

**Chaire d'innovation technologique**  
**Lilianne Bettencourt**

# **Innovation: Comparaisons Internationales**

**Elias Zerhouni**

26 Janvier 2011



**COLLÈGE  
DE FRANCE**  
— 1530 —

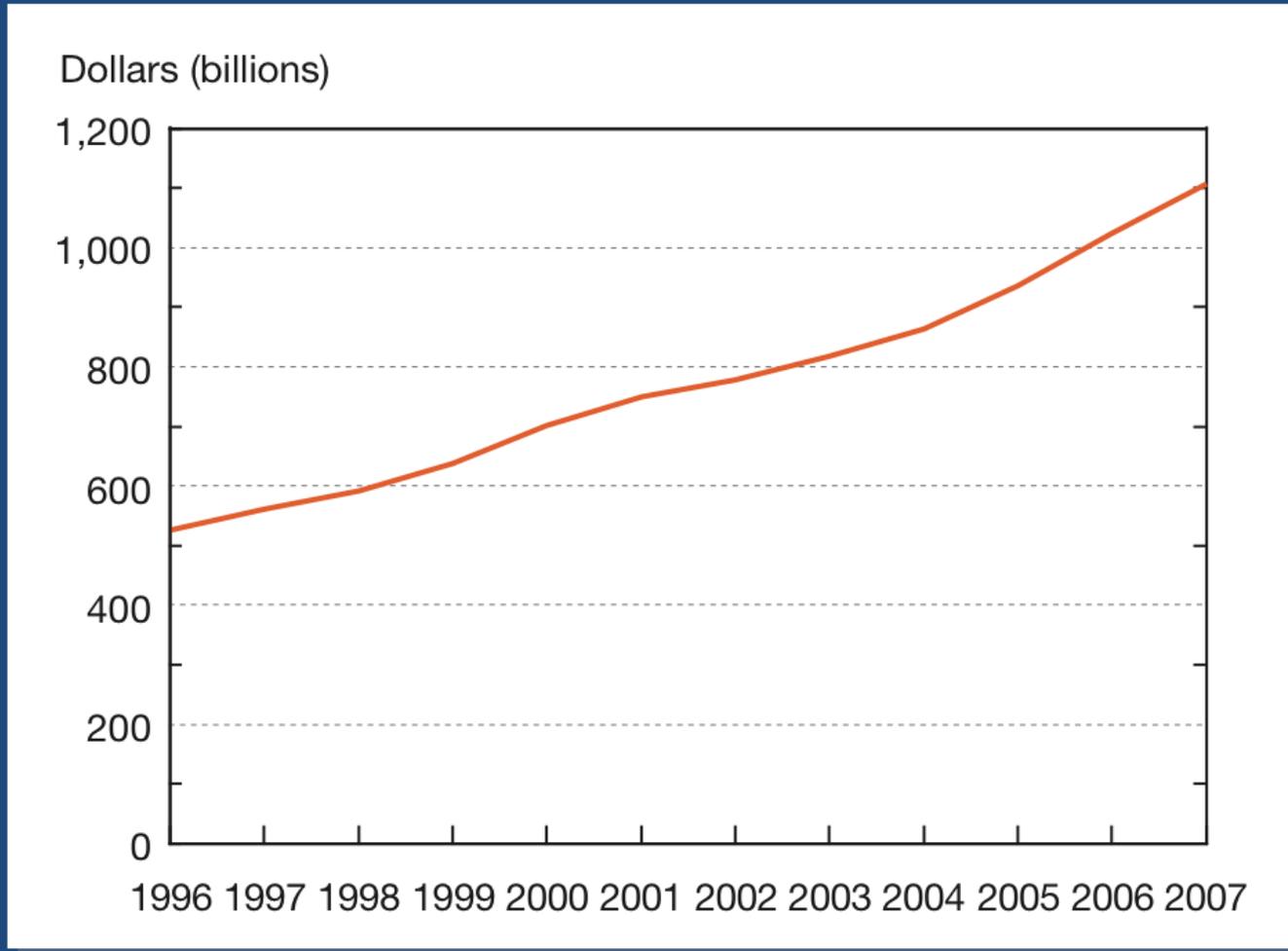
# SCIENCE AND ENGINEERING INTERNATIONAL INDICATORS

2010

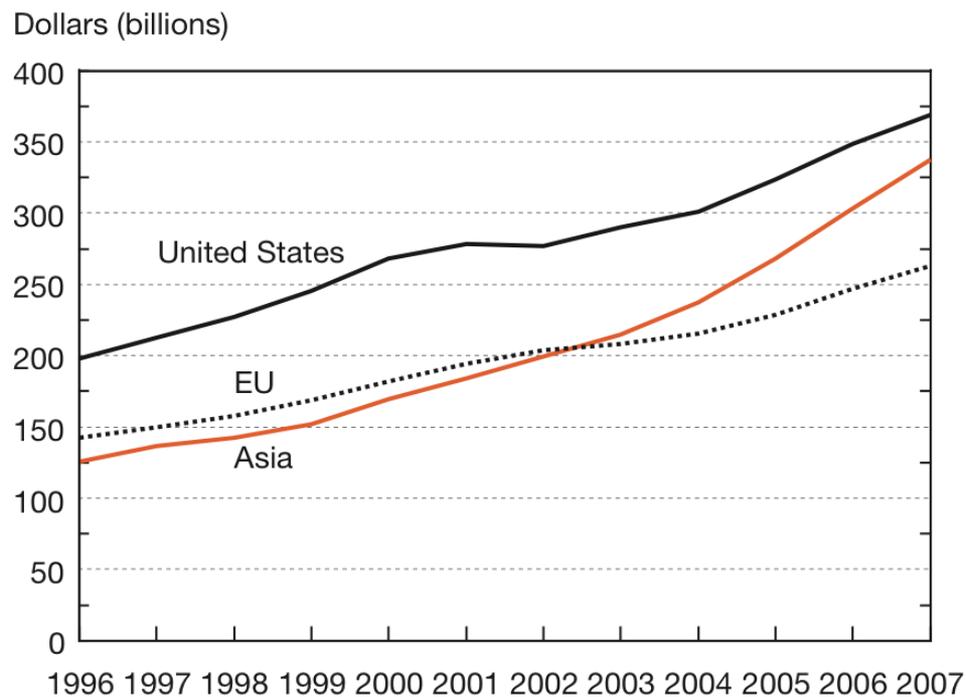
## GLOBAL EXPANSION OF RESEARCH AND DEVELOPMENT EXPENDITURES

NATIONAL SCIENCE BOARD- NATIONAL SCIENCE FOUNDATION

# Estimated R&D expenditures worldwide: 1996–2007



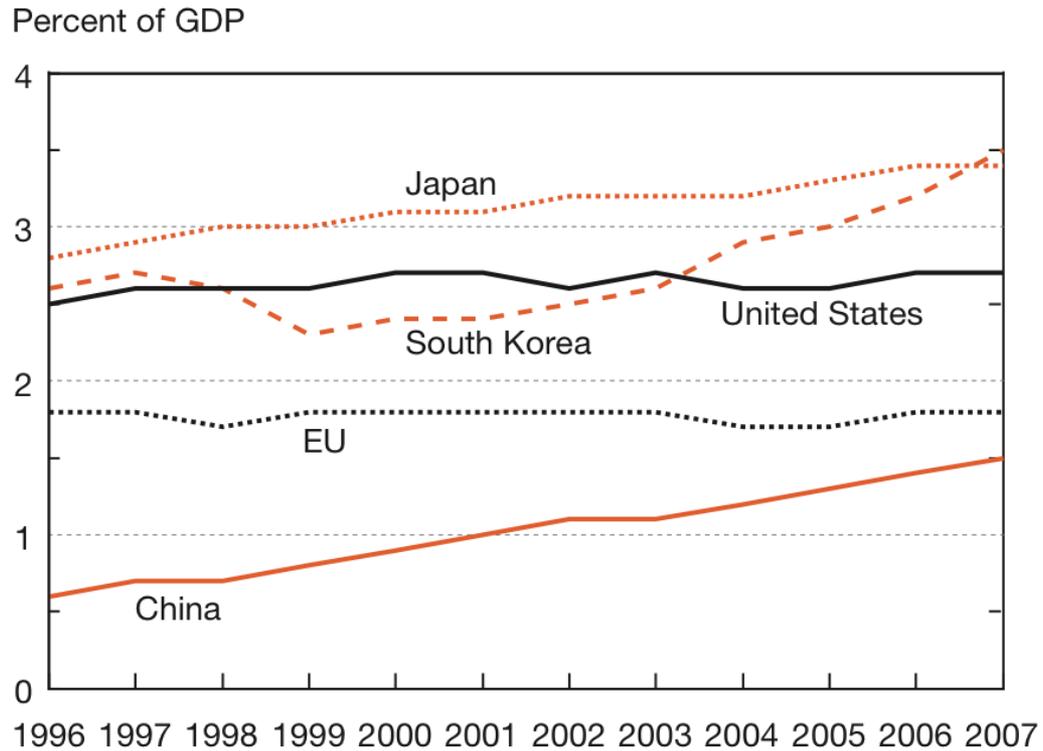
# R&D expenditures for United States, EU, and Asia: 1996–2007



**EU = European Union**

**NOTES: Asia includes China, India, Japan, Malaysia, Singapore, South Korea, Taiwan, and Thailand. EU includes all 27 member states.**

