

**THE TASK FORCE
ON THE FUTURE OF AMERICAN INNOVATION**

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**THE KNOWLEDGE ECONOMY:
IS THE UNITED STATES LOSING ITS COMPETITIVE EDGE?**

BENCHMARKS OF OUR INNOVATION FUTURE

Talk Presented

by

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Manufacturing Task Force Briefing

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Key Points

- U.S. technological supremacy not guaranteed: it must be earned in each generation.
- Emergent economies (eastern Europe, Asia) are on a fast track to competitive parity.
- Maintenance of “infrastructure of innovation” critical – basic research, education system, strong technical workforce are keys to innovation.
- To remain competitive, we must ensure that each remains vigorous and healthy; trends are not good.

Science Research → Economic Growth

Innovations

→ Lasers, Fiber Optics, Silicon Chips, Liquid Crystal Displays, internet/WWW, GPS ...

High-tech Jobs

→ e.g., Transistor/Integrated Circuit → Semiconductor Industry:
255,000 -- U.S. Jobs

2002 Sales: \$70B

→ e.g., MIT spin-offs*

- 5,000 companies;

- 1994: 1.1 million employees; Annual world sales of \$232 B

Economic Growth

→ Studies show half of GDP growth of last decades due to innovation

→ 20-50% annual rate of return

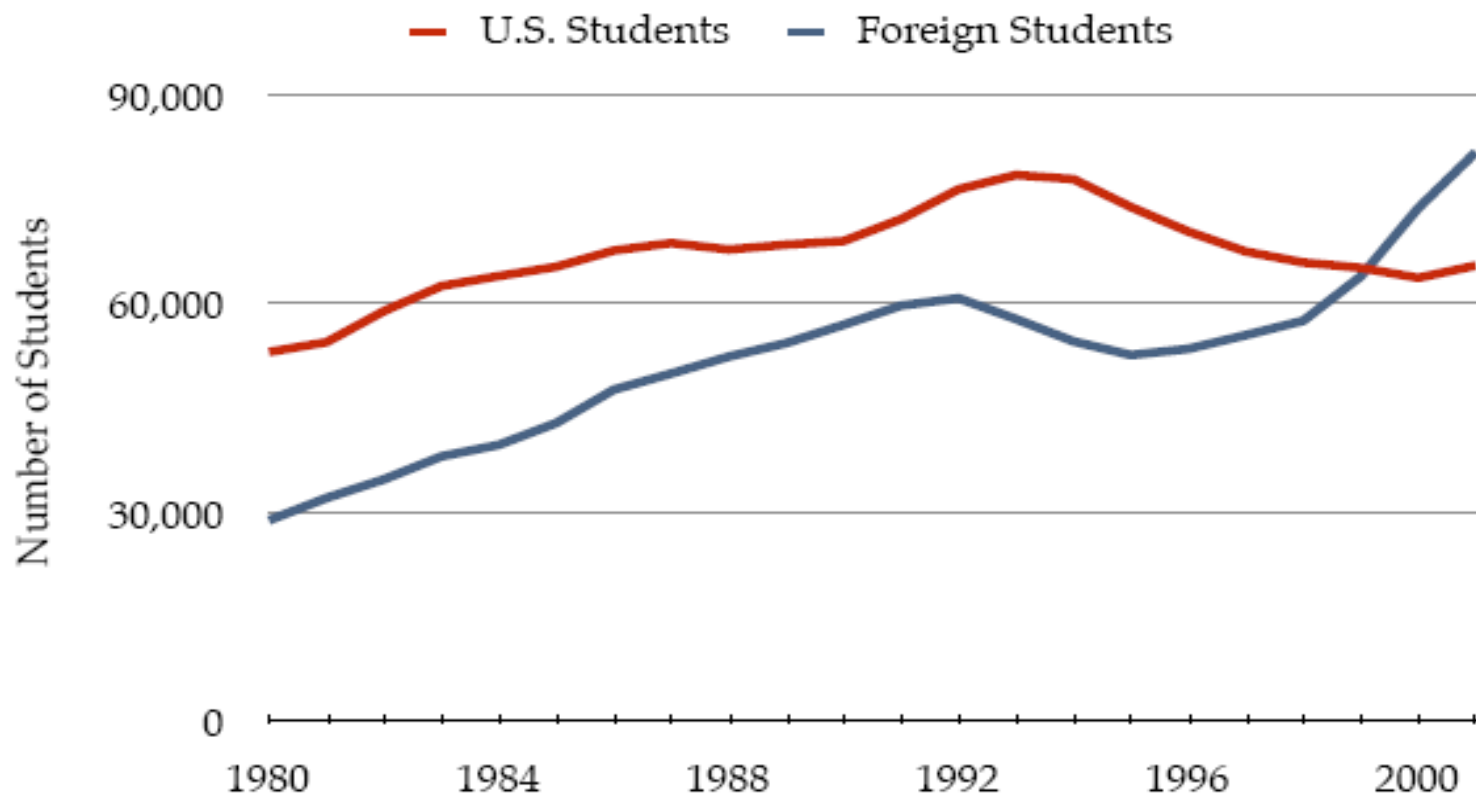
→ Greenspan: large productivity growth

Benchmarks

- Education
- Science and engineering (S&E) workforce
- Scientific knowledge
- Innovation
- R&D Investment
- High-tech economic output

