

# Federal Funding, Physical Sciences Research, China, and the U.S. Congress

## **APS Advocacy Efforts**

**Steve Pierson, Ph.D.**

**Head of Government Relations, APS**

Argument is not why Congress should increase research funding, but why they can't afford not to.

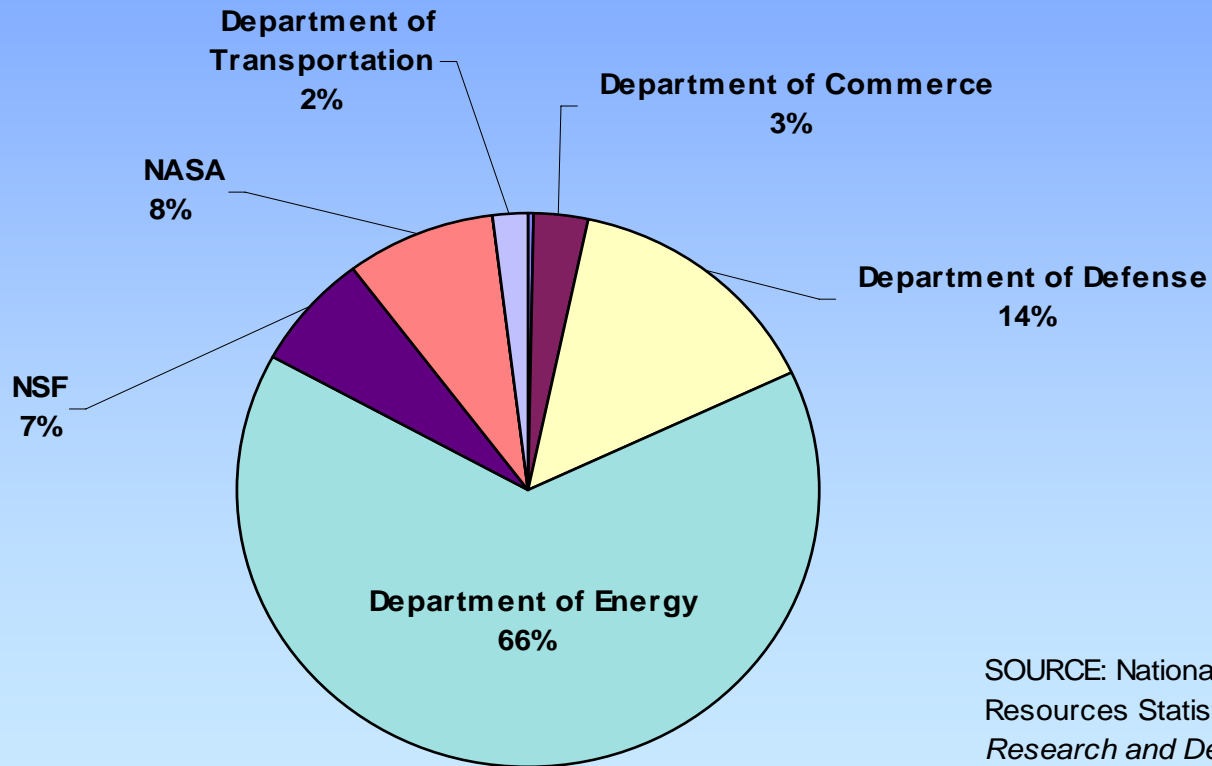
# Outline

- Federal Funding for the Physical Sciences
  - Who, how, why
  - Outlook
- World competition for High-Tech jobs & Science Leadership
- Advocacy Strategy

# APS Office of Public Affairs

- Issues
  - Science Research Budgets
  - Defense
  - Energy/Environment
  - Education/Workforce
- Four lobbyists located in downtown Washington

# Federal Funding for Physics Research



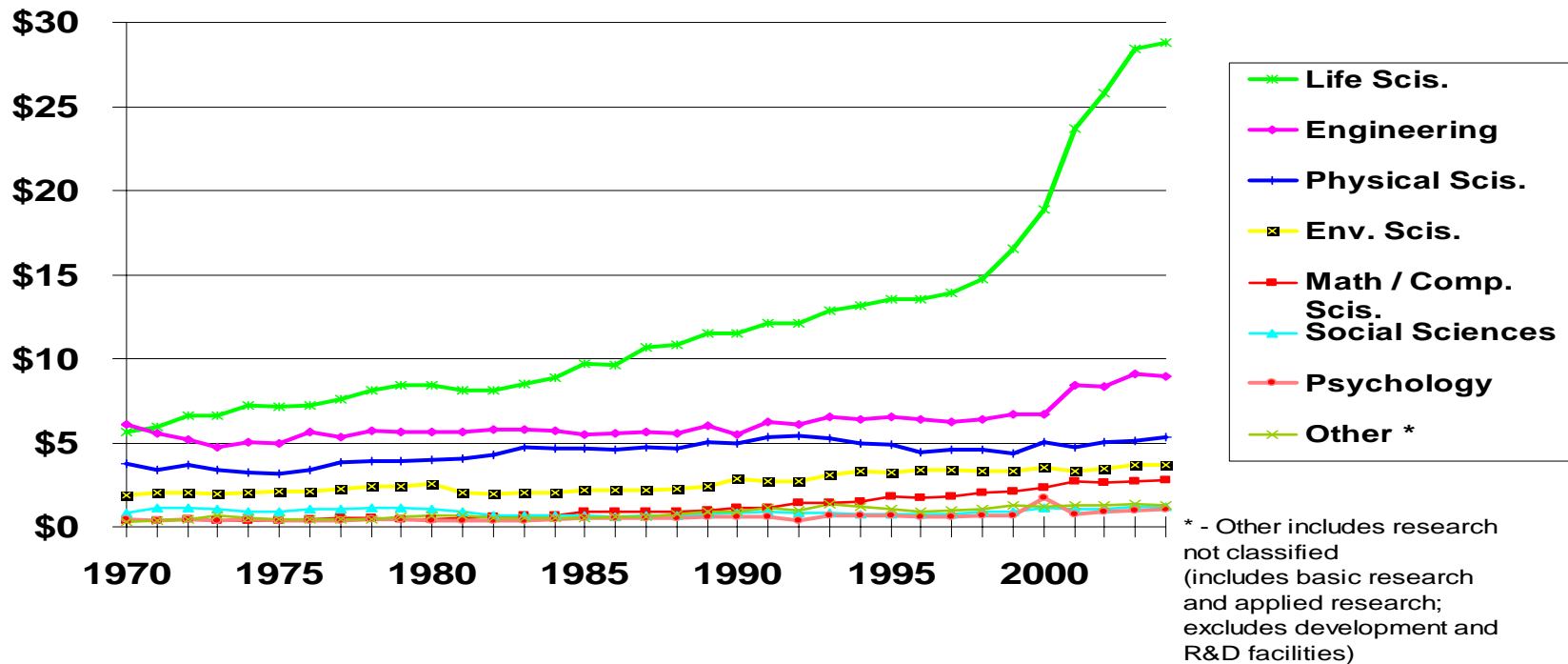
**FY 2001**

**Total: \$2.46 Billion**

SOURCE: National Science Foundation/Division of Science Resources Statistics, *Survey of Federal Funds for Research and Development: Fiscal Years 2001, 2002, and 2003*, Table C-24.