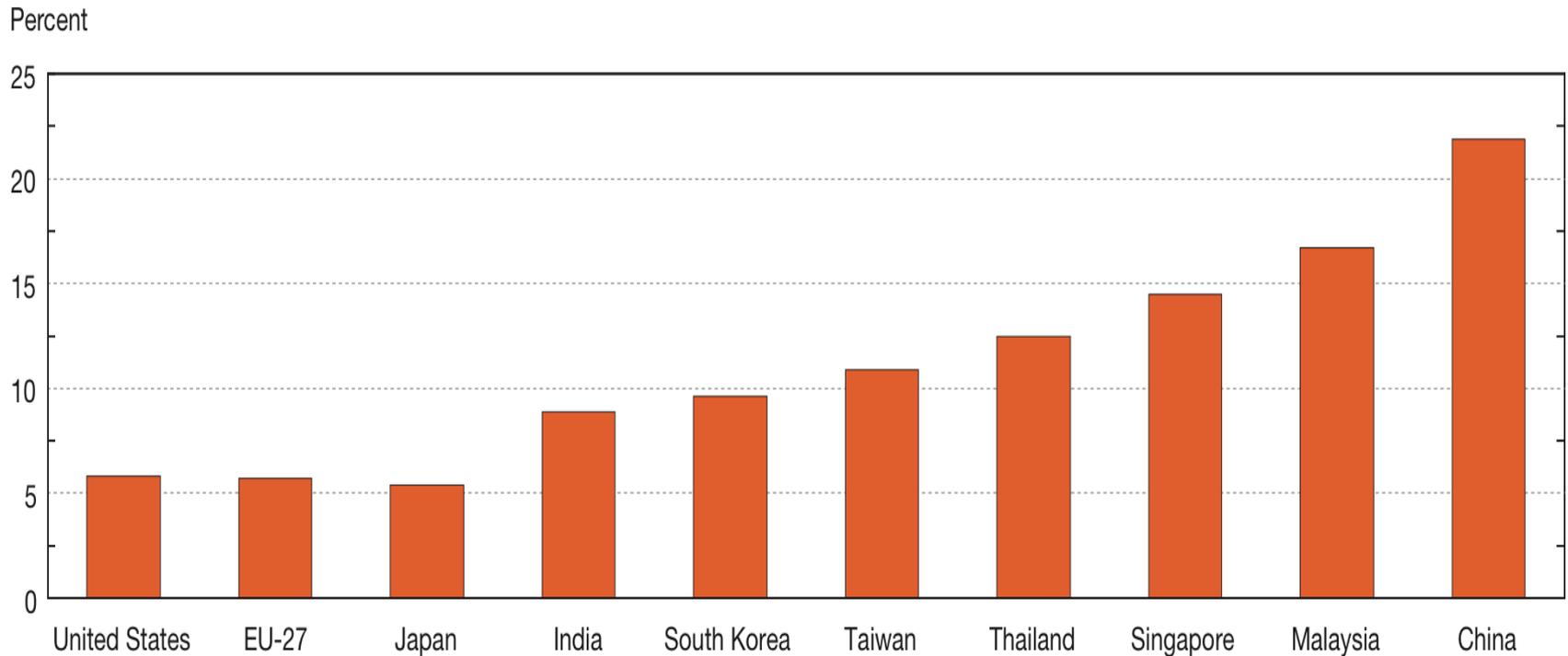
# R&D expenditures as share of economic output of selected countries: 1996–2007



EU = European Union; GDP = gross domestic product

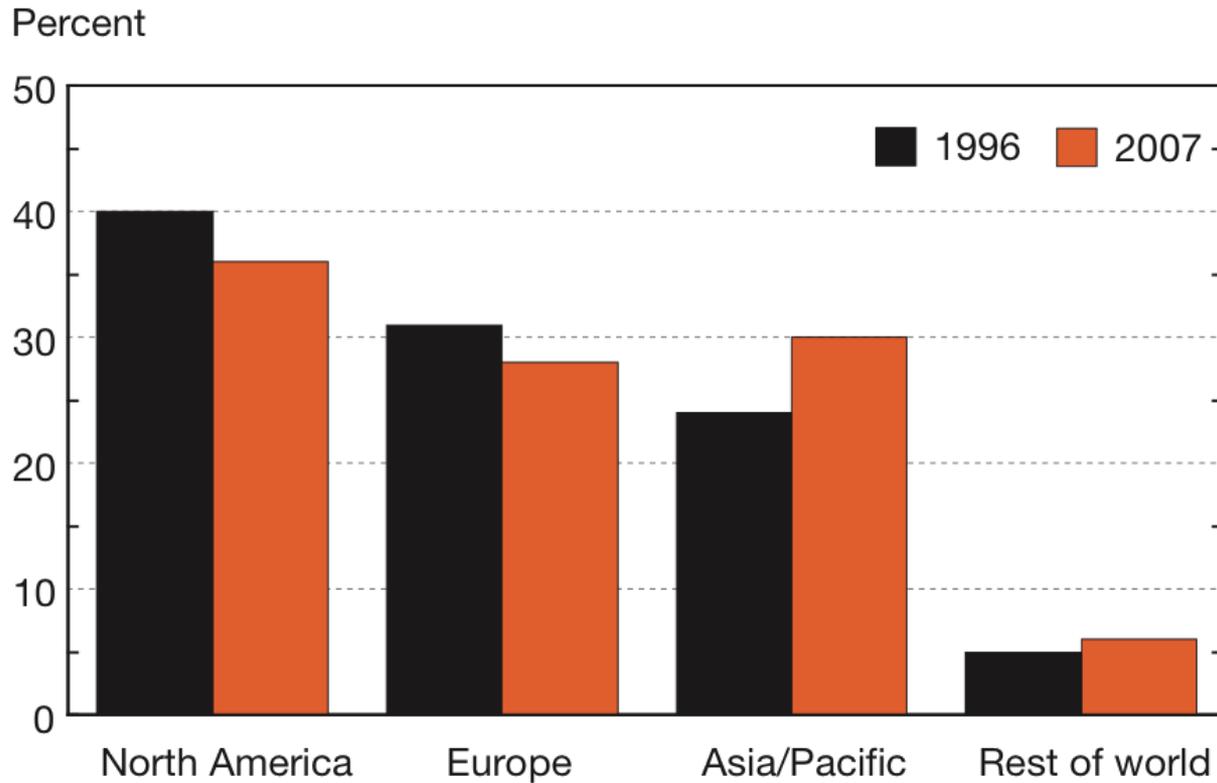
NOTE: EU includes all 27 member states.

# Average annual growth of R&D expenditures for United States, EU-27, and selected Asia-8

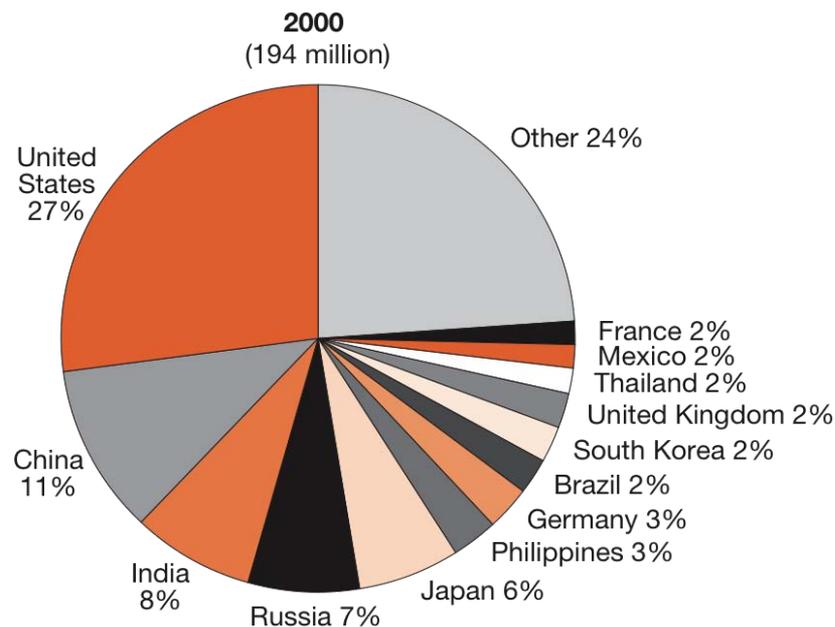
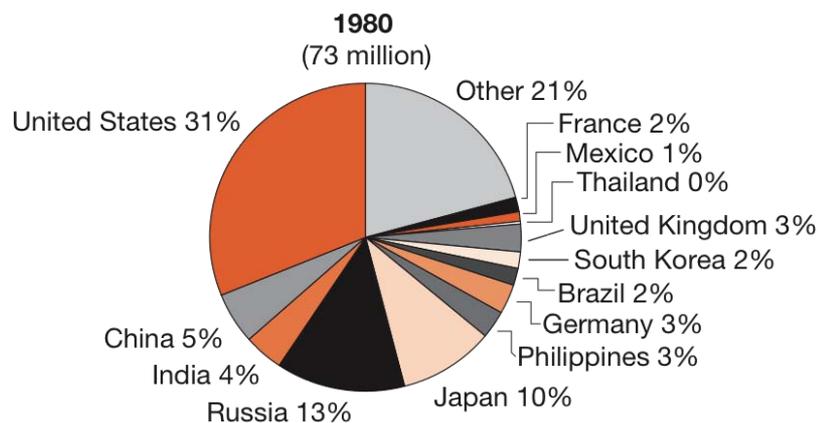


EU = European Union

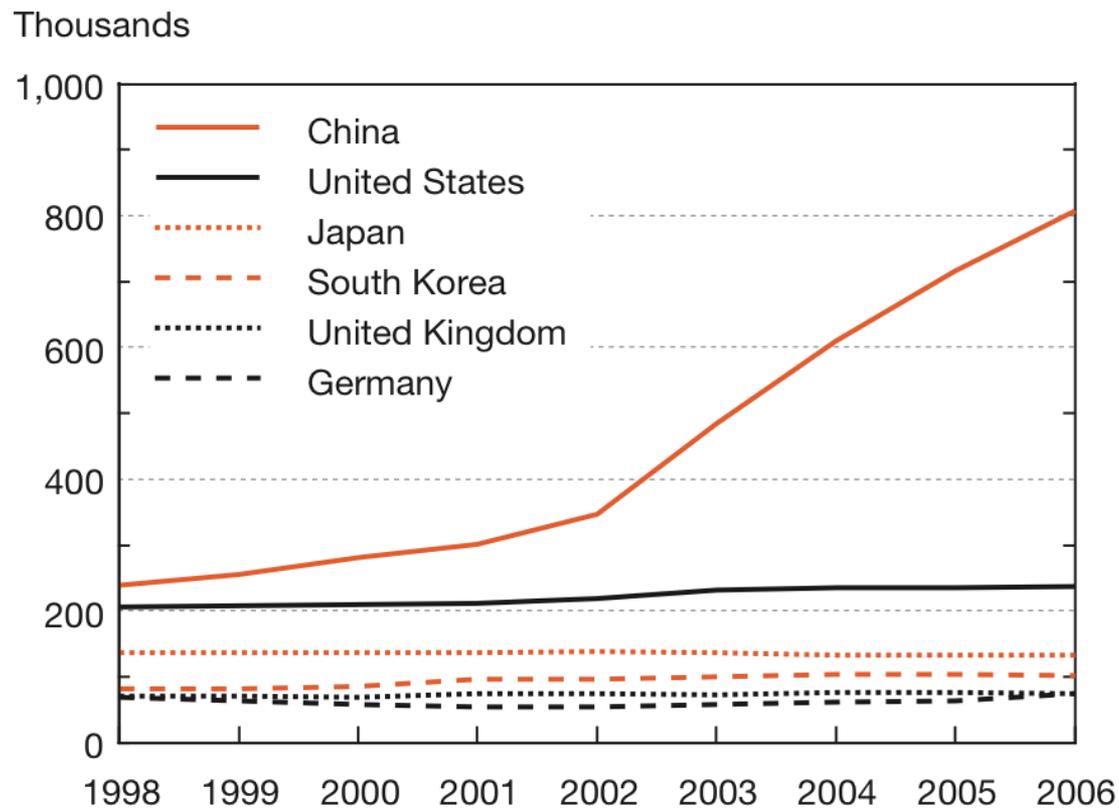
# Location of estimated worldwide R&D expenditures: 1996 and 2007



