

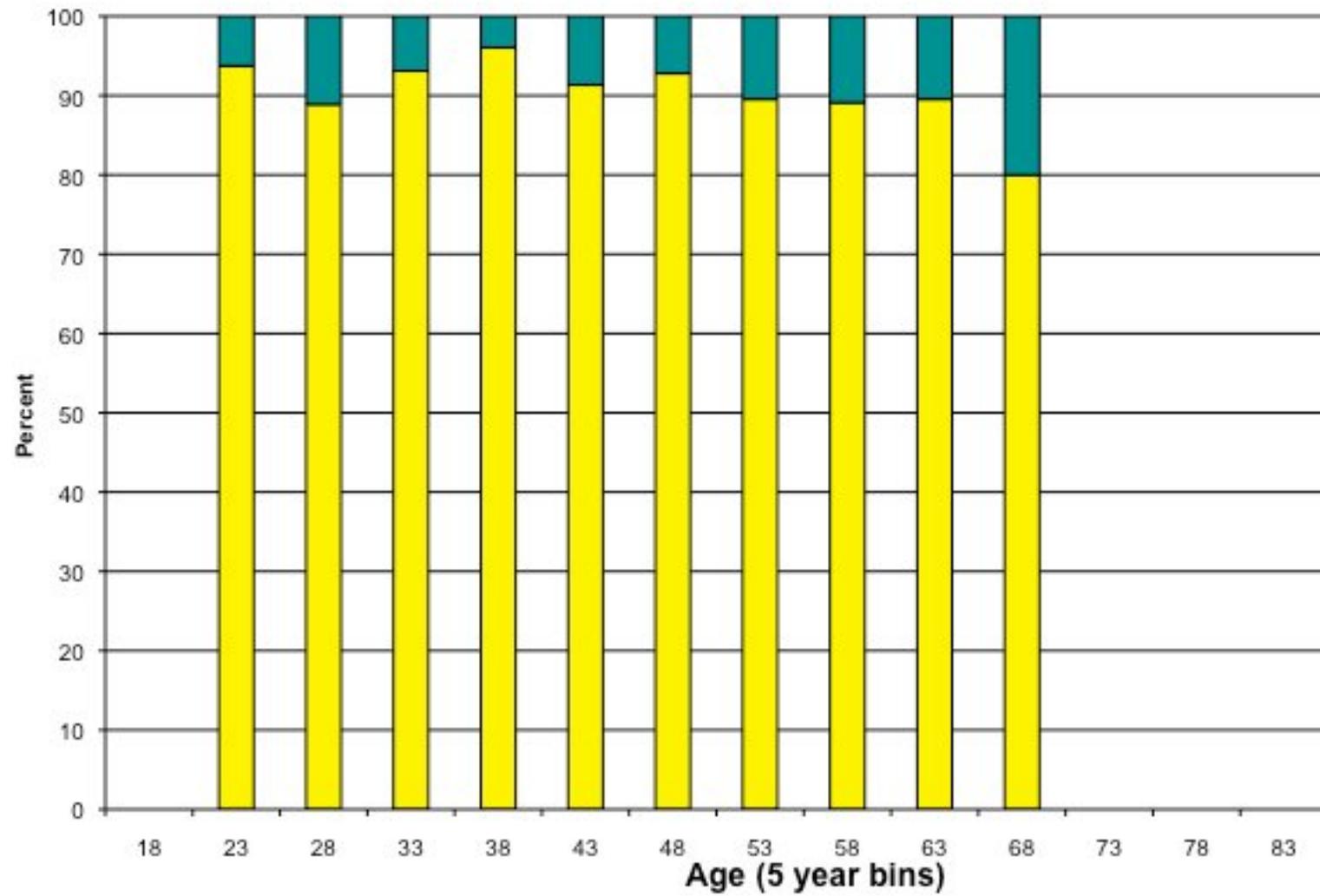
THE LONG DRY SEASON
SCIENCE FUNDING
IN THE USA
KEVIN MARVEL
EXECUTIVE OFFICER
AMERICAN ASTRONOMICAL SOCIETY

18 June 2010 – IPPW – Barcelona, Spain

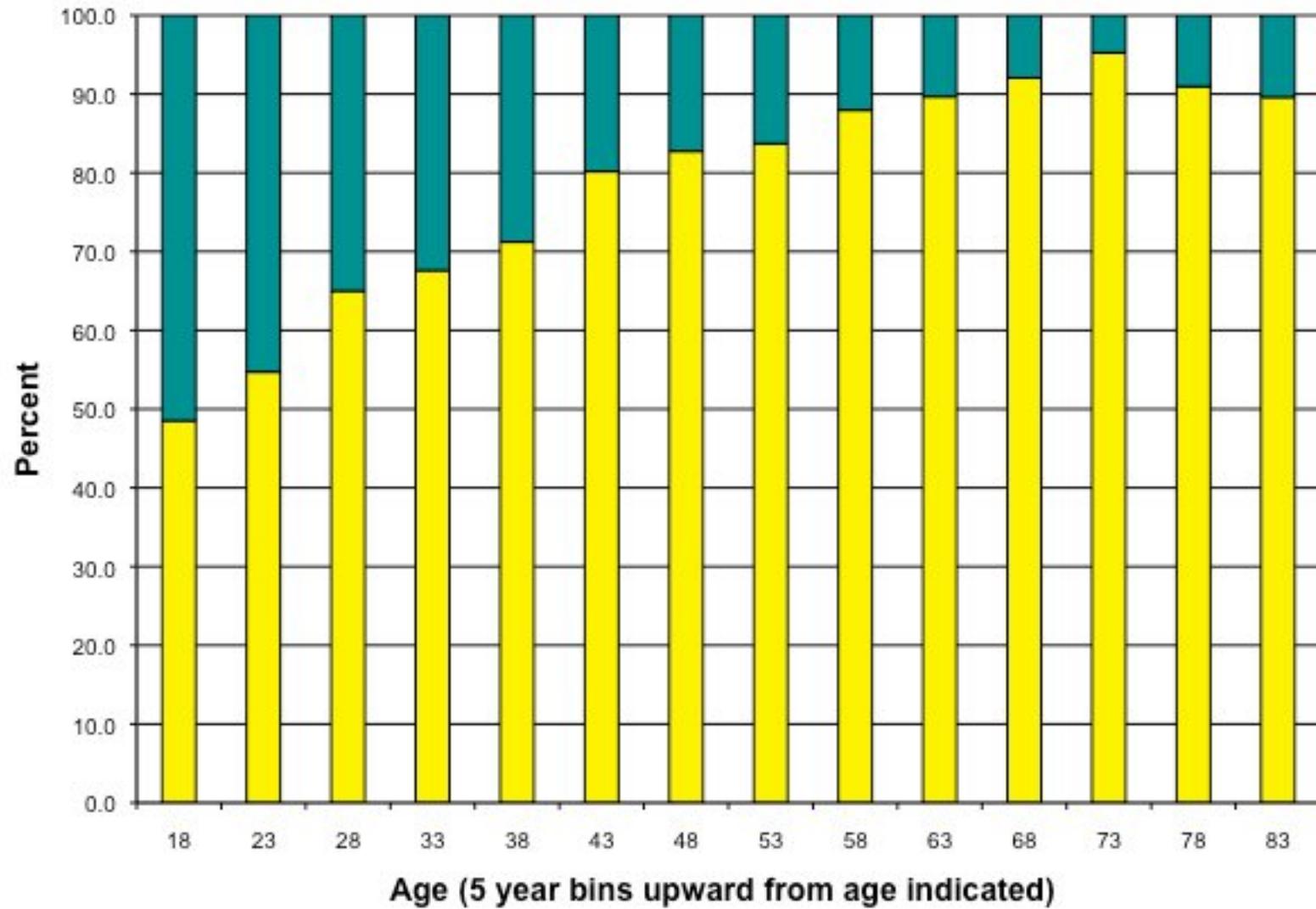
What is the American Astronomical Society?

- Largest professional membership organization for astronomy and closely related fields (e.g. planetary science) More than 7600 members total with about 1500 international members.
- We have five specialized divisions, including the DPS, Division for Planetary Science.
- We organize many (and the largest) astronomy-related science conferences in the world, >3 meetings per year.
- Publish the major research journals (~ 35k pages per year: ApJ, ApJL, AJ
- Public Policy, Education, Outreach, Job Register, etc.
- Based in Washington, DC, USA

1973 AAS Membership Distribution



2010 AAS Membership Gender Distribution



What is astronomy policy?



- Actions that impact astronomy
 - ▣ Presidential priorities – Energy vs. Human Space Flight vs...
 - ▣ Agency decisions – e.g. the importance of research grants vs. projects...
 - ▣ Funding decisions...balance of investment
 - ▣ To build or not to build
 - ▣ To cancel or not to cancel
 - ▣ Rules regulating publishing or data archiving
 - ▣ Visa issues relating to free movement of engineers & scientists (and information sharing)

The Government and Science funding



- In astronomy and planetary science, the government is the major funder of research.
- Actions the government takes can negatively impact our engineering & research...big time.
- If you don't make noise, you don't exist.