# Funding trends

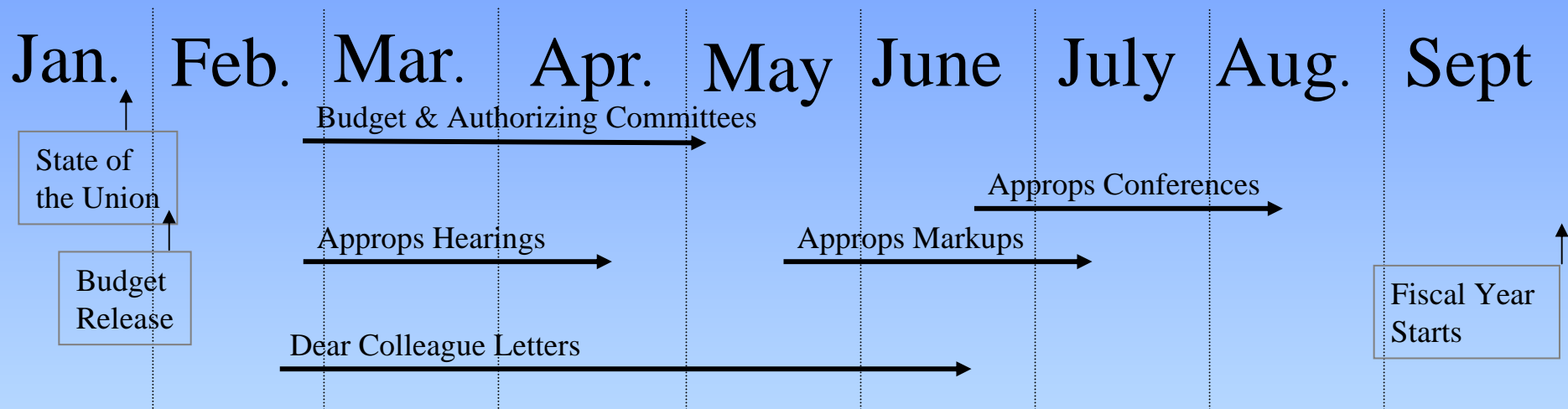
**Trends in Federal Research by Discipline, FY 1970-2004**  
obligations in billions of constant FY 2003 dollars



Source: National Science Foundation, *Federal Funds for Research and Development FY 2001, 2002, and 2003*, 2003. FY 2002 and 2003 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators. AUGUST '03 © 2003 AAAS

# Why the flat funding?

## Determining a Federal Budget



President requests budget

House and Senate versions

Conference Committees

→ House and Senate

Sent to President

# Congressional Appropriations

- Appropriations Subcommittees
  - 11 in Senate
  - 10 in House
- Each subcommittee given a fixed allocation
- Commerce, Justice, Science Subcommittee
  - NSF, NASA, NIST, NOAA, FBI, DOC, ...
- Energy and Water Subcommittee
  - DOE Office of Science, DOE programs, Water

# Why the flat funding?

- Competition within spending bills
- Not an Administration priority
- Large deficits
- No strong constituent support
  - NASA
  - NIH
  - Defense

# Washington Outlook Grim

NEWS OF THE WEEK

ENERGY SCIENCE

## Tight Budgets Force Lab Layoffs

15 JULY 2005 VOL 309 SCIENCE [www.sciencemag.org](http://www.sciencemag.org)

SPACE AND EARTH SCIENCES

## Budget Woes Greet NASA Science Chief

[www.sciencemag.org](http://www.sciencemag.org) SCIENCE VOL 309 19 AUGUST 2005

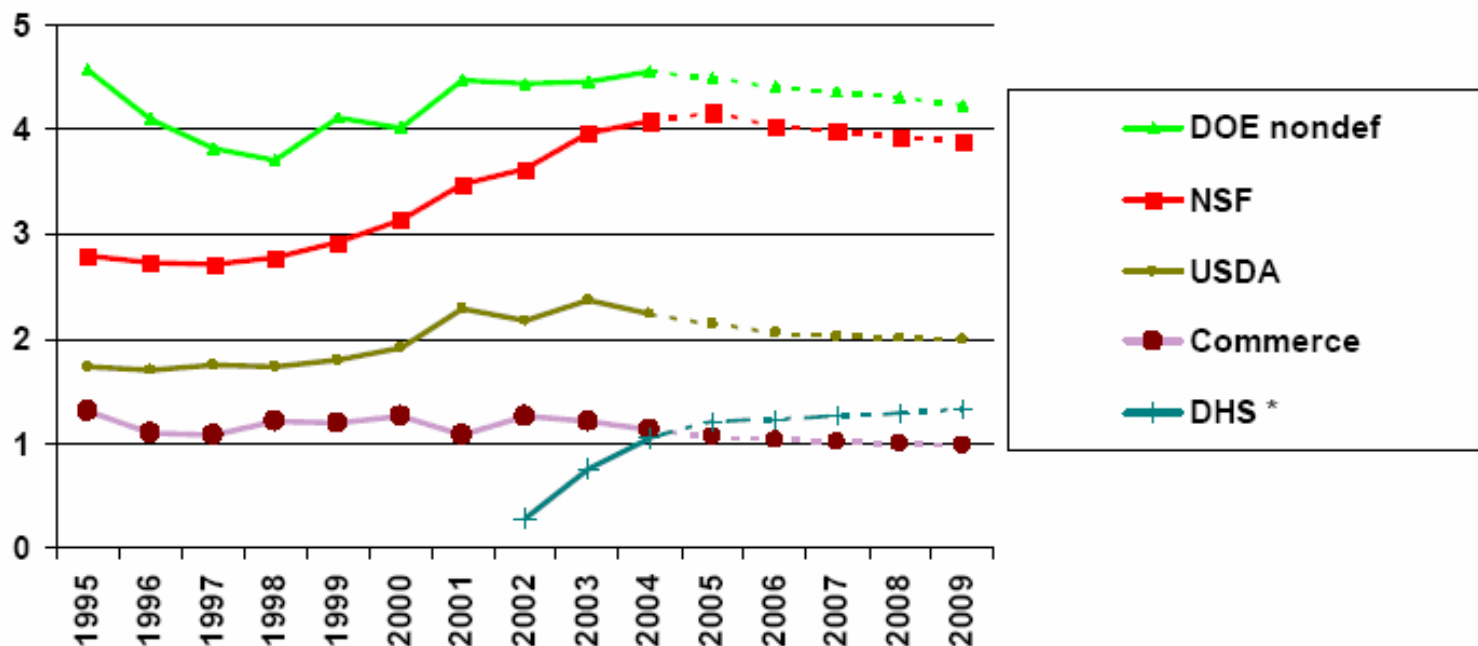
HIGH-ENERGY PHYSICS

## Costs Force NSF to Cancel Brookhaven Project

[www.sciencemag.org](http://www.sciencemag.org) SCIENCE VOL 309 19 AUGUST 2005

# Administration plans to trim R&D

**Projected Nondefense R&D in the President's Budget, FY 2004-2009**  
in billions of constant FY 2004 dollars



Source: AAAS analysis *Projected Effects of President's FY 2005 Budget on Nondefense R&D*. \* - Includes DHS nondefense and defense R&D.  
APRIL '04 © 2004 AAAS

# Washington Outlook Grim

- Very difficult budgets ahead
  - Large deficits
  - Increases in non-discretionary expenses
  - Reductions in discretionary funding
- Layoffs at DOE labs
- Proposal funding rates down
- Facility cuts being considered

# Signs of Hope-Congress

- Congress has rejected requested cuts (mostly)
- 68 Senators sign DOE SC Dear Colleague
  - (House: 121 for DOE; 167 for NSF)
- Wolf/Gingrich spearheading efforts
- Press articles on U.S. Science leadership and competitiveness
  - Thomas Friedman's Book, The World is Flat

# Message

- Science good for
  - ~~Security~~
  - ~~Health~~
  - ~~Economy~~

Warm and Fuzzy

Economic Growth, Competitiveness,  
Innovation!