# Tertiary-educated population 15 years old or older, by country/economy: 1980 and 2000

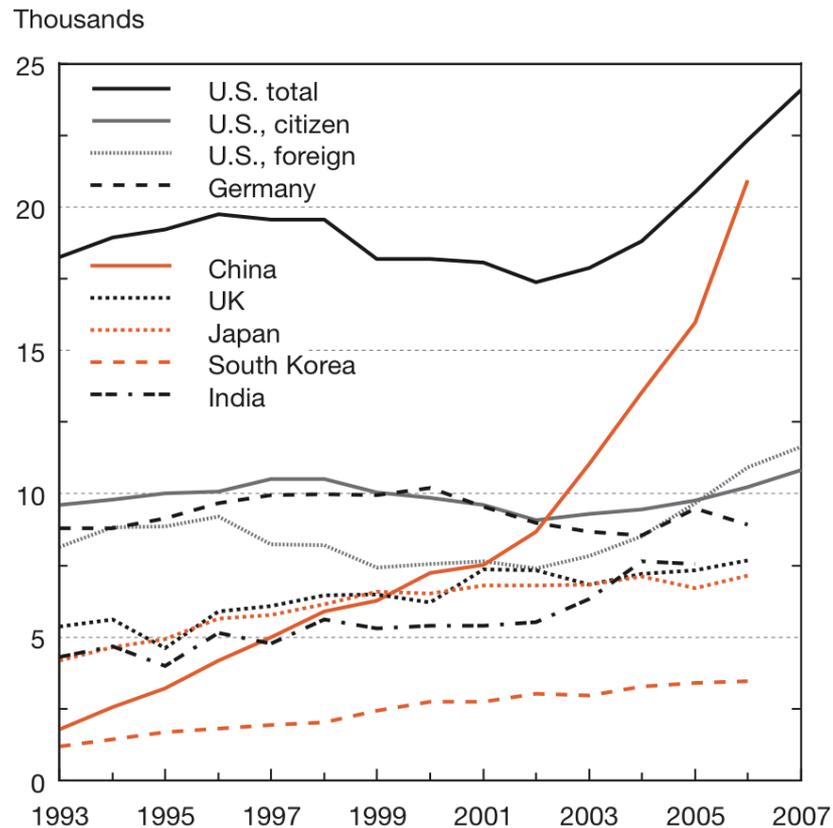


# First university degrees in natural sciences and engineering, selected countries: 1998–2006



NOTE: Natural sciences include physical, biological, earth, atmospheric, ocean, agricultural, and computer sciences and mathematics.

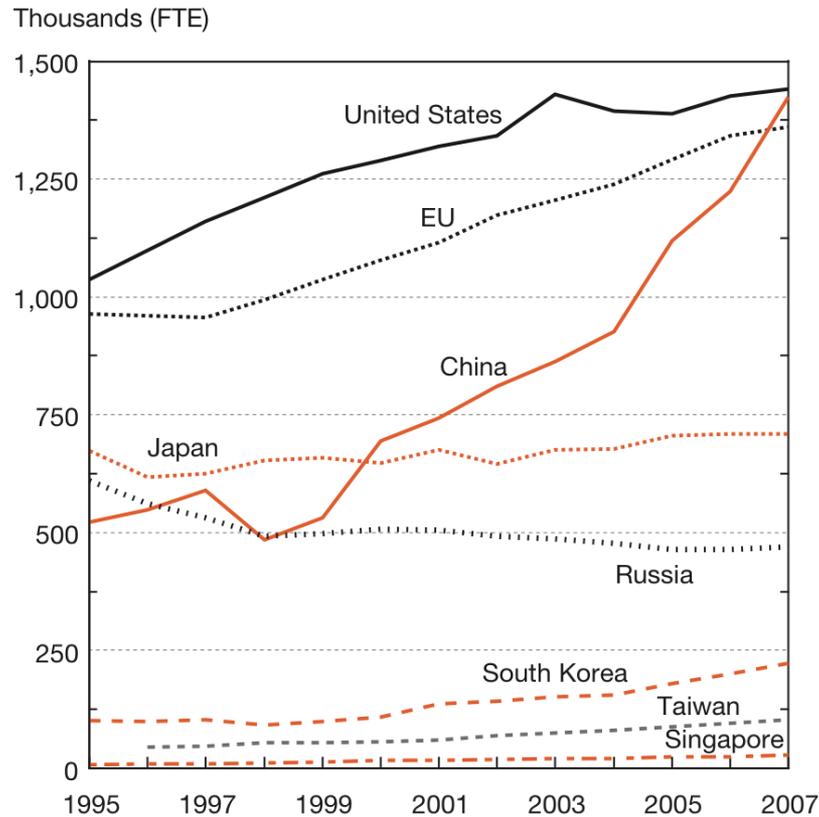
# Doctoral degrees in natural sciences and engineering, selected countries: 1993–2007



UK = United Kingdom

**NOTE: Natural sciences include physical, biological, earth, atmospheric, ocean, agricultural, and computer sciences and mathematics.**

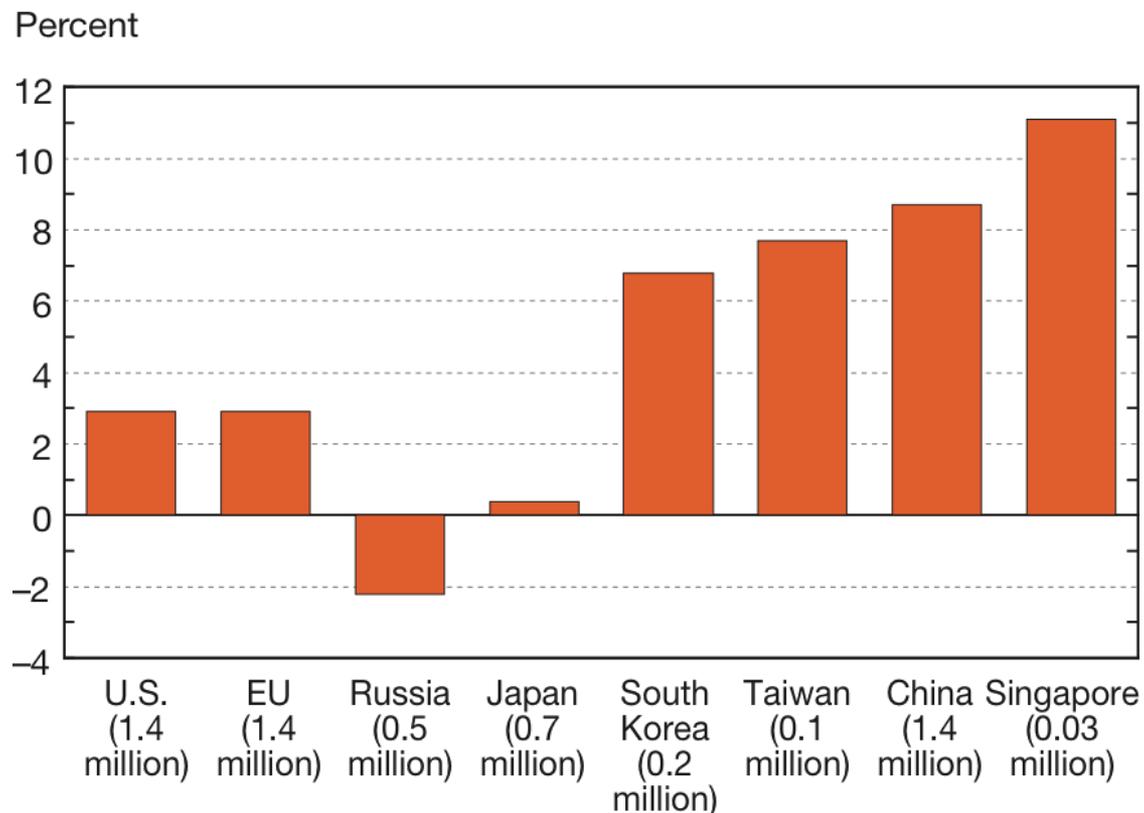
# Researchers in selected regions/countries/economies: 1995–2007



EU = European Union; FTE = full-time equivalent

NOTES: U.S. data for 2007 estimated based on 2004–06 growth rate. EU includes all 27 member states.

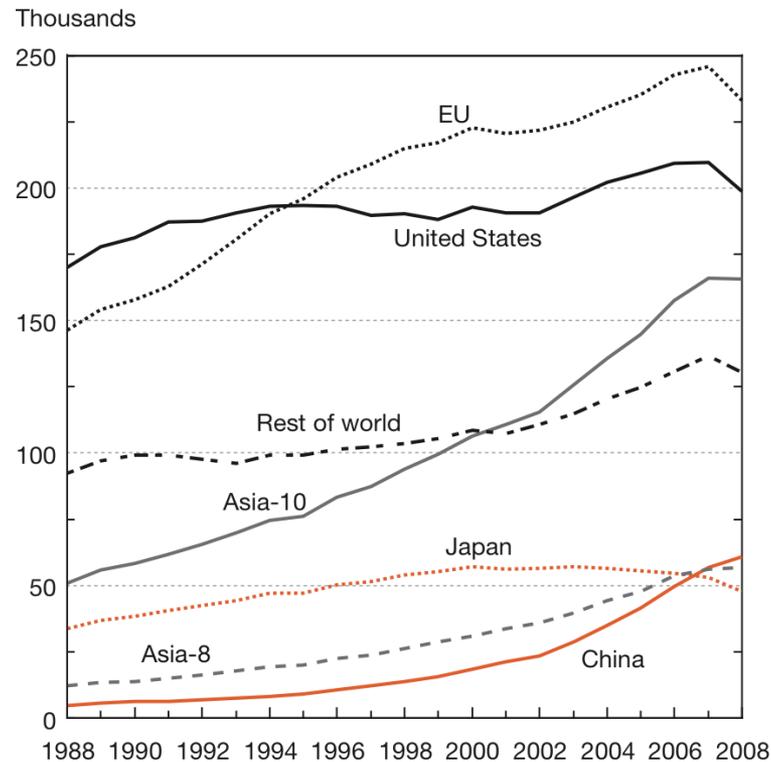
# Average annual growth in number of researchers in selected regions/countries/economies: 1995–2007



EU = European Union

NOTES: Researchers are full-time equivalents. U.S. data for 2007 estimated based on 2004–06 growth rate. EU includes all 27 member states.