Where does US Astronomy get its funding?



- NASA
 - ▣ ~ 75% of total, mainly related to space missions
- NSF
 - ▣ ~ 15% of total, minimal planetary funding
- Department of Energy (DOE)
 - ▣ ~ 5% of total, mainly high energy astrophysics
- Department of Defense (DOD)
 - ▣ ~5% of total, for 'military' purposes

AAAS US R&D Budget Analysis



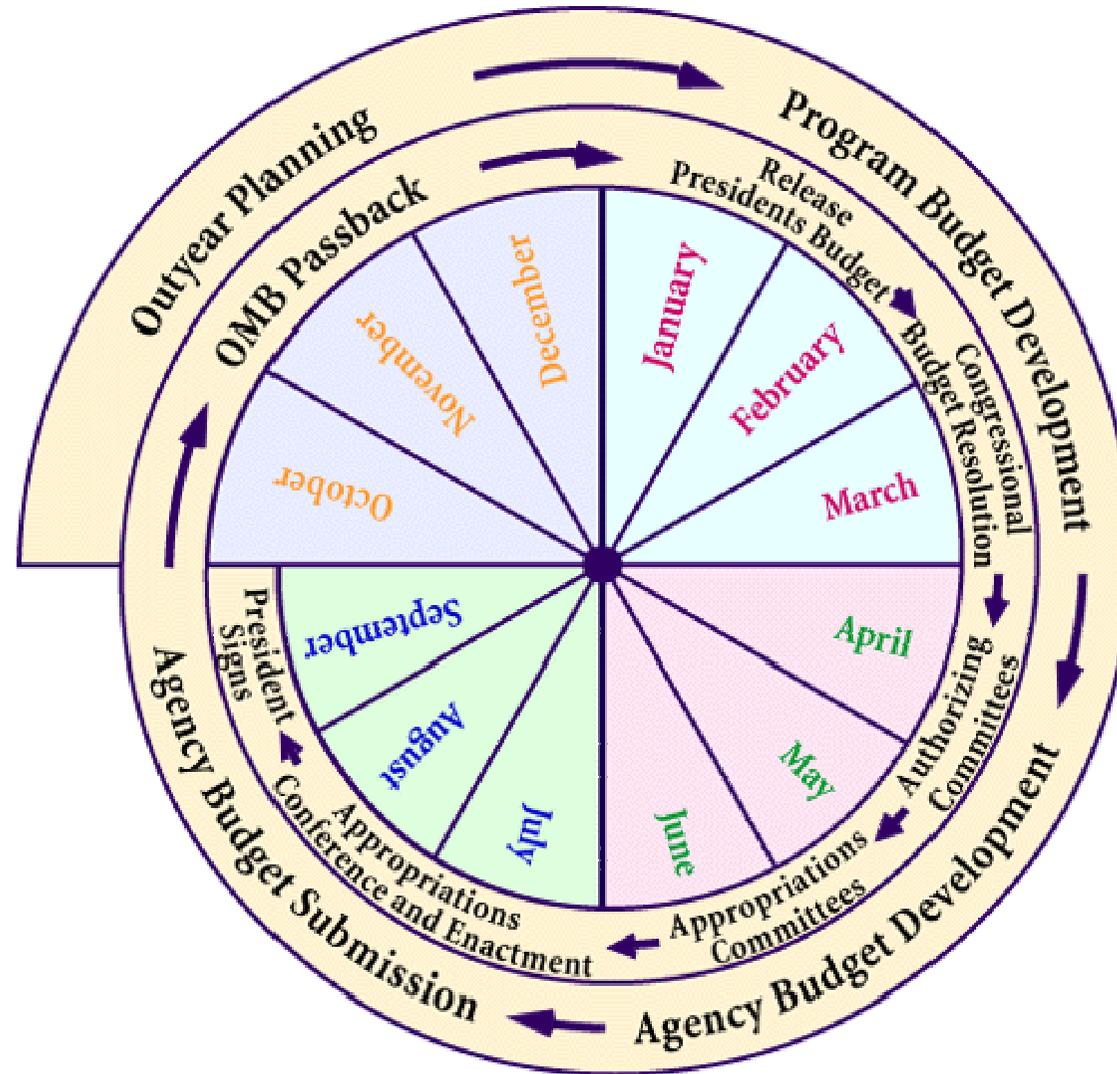
Best source of information
on the budget

Special chapters on
agencies

Special chapters on
disciplines

Special chapters on trends
and budget context

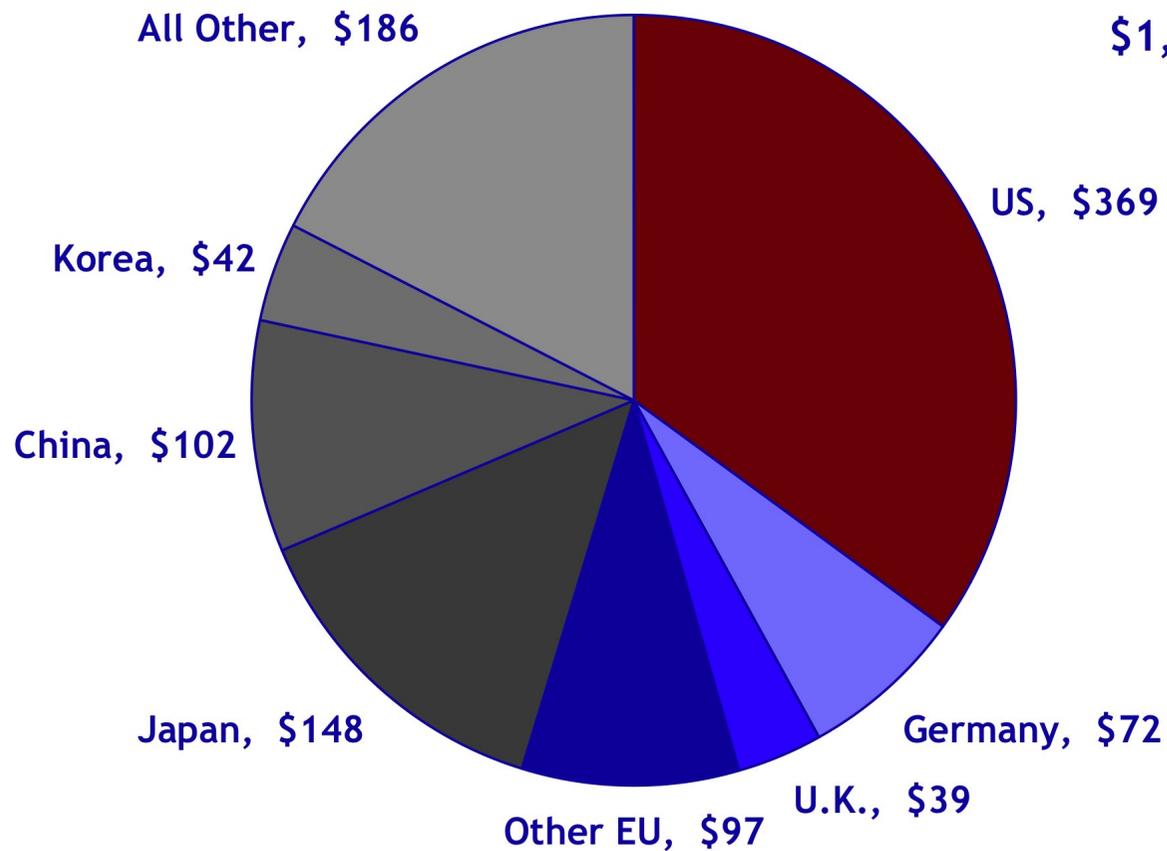
The Budget Cycle



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.