Compelling

# Message

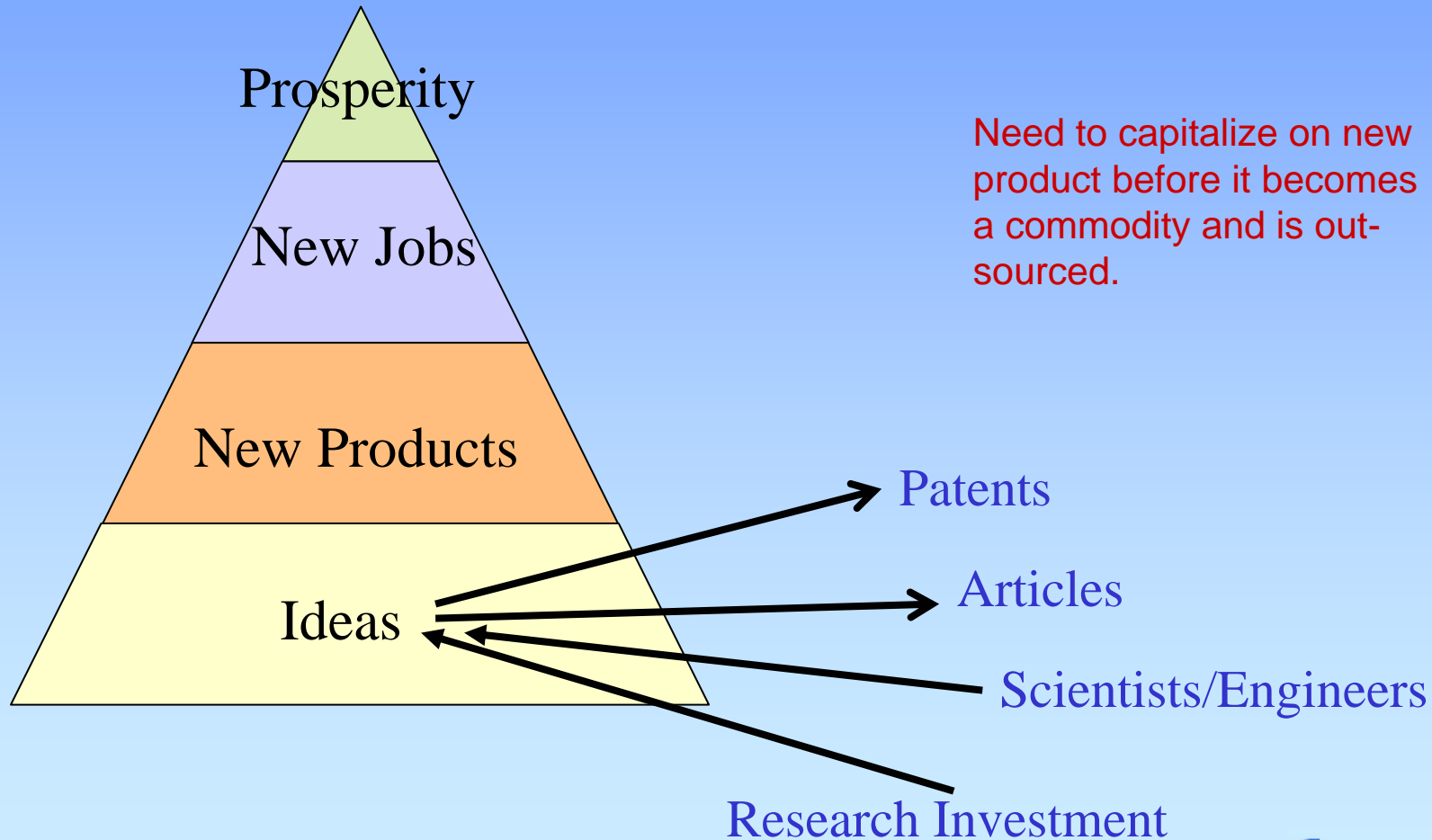
U.S Science leadership challenged, threatening  
U.S. prosperity and competitiveness.

Chinas and Indias of world rapidly building S&T  
infrastructure while U.S. remains complacent.

Results seen in:

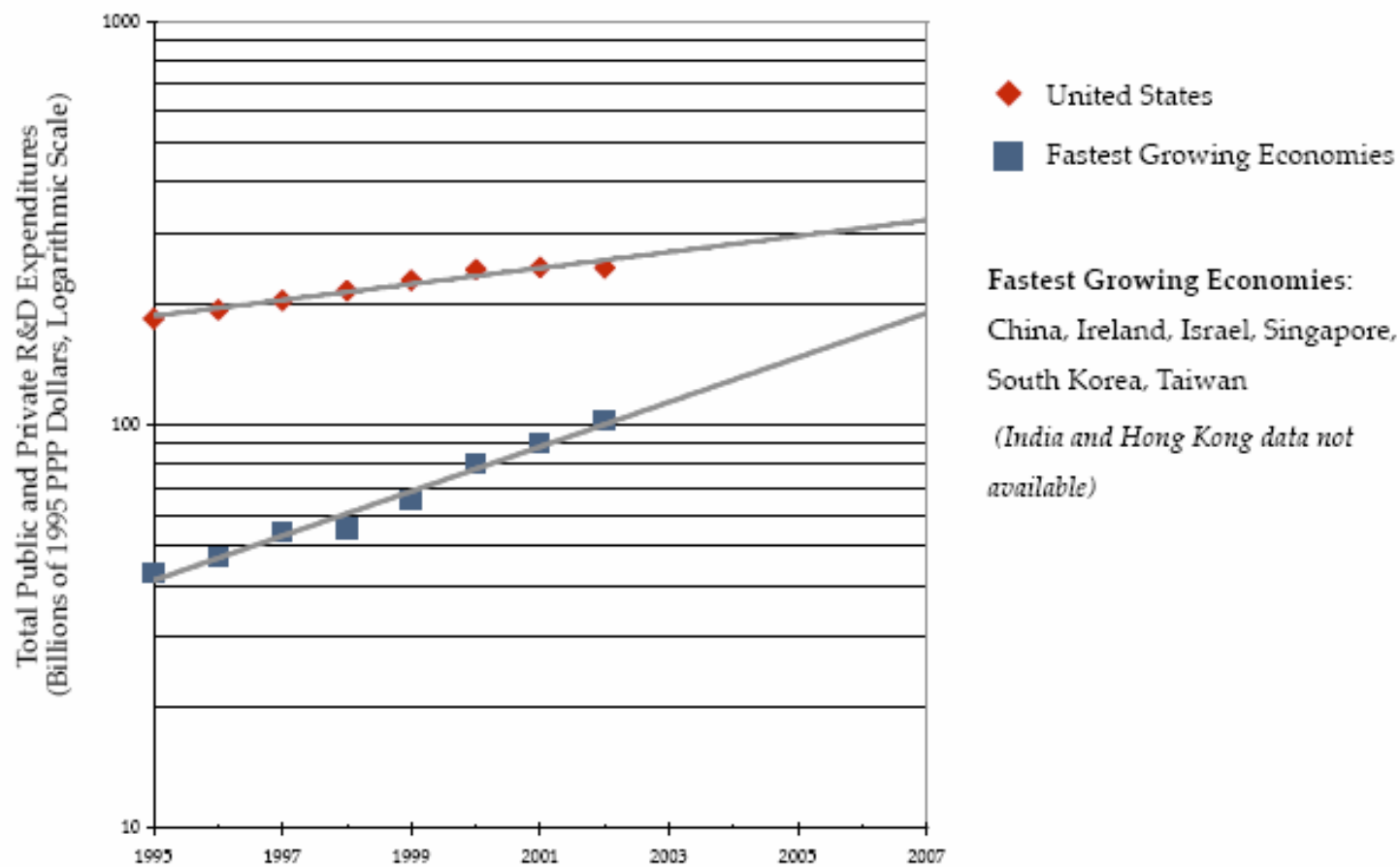
- R&D Funding
- S&E Degrees (Undergrad & Grad)
- S&E Articles
- Patents
- High-Tech products
- Jobs!