Education

U.S. GRADUATE INSTITUTIONS: FOREIGN STUDENTS OUTNUMBER U.S. STUDENTS

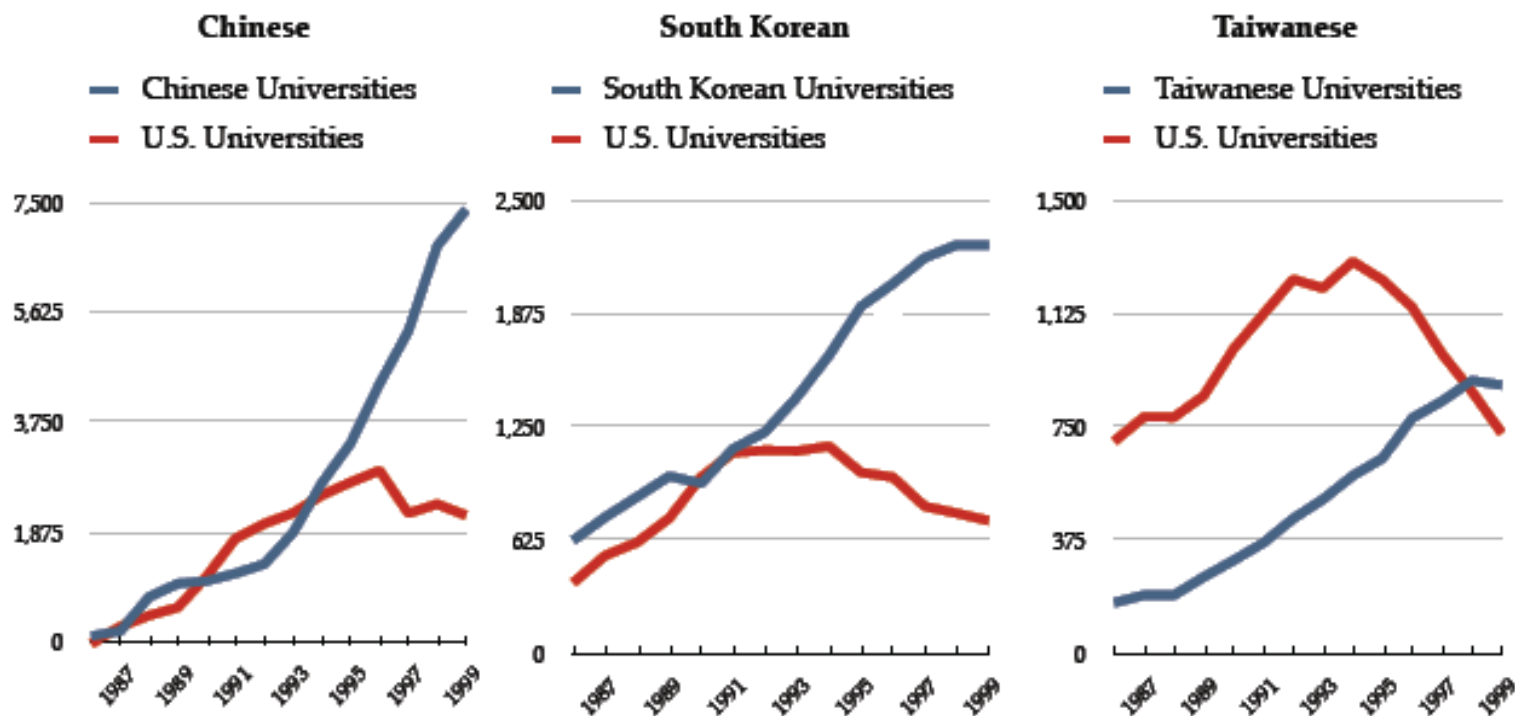


Source: National Science Foundation, *Graduate Students and Postdoctorates in Science and Engineering: Fall 2001*, Tables 8-9.
Compiled by the APS Office of Public Affairs.

Workforce

ASIAN PHD. STUDENTS ARE STAYING AT HOME

(1986 - 1999)