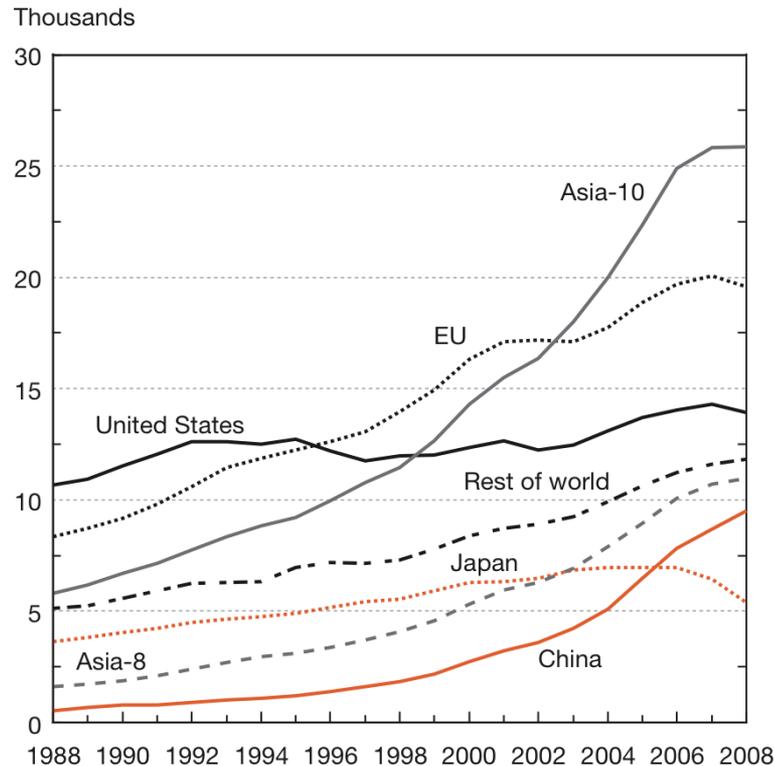
# S&E journal articles produced by selected regions/countries: 1988–2008



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Asia-10 includes Asia-8 plus China and Japan. Internationally coauthored articles credited fractionally to authors' countries/locations. Counts for 2008 are incomplete.

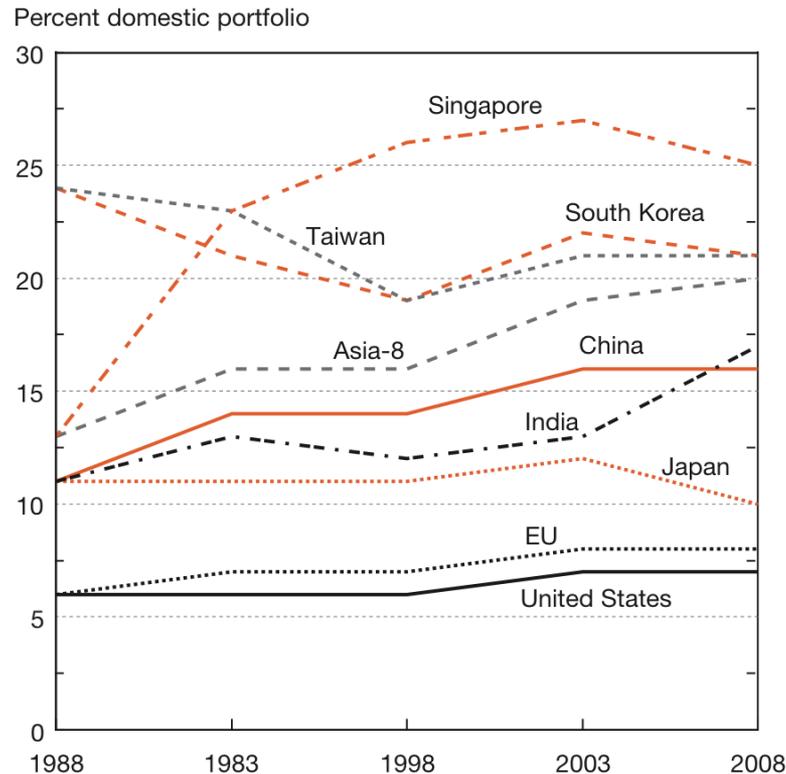
# Engineering journal articles produced by selected regions/countries: 1998–2008



EU = European Union

**NOTES:** Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Asia-10 includes Asia-8 plus China and Japan. Internationally coauthored articles credited fractionally to authors' countries/locations. Articles counts are 2-year moving average. Counts for 2008 are incomplete.

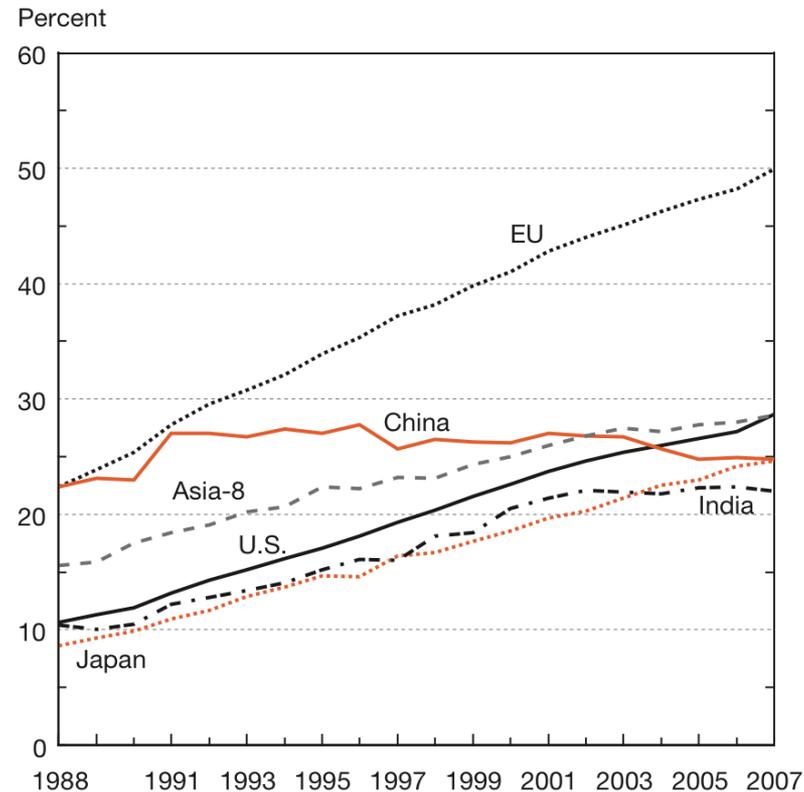
# Engineering article share of total S&E article output for selected regions/countries/economies: 1988–2008



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. EU includes all 27 member states. Internationally coauthored articles credited fractionally to authors' countries/locations. Counts for 2008 are incomplete.

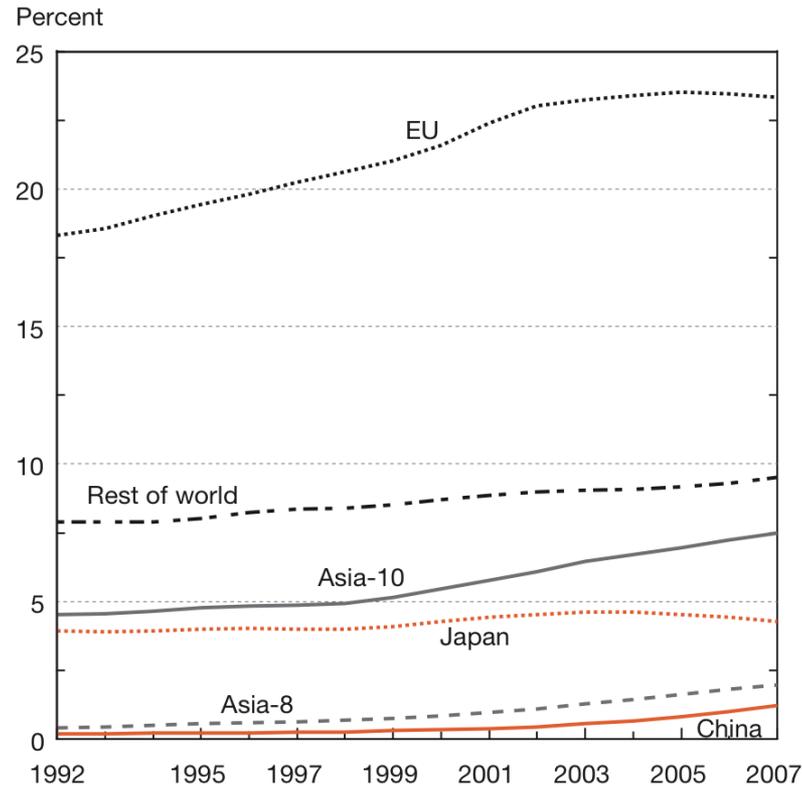
# International coauthorship of S&E articles, by region/country: 1988–2007



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand.  
EU includes all 27 member states. For internationally coauthored articles, each author location receives one count.

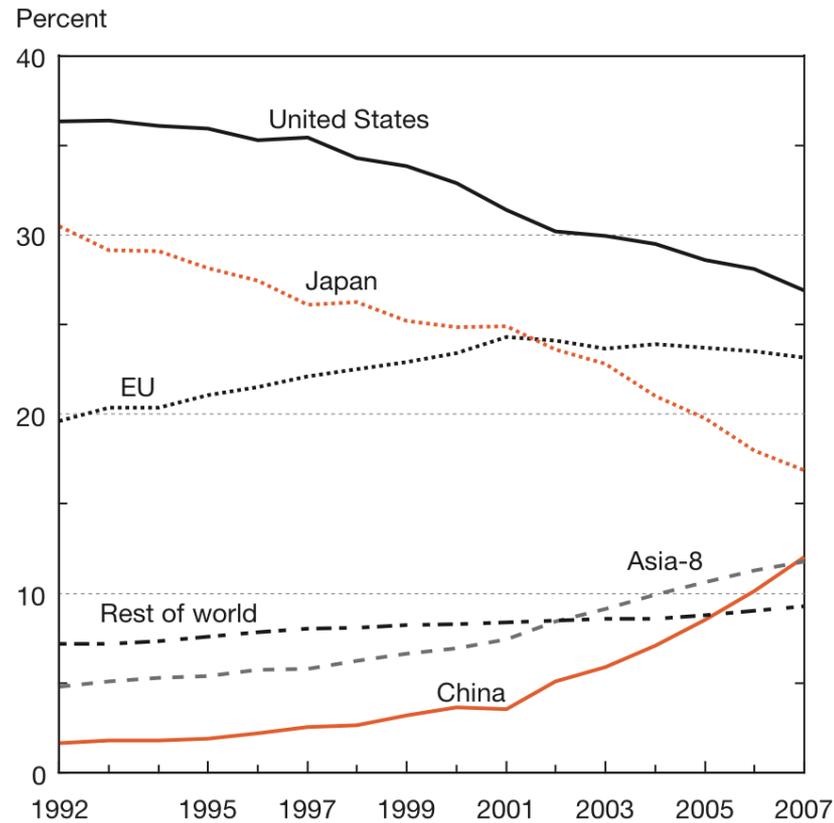
# Citations in U.S. S&E articles to non-U.S. publications: 1992–2007



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Asia-10 includes Asia-8 plus China and Japan. Internationally coauthored articles credited fractionally to authors' countries/locations.

