

The U.S R&D Enterprise

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for the Chinese Academy of Sciences

AAAS R&D Budget and Policy Program
<http://www.aaas.org/spp/rd>

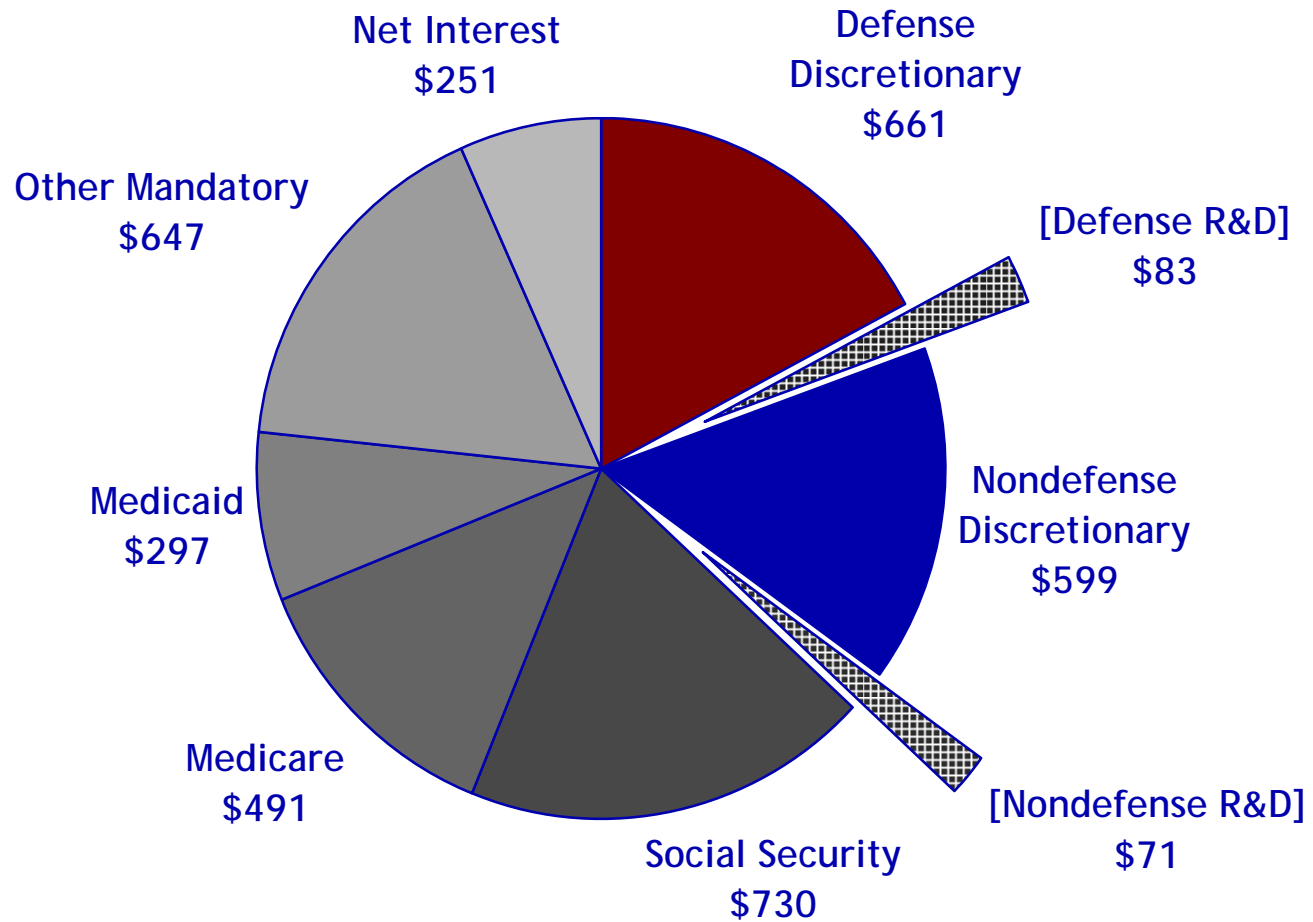
The FY 2011 Federal Budget

- \$3.8t total budget, \$1.3t unified deficit
- \$1.3t discretionary budget (+0.3%)
 - \$532b nondefense budget (+1.4%)
- Rescuing the Economy
- A Foundation for Economic Growth and Job Creation
 - Small business initiatives
 - Investing in science and basic research
- Restoring Responsibility
 - Three year non-security discretionary funding freeze

Composition of the Proposed FY 2011 Budget

Total Outlays = \$3.8 trillion

outlays in billions of dollars



Source: *Budget of the United States Government FY 2011*.

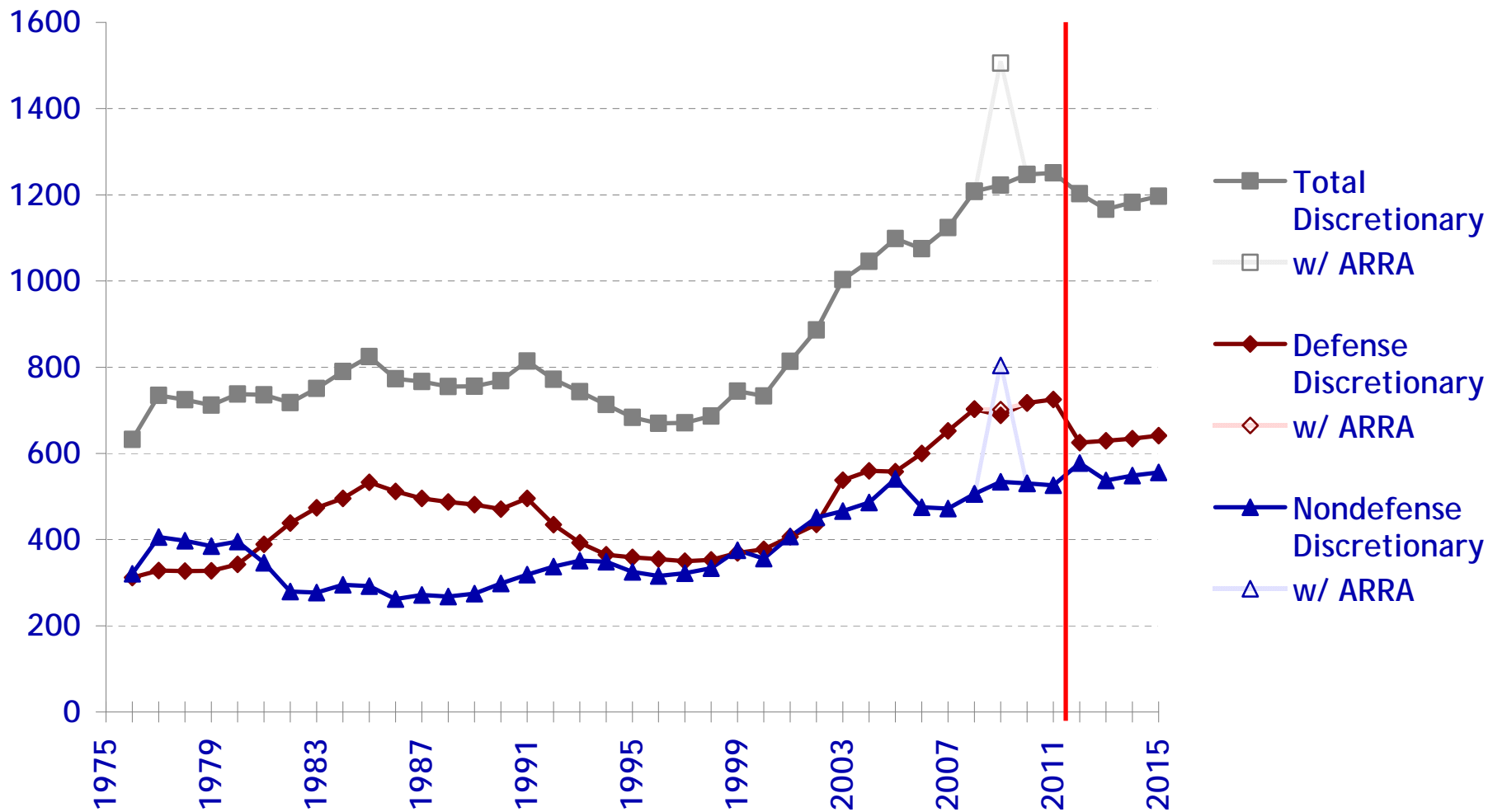
Projected unified deficit is \$1.3 trillion.

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Trends in Discretionary Spending

budget authority in billions of constant FY 2010 dollars



Source: *Budget of the United States Government, FY 2011.*

FY 2010-2015 data are budget projections.