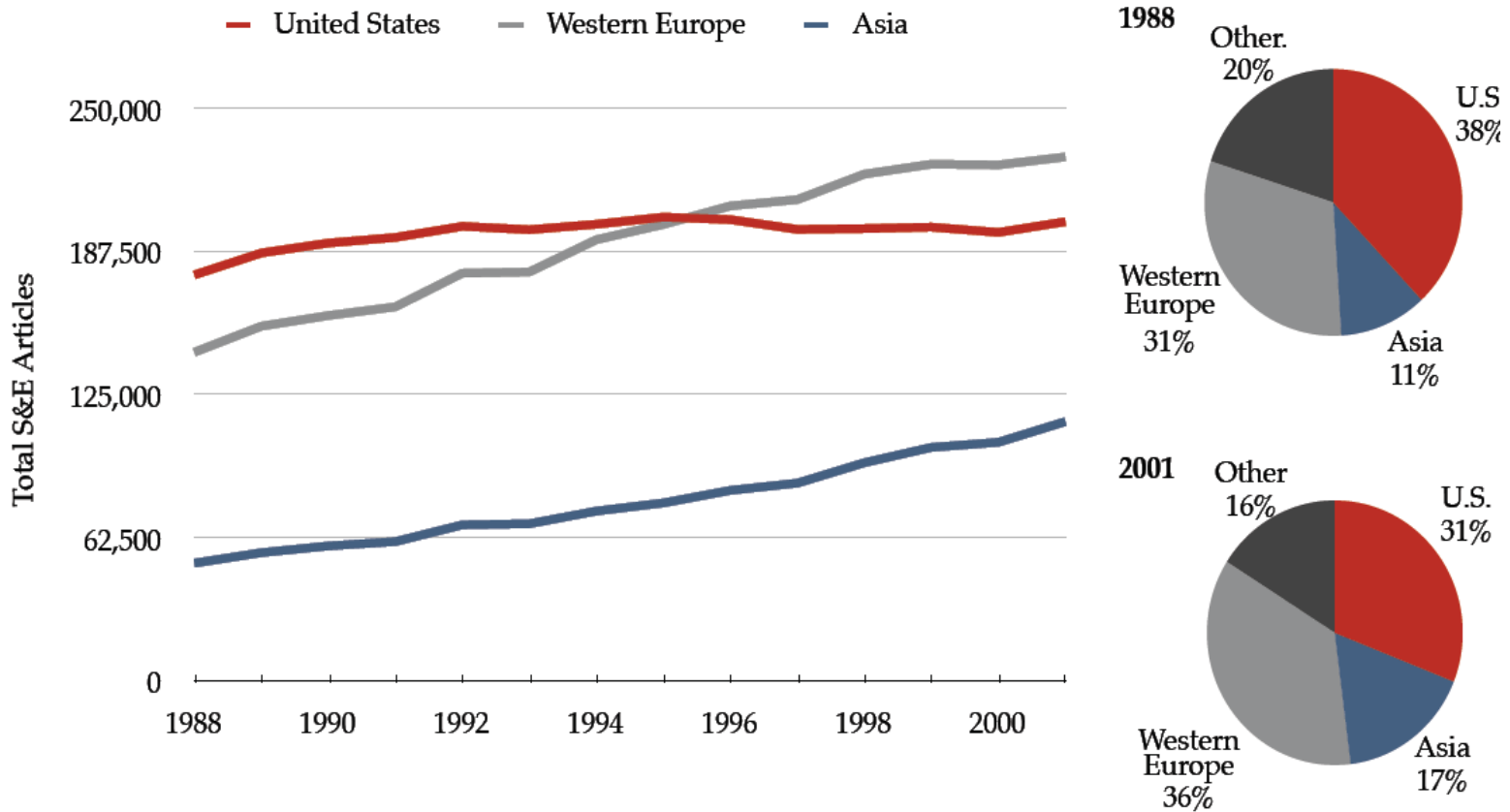
Source: National Science Foundation, *Science and Engineering Indicators 2002*, Appendix Table 2-41.

Adapted from Diana Hicks, "Asian countries strengthen their research," *Issues in Science and Technology*, Summer 2004.

Compiled by the APS Office of Public Affairs.