# The U.S. Innovation Economy: A Physicist's Model



# R&D Investment

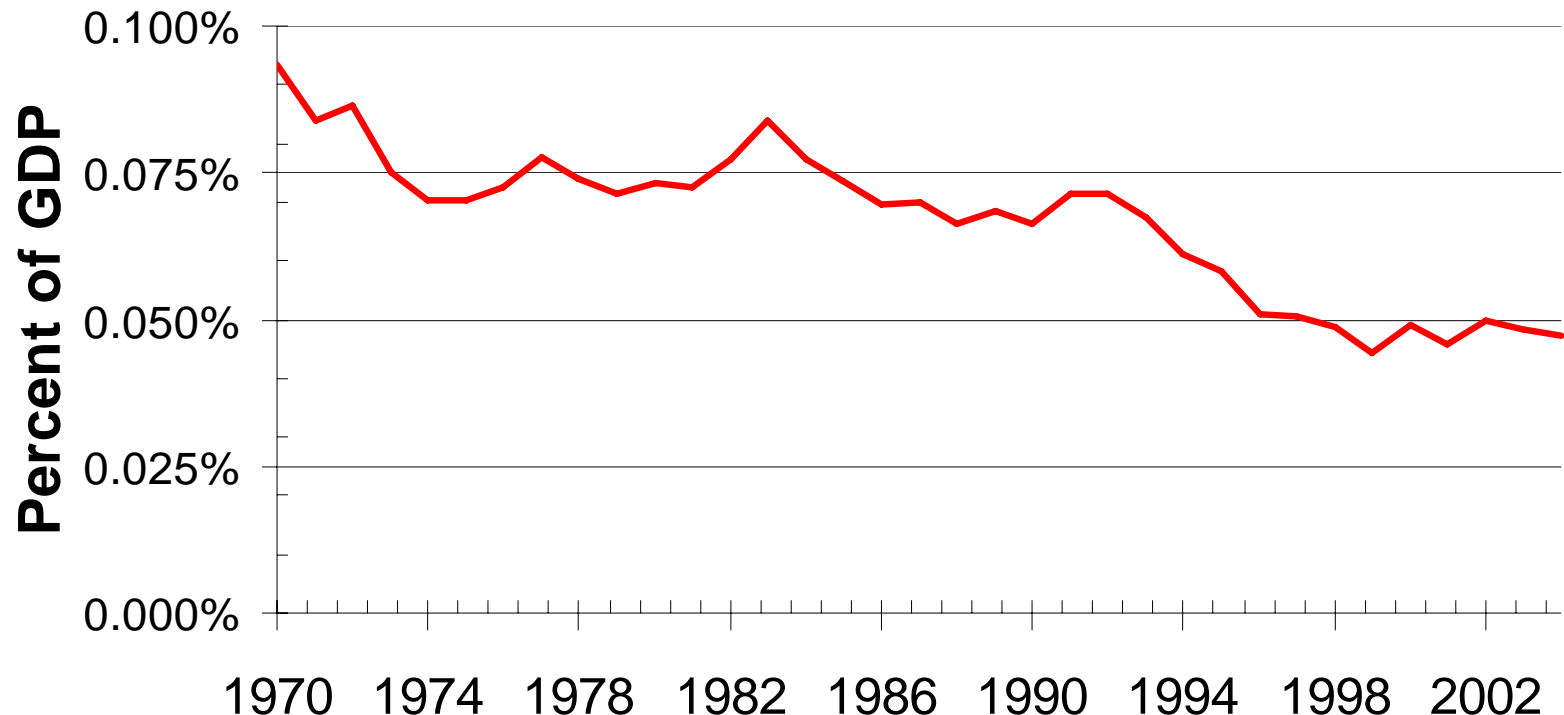
TOTAL R&D INVESTMENTS: FASTEST GROWING ECONOMIES GAINING RAPIDLY ON U.S.



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

# Federal Funding (cont'd)

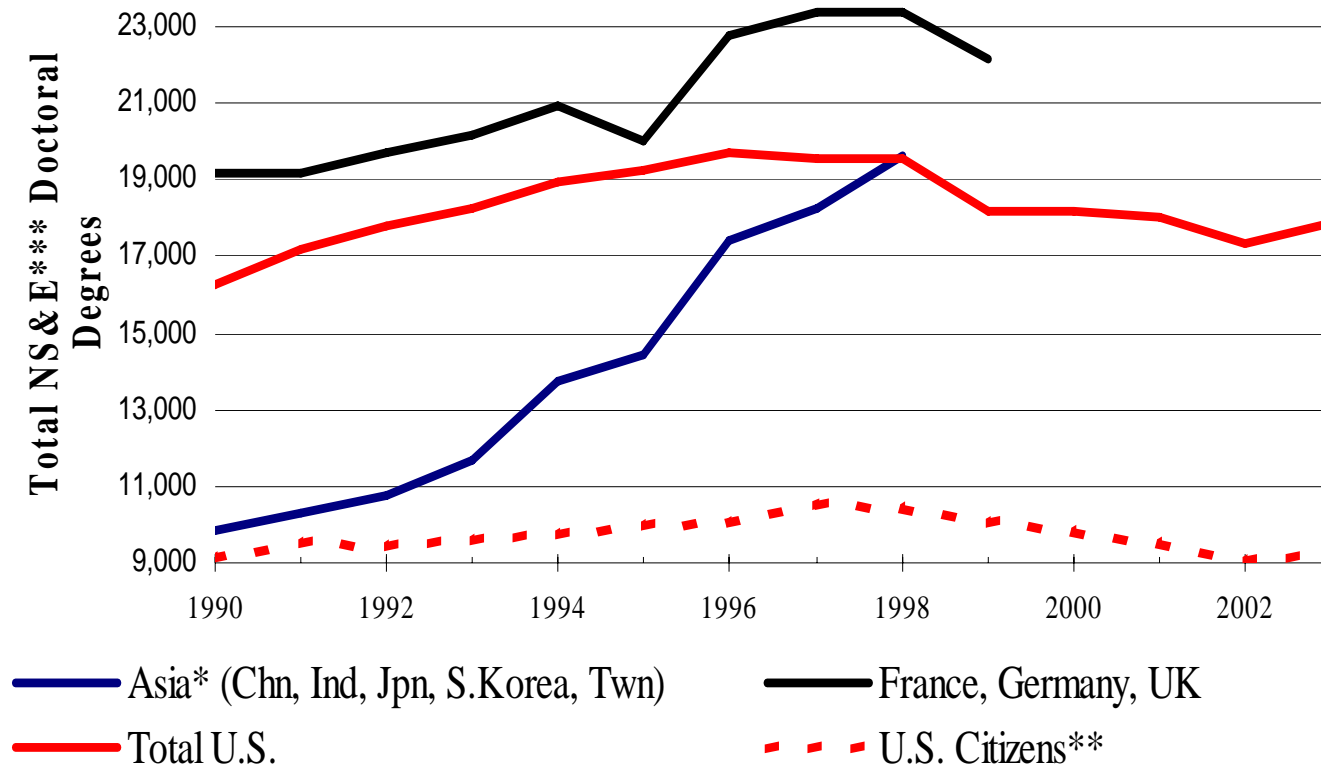
## Ratio of Federal Funding for Physical Sciences Research to GDP