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Federal R&D in Context

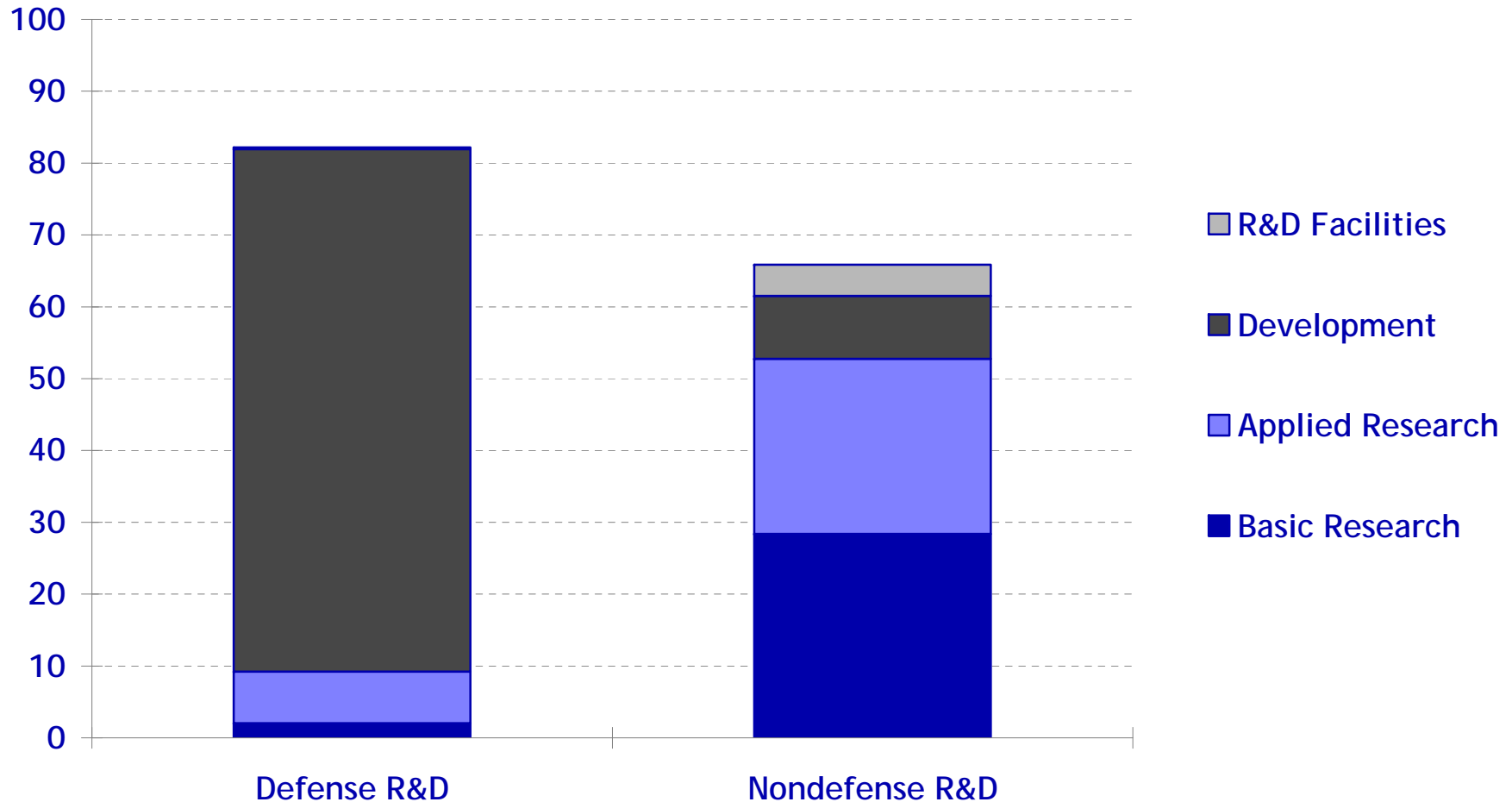
- The federal R&D investment is spread across over two dozen departments and agencies
 - Only two manage more than 10% of the investment
 - Department of Defense (52.7%)
 - Department of Health and Human Services (21.7%)
- The federal R&D investment is also spread across 11 of the 12 appropriations subcommittees.
- Role of federal R&D
 - Supports federal missions
 - Drives U.S. innovation

Character of R&D

- The Innovation Lifecycle
 - Basic Research
 - Study toward knowledge or understanding of fundamental properties and phenomena without a specific need in mind.
 - Applied Research
 - Study toward knowledge or understanding necessary to satisfy a specific need.
 - Development
 - The application of knowledge or understanding toward the production of materials, devices, systems, or methods.
- Facilities and Equipment (R&D Plant)

Character of R&D, FY 2011

budget authority in billions of dollars



Source: OMB R&D data, agency budget justifications, and agency budget documents.

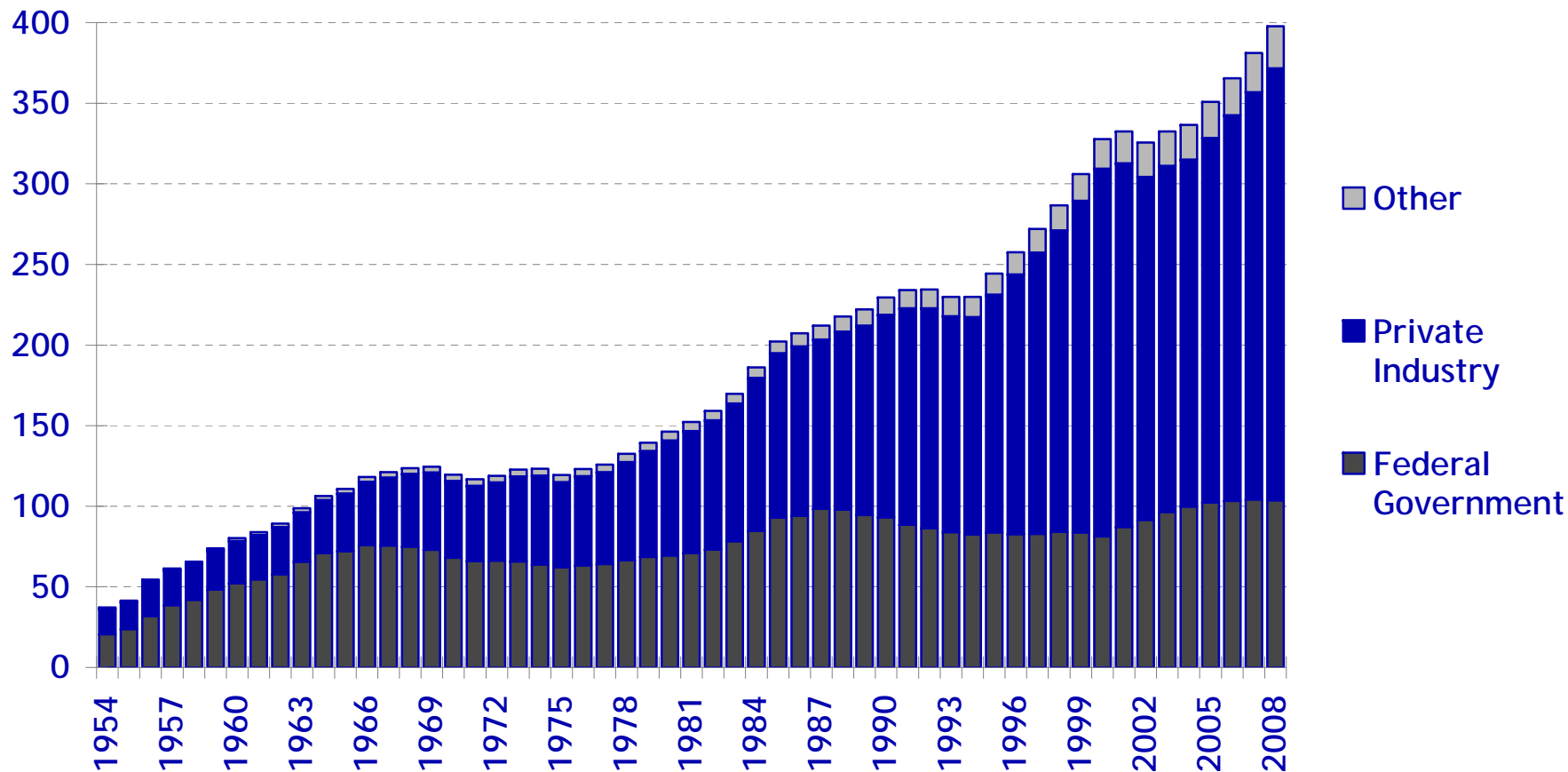
Defense R&D = DOD + DOE defense.

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Federal R&D Funding by Source

outlays in billions of constant 2008 dollars



Source: NSF, Division of Science Resources Statistics,
National Patterns of R&D Resources (NSF 08-318)

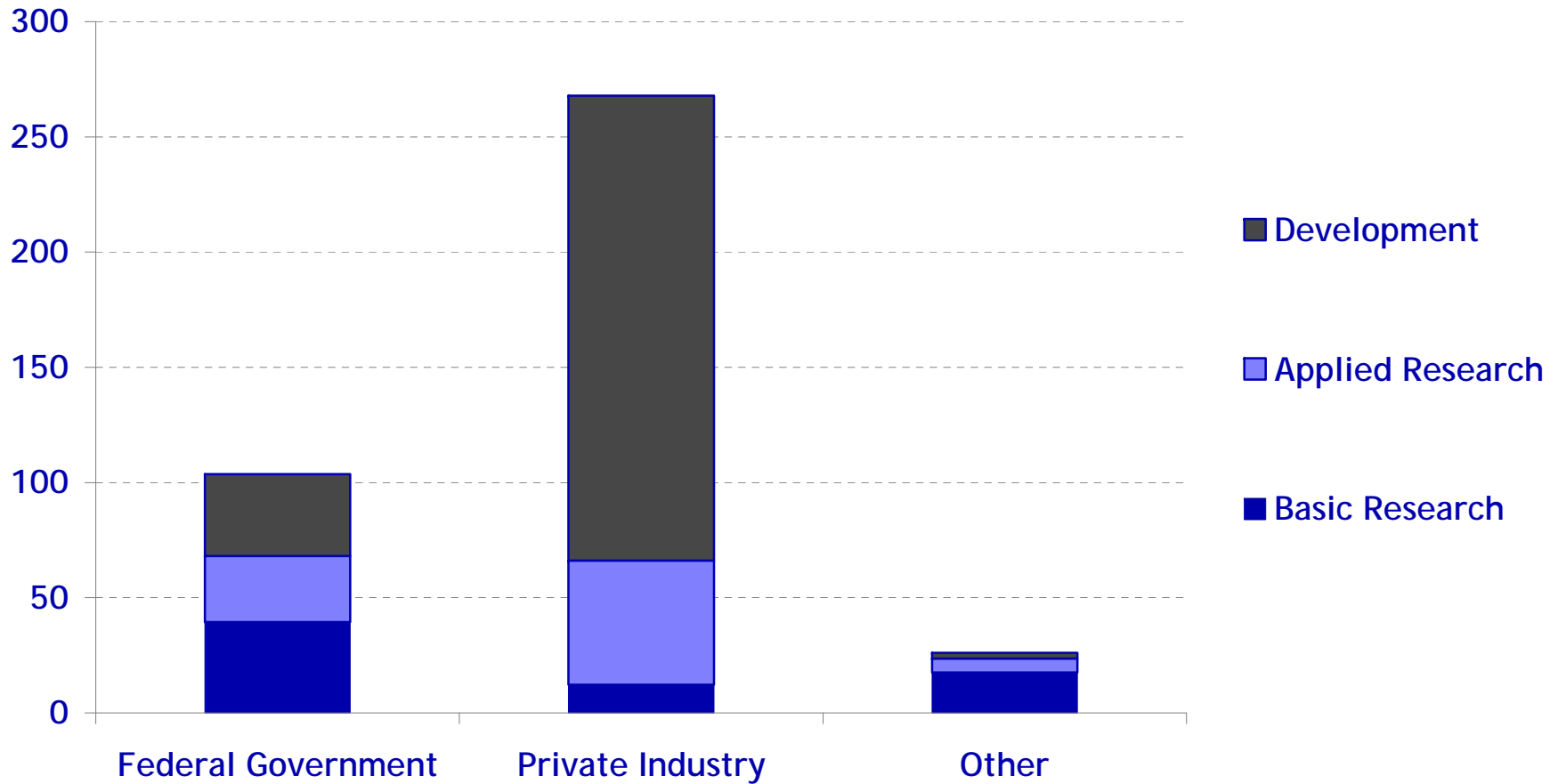
2008 figures are preliminary.