Knowledge Creation and New Ideas

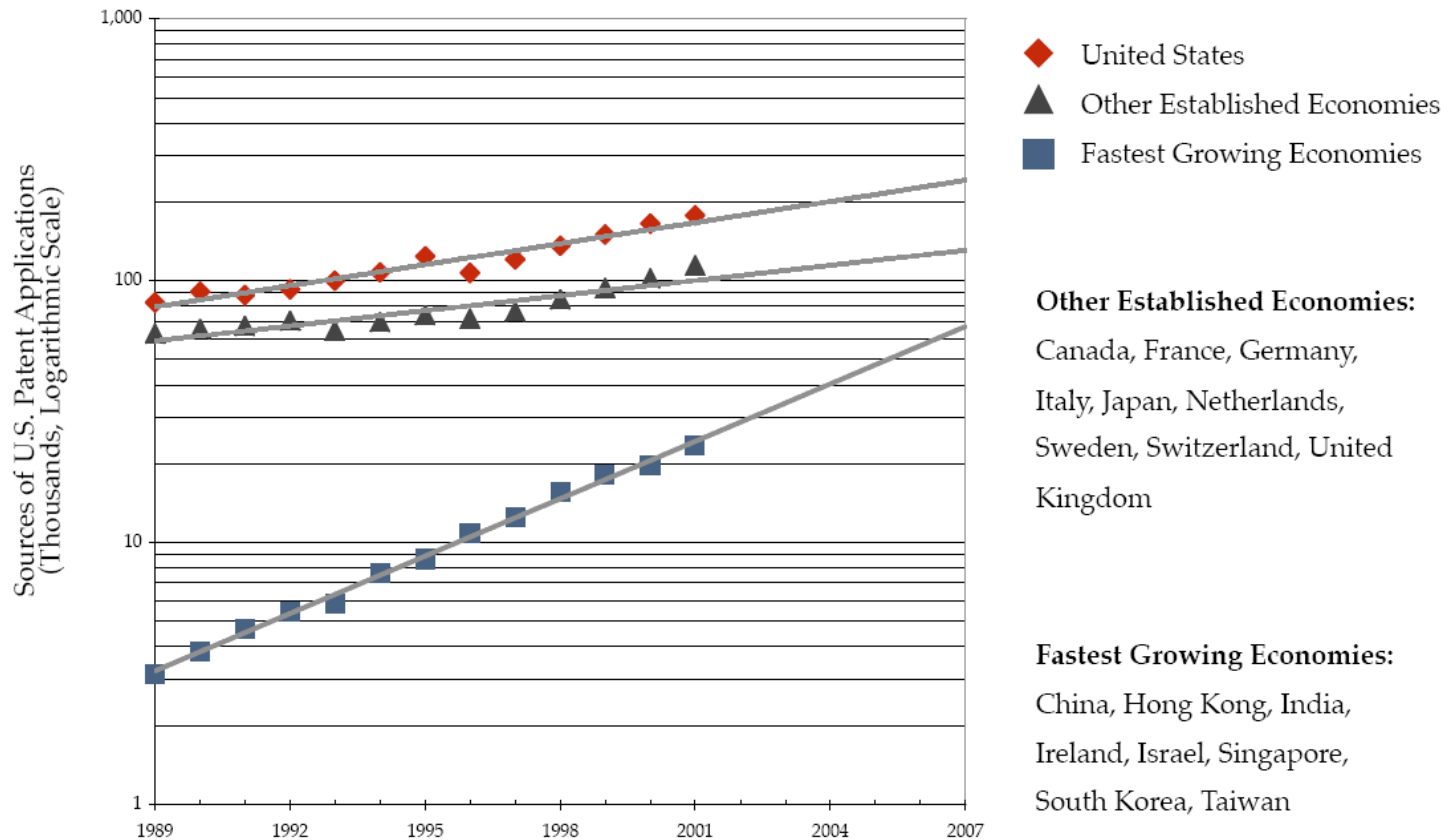
S&E ARTICLES: U.S. ALREADY PASSED BY WESTERN EUROPE, ASIA RAPIDLY CLOSING



Source: National Science Foundation, *Science and Engineering Indicators 2004*. Appendix Table 5-35.
Compiled by the APS Office of Public Affairs.