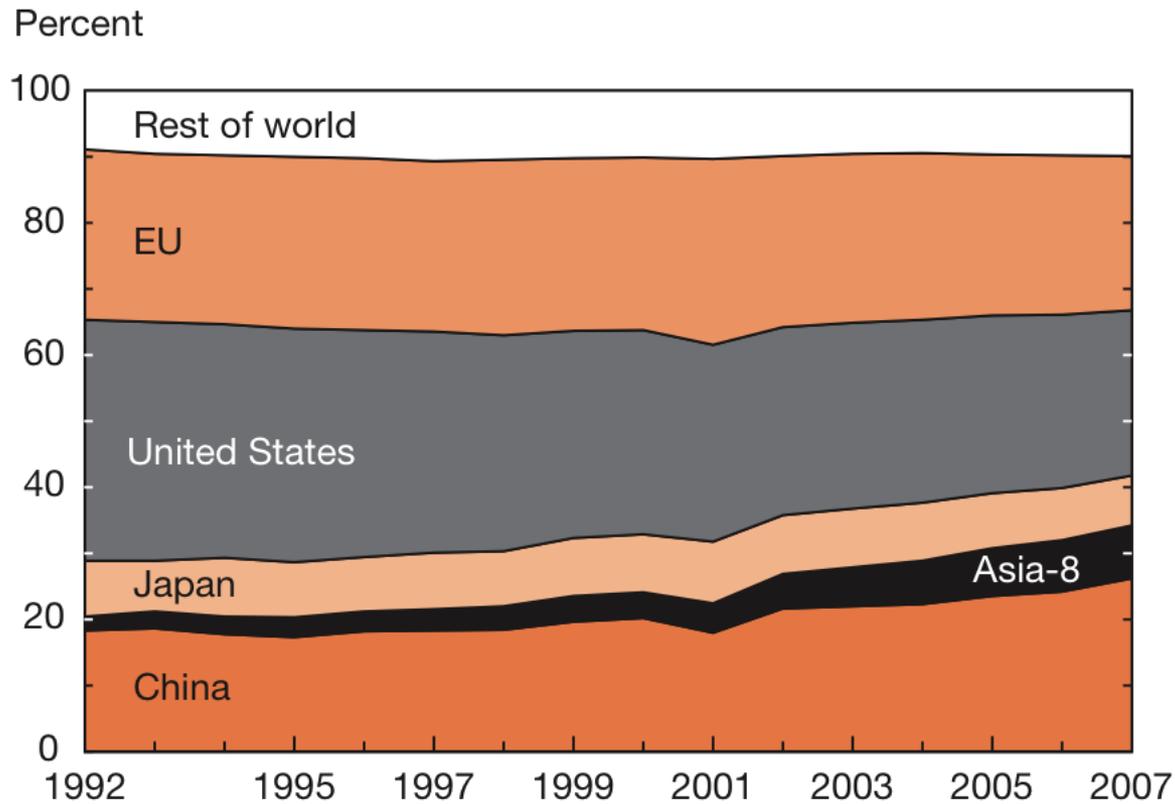
# Citations in Asia-10 S&E articles, by cited region/ country: 1992–2007



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand.

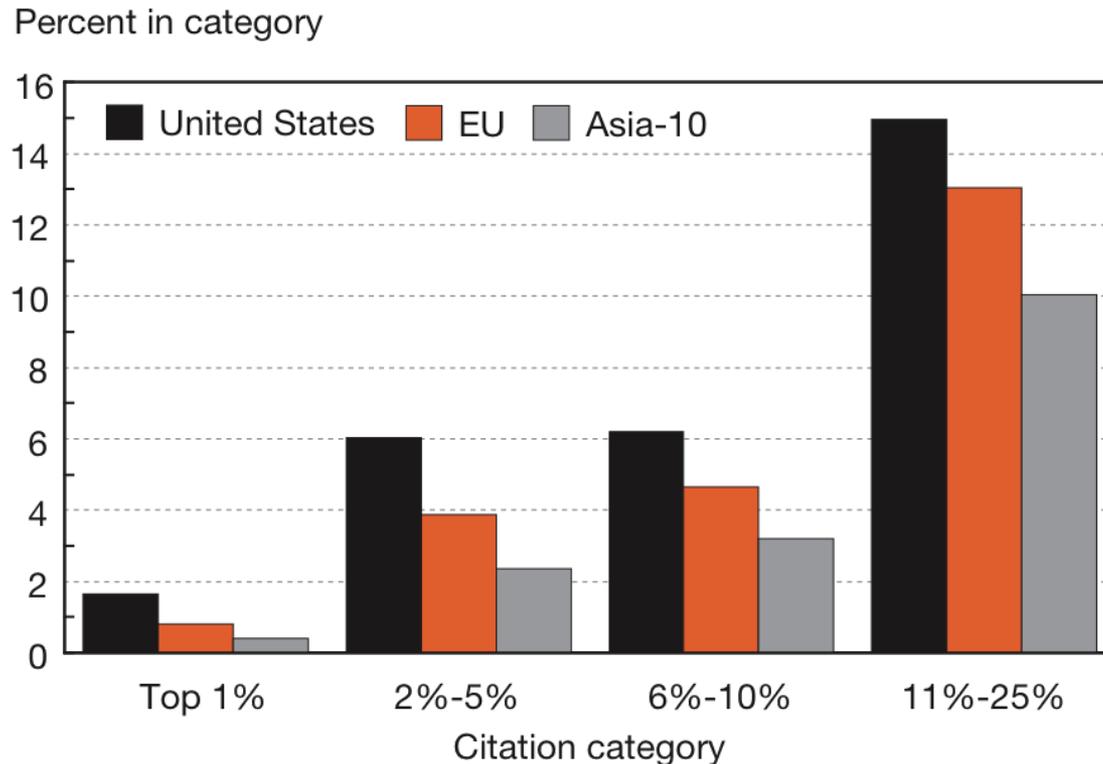
# Citations in China S&E articles, by cited region/country: 1992–2007



EU = European Union

NOTES: Asia-8 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand.

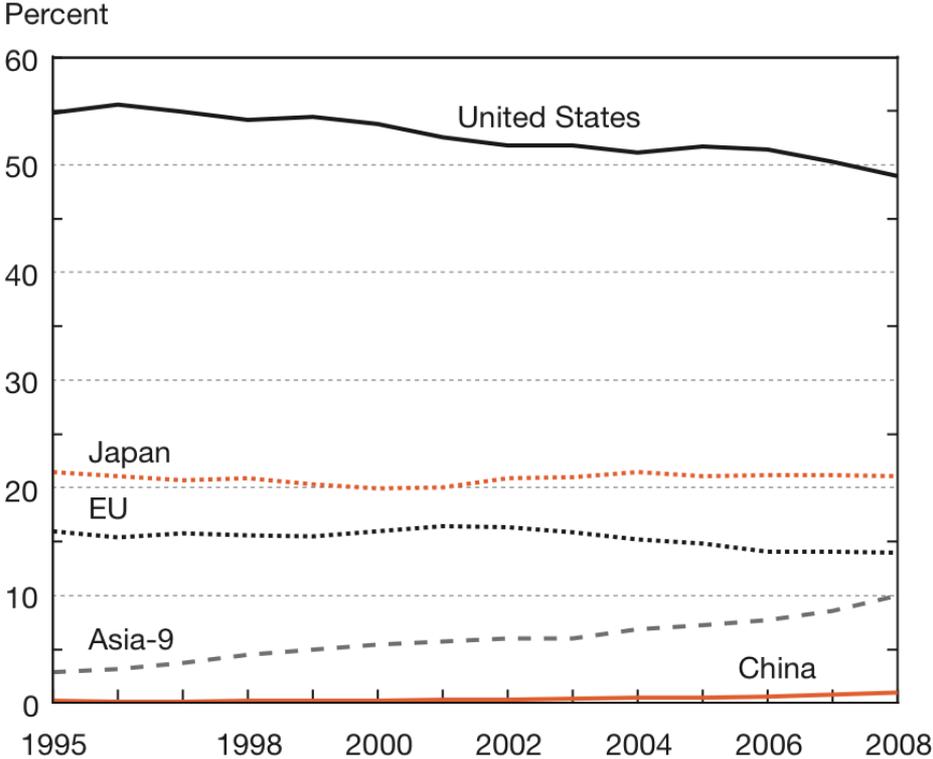
# Share of region's/country's papers among world's most-cited S&E articles: 2007



EU = European Union

NOTES: Asia-10 includes China, Japan, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. EU includes all 27 member states.

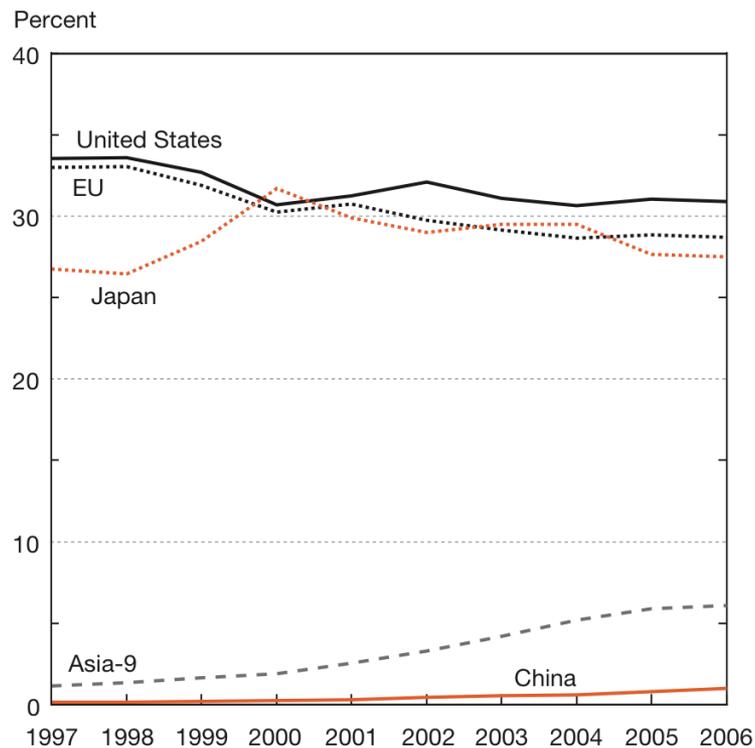
# Share of U.S. patent grants for selected regions/ countries: 1995–2008



EU = European Union

NOTES: Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU includes all 27 member states.