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Character of R&D, 2008

outlays in billions of dollars



Source: NSF, Division of Science Resources Statistics,
National Patterns of R&D Resources (NSF 08-318)

Figures are preliminary.

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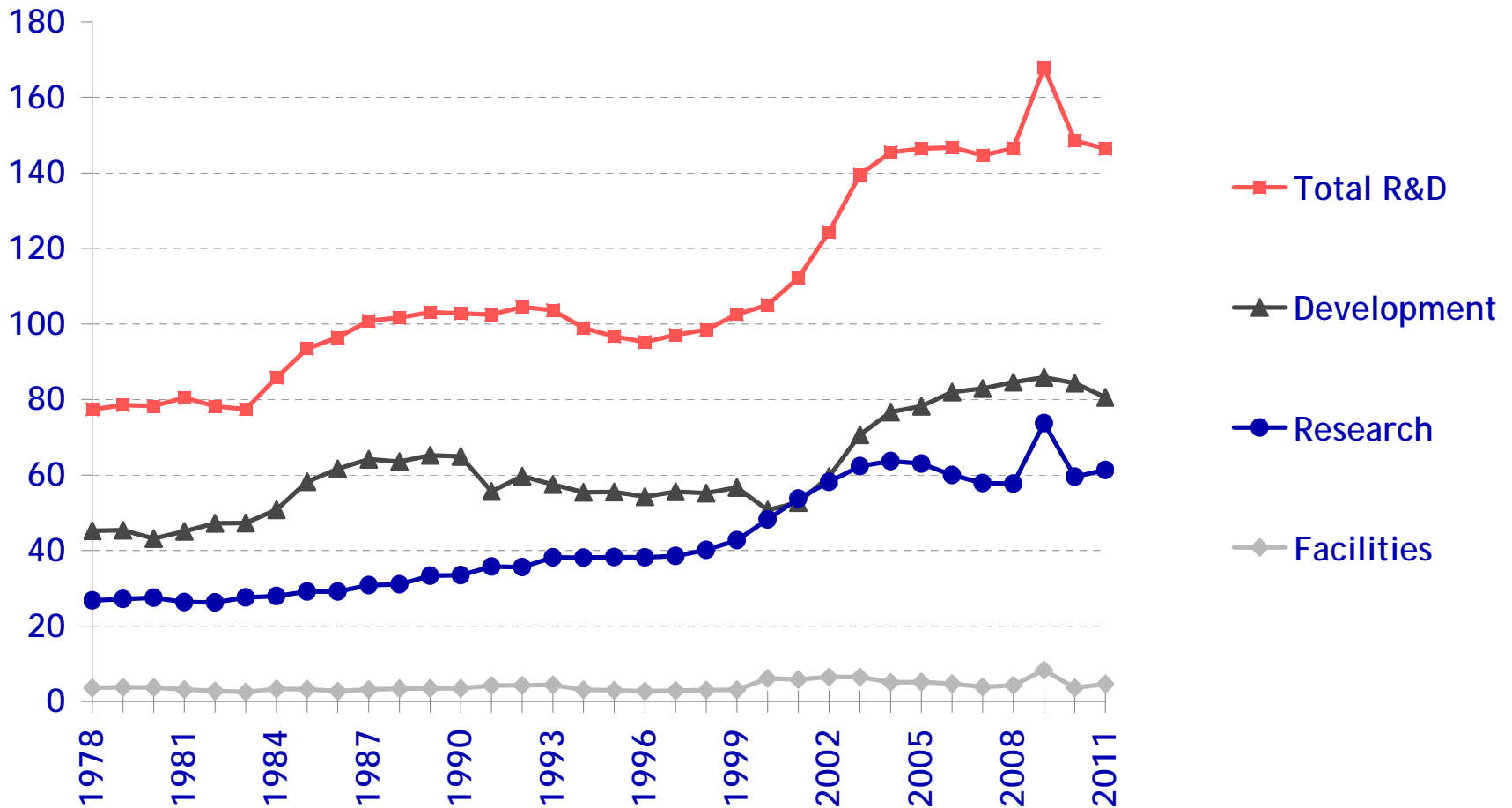


The FY 2011 Federal R&D Investment

- Total R&D: \$148.1b, -0.3% from FY 2010
 - Basic Research: \$30.4b, +4.3%
 - Applied Research: \$31.6b, +2.1%
 - Development: \$81.5b, -2.9%
 - Equipment and Facilities: \$4.6b, +1.3%
- \$82.2b for defense R&D, -4.8%
- \$65.9b for non-defense R&D, +5.9%
- -1.4% in constant dollars from FY 2010
- +0.7% in constant dollars since FY 2004
 - Peak in FY 2009

Trends in Federal R&D

in billions of constant FY 2010 dollars

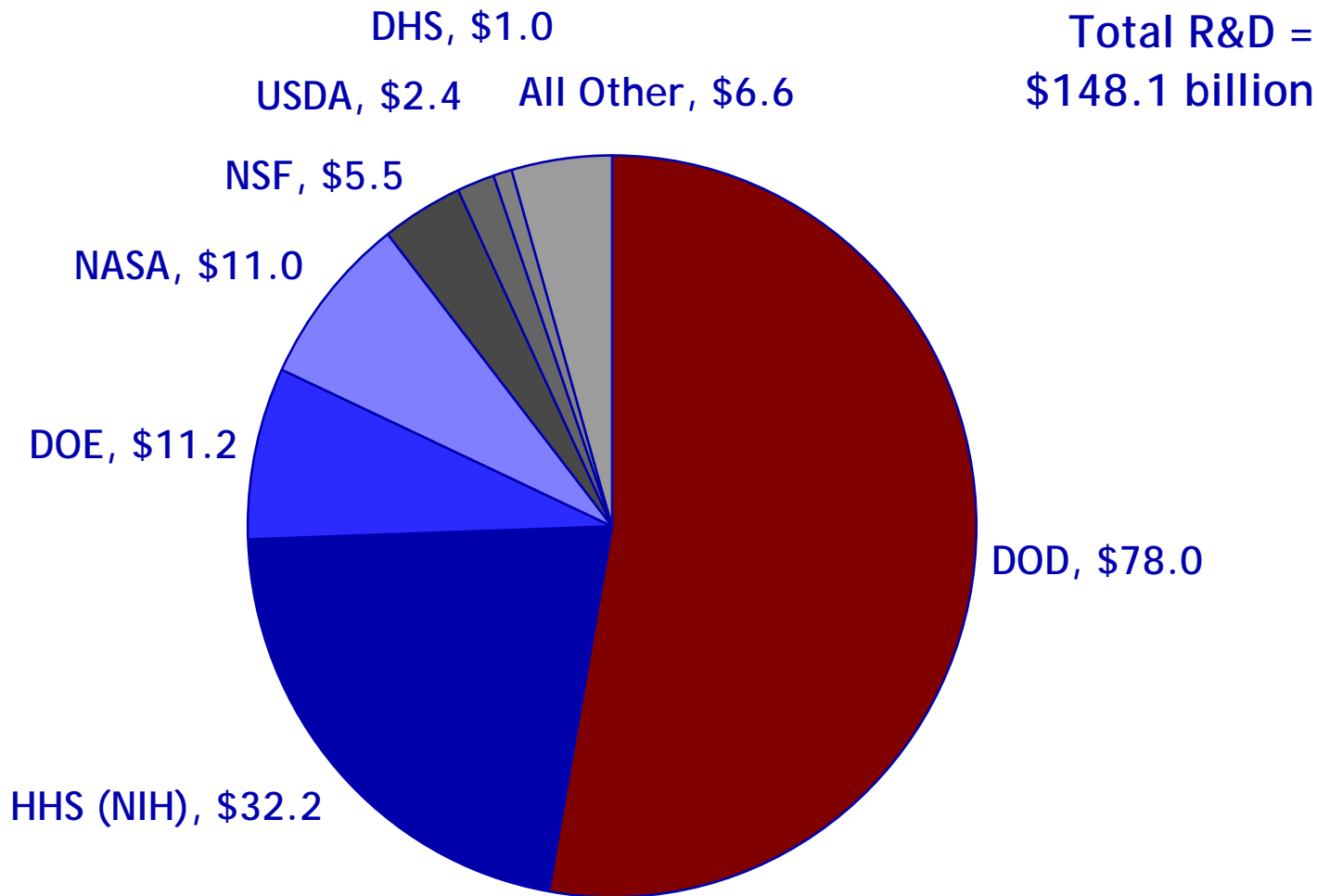


Source: AAAS analyses of R&D in annual AAAS R&D reports.
FY 2011 figures are latest AAAS estimates of FY 2011 request.
R&D includes conduct of R&D and R&D facilities.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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Total R&D by Agency, FY 2011

budget authority in billions of dollars



Source: OMB R&D budget data, agency budget justifications, and other agency documents.

