Federal R&D Investments in the 2009 Budget

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See the “What’s New” section for the latest updates; see the “Seminars and Presentations” section for copies of this presentation.
The federal government had a record budget deficit of $455 billion in FY 2008, and will have an even larger deficit in 2009.

To help control the deficit, President Bush proposes to keep domestic appropriations flat in 2009.

Domestic appropriations have barely kept pace with inflation since 2004.

Historically, federal R&D investments have closely tracked trends in discretionary spending.
Trends in Discretionary Spending, FY 1976-2013
in billions of constant FY 2008 dollars

FY 2008 data are estimates. FY 2009-2013 data are budget projections. FY 2009-
2013 figures exclude Iraq and Afghanistan military costs.
FY 2009 has started, but only 3 departments (DOD, DHS, VA) have their final 2009 budgets. The remaining federal agencies are operating under a CR (continuing resolution) at or below 2008 levels through March 6. Because President Bush threatened to veto any appropriations bills that exceed his request, Congress has delayed the bills, which would collectively add $21 billion to the request for domestic programs. The new 111th Congress plans to send the remaining 9 (of 12) 2009 appropriations bills to President Obama in February or March. This Congress may still approve 2009 supplementals for NIH, DOE, and others as part of an economic stimulus package this week.
Total R&D by Agency: FY 2009 Proposed
Budget Authority in billions of dollars

DOD, $80.7
HHS (NIH), $30.0
NASA, $12.8
DOE, $10.5
All Other, $5.2
NSF, $5.2
USDA, $2.0
DHS, $1.0

Total R&D = $147.4 billion (revised)

Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2009.
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Trends in Federal R&D, FY 1976-2009 *

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in AAAS Reports VIII-XXXIII. * FY 2009 figures are latest AAAS estimates of FY 2009 request.
R&D includes conduct of R&D and R&D facilities.
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Trends in Defense R&D, FY 1976-2009 *

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in annual R&D reports. * - FY 2009 figures are latest AAAS estimates of FY 2009 request. FY 2008 figures exclude pending supplementals. R&D includes conduct of R&D and R&D facilities. DOD S&T figures are not comparable for all years because of changing definitions.

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Selected Trends in Nondefense R&D, FY 1976-2009*

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in AAAS Reports VIII-XXXIII. * FY 2009 figures are latest AAAS estimates of FY 2009 request. 
R&D includes conduct of R&D and R&D facilities.
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In response to the “Gathering Storm” report and others, President Bush announced the American Competitiveness Initiative (ACI) in his 2006 State of the Union address.

There are also several congressional responses, culminating in the America COMPETES Act of August 2007, an authorization bill.

For R&D investments, the theme is boosting federal support for basic research in the physical sciences (broadly defined).

The plan: Doubling the budgets of NSF, DOE Office of Science, and the NIST laboratories over 7 to 10 years. But 2007 and 2008 appropriations leave the plan off track despite COMPETES.
THE 2009 BUDGET FOR R&D

- The ACI continues for a third year, with large increases for NSF, DOE Science, and the NIST labs to catch up to a 10-year doubling track.
- Again, there would be large increases for DOD weapons and NASA spacecraft development, but also increases for most R&D programs.
- The NIH budget would be flat, agricultural and environmental R&D agencies would decline.
- Congress has a long way to go in finalizing 2009 appropriations, but is hoping to add money to the request, especially for energy, biomedical, and environmental R&D.
FY 2009 R&D Request
Percent Change from FY 2008

-15% -10% -5% 0% 5% 10% 15%

DOE Science +21%
NSF +16%
DOT
DOD weapons
NASA
NIST
DHS
DOE defense
DOE energy
NIH
VA
NOAA
EPA
USGS
DOD "S&T"
USDA

Source: AAAS, based on OMB R&D data and agency estimates for FY 2009.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
DOD weapons = DOD R&D in "6.4" and higher categories.
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FY 2009 R&D Appropriations in the 2009 CR
Percent Change from FY 2008 (as of SEPT. '08)

Source: AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution.
Only DOD, VA, and DHS have final FY 2009 appropriations. The remaining agencies are funded temporarily through March 6 under the continuing resolution.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
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Trends in DOD "S&T", FY 1994-2009 (final) *