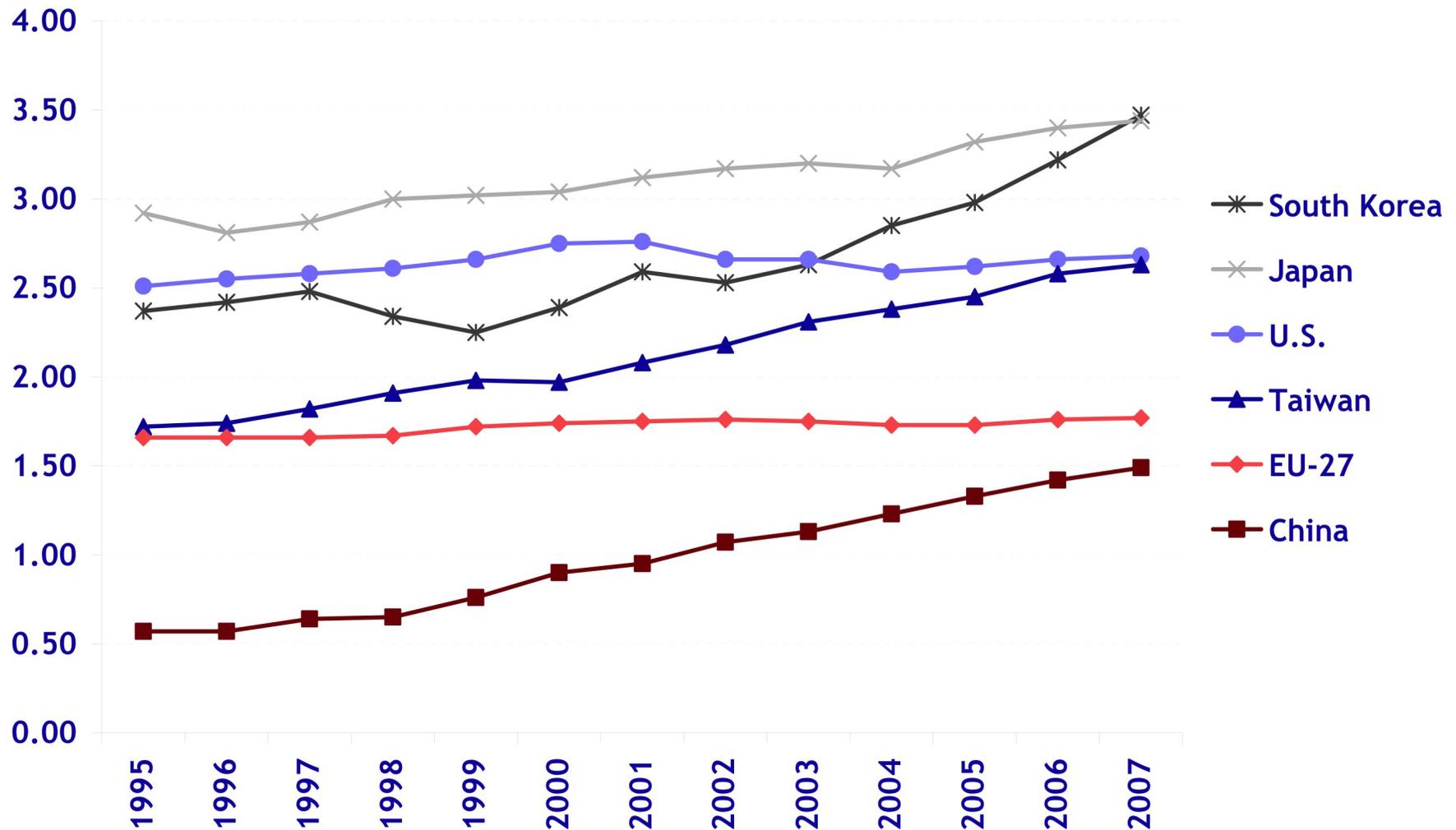
Calculated using purchasing power parities.

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National R&D Investment

percent of GDP

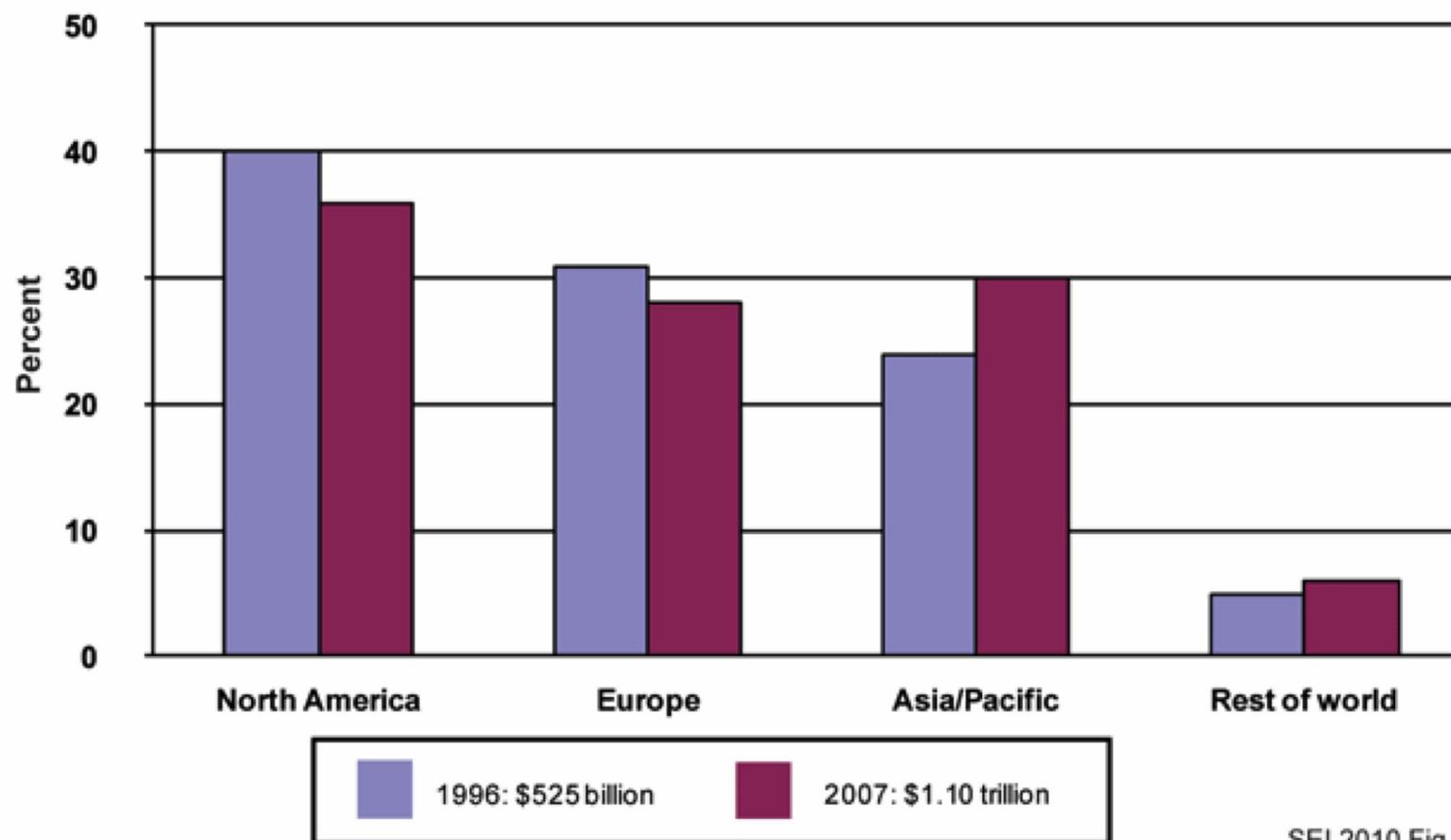


Source: OECD, Main Science and Technology Indicators, May 2009.

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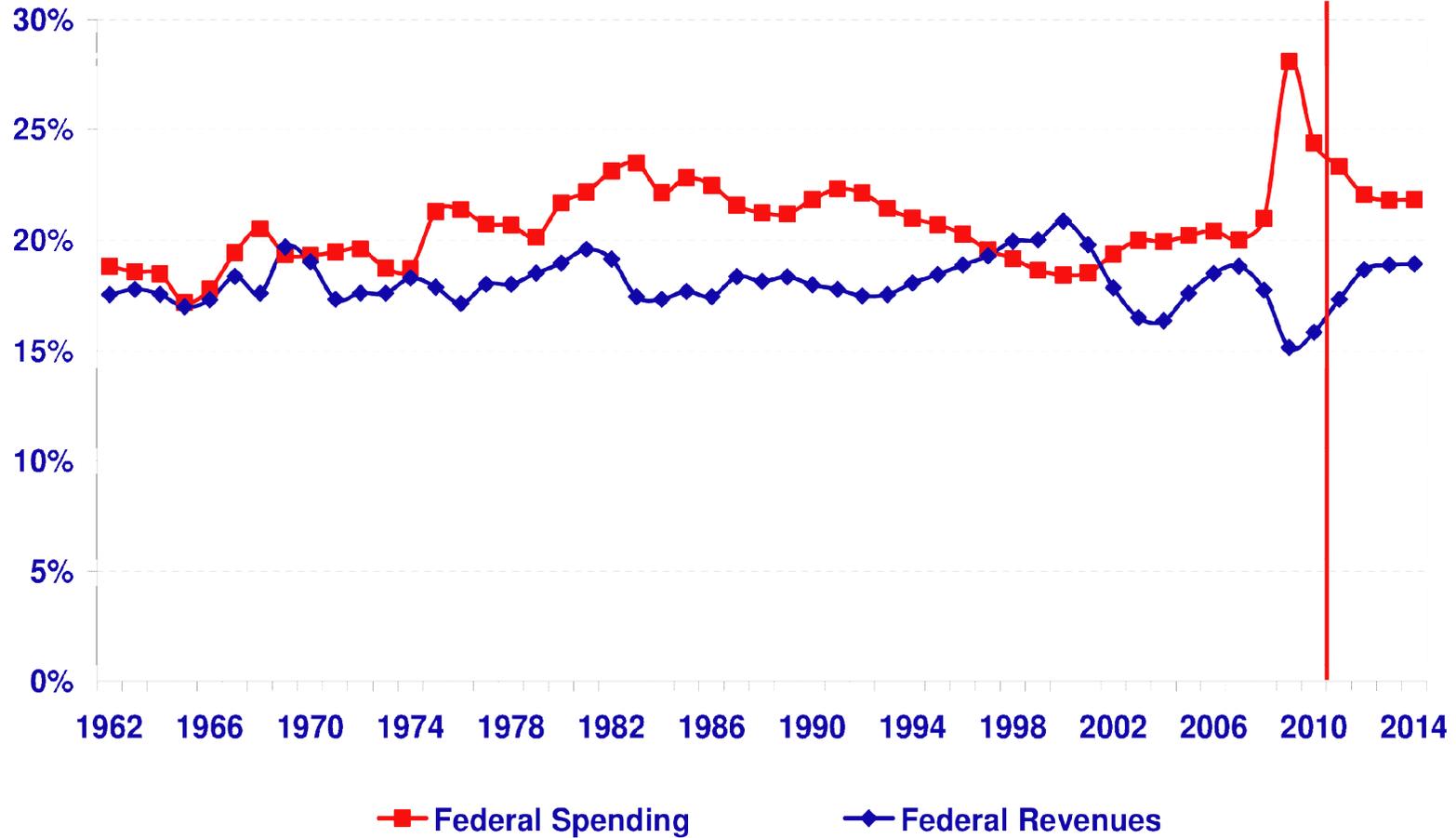
Figure 1: Location of Estimated Worldwide R&D Expenditures: 1996 and 2007