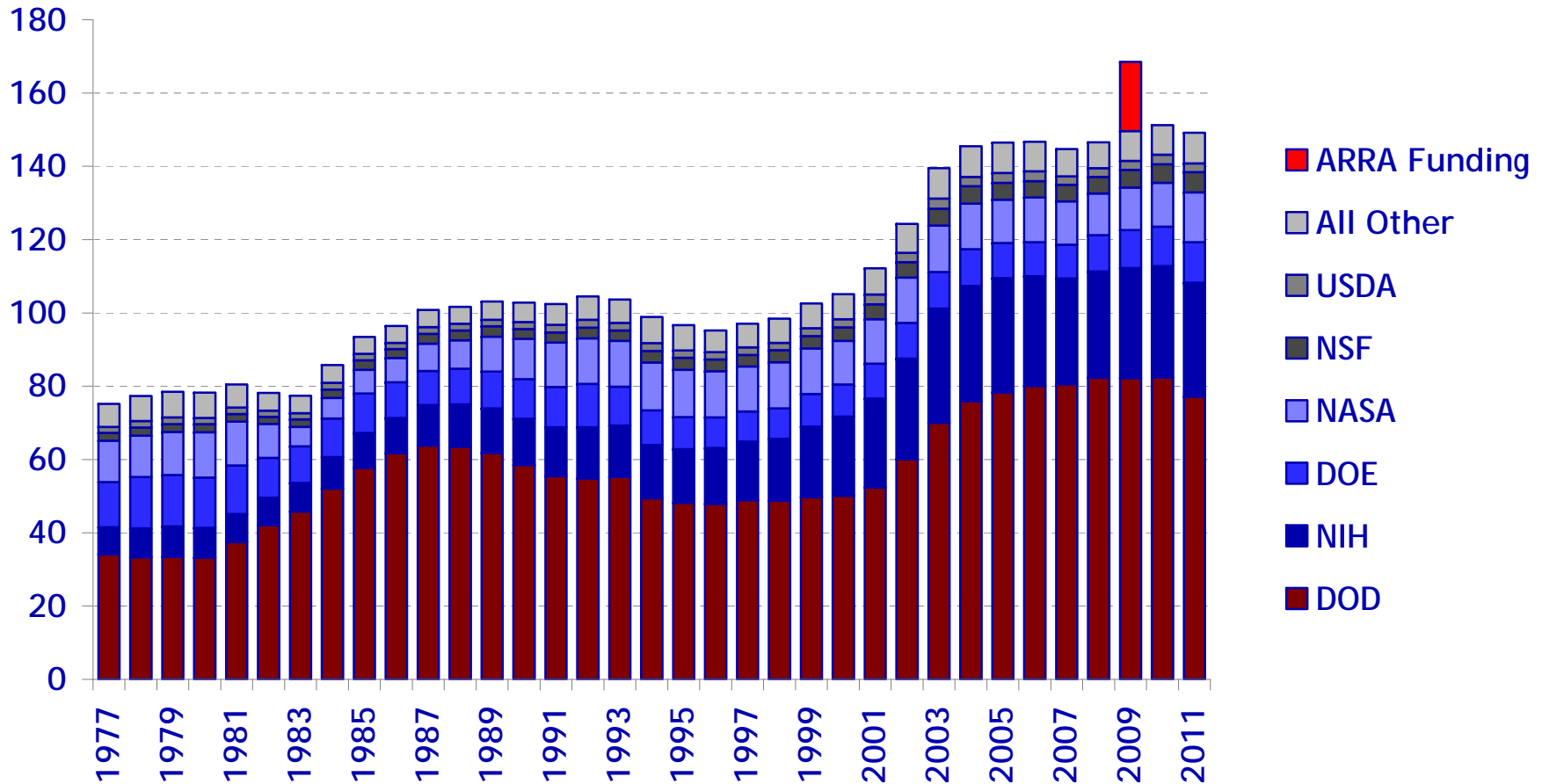
R&D includes conduct of R&D and R&D facilities.

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Trends in R&D by Agency

in billions of constant FY 2010 dollars

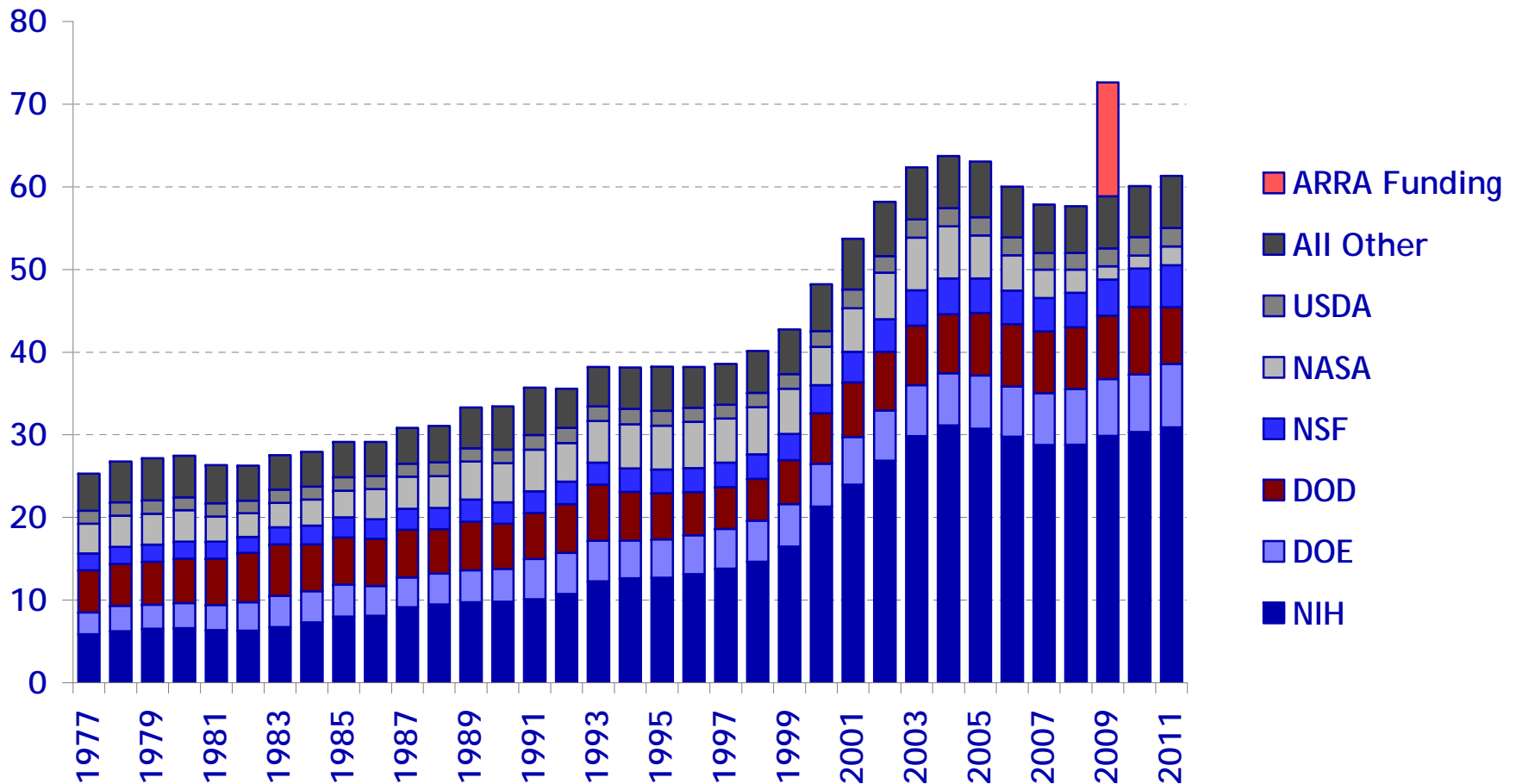


Source: AAAS Report: Research & Development series.
FY 2010 and FY 2011 figures are latest estimates.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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Trends in Research by Agency

in billions of constant FY 2010 dollars

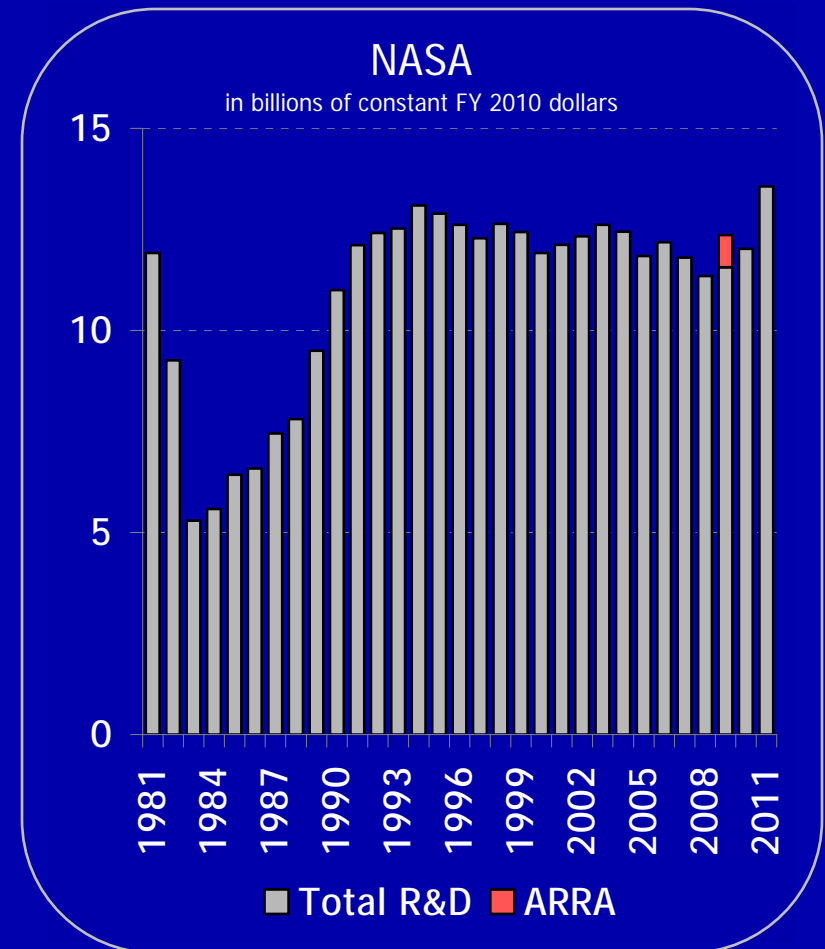


Source: AAAS Report: Research & Development series.
 FY 2010 and FY 2011 figures are latest estimates.
 Research includes basic research and applied research.
 1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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NASA

