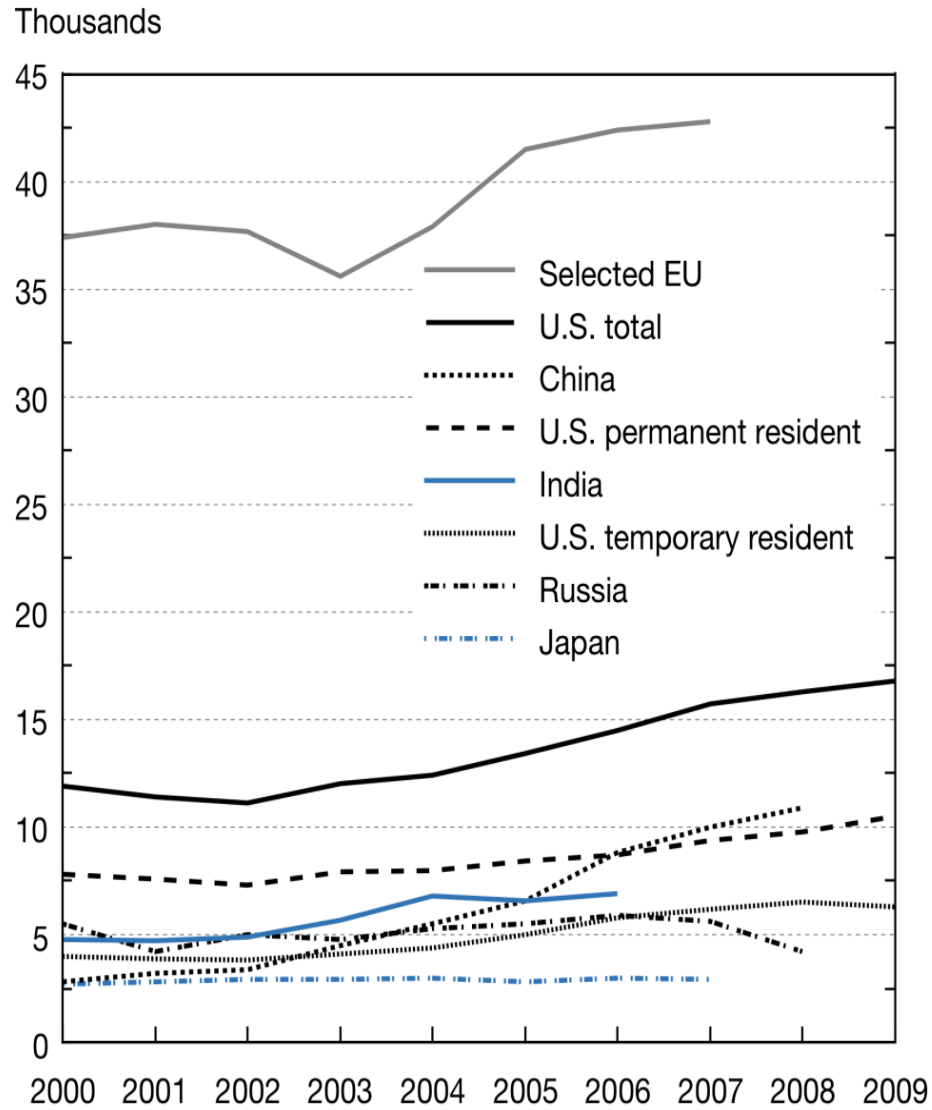
NOTES: Data for first university degrees use International Standard Classification of Education, level 5A. Data not available for all locations in all years.