SEI 2010 Fig. 0-5

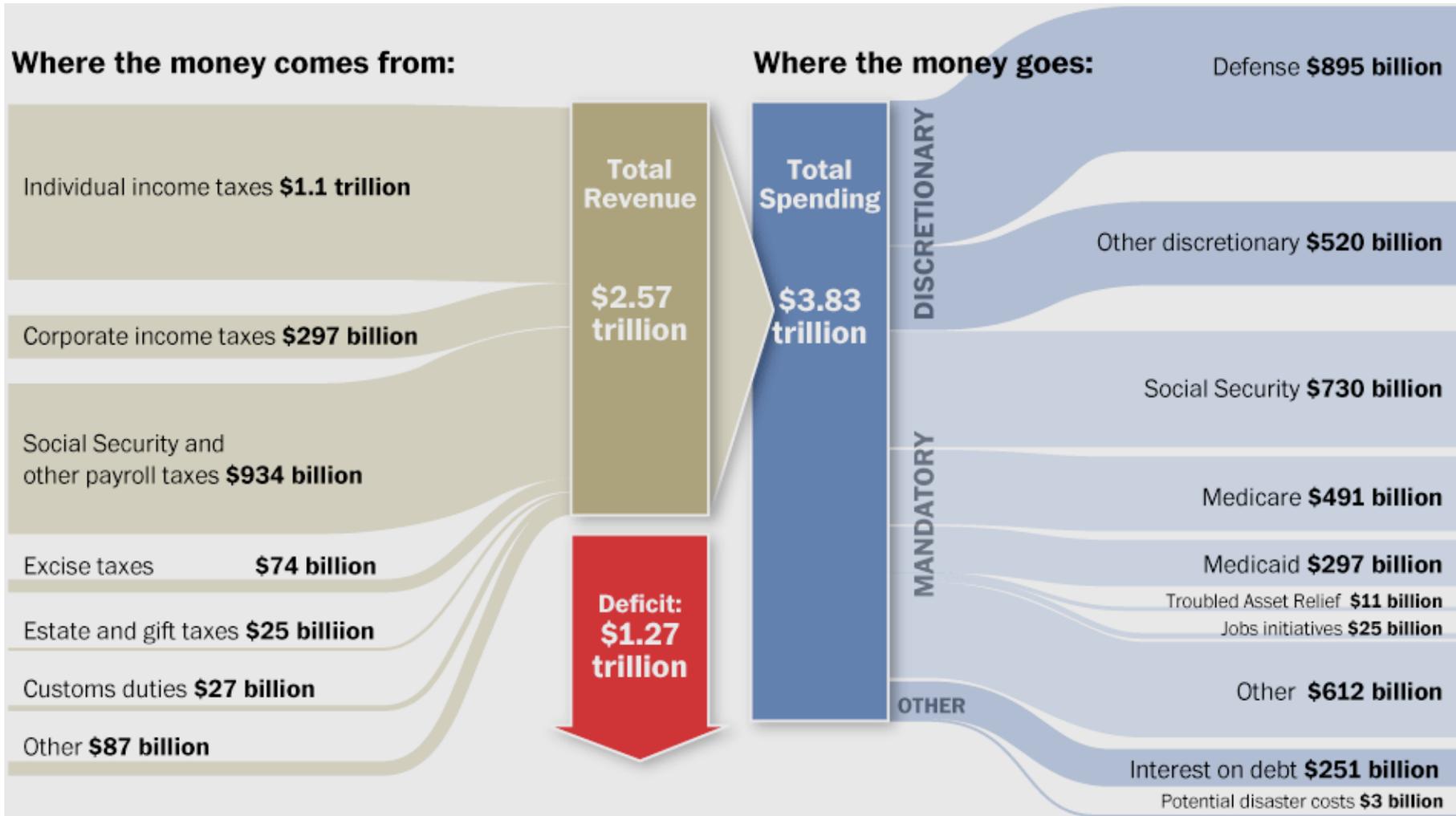
Federal Spending and Revenues

(percent of GDP)



Source: *Budget of the United States Government, FY 2010*.
FY 2009 data are estimates. FY 2010-2014 data are budget projections.
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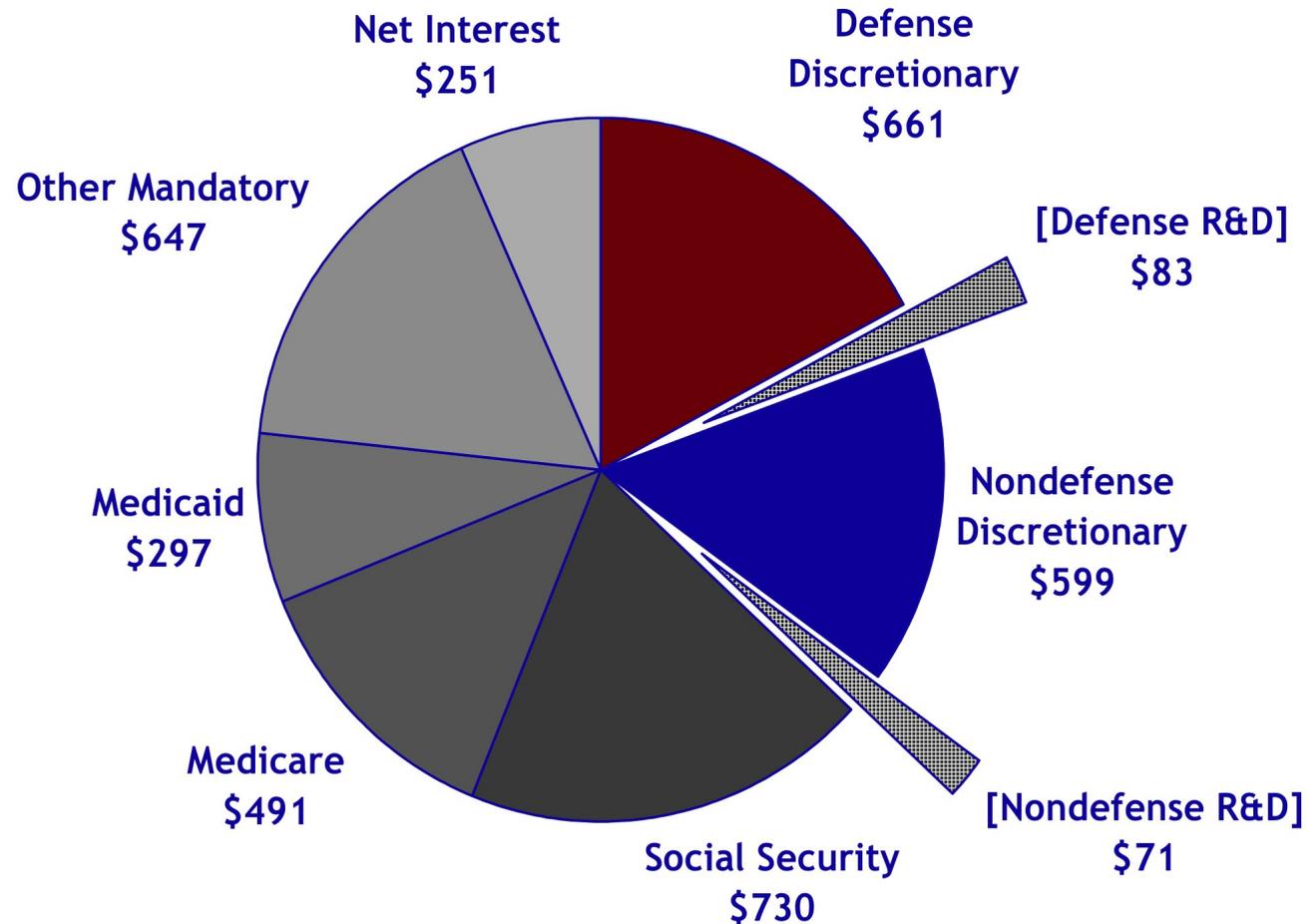