- Total R&D
 - Request: \$11.0b
 - House: \$9.7b, +4.1%
 - Senate: \$10.5b, +12.4%
- NASA Reauthorization (S.3729)
 - International Space Station through 2020
 - One additional shuttle mission
 - Commercial cargo and crew services for near-earth orbit
 - New space launch system and multi-purpose crew vehicle
 - New \$500 million Space Research and Technology Program



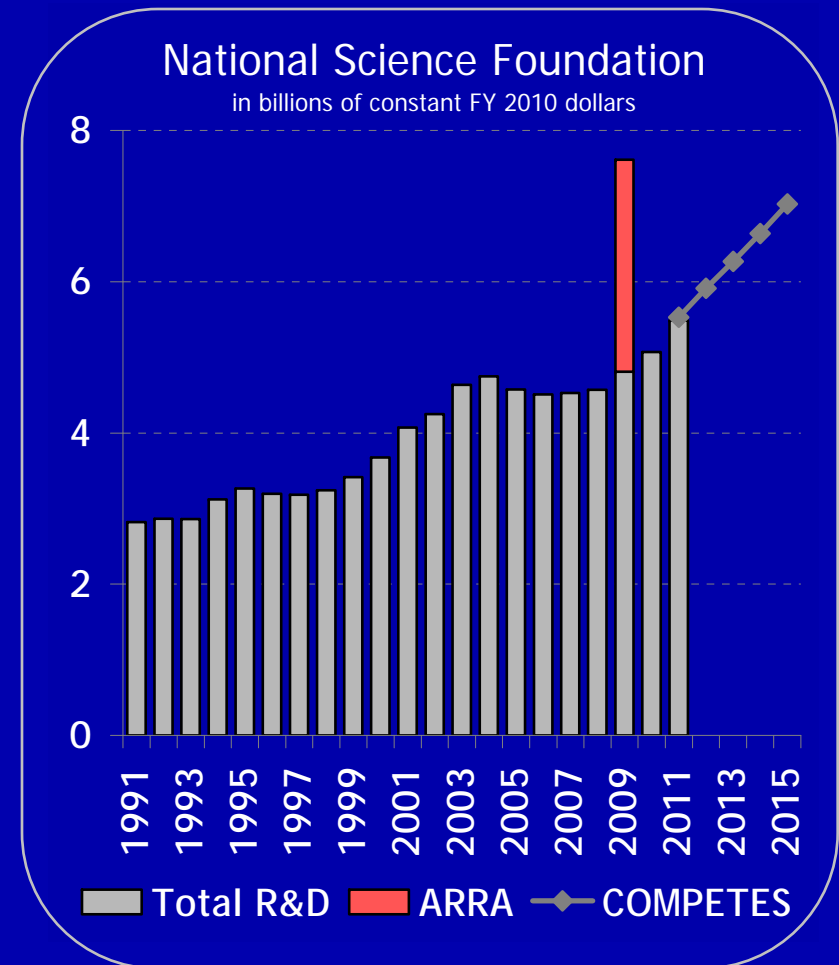
USDA

- Total R&D
 - Request: \$2.1b
 - House: \$2.2b, +4.4%
 - Senate: \$2.2b, +3.9%
- ARS R&D (Intramural)
 - Request: \$1.1b
 - House: \$1.2b, -3.3%
 - Senate: \$1.3b, +0.0%
- AFRI Total (Extramural)
 - Request: \$429m, +63.4%
 - House: \$312m, +18.9%
 - Senate: \$310m, +18.1%



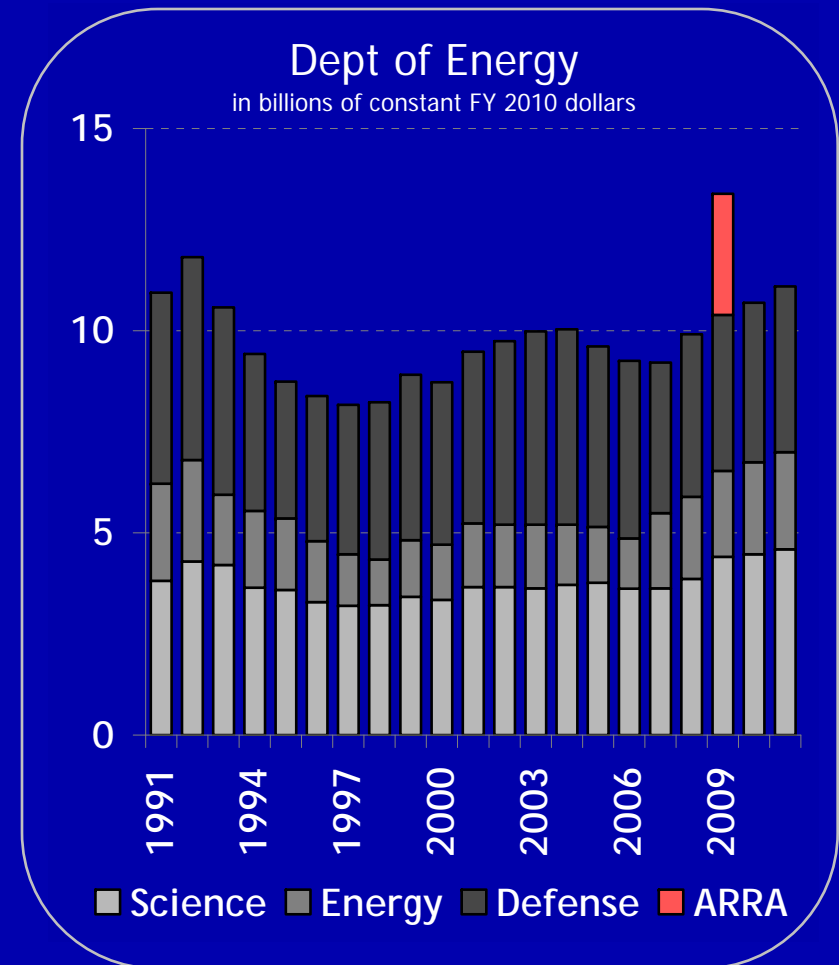
National Science Foundation

- Total
 - Request: \$7.42b
 - House: \$7.42b, +8.0%
 - Senate: \$7.35b, +7.0%
- R&D
 - Request: \$5.54b
 - House: \$5.50b, +8.6%
 - Senate: \$5.49b, +8.3%
- National Innovation Strategy
- Workforce Development
- Broadening Participation



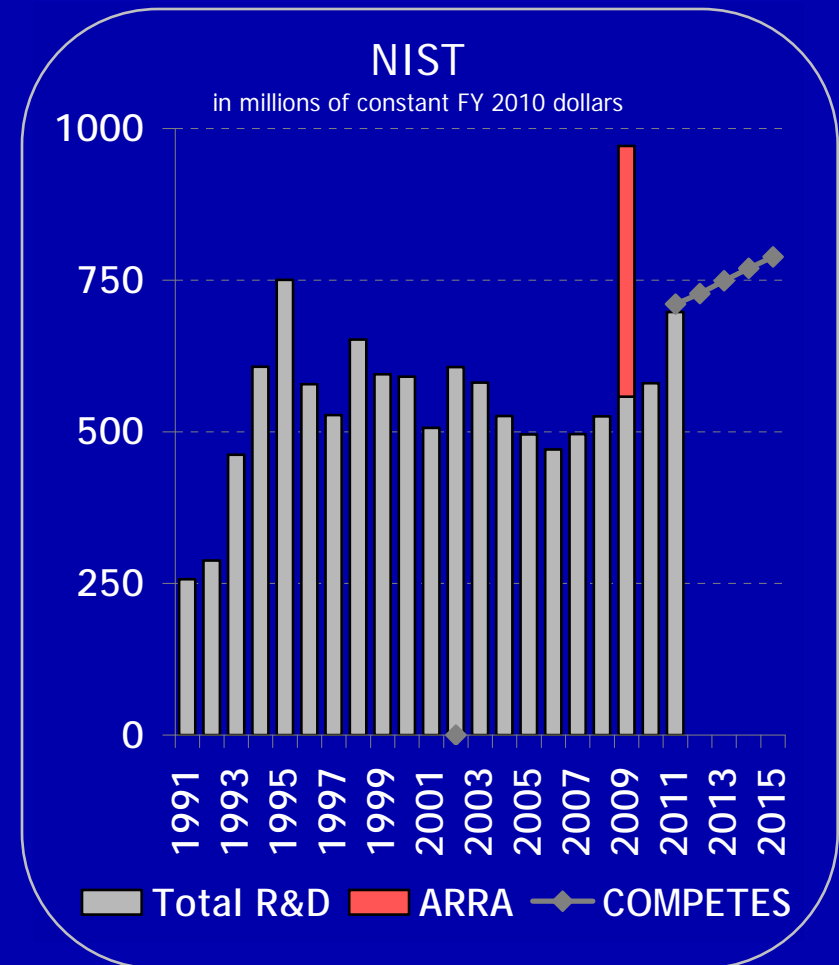
Department of Energy

- Total R&D
 - Request: \$11.2b
 - House: \$10.9b, +1.6%
 - Senate: \$11.0b, +3.3%
- Office of Science
 - Request: \$5.1b
 - House: \$4.9b, -0.1%
 - Senate: \$5.0b, 2.2%
- ARPA-E
 - Request: \$300m
 - House: \$220m
 - Senate: \$200m