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

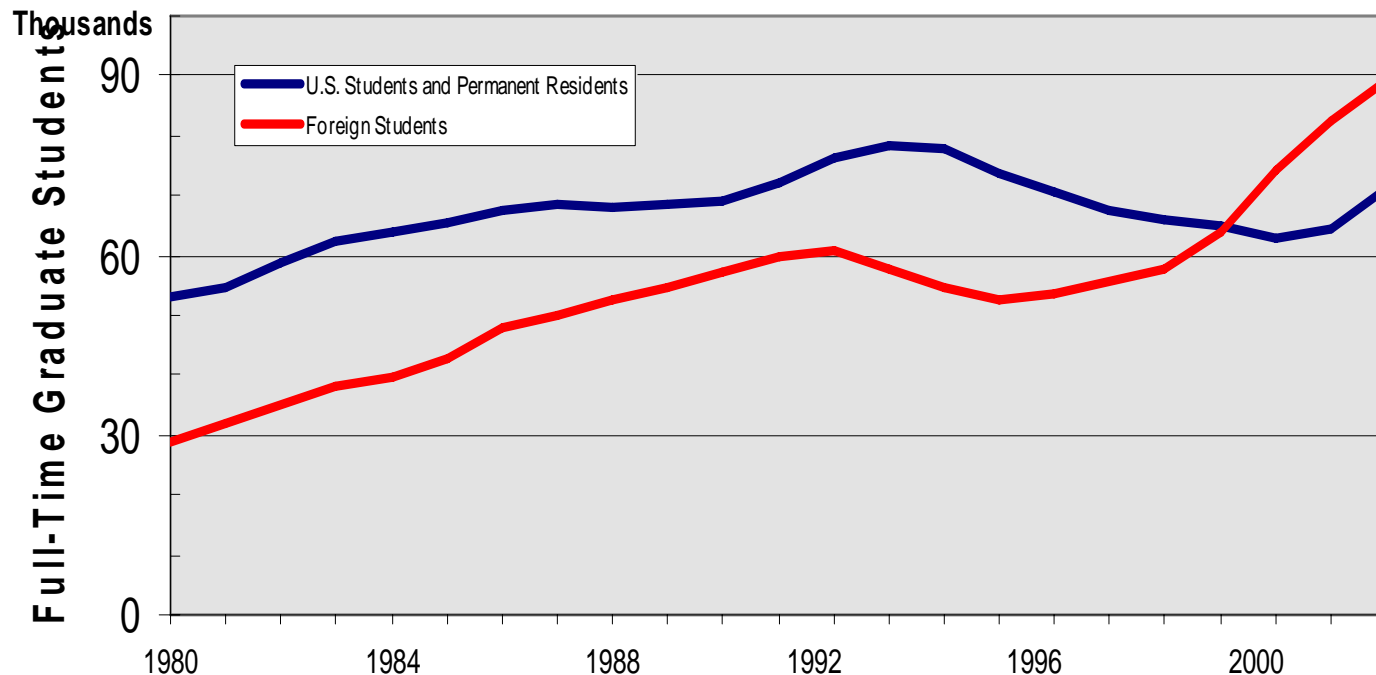
# Scientists and Engineers

Science and Engineering Ph.D.'s: U.S. passed by Asia, trailing Europe



# Scientists and Engineers

## U.S. Graduate Institutions: Foreign students outnumber U.S students in Physical Sciences\* & Engineering

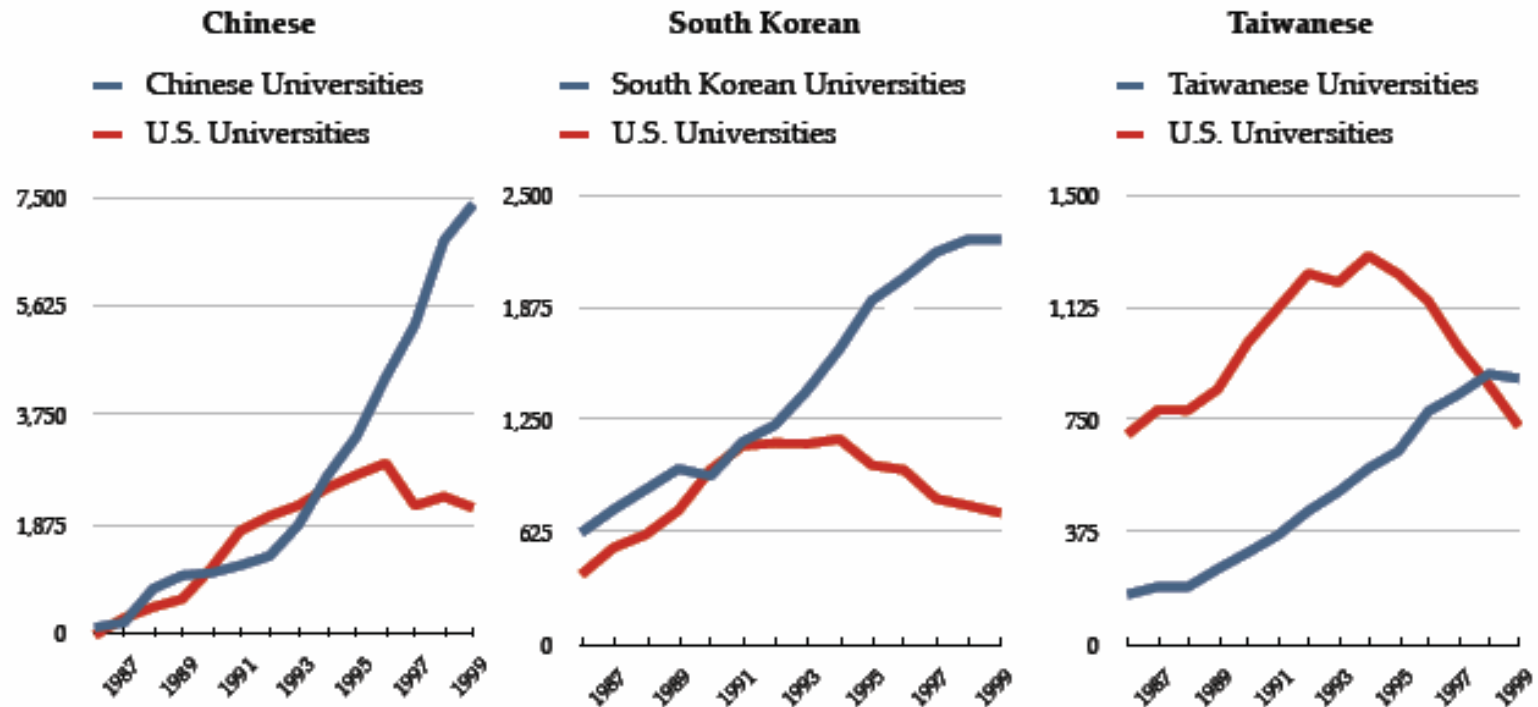


\*Mathematical and Computer Science included. Source: National Science Foundation Division of Science Resources Statistics: Graduate Students and Engineering: Fall 2002; Compiled by the American Physical Society Office of Public Affairs.

# Scientists and Engineers

## ASIAN PHD. STUDENTS ARE STAYING AT HOME

(1986 - 1999)

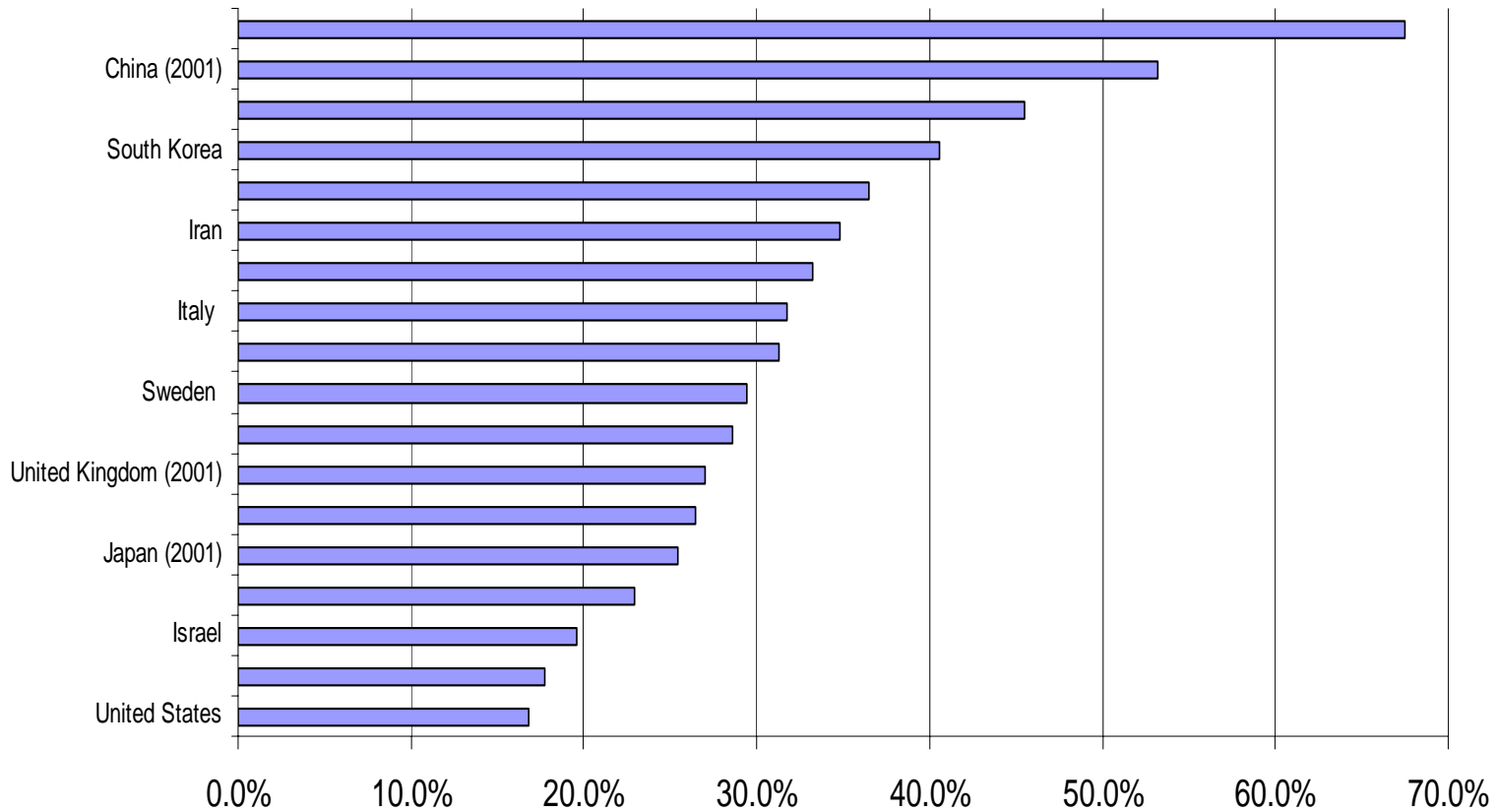


Source: National Science Foundation, *Science and Engineering Indicators 2002*, Appendix Table 2-41.

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

Compiled by the APS Office of Public Affairs.