Credit: Washington Post, www.washingtonpost.com/obama-budget

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.*

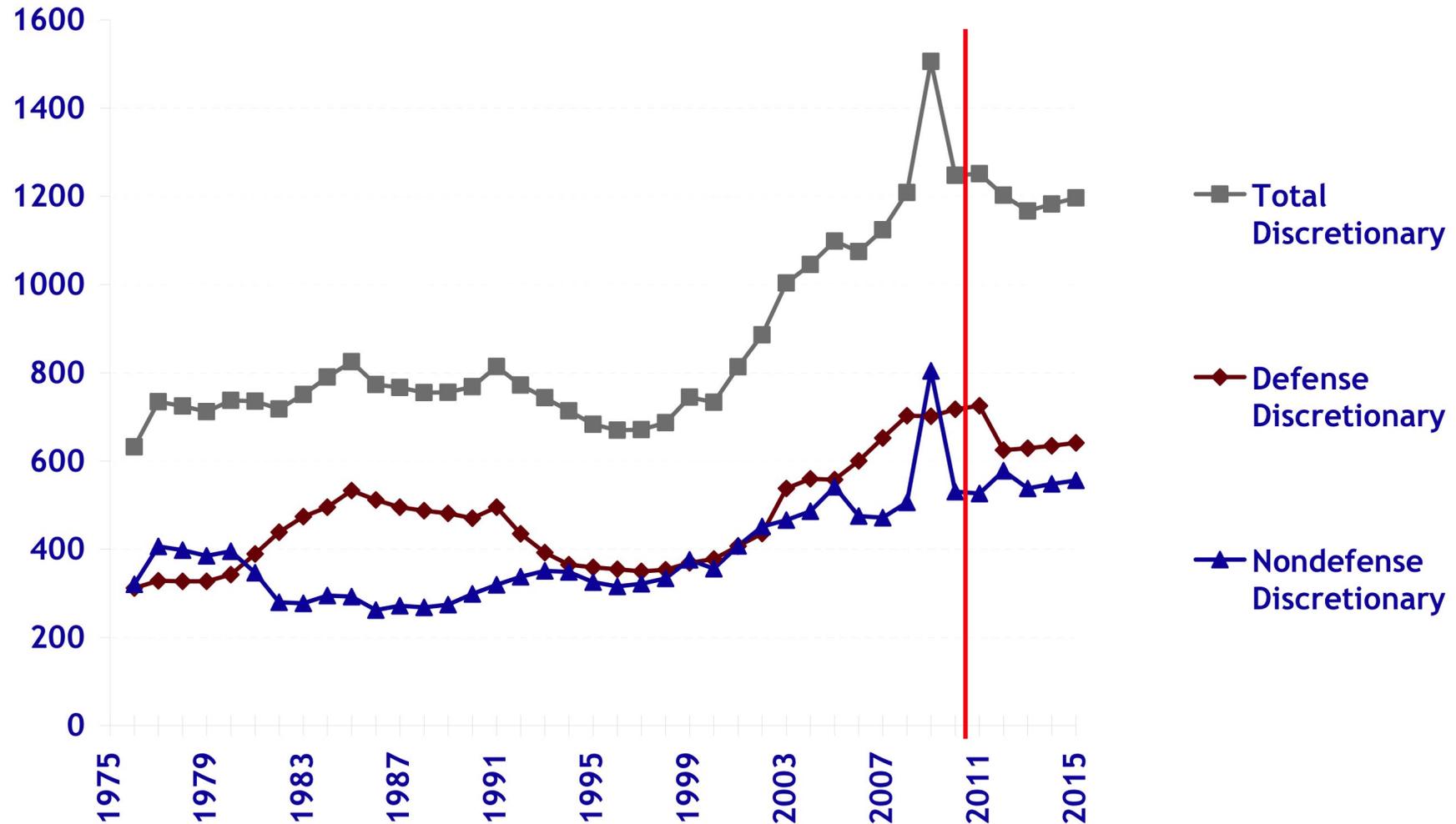
Projected unified deficit is \$1.3 trillion.

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Trends in Discretionary Spending

outlays in billions of constant FY 2010 dollars



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

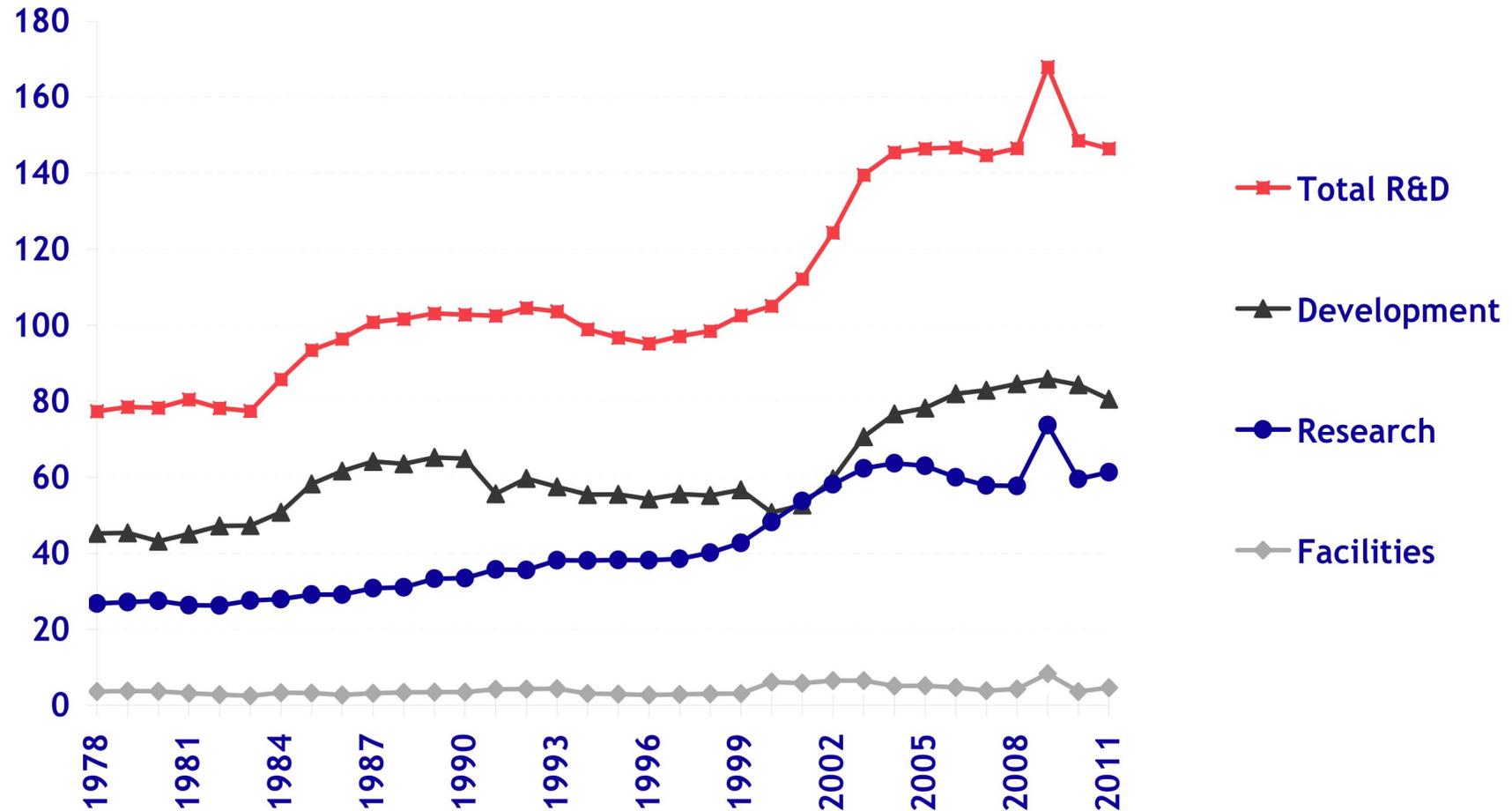
FY 2010-2015 data are budget projections.