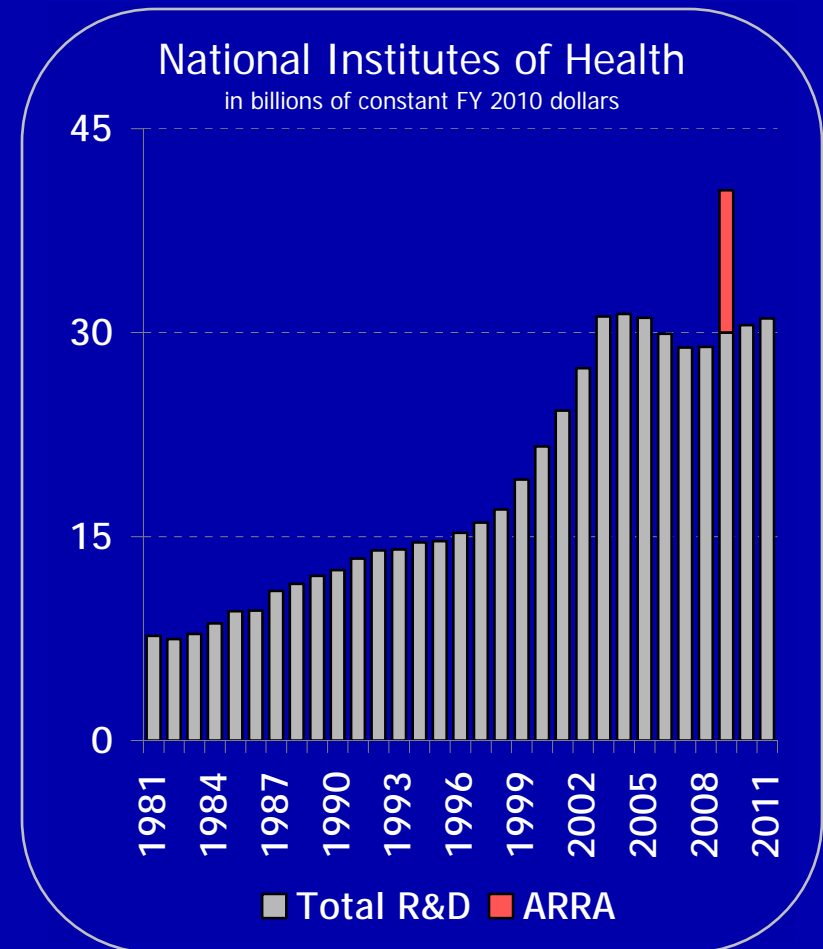
NIST

- Total R&D
 - Request: \$705m
 - House: \$673m, +16.1%
 - Senate: \$734m, +26.6%
- NIST Labs R&D (STRS)
 - Request: \$521m
 - House: \$491m, +9.0%
 - Senate: \$521m, +15.6%
- Competitive Manufacturing and Construction in a Clean-Energy Economy
 - +\$34.6 million



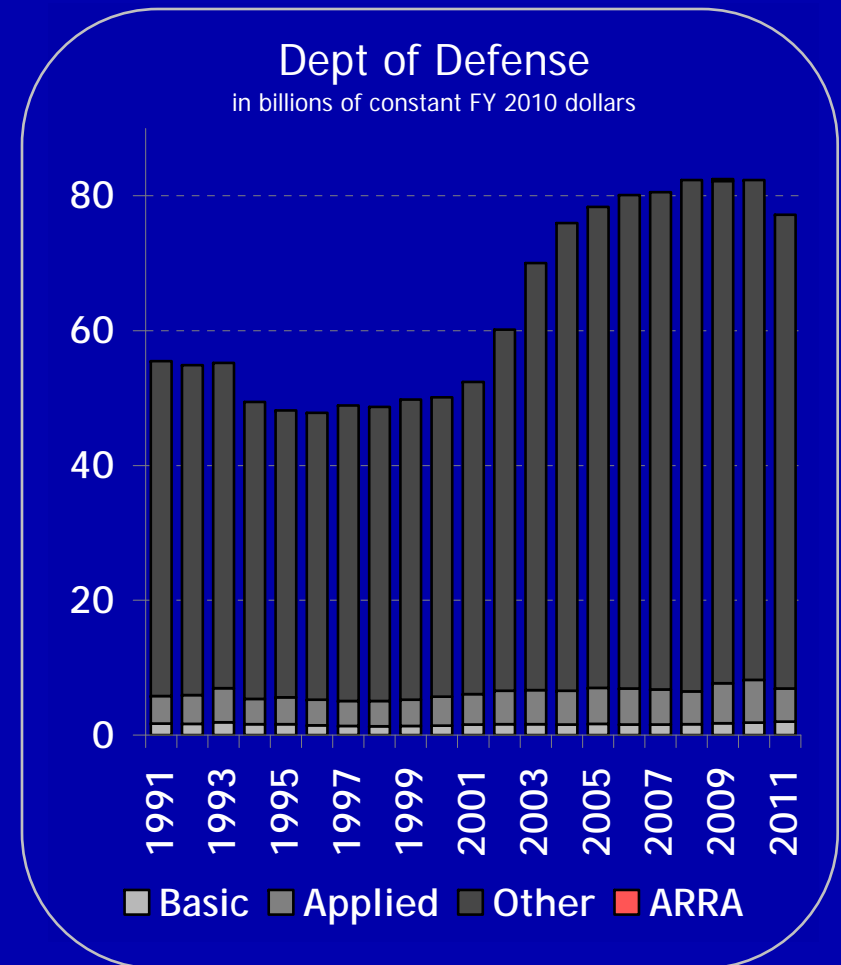
National Institutes of Health

- Total
 - Request: \$32.2b
 - House: \$32.2b, +3.2%
 - Senate: \$32.2b, +3.2%
- Cancer and autism spectrum disorders
- AIDS research - Global Fund
- National Nanotechnology Initiative: +6.0% to \$382m
- Therapeutics for Rare and Neglected Diseases (TRND)
- National Synchrotron Light Source-II (NSLS-II): \$33m



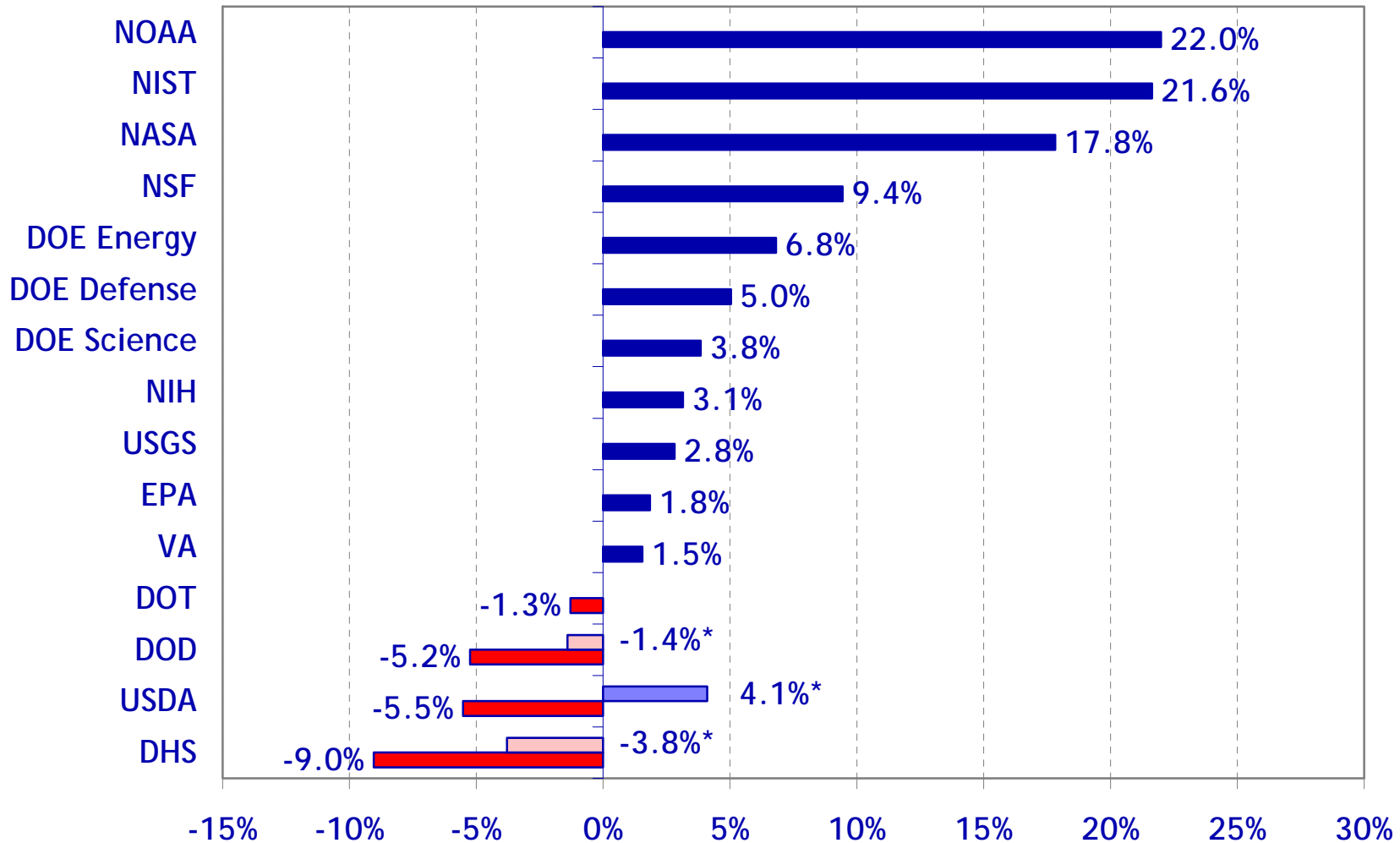
Department of Defense

- Total R&D
 - Request: \$78.4b
 - House: \$79.3b, -5.1%
 - Senate: \$79.3b, -5.1%
- S&T (6.1-6.3 + medical)
 - Request: \$12.4b
 - Senate: \$14.0b, -5.5%
- From major weapons systems to counter insurgency in future years



R&D in the FY 2011 Budget Request

percent change from FY 2010



Source: OMB R&D budget data, agency budget justifications, and other agency documents.