Innovation

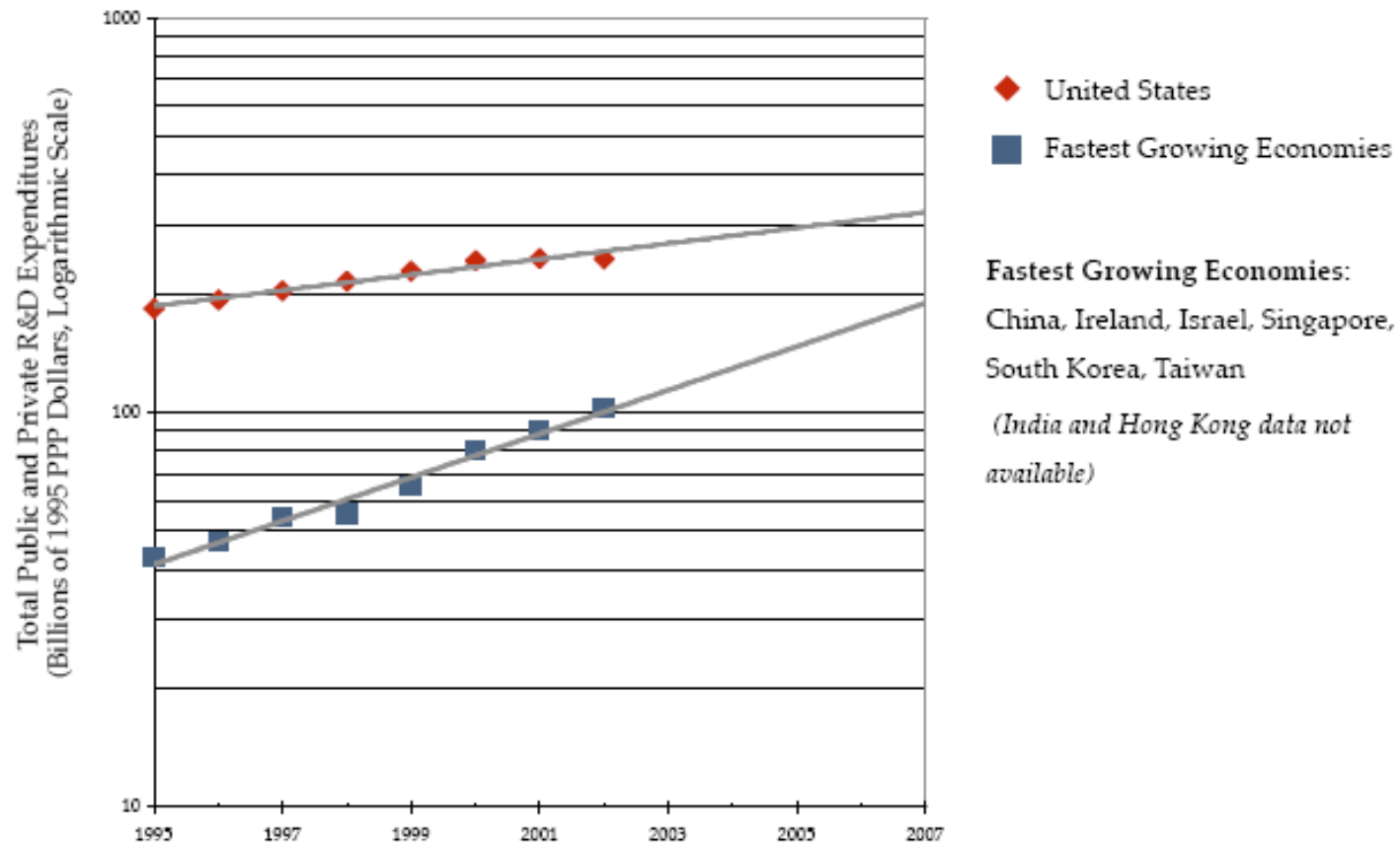
U.S. PATENT APPLICATIONS: FASTEST GROWING ECONOMIES GAINING ON U.S. RAPIDLY



Source: National Science Foundation, *Science and Engineering Indicators 2004*, Appendix Table 6-11.
Compiled by the APS Office of Public Affairs

R&D Investment

TOTAL R&D INVESTMENTS: FASTEST GROWING ECONOMIES GAINING RAPIDLY ON U.S.

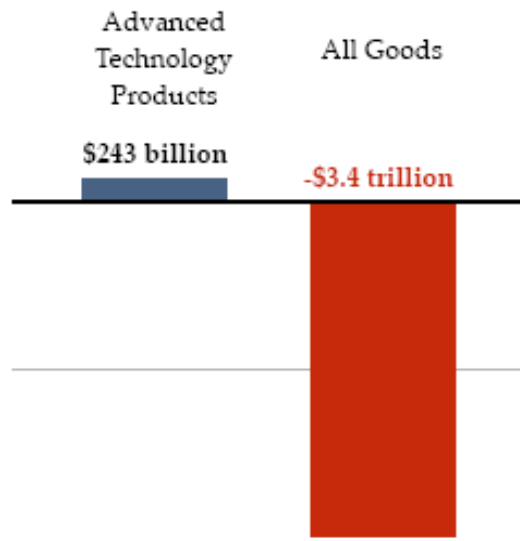


Source: Organisation for Economic Cooperation and Development, *Main Science and Technology Indicators*, May 2003.
Compiled by the APS Office of Public Affairs

High-Tech Economy

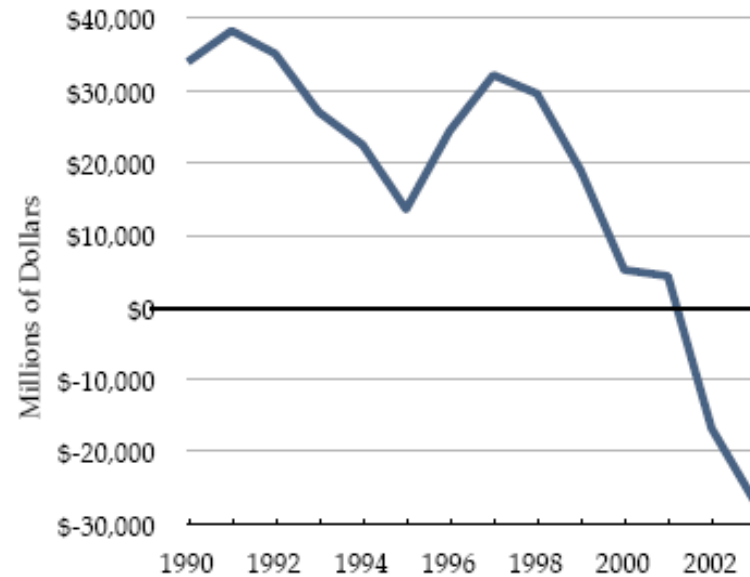
HIGH-TECH HAS
DELIVERED FOR THE U.S.
ECONOMY ...

Cumulative U.S. Trade Balance, 1990-2003



...BUT WILL IT
CONTINUE?