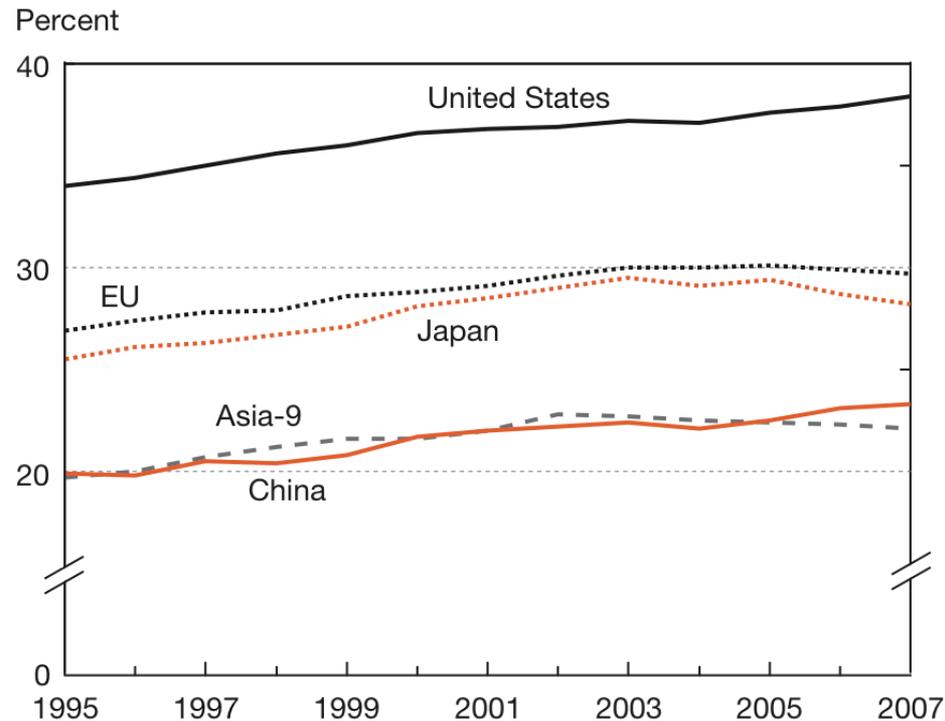
# Share of high-value patents, for selected regions/ countries: 1997–2006



EU = European Union

NOTES: High-value patents are registered in three markets: the United States, the EU, and Japan. Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU includes all 27 member states.

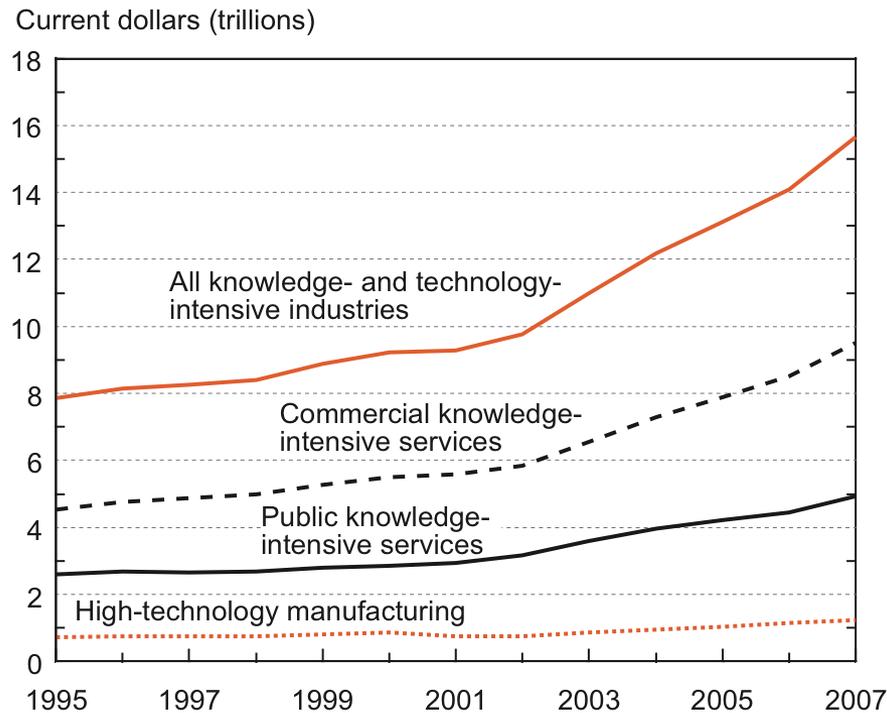
# Value added of knowledge-intensive and high-technology industries as share of region's/country's GDP: 1995–2007



EU = European Union; GDP = gross domestic product

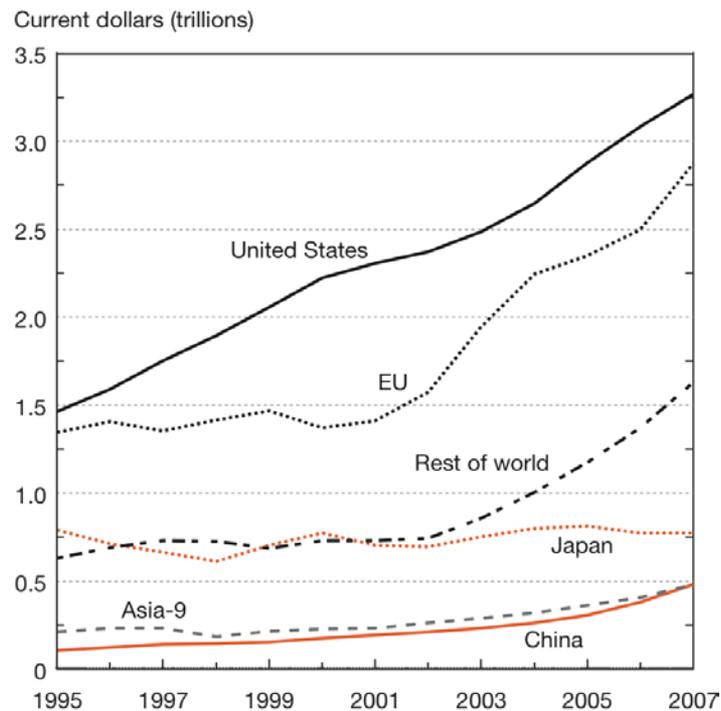
NOTES: Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

# Global value added of knowledge- and technology-intensive industries: 1995–2007



**NOTES:** Knowledge-intensive services include commercial business, financial, and communication services and largely publicly supported education and health services. High-technology manufacturing includes air- and spacecraft; pharmaceuticals; office, accounting, and computing machinery; radio, television, and communication equipment; and medical, precision, and optical instruments.

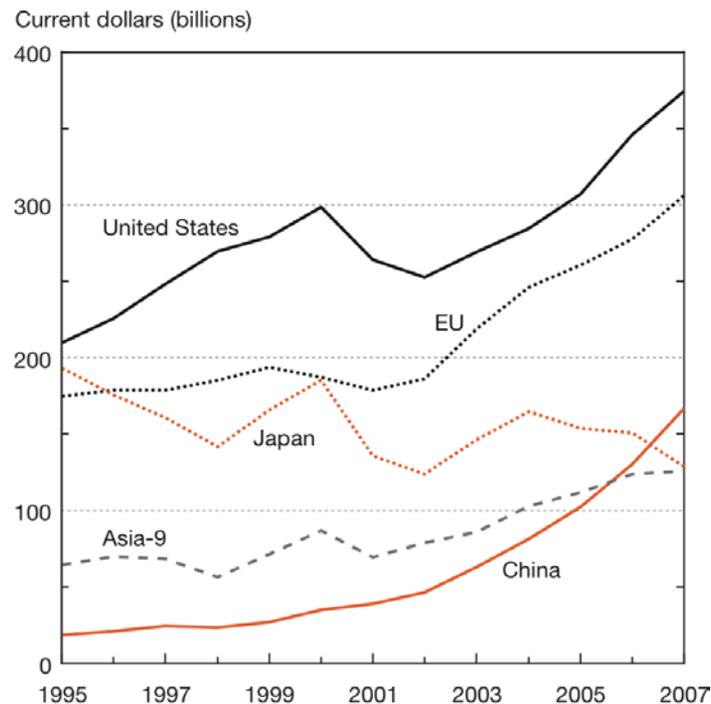
# Value added of commercial knowledge-intensive services, by region/country: 1995–2007



EU = European Union

**NOTES:** Knowledge-intensive services include commercial business, financial, and communication services and largely publicly supported education and health services. Commercial knowledge-intensive services exclude education and health. Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU includes all 27 member states.

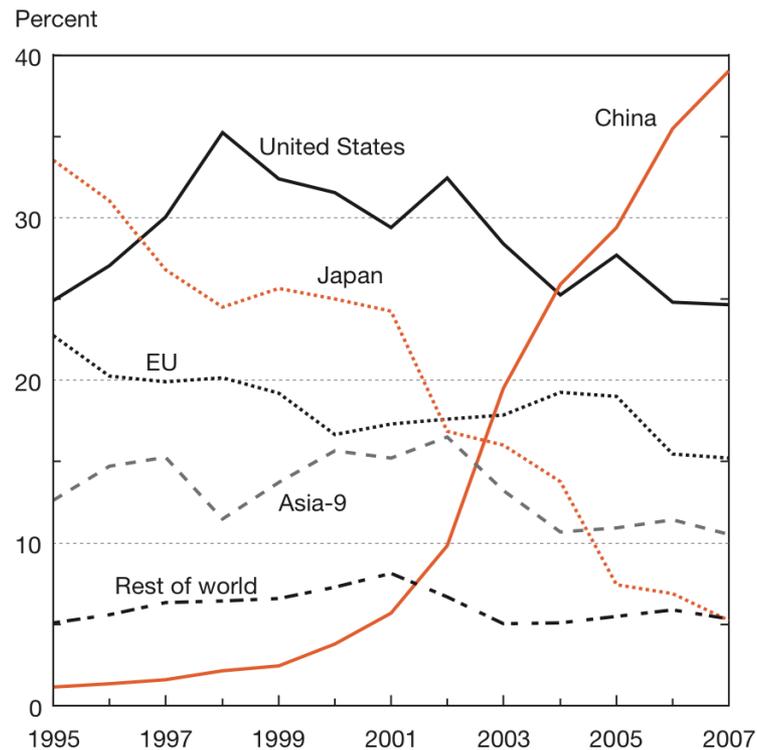
# Value added of high-technology manufacturing industries, by selected region/country: 1995–2007



EU = European Union

NOTES: High-technology manufacturing includes air- and spacecraft; pharmaceuticals; office, accounting, and computing machinery; radio, television, and communication equipment; and medical, precision, and optical instruments. Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU includes all 27 member states.