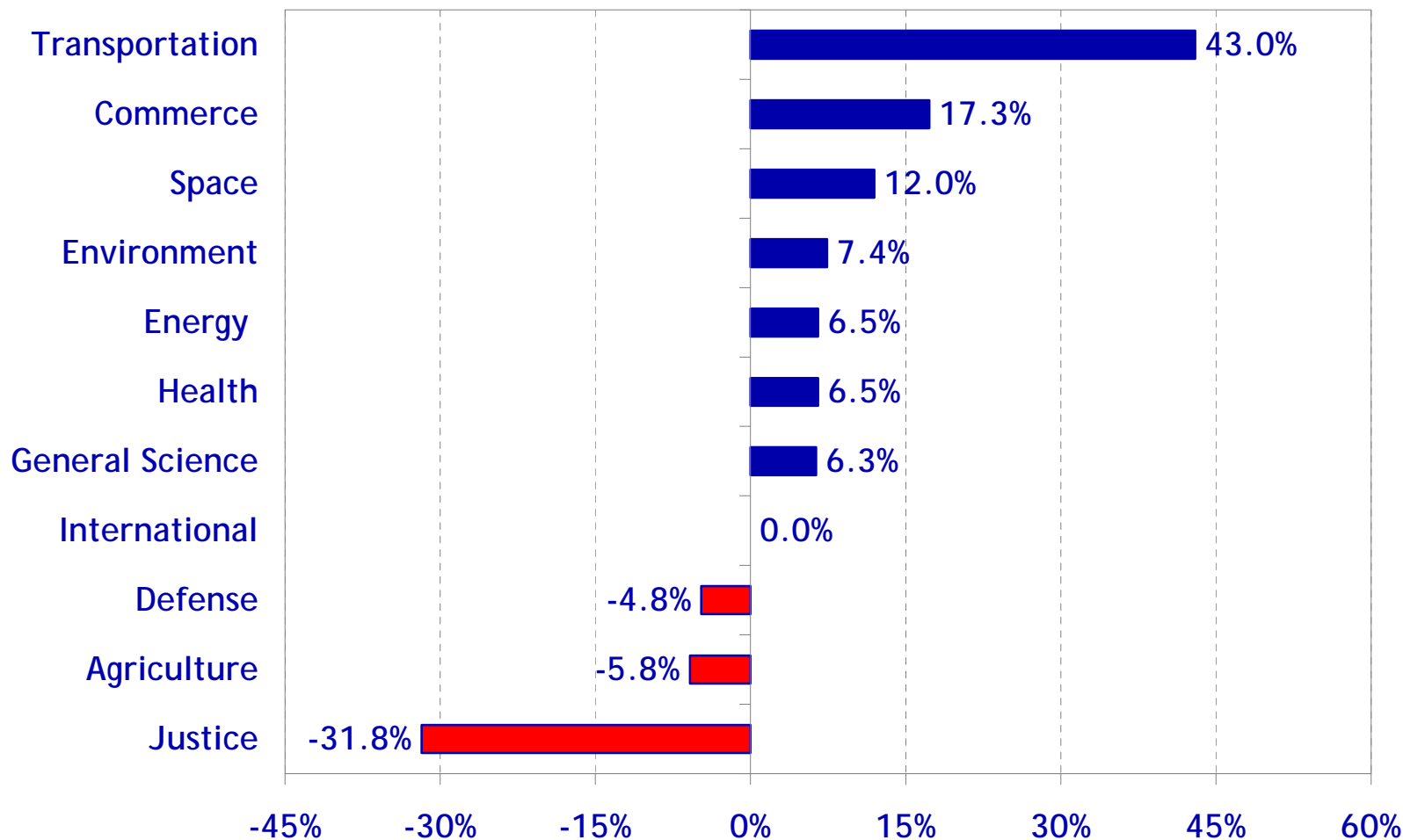
* - Lighter colored bars indicate percent change with projected FY 2011 earmarks.

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FY 2011 R&D Budget Request by Function

percent change from FY 2010



Source: OMB and agency budget data.
Environment includes natural resources R&D
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STEM Education

- \$3.7b, +\$32m from FY 2010
- K-12 Education
 - Dept of Ed: \$450m, NASA: \$63m, NSF: \$41m
- RE-ENERGYSE (Undergraduate)
 - NSF: \$19m, DOE: \$55m
- Undergraduate Diversity
 - NSF: +14% to \$103m
- Graduate Fellowships
 - NSF: +16% to \$158m, NIH: +5% to \$824m, EPA: +55% to \$17m
DOD: +4% to \$40m, DOE: +\$10m to \$15m

Next Steps

- So far, the House has passed 2 appropriation bills and have subcommittee approval of 9 others. The Senate Appropriations Committee has reported on 11 bills, but none have passed the full Senate.
- Congress passed a CR which extends funding until December 3.
- Fall elections will push budget action back to November, December, or even 2011 and it will likely be in the form of an omnibus bill.
- FY 2012: OMB Memos: 5% reduction; list of low-impact programs totaling 5% of discretionary budget. Initial budget submissions were due to OMB by September 13.

FY 2012 R&D Challenges

- Promoting sustainable economic growth and job creation
- Defeating the most dangerous diseases and achieving better health outcomes for all while reducing health care costs
- Moving toward a clean energy future to reduce dependence on energy imports while curbing greenhouse gas emissions
- Understanding, adapting to, and mitigating the impacts of global climate change
- Managing the competing demands on land, fresh water, and the oceans for the production of food, fiber, biofuels, and ecosystem services based on sustainability and biodiversity
- Developing the technologies to protect our troops, citizens, and national interests

Industry Innovation Initiatives

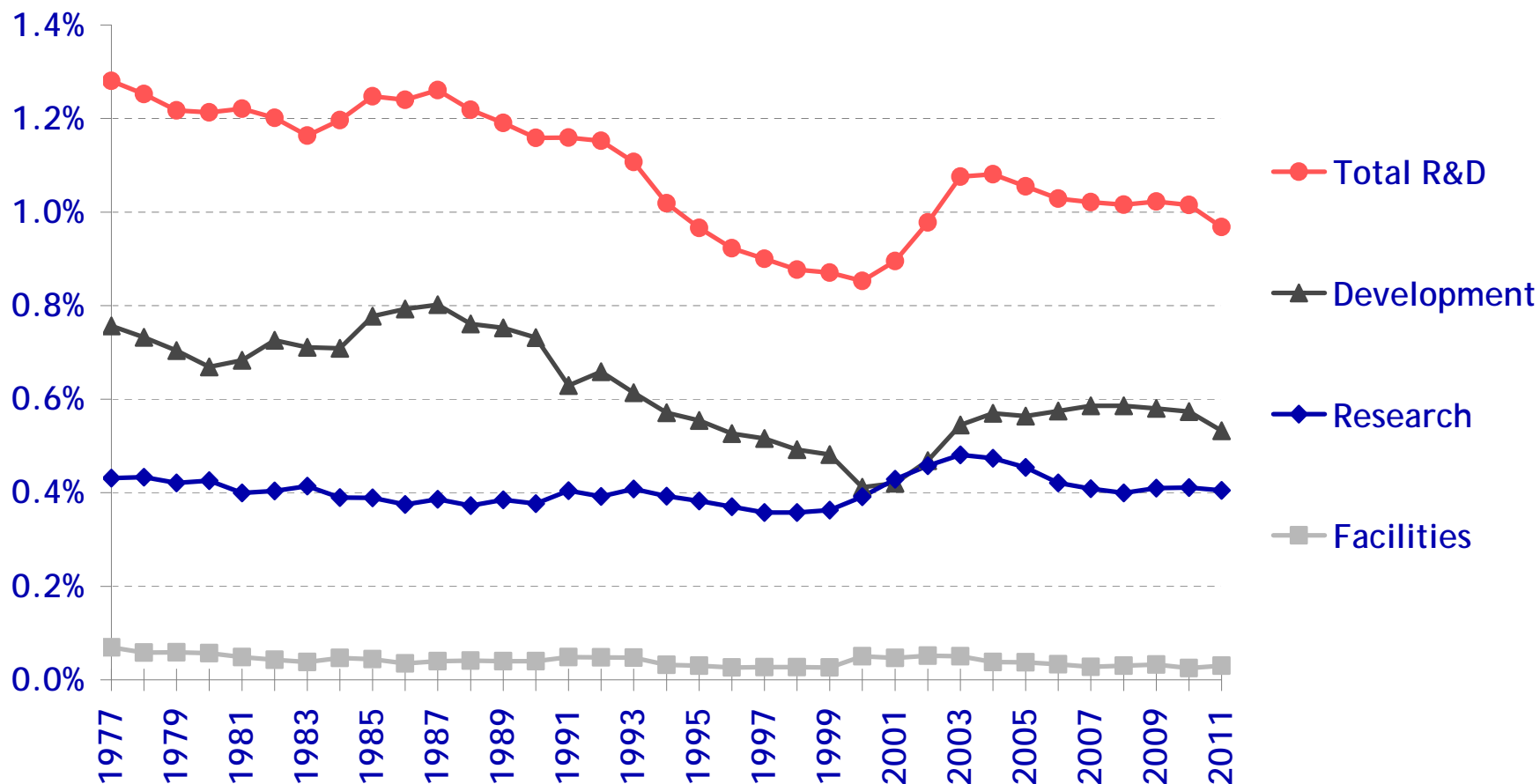
- S.3839 - SBIR/STTR Extended through January 31, 2011
 - Keeps same percentages (SBIR: 2.5%, STTR: 0.3%)
- R&D Tax Credit Proposal
 - Make the tax credit permanent
 - Increase simple formula credit from 14 to 17 percent
- ARRA Report: \$100 billion in innovation
 - \$18.7 billion in R&D
- H.R.5297 - Small Business Jobs and Credit Act
 - \$30 billion small business lending fund
 - \$12 billion in tax breaks
- "Make it in America" Agenda
- Patent Reform