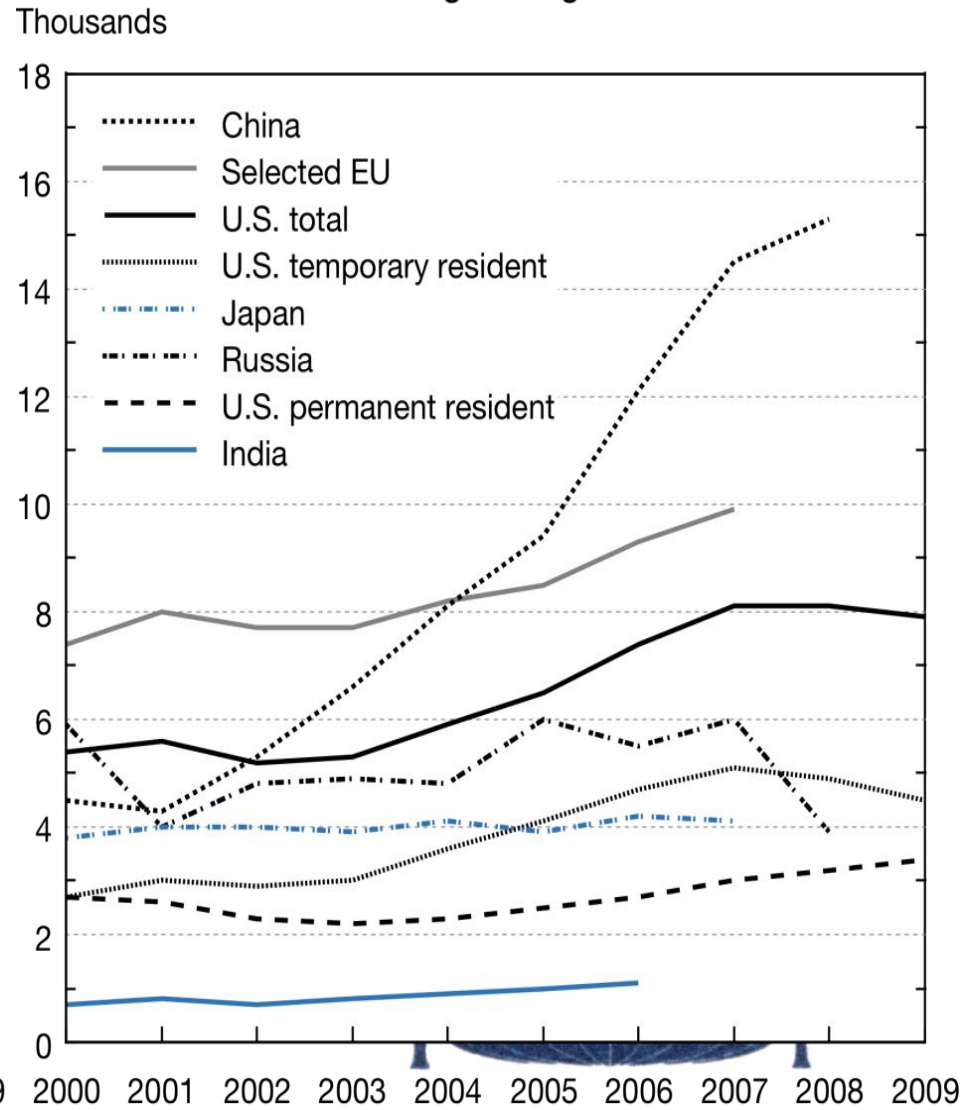


## Doctoral degrees in natural sciences and engineering, by selected region/country: 2000 to most recent year (NSF)

Natural sciences



Engineering



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## Post-docs

- in 2007: 120.000 in EU 27
- in 2005: 48.000 in US

1/3 in top 15 institutions:

Harvard (4386), Johns Hopkins, Stanford, UCLA, Yale, UCSF, W.WA, UCO, UCSD, MIT, UPA, Columbia, Berkeley, Duke, UPittsburgh,

- post-doctoral salaries: US\$ 45.000 after 3 years  
(compare to full professors: 125.000-250.000)



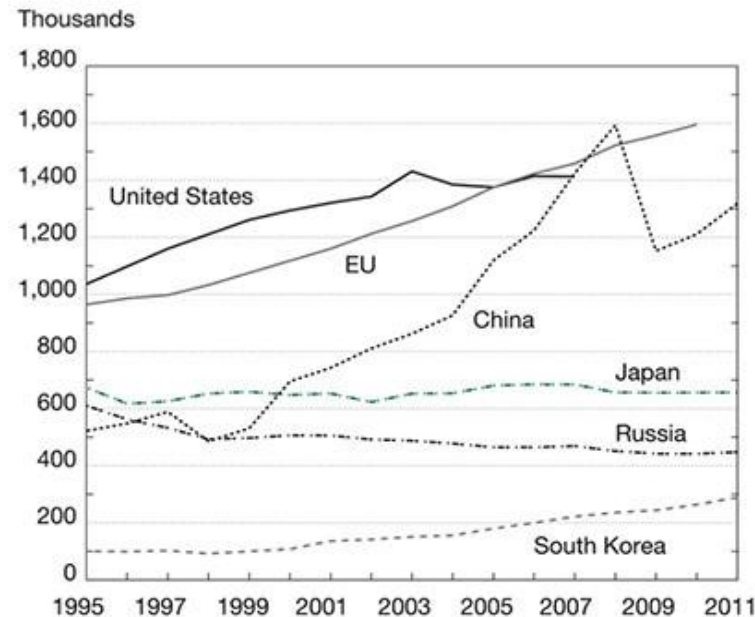
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## University Faculty

### Career options

- post-doc, lecturer/adjunct, assistant prof., associate prof., full prof.
- alternative: administrator or researcher
- salaries/benefits: fully negotiable
- over time fewer tenure-track and full professor positions:  
 $\frac{3}{4}$  of courses taught at universities/colleges are taught by adjunct faculty: they are part-time professors who are hired on a contractual basis rather than being given tenure and a permanent position; may be renewed annually, for decades....