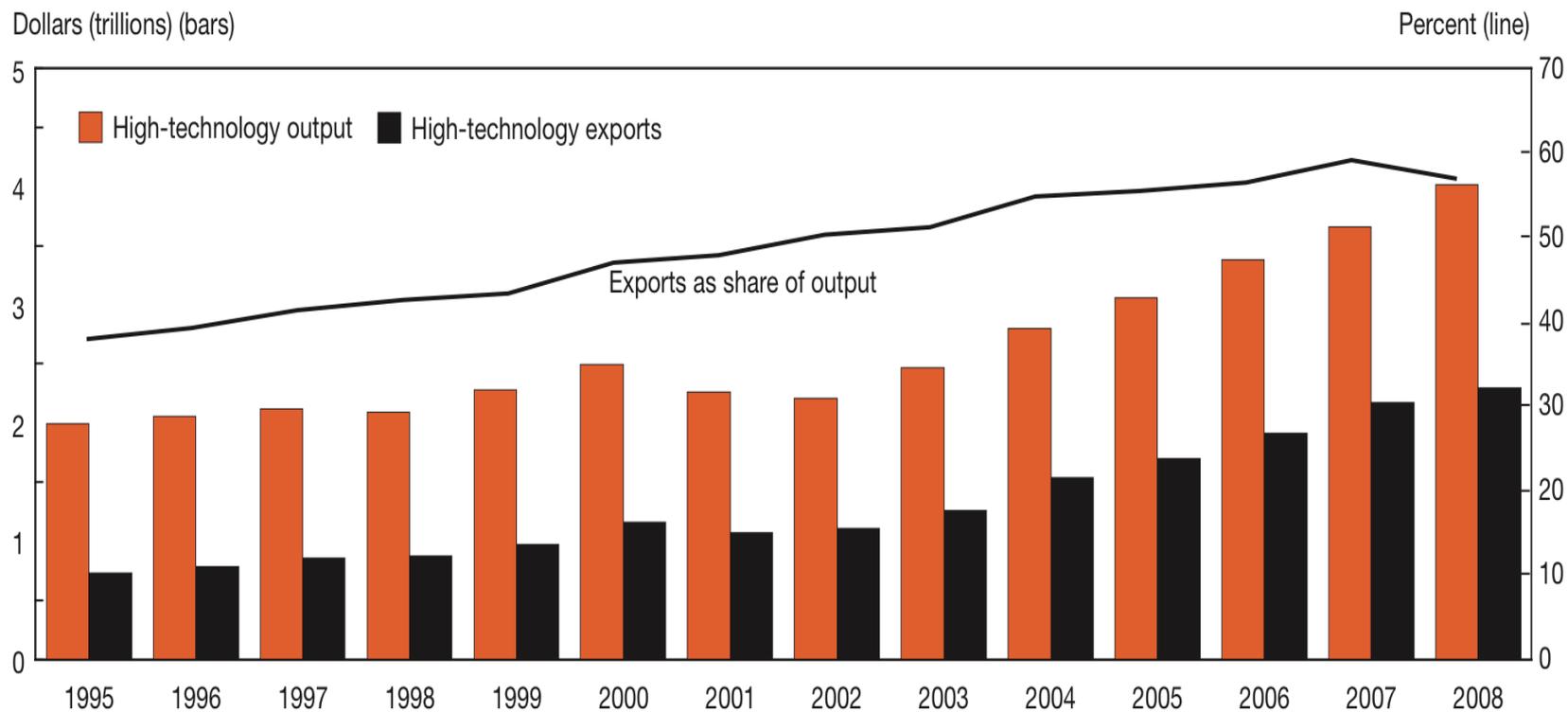
# Global value added market shares of computer and office machinery manufacturing, by region/country: 1995–2007



EU = European Union

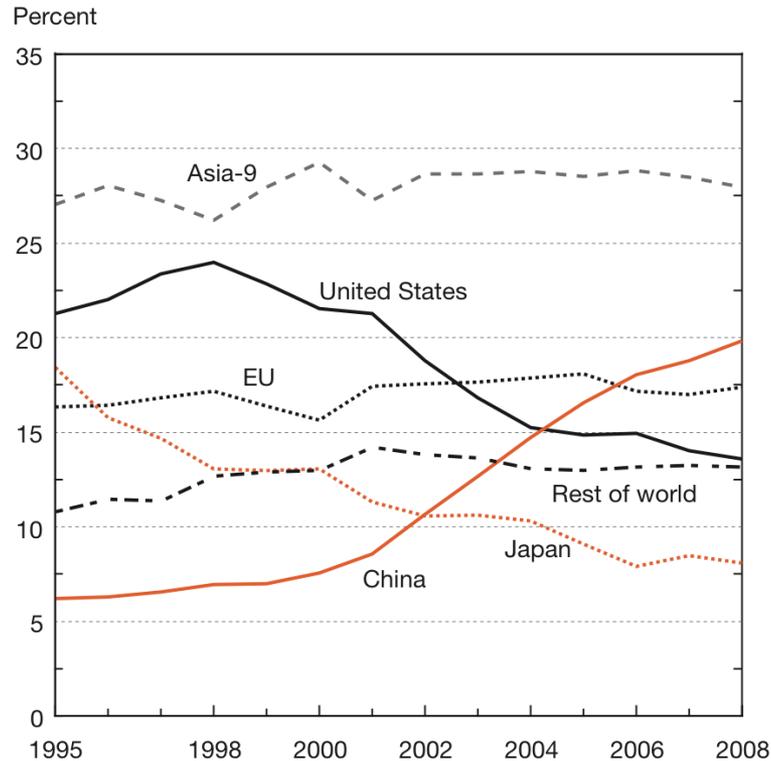
NOTES: Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

# Global high-technology exports as share of production: 1995–2008



**NOTE: Excludes intra-European Union trade.**

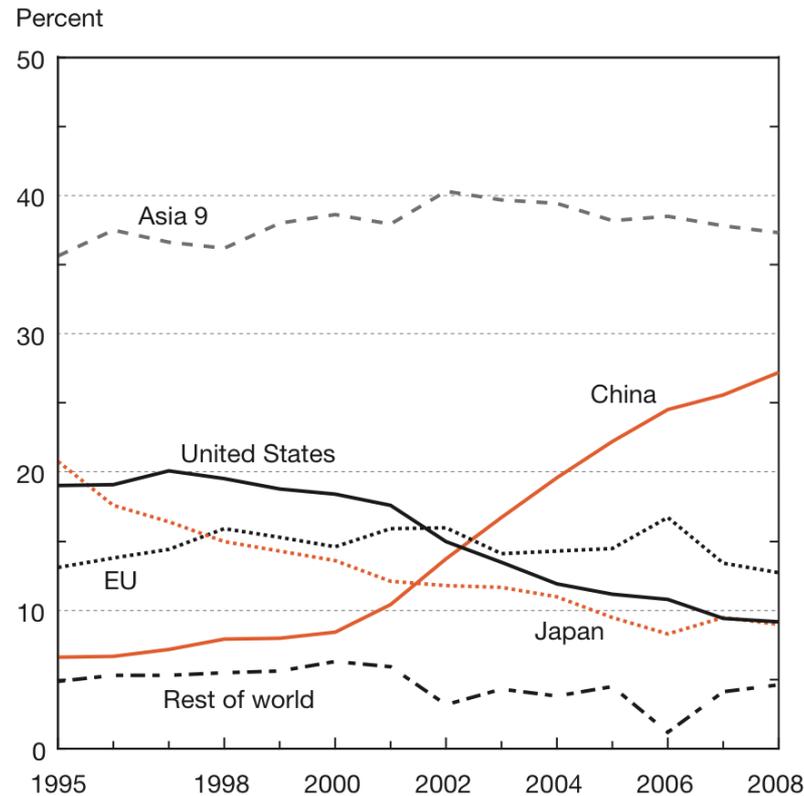
# Share of global high-technology exports, by region/country: 1995–2008



EU = European Union

NOTES: Excludes intra-EU trade. Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

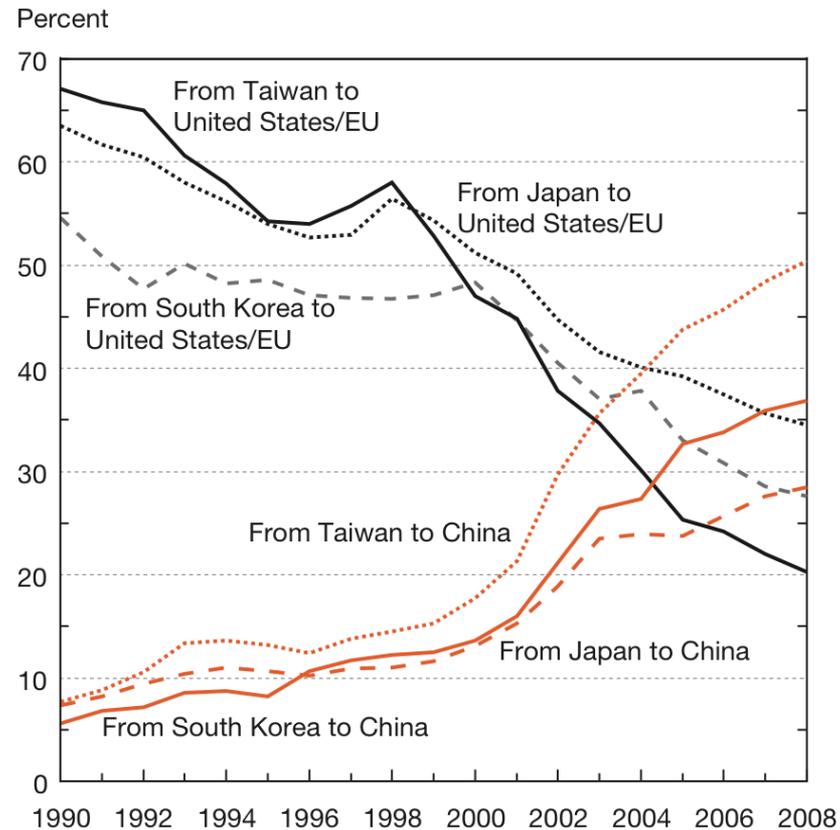
# Global export shares in information and communications technology products, by region/country: 1995–2008



EU = European Union

**NOTES:** Includes computers and communications and semi-conductors. Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

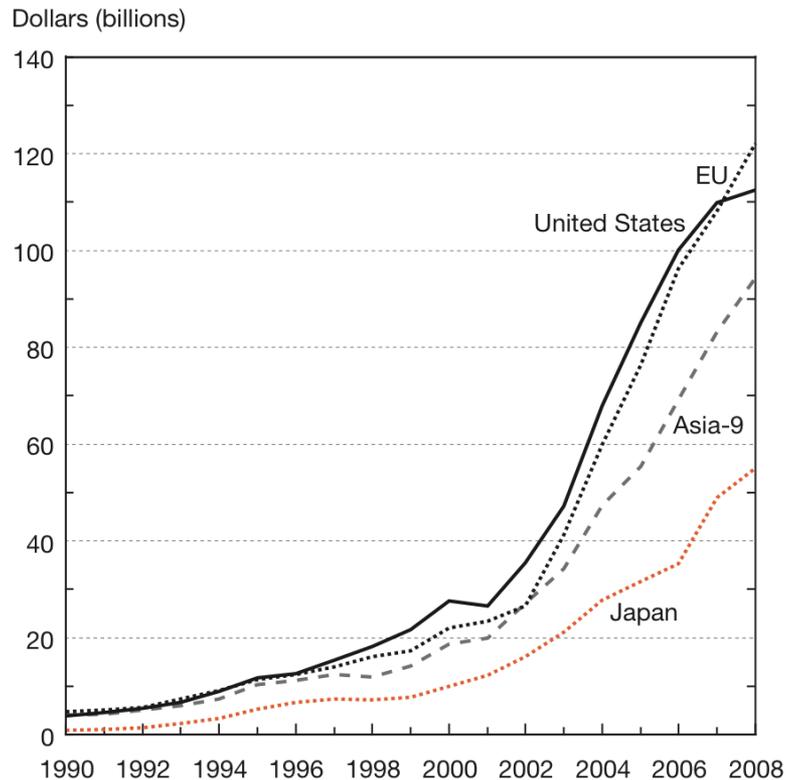
# Selected Asian countries'/economies' share of high-technology exports to United States/EU and China: 1990–2008