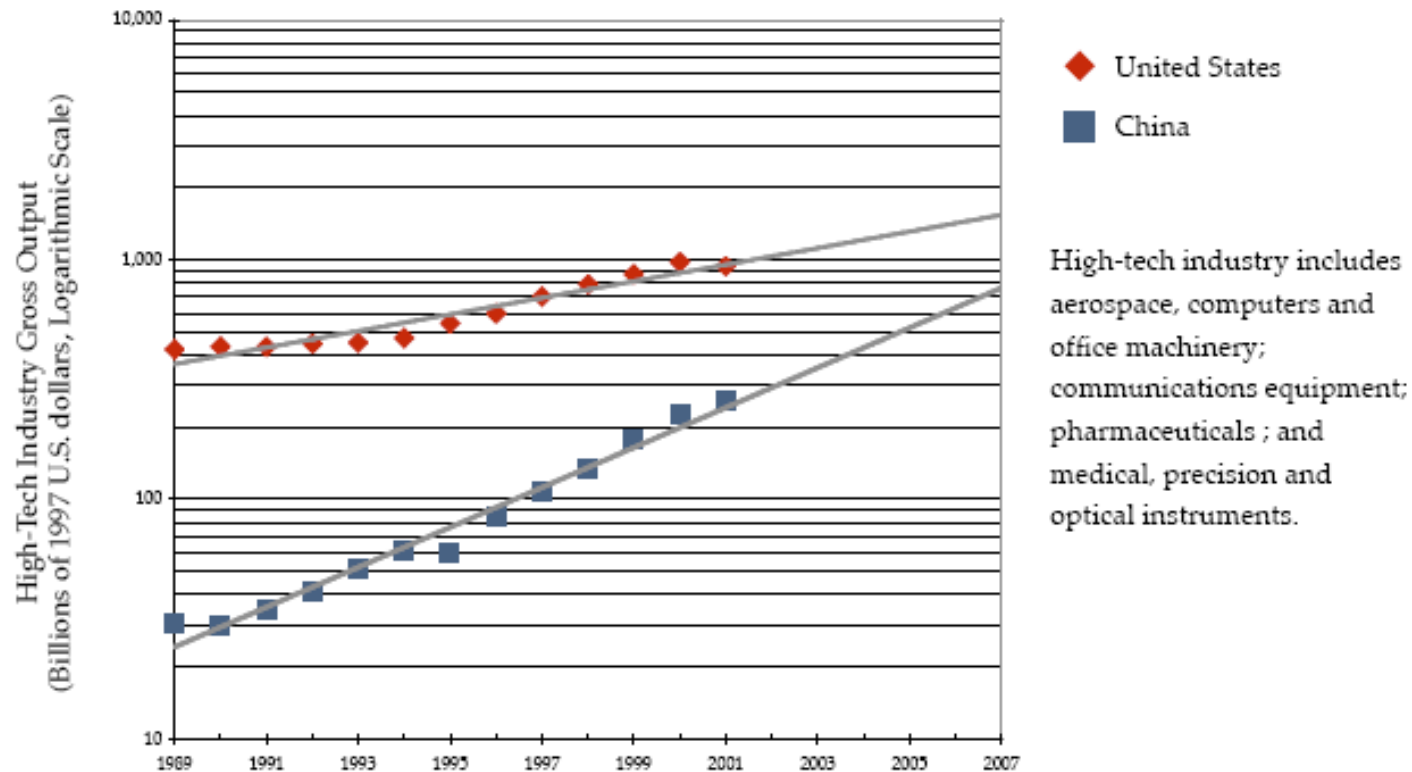
U.S. Trade Balance for High-Tech Products, 1990-2003



Source: U.S. Census Bureau Foreign Trade Statistics, *U.S. International Trade in Goods and Services*.
Compiled by the APS Office of Public Affairs.

High-Tech Economy

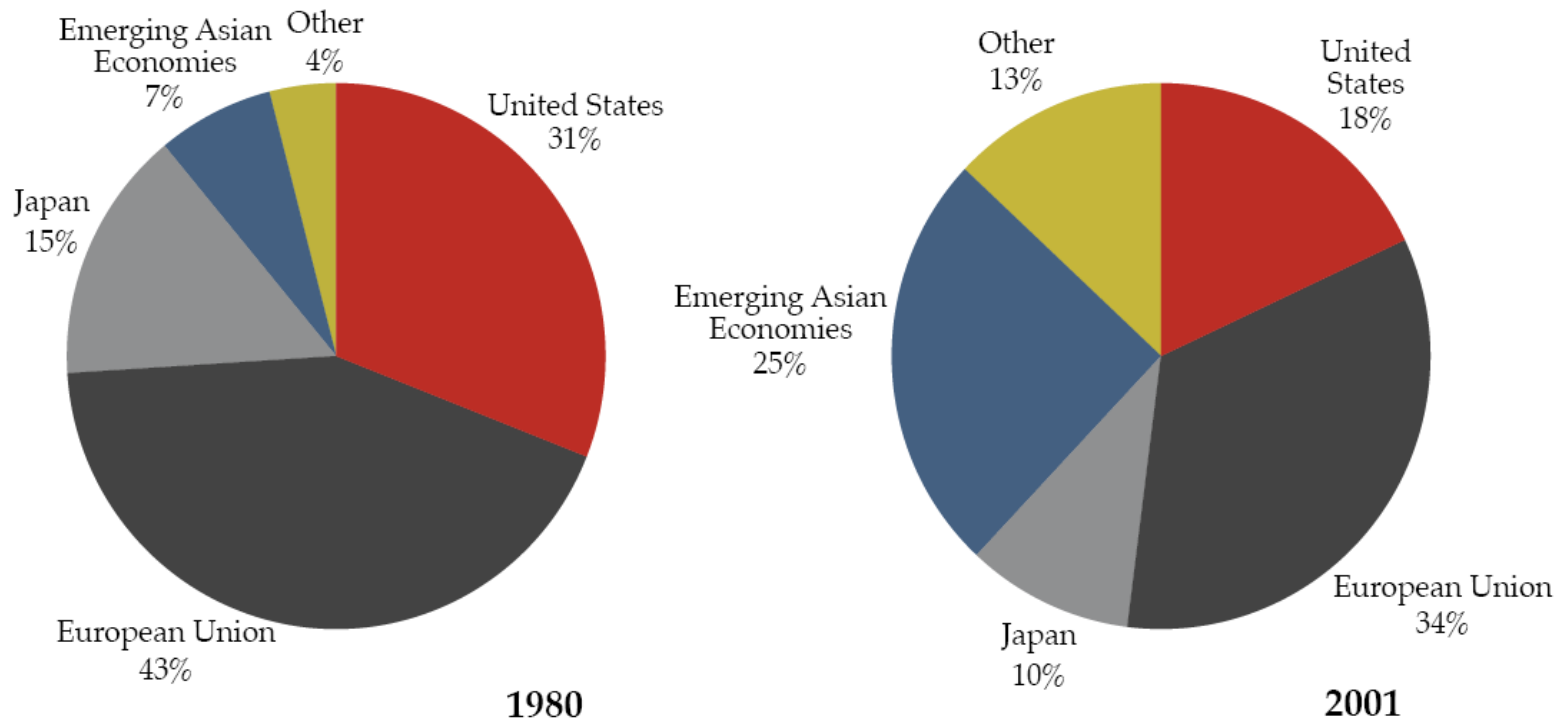
HIGH-TECH INDUSTRY OUTPUT: CHINA RAPIDLY GAINING ON U.S.