## Estimated number of researchers in selected countries/regions: 1995–2011

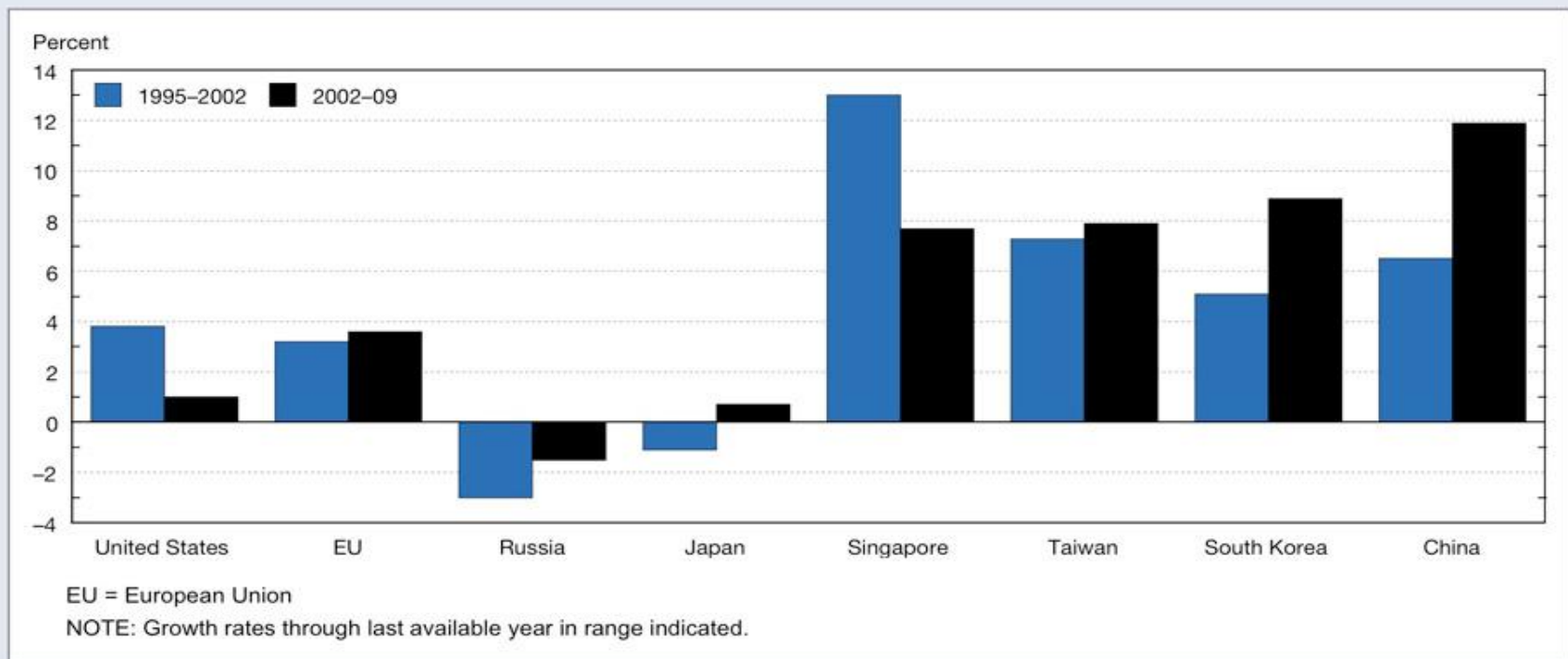


EU = European Union.

NOTES: Data are not available for all countries/regions for all years. Researchers are full-time equivalents. Before 2009, counts for China were not consistent with Organisation for Economic Co-operation and Development (OECD) standards.



## Average annual growth in number of researchers, by region/country/economy: 1995–2002 and 2002–09



SOURCE: National Science Board, *Science and Engineering Indicators 2012*



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## international attractiveness

- Student mobility: 5 million worldwide in 2014
- international students in
  - the U.S.: 820.000 (increased 1/3 in 10 years)
  - compared to*
  - Europe: 1.968.000 (doubled in 10 years)
  - Asia: 500.000 (doubled in 10 years)
  - Australia: 350.000 (doubled in 10 years)
- US market share. 19% (in 2001: 28%)
- degree of internationalization: 3,5% (AUS 26%, UK 19%, F 12%, GER 11%)

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Generally, the US has become less attractive for students from Western Europe (UK, F, E, GER), whereas *Western Europe's attractiveness has increased for US students* (Open Doors 2013)

N students

going from	<u>2001</u>	<u>2011/12</u>
GER to US	9.613	9.347
<i>US to GER</i>	<i>5.116</i>	<i>9.500</i>
UK to US	8.414	9.186
<i>US to UK</i>	<i>30.289</i>	<i>34.660</i>
F to US	7.401	8.232
<i>US to F</i>	<i>12.200</i>	<i>17.100</i>
E to US	4.048	4.924
<i>US to E</i>	<i>17.176</i>	<i>26.480</i>

# The U.S. – Still Reigning Supreme?

conclusion: US *higher ed* – where is it heading?

strengths:

- graduate and post-graduate education philosophy
- governance and structure
- services
- budgets
- learning and research environment

# The U.S. – Still Reigning Supreme?

conclusion: US *higher ed* – where is it heading?

Weaknesses:

- graduate and post-graduate education philosophy
- governance and structure
- services
- budgets
- learning and research environment

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conclusion: US *higher ed* – where is it heading?

challenges ahead for US institutions:

- very high institutional concentration of academic excellence (,world universities‘)
- increasing dependence on international HR
- costs, costs, costs: funding models reach critical point
- the university mission – administration or academics?
- secondary education, access and equity – the national role of universities in the future.....



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*Thank you!*