EU = European Union

NOTES: China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

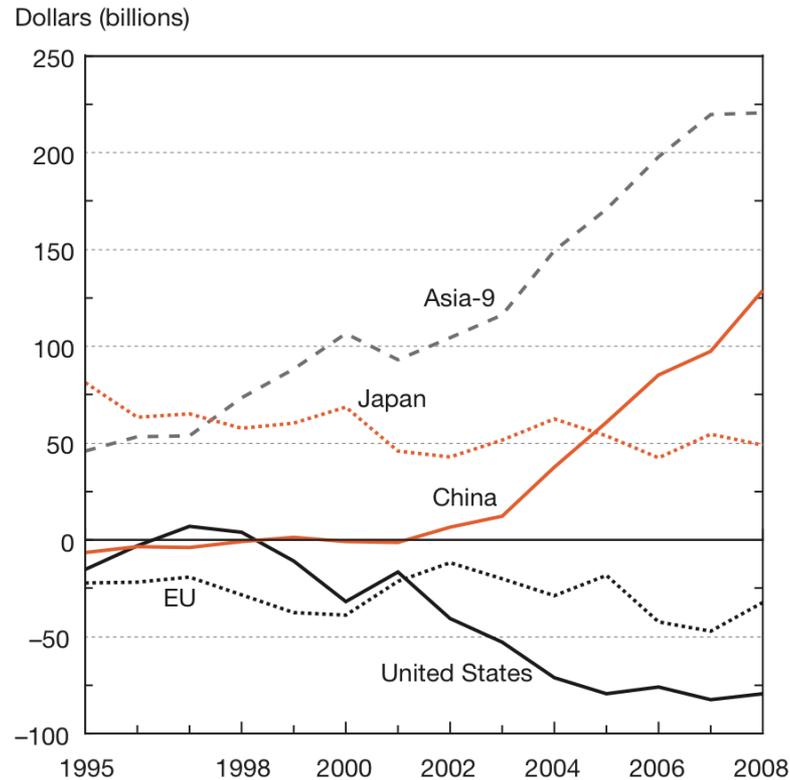
# China's high-technology exports to selected regions/countries: 1990–2008



**EU = European Union**

**NOTES:** Asia-9 includes India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU includes all 27 member states.

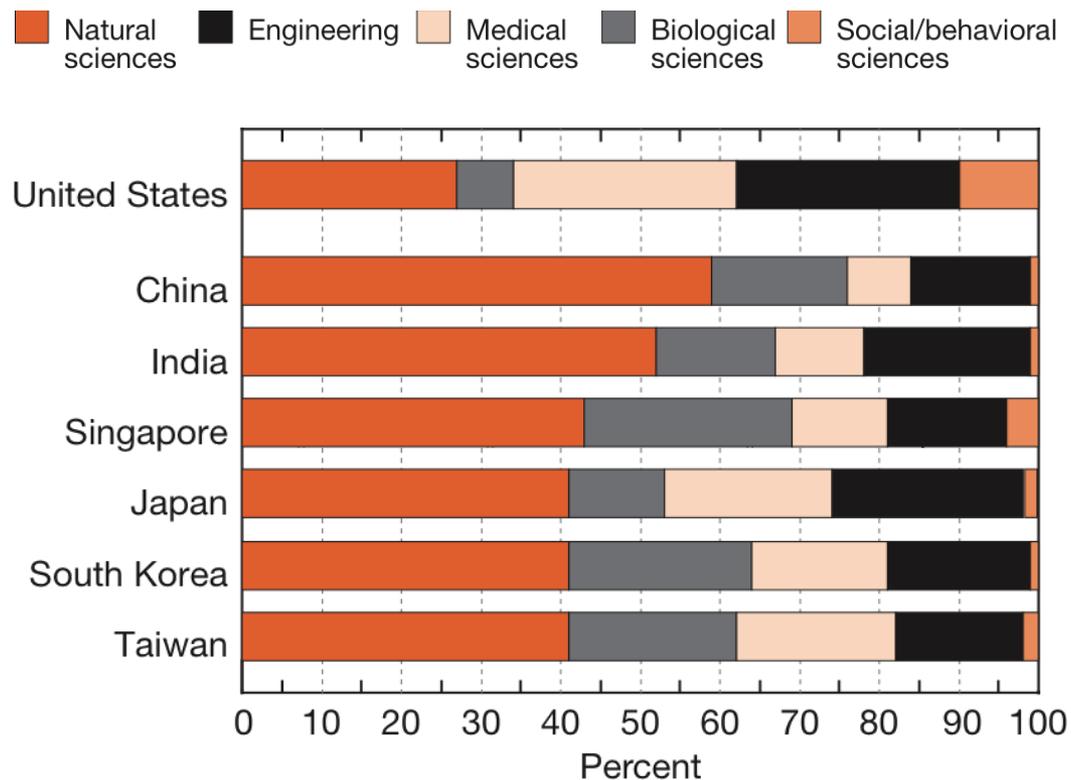
# Trade balance in high-technology goods for selected regions/countries: 1995–2008



EU = European Union

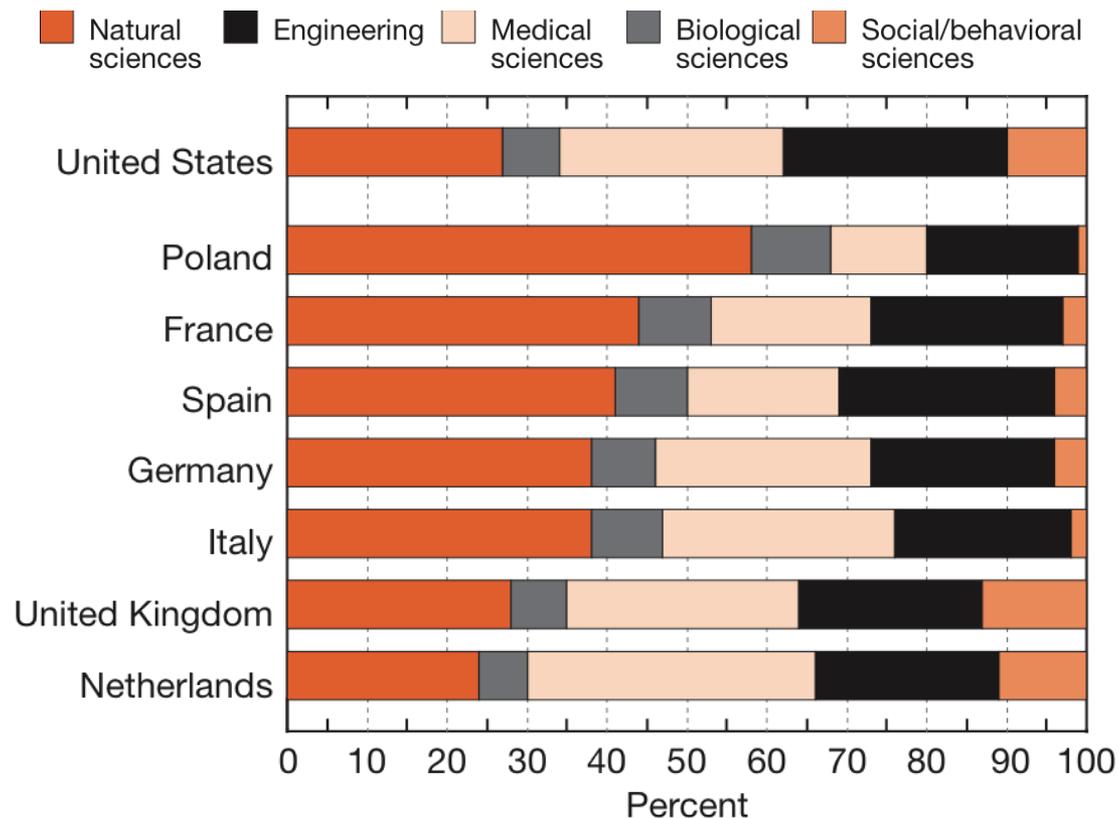
NOTES: Asia-9 includes India, Indonesia, Malaysia, Philippines, South Korea, Singapore, Taiwan, Thailand, and Vietnam. China includes Hong Kong. EU excludes Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia.

# Field shares of research articles for selected Asian countries/economies: 2007



**NOTE:** Natural sciences include astronomy, chemistry, physics, geosciences, mathematics, and computer sciences.

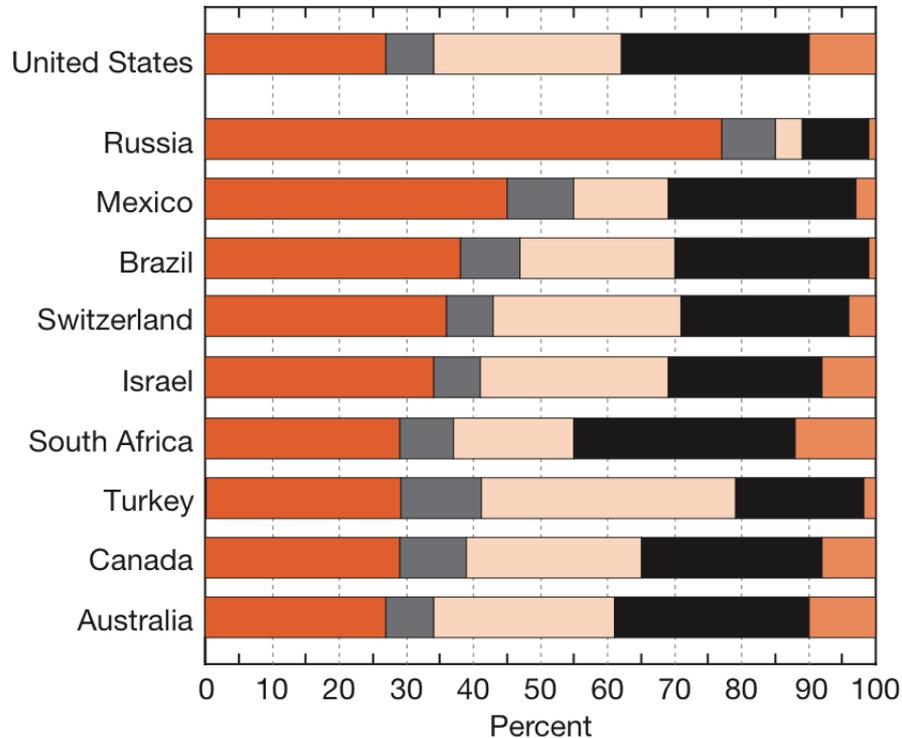
# Field shares of research articles for selected European countries: 2007



**NOTE:** Natural sciences include astronomy, chemistry, physics, geosciences, mathematics, and computer sciences.

# Field shares of research articles for other selected countries: 2007

Legend: Natural sciences (dark orange), Engineering (black), Medical sciences (light orange), Biological sciences (grey), Social/behavioral sciences (medium orange)



**NOTE: Natural sciences include astronomy, chemistry, physics, geosciences, mathematics, and computer sciences.**