# Science and Engineering Education

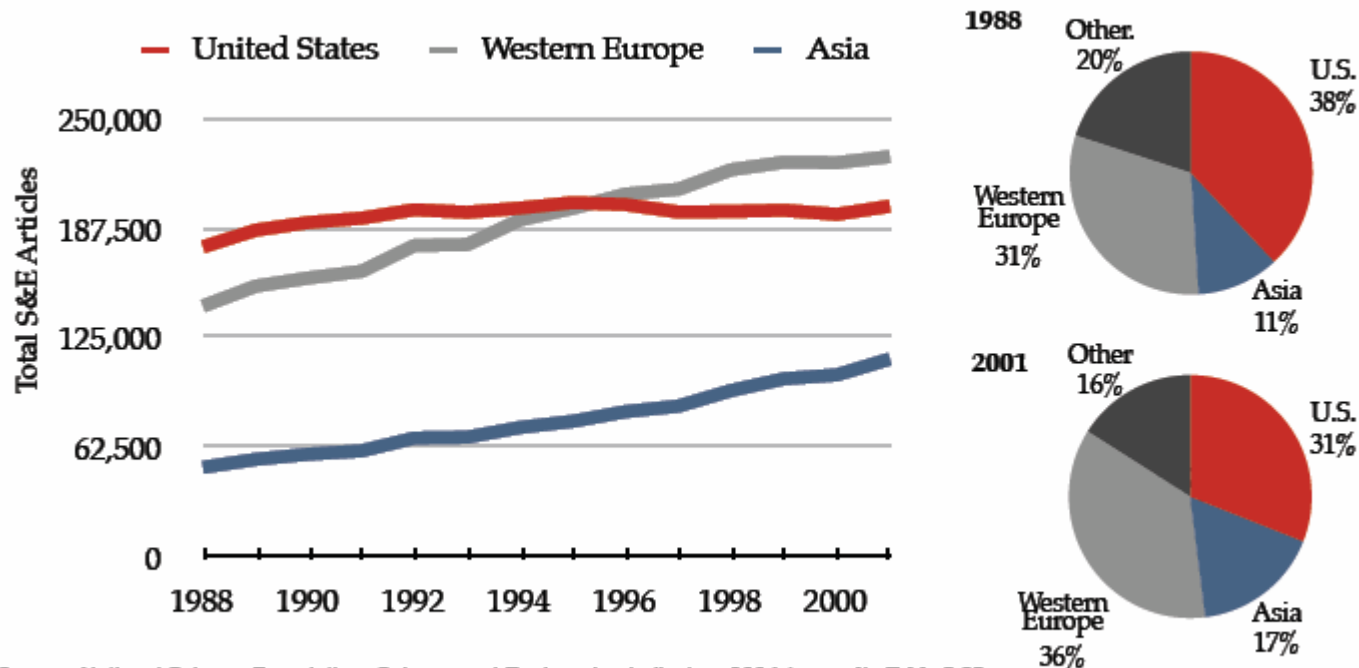


**Percent of University Population**

Source: 2004 NSF Science and Engineering Indicators. Appendix 2-33. Compiled by the APS Office of Public Affairs.

# Knowledge Creation and New Ideas

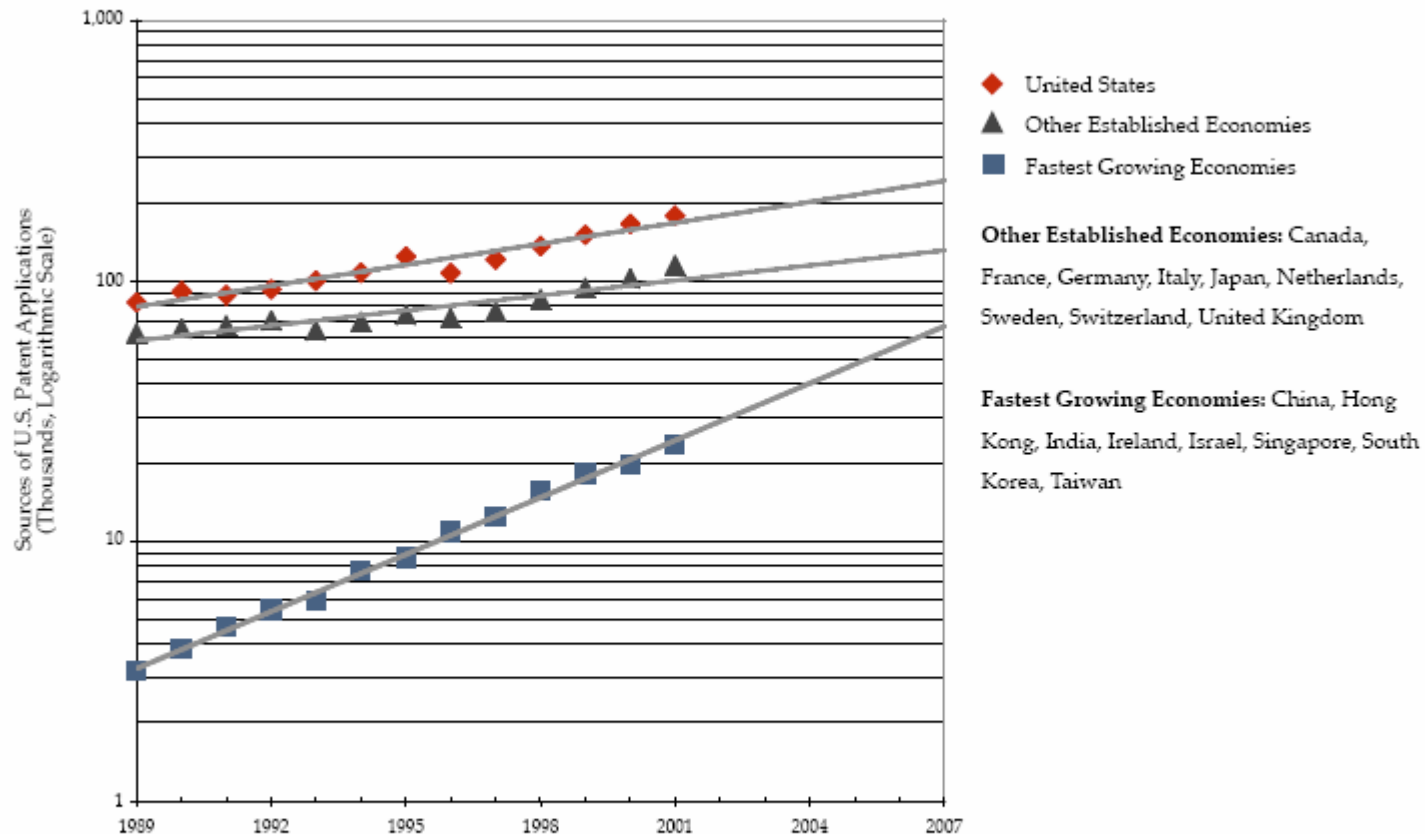
S&E ARTICLES: U.S. ALREADY PASSED BY WESTERN EUROPE, ASIA RAPIDLY CLOSING



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

# Knowledge Creation and New Ideas

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

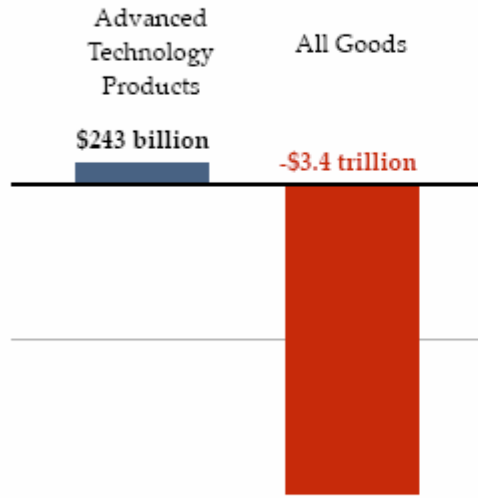


Source: National Science Foundation, *Science and Engineering Indicators 2004*, Appendix Table 6-11.  
Compiled by the APS Office of Public Affairs

# High-Tech Economy

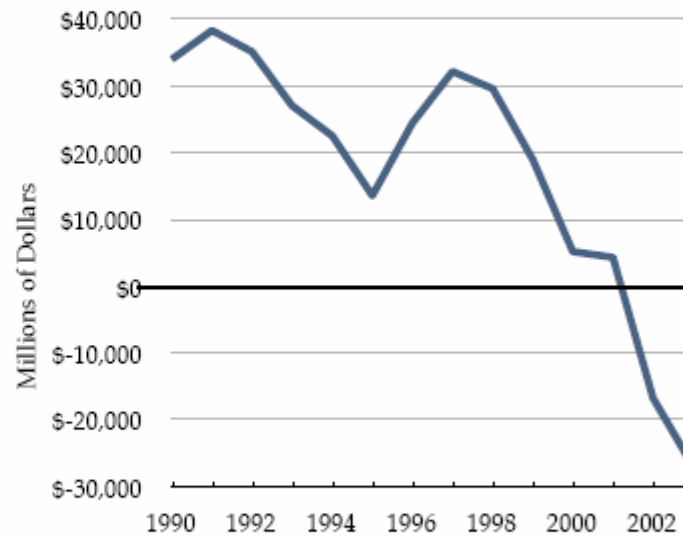
HIGH-TECH HAS  
DELIVERED FOR THE U.S.  
ECONOMY ...