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Trends in Federal R&D

in billions of constant FY 2010 dollars

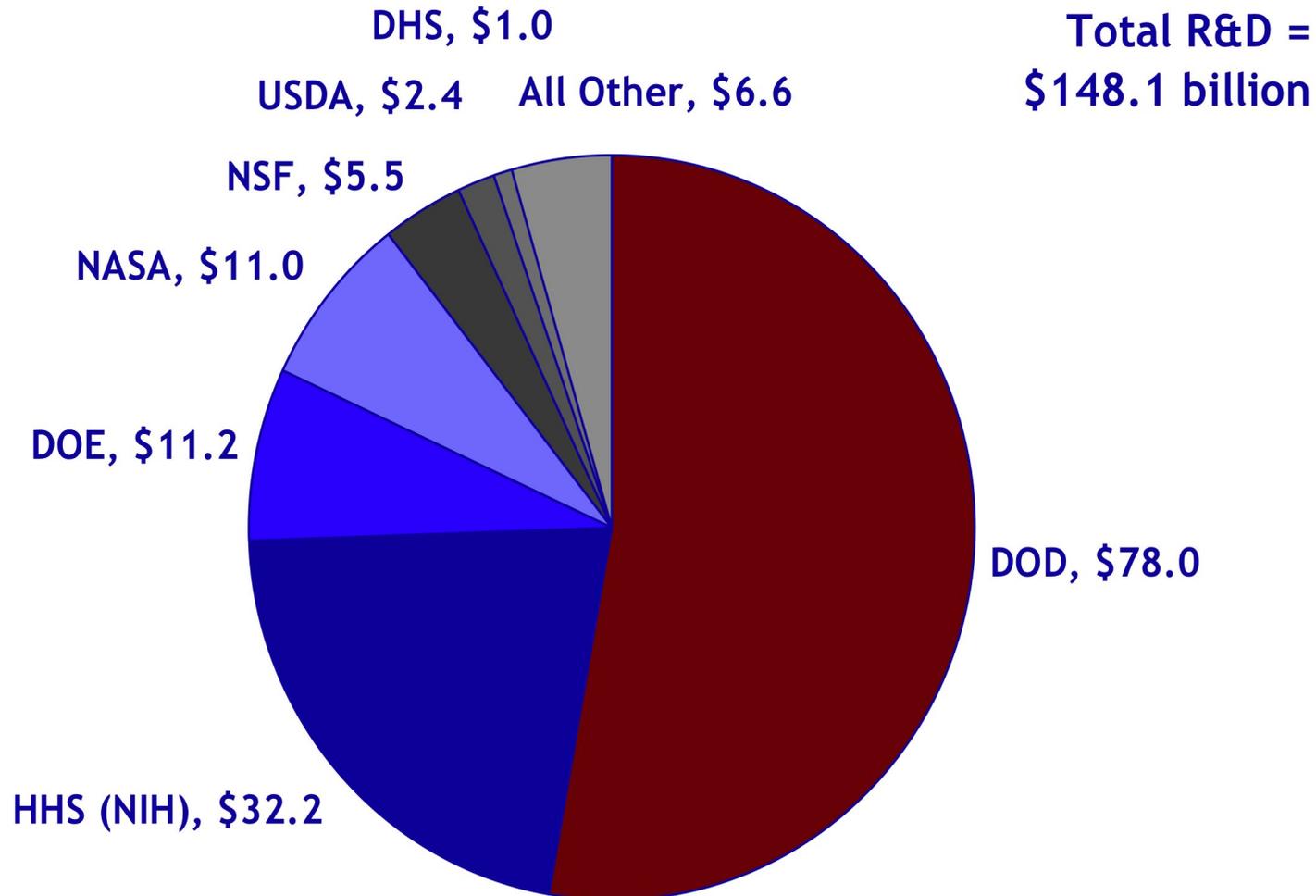


Source: AAAS analyses of R&D in annual AAAS R&D reports.
FY 2011 figures are latest AAAS estimates of FY 2011 request.
R&D includes conduct of R&D and R&D facilities.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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Total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

budget authority in billions of dollars



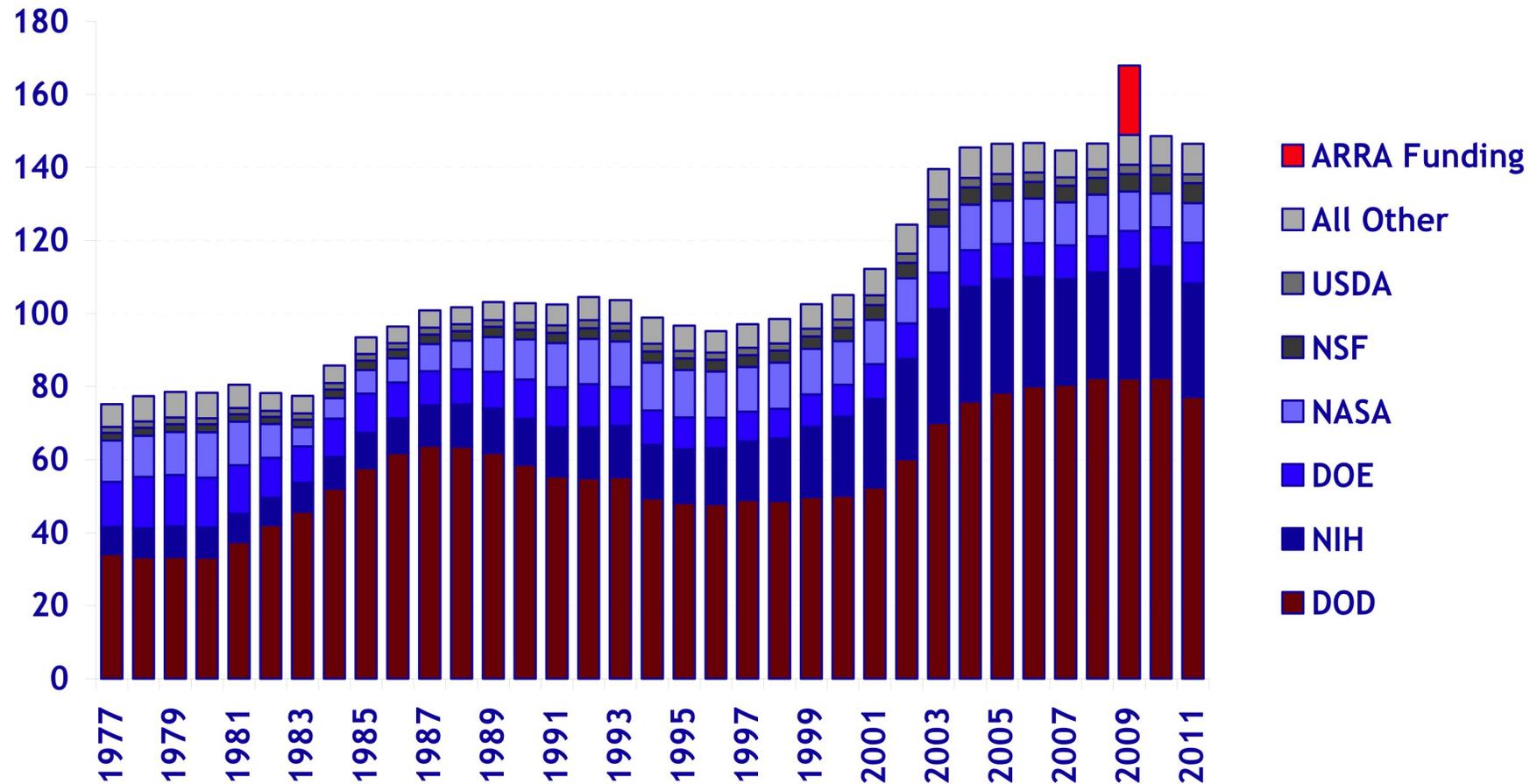
Source: OMB R&D budget data, agency budget justifications, and other agency documents.
R&D includes conduct of R&D and R&D facilities.

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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.