International R&D Investment

- The United States leads the world in R&D investment
 - \$369b PPP, 35.7% of world R&D investment
- But, others are quickly increasing their investment
 - Over 1997 - 2007,
 - South Korea, +0.99% of GDP to 3.47%
 - China, +0.85% of GDP to 1.49%
 - Taiwan, +0.81% of GDP to 2.63%
 - Japan, +0.57% of GDP to 3.44%
 - United States, +0.10% of GDP to 2.68%
- President Obama set goal of 3.0% of GDP investment in R&D

Trends in Federal R&D

percent of GDP



Source: AAAS Report: Research and Development series.

FY 2011 figures are latest AAAS estimates of the FY 2011 request.

R&D includes conduct of R&D and R&D facilities.

Data to 1984 are obligations from the NSF Federal Funds survey.

GDP figures are from *Budget of the U.S. Government FY 2011*.

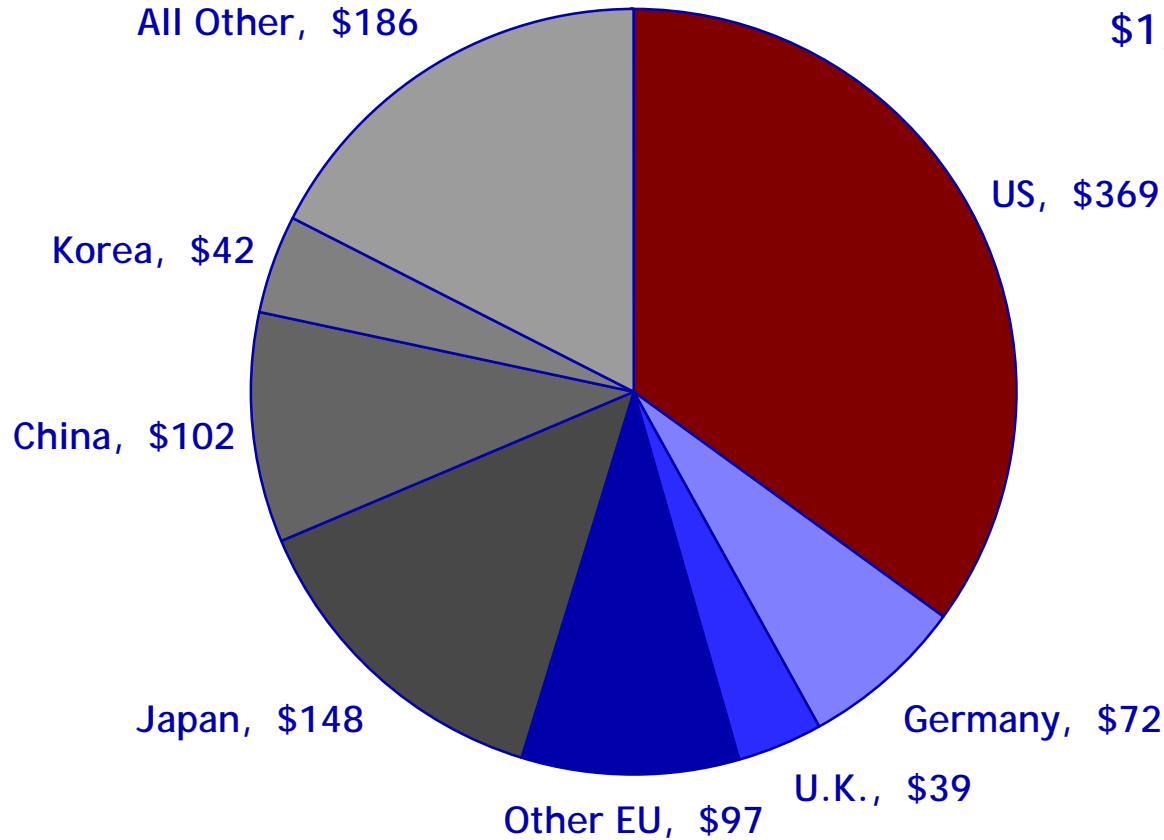
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Total World R&D, 2007

in billions of PPP \$

Total World R&D =
\$1,054 billion



Source: OECD, Main Science and Technology Indicators, May 2009.

World = OECD members plus Argentina, China, Israel, Romania,
Russian Federation, Singapore, Slovenia, South Africa, Taiwan.

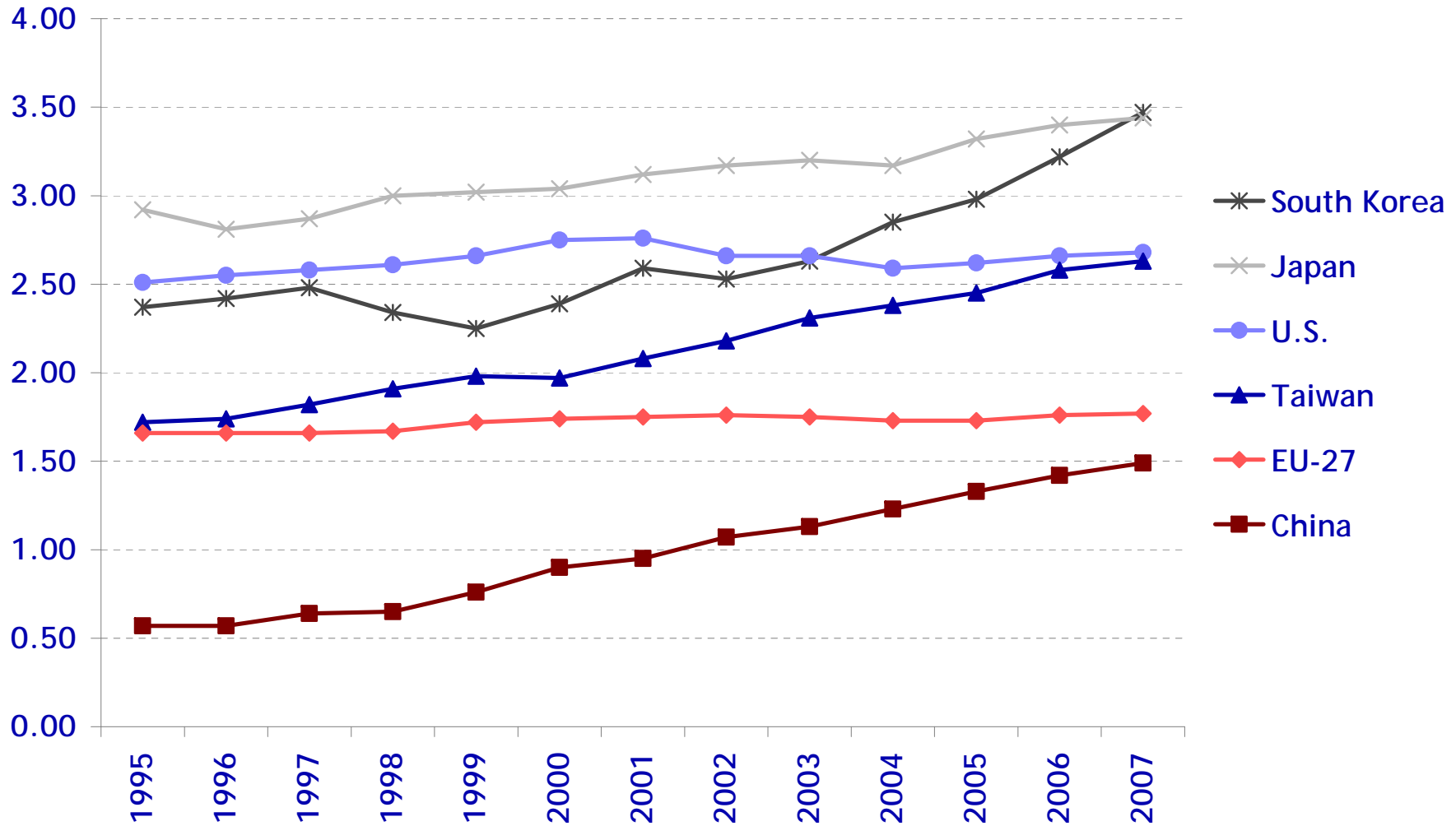
Calculated using purchasing power parities.

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National R&D Investment

percent of GDP



Source: OECD, Main Science and Technology Indicators, May 2009.

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For More Information...

The AAAS R&D web site is
<http://www.aaas.org/spp/rd/>

Twitter: @AAAS_RDBudget

The FY 2012 AAAS Forum on
Science and Technology Policy
is May 5-6, 2011
in Washington, DC

AAAS REPORT XXXV Research & Development FY 2011

Intersociety Working Group