Cumulative U.S. Trade Balance, 1990-2003



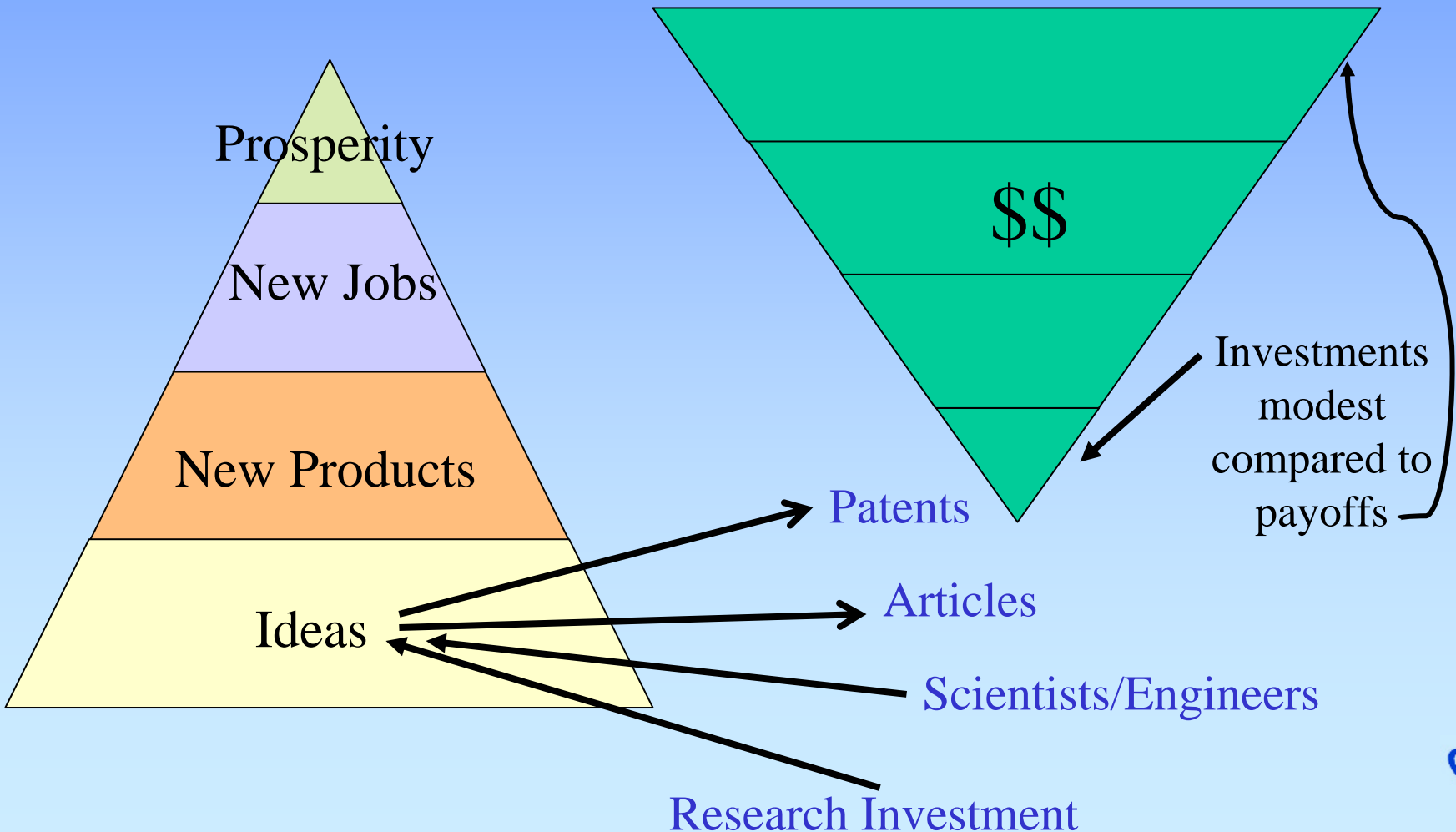
...BUT WILL IT  
CONTINUE?

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.

# The U.S. Innovation Economy: A Physicist's Model



# America's Science Lead Is Dwindling Rapidly

December 21, 2004

# U.S. Slips in Attracting the World's Best Students

The New York Times  
nytimes.com

A26 SATURDAY, MAY 29, 2004

# The New York Times

MONDAY, MAY 3, 2004

Copyright © 2004 The New York Times

# U. S. Is Losing Its Dominance In the Sciences

THE WALL STREET JOURNAL.

FRIDAY, AUGUST 12, 2005 B1

## SCIENCE JOURNAL

By SHARON BEGLEY

# U.S. Science Research Is in Danger of Losing Place on Cutting Edge

THE WALL STREET JOURNAL.

OPINION

WEDNESDAY, MAY 4, 2005

# The Washington Post

## Starving Science

As Other Nations Gain, Virginia Lab Keeps U.S. Out Front



## CAPITAL JOURNAL

By JOHN HARWOOD

# Competitive Edge Of U.S. Is at Stake In the R&D Arena

Singapore

Op-ed page  
mail address is  
on@abqjournal.com

## Op-Ed Page

THE ALBUQUERQUE JOURNAL WEDNESDAY, JUNE 22, 2005 A

# U.S. Competitiveness Shrinks With Research Cuts

# Influencing Science Budgets

- Congress → Influence appropriators
  - Ask your Congressman to lobby appropriators
    - Personal letter/talk
    - Dear Colleague letters
  - Direct interactions with appropriators
    - Constituents
    - VIP's
    - Staff
- Public Relations
  - Press, Op-Eds, Rotary Clubs, ...

# APS Grassroots Efforts

- Template letters at APS website
  - Contact Congress at APS Meetings (6000+ letters)
  - Email alerts
  - Follow up
- Visits
- Op-Eds

# Dear Colleague Letter

March 30, 2004

## *Want to Ensure Economic Vitality & National Security? Invest in Science & Technology*

Dear Colleague:

We invite you to join us in signing the attached letter requesting that the VA-HUD subcommittee make the National Science Foundation (NSF) a priority as it deliberates the FY 2005 budget.

Advances in science and technology underpin our ability to meet many of our nation's challenges today, including securing the homeland, preventing terrorism, promoting economic development, and educating our children to compete in a global economy. As a nation, we must continue to invest in science and technology.

Supporting the National Science Foundation (NSF) and technology. NSF investments are critical to our nation's economic and technological advances in fundamental knowledge and education of scientists and engineers and to our nation's workforce, from office assistants to rocket scientists.

We believe that the National Science Foundation (NSF) should be a priority in the FY 2005 budget, and hope that you will support this request.

To sign the letter, or for answers to any questions, please contact Marty Sokoloski in Mr. Holt's office at (202) 548-5381 or (202) 548-53831.

Sincerely,

**Congress of the United States**  
Washington, DC 20515

May 4, 2005

The Honorable Frank Wolf  
Chairman  
Subcommittee on Science, State, Justice and  
Commerce  
H-309 Capitol  
Washington, DC 20515

The Honorable Alan Mollohan  
Ranking Member  
Subcommittee on Science, State, Justice and  
Commerce  
H-309 Capitol  
Washington, DC 20515

Dear Chairman Wolf and Ranking Member Mollohan:

As supporters of fundamental scientific research and education, we respectfully ask that you make the National Science Foundation (NSF) funding a priority and provide \$6.1 billion in your Fiscal Year 2006 Science, State, Justice and Commerce Subcommittee appropriations legislation. Science and technology drive our economy. Economists estimate that more than 25% of our economic growth is attributed to technological innovation. As a result, we are losing our leadership in the global economy.