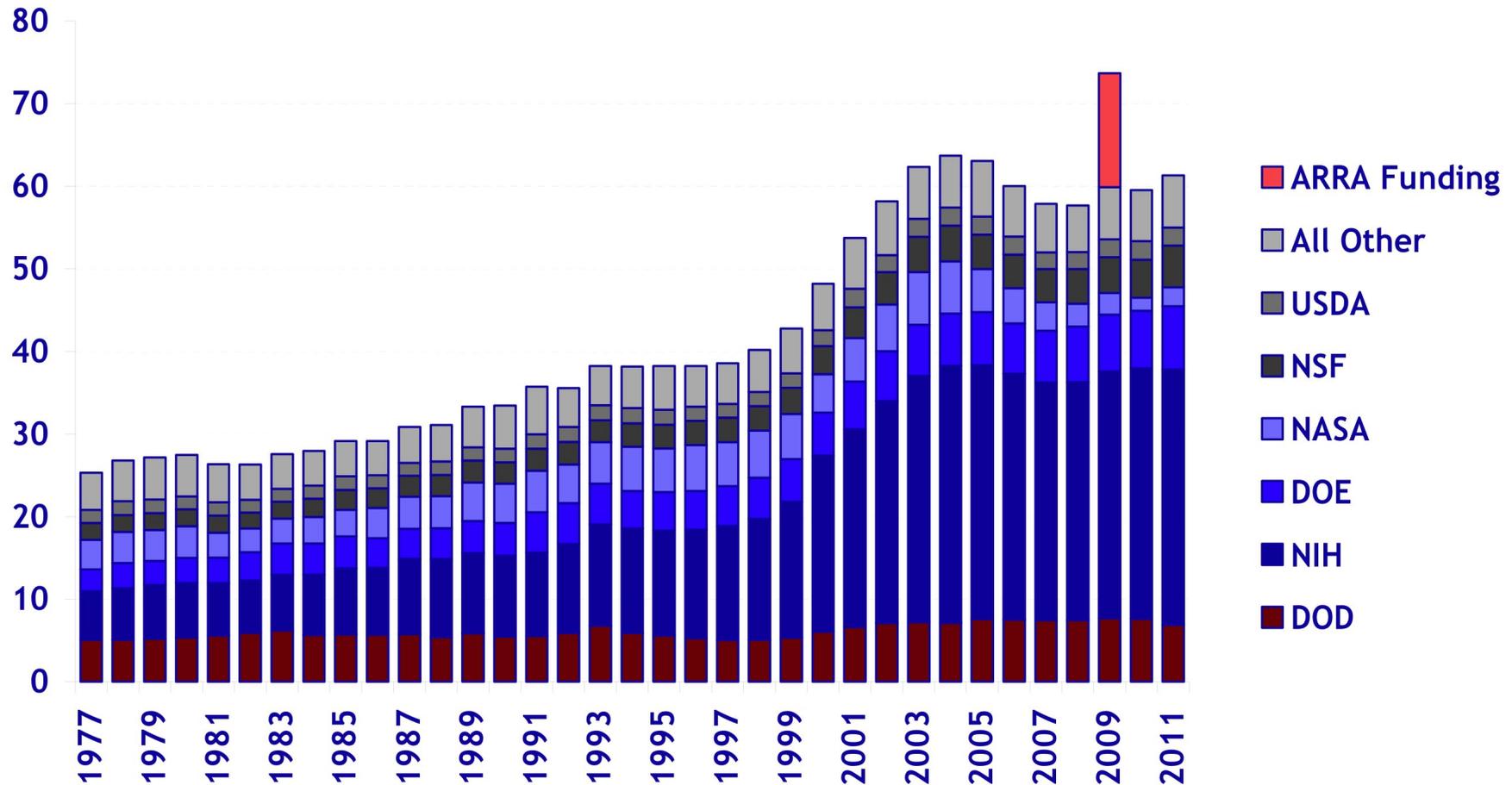
1976-1994 figures are NSF data on obligations in the Federal Funds survey.

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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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Overall US Budget Priorities 2011



- Jobs, Jobs, Jobs
- Climate change research
- Renewable energy research
- STEM education

Our challenge: Astronomy and planetary science are not viewed as part of the national agenda or contributing to the country's economic growth. They are not currently viewed as priorities and are therefore at risk.

Astronomy in the FY 2011 budget request



- NSF – overall 8% increase. AST got a 2.5% increase (vs. 2010).
- NASA – Science up 11.4% (nearly all Earth Science)
(Earth Science: +26.8%; Planetary: +10.8%; Heliophysics: +2.3%; Astrophysics: -2.5%)

BUT – this is just the budget request.

Human Space Flight Program in the 2010 Budget



- Retires the shuttle.
- Ends the Constellation program.
- Extends International Space Station to 2020.
- Promotes commercial space launches.
- Not well received on the Hill...
- Obama revealed details in Florida earlier this spring, but Congress was not impressed...stay tuned...negotiations are ongoing.

Congressional Quotes



- “NASA’s current budget may be a high water mark for years to come.” — Sen. Jay Rockefeller
- “I think our 40 years of leadership in space is on the line.” — Sen. Kay Bailey Hutchison
- “The president’s new plans for NASA are flat-out irresponsible.” — Sen. David Vitter
- “Neil (Armstrong), Jim Lovell, and I have come to a unanimous conclusion that this budget proposal presents no challenges, has no focus, and is in fact a blueprint for a mission to nowhere.” — Gene Cernan

NASA top-level budget

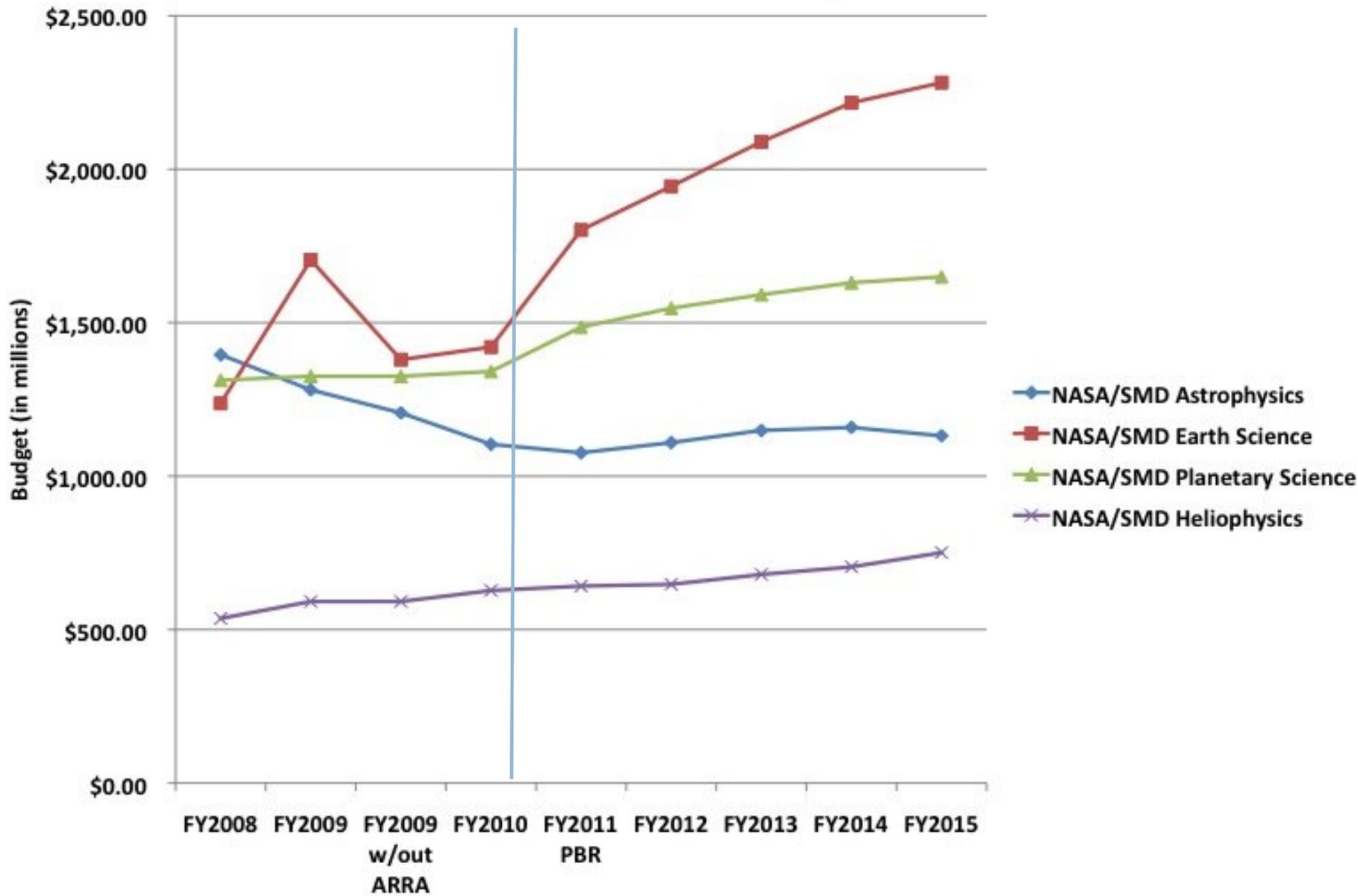
	FY2009	ARRA	FY2010	FY2011	% change: Fy2010-Fy2011
Total	17,782	1002	18,724	19,000	+1.5
Science	4,503	400	4493	5005	+11.4
Aeronautics	500	150	507	579	+14.2
Exploration	3,505	400	3,780	4,263	+12.7
Space Ops	5,765		6,181	4,888	-21
Education	169		184	146	-20.6

NASA FY 2011 SMD Budget Overview

	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015
<u>Science</u>	<u>\$4,903.1</u>	<u>\$4,493.3</u>	<u>\$5,005.7</u>	<u>\$5,248.7</u>	<u>\$5,509.7</u>	<u>\$5,709.9</u>	<u>\$5,814.1</u>
Earth Science	\$1,702.3	\$1,420.7	\$1,801.7	\$1,944.5	\$2,089.5	\$2,216.6	\$2,282.2
Planetary Science	\$1,288.1	\$1,341.3	\$1,485.8	\$1,547.3	\$1,591.3	\$1,630.2	\$1,649.5
Astrophysics	\$1,304.9	\$1,103.9	\$1,076.3	\$1,109.3	\$1,149.1	\$1,158.7	\$1,131.6
Heliophysics *	\$607.8	\$627.4	\$641.9	\$647.6	\$679.8	\$704.4	\$750.8