Source: National Science Foundation, *Science and Engineering Indicators 2004*, Appendix Table 6-1.
Compiled by the APS Office of Public Affairs

Will the U.S. Remain Competitive?

HIGH-TECH INDUSTRY EXPORTS: U.S. LOSING WORLD SHARE

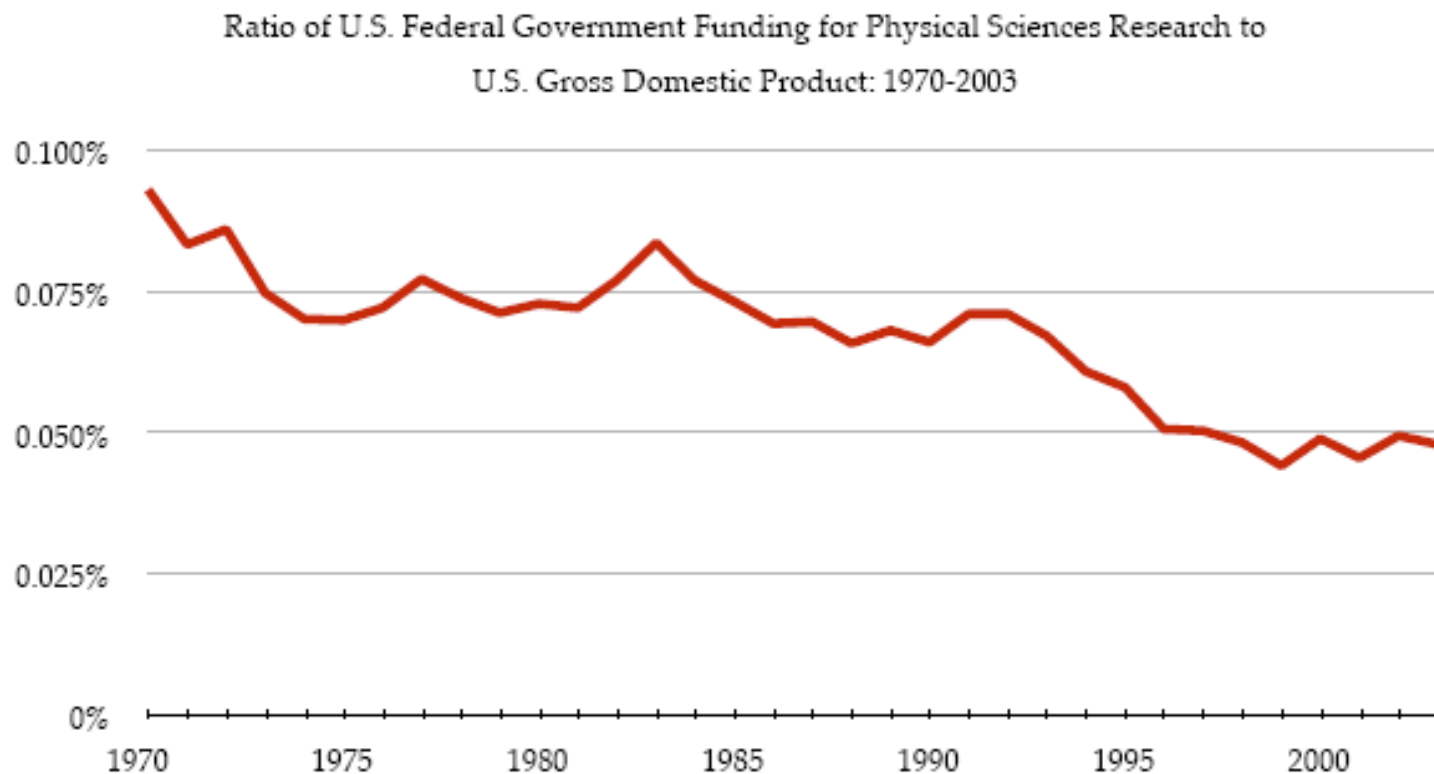


Emerging Asian Economies: China, South Korea, Taiwan, Singapore, Hong Kong, India