# 2005 Letter Writing Activity

Senator John William (John) Warner (R-VA-001)	<b>108</b>
Senator George F. (George) Allen (R-VA-002)	<b>109</b>
Congresswoman Jo Ann Davis (R-VA-001)	<b>37</b>
Congresswoman Thelma D. (Thelma) Drake (R-VA-002)	<b>3</b>
Congressman Robert C. (Bobby) Scott (D-VA-003)	<b>7</b>
Congressman James Randy (Randy) Forbes (R-VA-004)	<b>0</b>
Congressman Virgil H. (Virgil) Goode (R-VA-005)	<b>10</b>
Congressman Bob Goodlatte (R-VA-006)	<b>8</b>
Congressman Eric Cantor (R-VA-007)	<b>4</b>
Congressman James P. (Jim) Moran (D-VA-008)	<b>20</b>
Congressman Rick Boucher (D-VA-009)	<b>8</b>
Congressman Frank R. (Frank) Wolf (R-VA-010)	<b>5</b>
Congressman Tom Davis (R-VA-011)	<b>6</b>

## Thresholds:

House ~10


Senate ~25



















# VA Congressional Delegation

## House Record on NSF and DOE Office of Science Dear Colleague

compiled by American Physical Society Office of Public Affairs, 11/22/04

**Key:** D.C. ==> Dear Colleague; csp ==> cosponsor; \* ==> original cosponsor

 ==> not in Congress

Members of the House	State	District	party	DOE Office of Science								Function 250 2004	NSF				
				D.C. 2000	D.C. 2001	D.C. 2002	HR 5270	HR 34 * is original csp	FY04 Conference D.C.	D.C. 2004	D.C. 2005		HR 4664 vote	D.C. 2002	D.C. 2003	D.C. 2004	D.C. 2005
Boucher, Rick (D-VA, 9th)	VA	9	D		Yes	Yes	csp	csp	Yes	Yes	Yes		Yes	Yes	Yes		Yes
Cantor, Eric (R-VA, 7th)	VA	7	R										Yes				
Davis, Jo Ann (R-VA, 1st)	VA	1	R		Yes	Yes	csp	csp	Yes		No		Yes				
Davis, Tom (R-VA, 11th)	VA	11	R	Yes	Yes	Yes	csp	csp*	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Drake, Thelma (R-VA, 2nd)	VA	2	R														
Forbes, J. Randy (R-VA, 4th)	VA	4	R										Yes*				
Goode, Virgil (R-VA, 5th)	VA	5	R										Yes				
Goodlatte, Bob (R-VA, 6th)	VA	6	R										Yes				
Moran, James (D-VA, 8th)	VA	8	D		yes	Yes	csp	csp*	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Scott, Robert (D-VA, 3rd)	VA	3	D						Yes	Yes	Yes		Yes				
Wolf, Frank (R-VA, 10th)	VA	10	R										Yes				

# VA Senators

Senators	party	state	NSF	DOE Office of Science					
			D.C. 2001	D.C. 2001	D.C. 2002	D. C. 2003	S. 915	D.C. 2004	D.C. 2005
Allen, George (R-VA)	R	VA	Yes	Yes	Yes	Yes		ind.*	Yes
Warner, John (R-VA)	R	VA	Yes	Yes	Yes	Yes	csp*	Yes	Yes

# Grassroots Network

- Need to increase support for science research
- ➔ Network of District Advocates
  - Local liaisons who lobby a office
  - APS provides
    - Materials
    - Coordination
    - Recommendations on strategy

# Grassroots Advocacy Works!

- 2005 Senate Dear Colleague letter: 68 Signatures
  - ...
- Be involved
  - Respond to alerts
  - Be a “DA”
  - Contact us if visiting Washington
  - Speak at local Rotary club

# Conclusions

- Federal support for research needs help
- Message must be compelling
- Congress
  - Supportive but no money
  - Funding dynamics make science funding difficult
- Administration needs convincing
- Grassroots activity effective and absolutely essential

# For more info or to participate

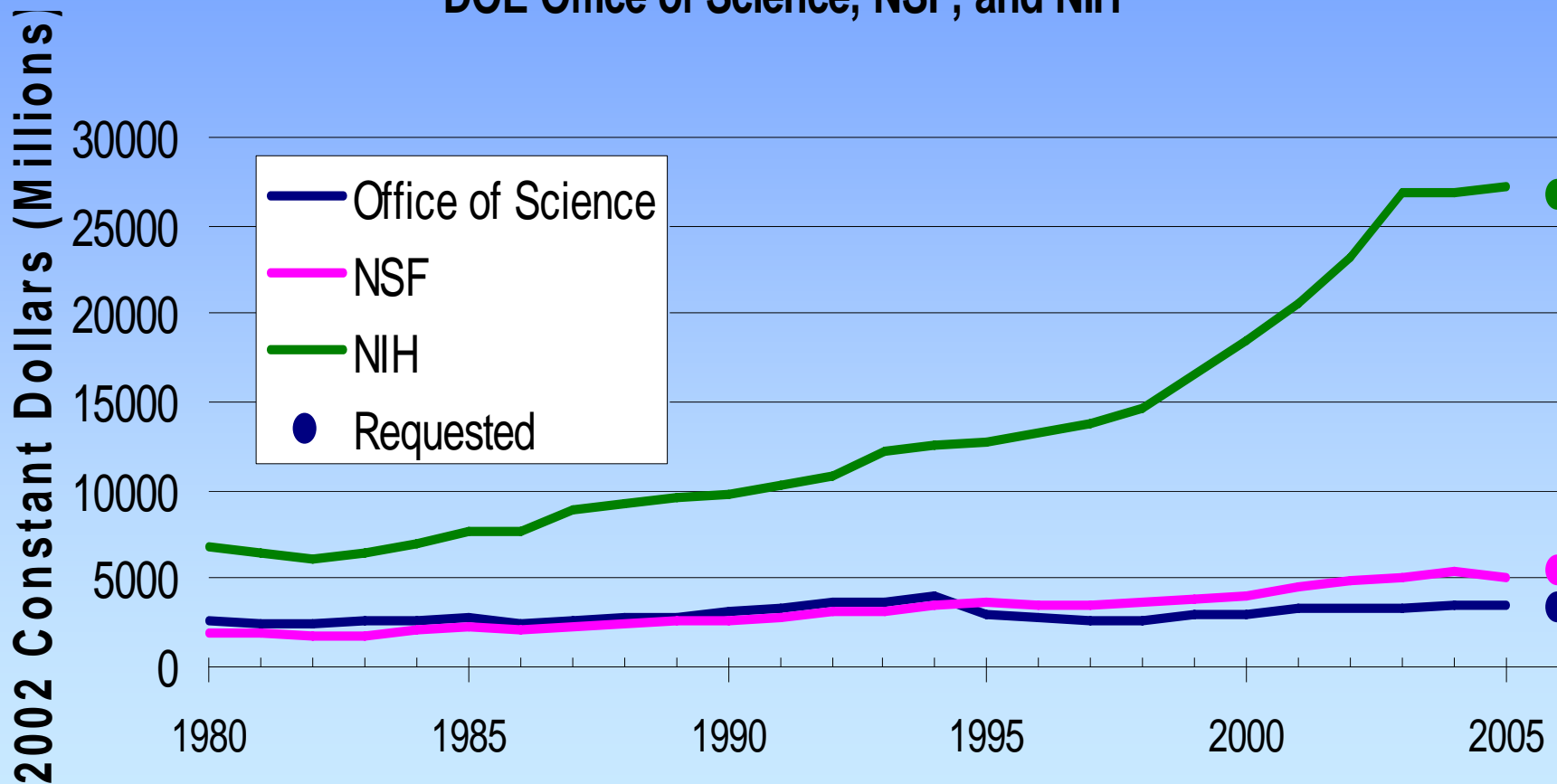
- Benchmarks Report
  - <http://www.futureofinnovation.org>
- APS Office of Public Affairs
  - [http://www.aps.org/public\\_affairs/index.cfm](http://www.aps.org/public_affairs/index.cfm)
  - [pierson@aps.org](mailto:pierson@aps.org)
- APS Membership
  - <http://www.aps.org/memb/index.cfm>

# Advocating a Dear Colleague

- Brute force methods
  - Phonecalls, letters, visits
- Finesse
  - Official university contact
  - Using rapport developed with office
  - Department letters

# Federal Funding (cont'd)

## DOE Office of Science, NSF, and NIH



# Where's the Administration?

## Average Percentage Changes in Indicators and Accounts Since FY01