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in annual AAAS R&D reports.
* - FY 2009 figures are AAAS estimates of final FY 2009 appropriations.
Medical research appropriated outside RDT&E; appropriated in "6.2" accounts before 1999.
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National Institutes of Health Budget by Institute, 1998-2009 *
(budget authority in billions of constant FY 2008 dollars)

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National Science Foundation Budget, FY 2000-2009
(budget authority in billions of constant FY 2008 dollars)

Source: National Science Foundation, and latest AAAS estimates of FY 2009 budget. FY 2009 is budget request.
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Trends in DOE R&D, FY 1987-2009 *

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in AAAS Reports VIII-XXXIII. * FY 2009 figures are latest AAAS estimates of FY 2009 request.
R&D includes conduct of R&D and R&D facilities.
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SOME NOTES ON ENERGY R&D

- Most federal energy R&D is performed in DOE national or federal labs, and industry.
- Although funding is flat so far in 2009 under the CR, the Senate proposed a 22 percent increase in DOE energy R&D.
- DOE’s Office of Science, as part of the ACI, hopes to dramatically expand its energy research funding, especially at universities.
- ARPA-E is authorized under the America COMPETES Act, but so far has not received an appropriation.
- If Congress agrees on climate change legislation next year with a carbon tax or equivalent, there could be a major new revenue source. There is already discussion on setting aside a portion of revenues for renewable energy R&D and climate change research.
ENERGY POLICY

- There are many proposals, but Congress will have to start over in 2009.
- Proposed climate change bills contain authorizations for new or expanded programs in energy R&D in areas such as clean coal, carbon sequestration, alternative energy, nuclear energy, etc.
- Congress is deadlocked over offshore drilling and other expanded domestic oil production, but agreed to let the federal ban on offshore drilling expire on Sept. 30.
- Comprehensive energy legislation could contain expanded mandates for renewable energy sources, as well as tax incentives or subsidies for renewable energy.
Trends in Research by Agency, FY 1976-2009 (as of 9/08) *

in billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in annual AAAS R&D reports.
* FY 2009 figures are AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution. Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey.

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R&D at Colleges and Universities by Source of Funds
in billions of constant FY 2008 dollars, FY 1953-2007


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Life sciences - split into NIH support for biomedical research and all other agencies’ support for life sciences.

HOW DOES THE U.S. COMPARE?

- The U.S. is still the leading science and technology superpower in R&D investments, but the lead is shrinking.
- The U.S. R&D / GDP ratio compares favorably with other nations, but defense development is a big factor in the U.S.
- Other nations:
  - EU – A plan to reach 3% of EU GDP by 2010, but it won’t happen.
  - Korea – R&D growing by 10%+ a year, R&D/GDP ratio surpasses U.S. ratio in 2004 and hits 3%.
  - China – R&D spending grew 20% in 2004 and 25% in 2005; basic research still small, but expanding rapidly.
  - India – Not big in R&D spending yet, but there are plans to boost its R&D capabilities to compete in high-tech industries.
Shares of Total World R&D, 2007*

- US, $344
- Germany, $67
- France, $41
- U.K., $36
- Other EU, $99
- Japan, $139
- Korea, $36
- China, $87
- All Other, $114

Total World R&D = U.S. $962 billion**

* World = OECD members plus Argentina, China, Romania, Israel, Russia, Singapore, Slovenia, South Africa, Taiwan. 2007 or most recent year available.

**- calculated using purchasing power parities.

Source: OECD, Main Science and Technology Indicators, 2008.
2007 data or latest year available.
* *- calculated using purchasing power parities.

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Total National R&D as % of GDP, 1991-2006

Source: National Science Foundation, National Patterns of R&D Resources and OECD, Main Science and Technology Indicators. Data not available for all nations for all years. AUGUST ’08 © 2008 AAAS
WHERE IS FEDERAL R&D FUNDING HEADED?

- The new Congress and President Obama could finish FY 2009 appropriations with increased funding for key R&D programs.
- The FY 2010 budget proposal will be released in late March or April; it will be the first budget to be formulated under current economic conditions.
- Even at a time when policymakers are concerned about U.S. leadership in science and technology eroding, and when proposed R&D increases are authorized in the America COMPETES Act and other legislation, the problem is how to find the resources in a recession. New sources of revenue (such as from climate change legislation for energy R&D) may be years away.
- Don’t expect increased funding for research: the broader budget choices policymakers make will constrain future investments in R&D.
FOR MORE INFORMATION...

The AAAS R&D web site is
www.aaas.org/spp/rd