Source: National Science Foundation, *Science and Engineering Indicators 2004*, Appendix Table 6-1
Compiled by the Association of American Universities

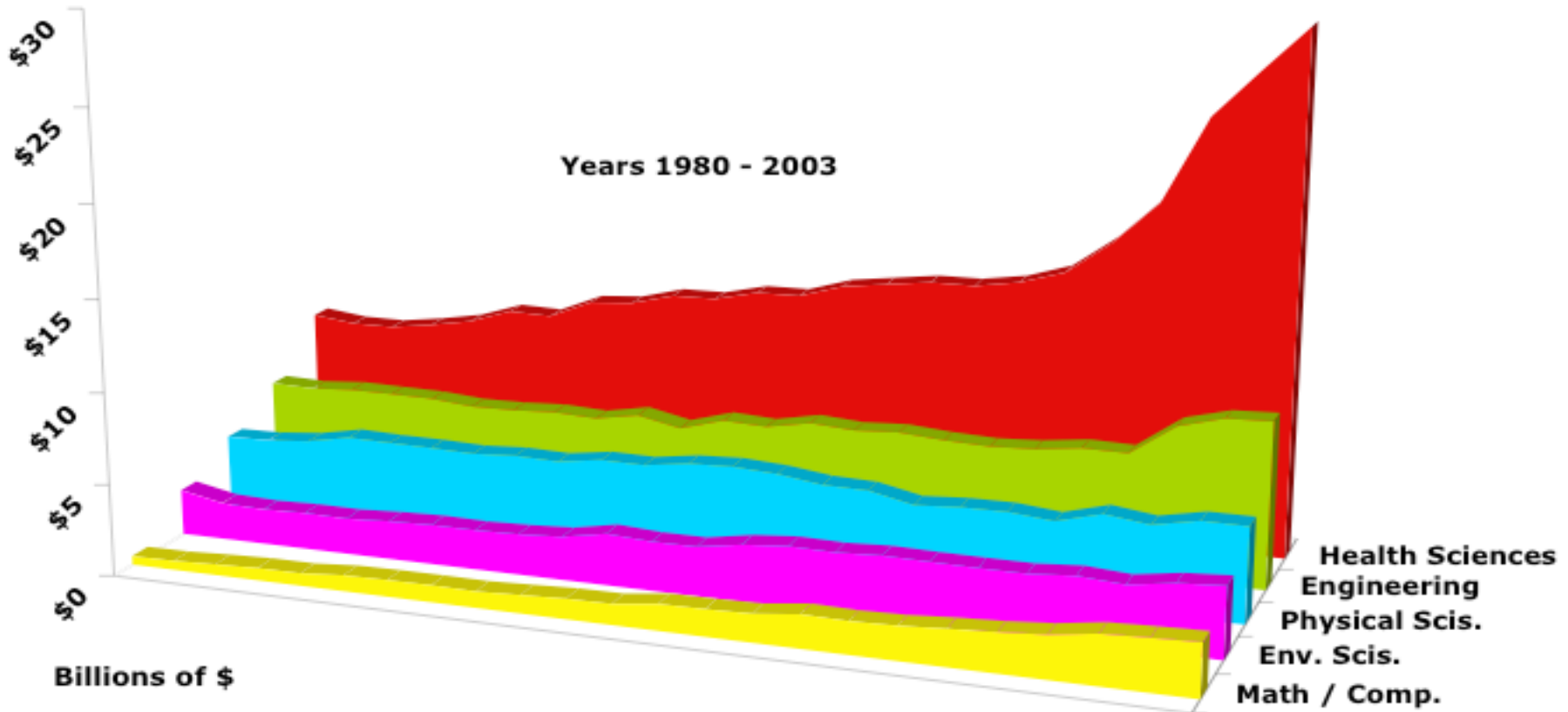
The U.S. Response

FEDERAL INVESTMENT IN PHYSICAL SCIENCES IN SIGNIFICANT DECLINE



Source: American Association for the Advancement of Science. www.aaas.org/spp/rd/guidisc.htm
Compiled by the APS Office of Public Affairs

Physical Sciences & Engineering Funding: Flat!



FY 2002 and 2003 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators from the Budget of the U.S. Government FY 2004.

Not only do our economy and quality of life depend critically on a vibrant R&D enterprise, but so too do our national and homeland security. As the Hart-Rudman Commission on National Security stated in 2001:

“[T]he inadequacies of our systems of research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine.”

"It's a creeping crisis, and it's not something the American psyche responds to well. It's not a Sputnik shot, it's not a tsunami..."

Craig Barrett, CEO Intel