* includes future Astro Explorers

NASA Science Funding



FY 2011 Budget Request

Budget Authority (\$ millions)	FY 2009 Actual	FY 2010 Enacted	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
FY 2011 President's Budget Request	<u>1,288.1</u>	<u>1,341.3</u>	<u>1,485.7</u>	<u>1,547.2</u>	<u>1,591.2</u>	<u>1,630.1</u>	<u>1,649.4</u>
Planetary Science Research	166.2	160.7	180.4	190.8	195.2	214.2	240.9
Lunar Quest Program	69.1	103.6	136.6	136.4	131.7	109.7	110.5
Discovery	234.8	209.2	202.0	216.8	235.9	263.0	312.9
New Frontiers	279.0	264.1	223.8	229.5	237.9	247.7	258.5
Mars Exploration	361.7	416.1	532.8	514.8	549.9	569.6	485.8
Outer Planets	104.8	98.6	103.5	157.9	152.0	144.0	155.8
Technology	72.4	89.0	106.5	101.1	88.7	82.0	85.1
FY 2010 President's Budget Request	<u>1,325.6</u>	<u>1,346.2</u>	<u>1,500.6</u>	<u>1,577.7</u>	<u>1,600.0</u>	<u>1,633.2</u>	=
Planetary Science Research	162.1	161.7	193.5	240.2	232.6	254.2	-
Lunar Quest Program	105.0	103.6	142.6	138.6	145.5	118.7	-
Discovery	247.0	213.2	234.6	256.8	256.5	264.3	-
New Frontiers	263.9	264.1	239.9	294.2	239.8	249.6	-
Mars Exploration	381.6	416.1	494.5	405.5	514.3	536.7	-
Outer Planets	101.1	98.6	97.1	140.3	117.7	118.5	-
Technology	64.9	89.0	98.4	102.1	93.5	91.4	-
Total Change from FY 2010 Request	-37.6	-4.9	-15.0	-30.5	-8.7	-3.1	-

Note: Zero-sum funds transfer within NASA to consolidate CM&O, institutional facilities, and SBIR. Funds were included for additional NEO activities and carved out within Planetary Science Theme to co-fund Plutonium restart effort with DOE.

Astronomy Inspires



Astronomy is well-liked at the highest levels...

(but what is he looking at with the spotlights on?)

FY2012 Outlook



- OSTP (White House Science Policy Office), OMB (White House Budget Office), and agencies anxiously awaiting the Decadal Reports (astrophysics this year, planetary science in the works).
- Strong message from OSTP about a “coherent message” from community served by NASA
- International collaborations increasingly common and necessary
- Coming dry season

Our challenge

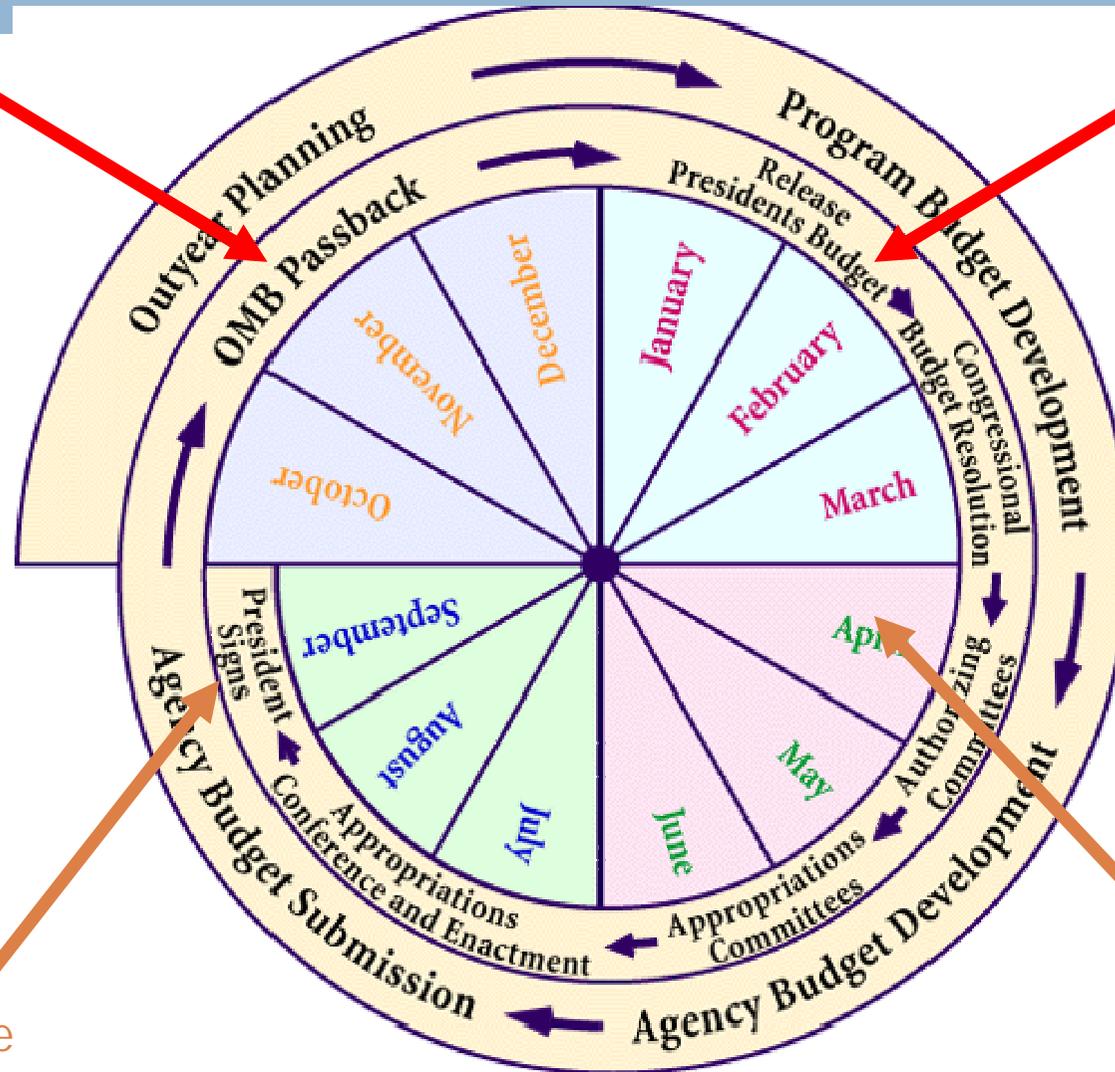


- Science funding is a **tiny** fraction of the overall total. Also optional!
- Competes with other discretionary spending.
- The budget is complex and complicated, but not impossible to understand.
- Now, more than ever, engineers & scientists must participate in this clumsy and repetitive process...
- Resources are available to enable you to have an impact.

The Budget Cycle

Impact OMB here

Thank OMB here



Thank Congress here

Impact Congress here

What can you do?



- Write letters – often and regularly, write when you don't want something, thanking members for their work.
- Visit local/DC offices of your members of Congress, know at least the local office staff if not also DC science staff.
- Invite them to your institution regularly, coordinate press coverage, give awards, donate to campaigns.
- Participate in forming public opinion, letters to the editor, op-ed pieces etc.
- Educate the public and get them on our side at every opportunity.

Mental Checklist for Visits



- What is my message? Is it proactive and positive? Do I have a summary sheet of talking points to leave behind?
- Is there a current bill that is relevant?
- What about the big picture...how does my message fit into national priorities?
- Who am I representing? Myself? My employer? My kids?
- Can I pitch my case in terms of local concerns?
- Am I communicating a consensus view? Can I prove it?
- Have I profiled my audience?

Some General Tips

- ❑ Do no harm (repeat) (repeat again).
- ❑ Stick to the Decadal Survey. It separates us from other disciplines like night and day.
- ❑ Make an effort. A silent constituency is a nonexistent constituency.
- ❑ If you don't know, say so.
- ❑ Science staff may not be experts, but are very smart (and influential!).
- ❑ Don't let visits or communications be a one-time deal, make it a part of your professional life...the farmers do, the veterans do, the scientists should.

Resources



- [Me \(marvel@aaas.org\)](mailto:marvel@aaas.org)
- www.aaas.org/policy
- www.nasa.gov/budget
- www.nsf.gov/about/budget/
- www.aps.org
- www.aip.org
- www.aaas.org/spp

- www.house.gov (House Science Committee and House Appropriations Subcommittee)
- www.senate.gov (Commerce, Science, & Transportation; CJS Appropriations Subcommittee)
- www.thomas.loc.gov

- NPR, CNN, NYT, Wash. Post, NASA Watch!