Introduction to the Federal Budget

Patrick J Clemins
September 2, 2010
for AAAS S&T Policy Fellows

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

- How does the federal government implement policy?
- The budget is the primary way Congress directs U.S. policy and priorities
  - Almost all policy involves money, directly or indirectly
  - The budget cycle drives decision-making
  - Affects the health of U.S. science and engineering
    - $148.1b on research and development
    - Over 60% of all university R&D is federally funded
    - Education and workforce training
The U.S. Federal Budget in FY 2011

- Total Budget: $3.8t
  - Over 1/5 of the total U.S. economy
- Total Receipts: $2.6t
  - Mostly from income and payroll taxes
- Deficit: $1.3t
  - $89b borrowed from Social Security
Federal Spending and Revenues

(percantage of GDP)

FY 2010 data are estimates. FY 2011-2015 data are budget projections.
© 2010 AAAS
Discretionary vs Mandatory

- **Mandatory Spending (Entitlements)**
  - Social Security, Interest on the debt, Medicare, etc.
  - Only adjusted by act of Congress

- **Discretionary Spending**
  - Military, salaries, construction, domestic programs, R&D, etc.
  - Appropriated to each agency in yearly budget

- **FY 2011**
  - $1.3t discretionary budget (+0.3%)
  - $532b nondefense spending (+1.4%)
Composition of the Proposed FY 2011 Budget

Total Outlays = $3.8 trillion

outlays in billions of dollars

- **Social Security**: $730
- **Defense Discretionary**: $661
- **Nondefense Discretionary**: $599
- **Medicare**: $491
- **Medicaid**: $297
- **Other Mandatory**: $647
- **Net Interest**: $251
- **[Defense R&D]**: $83
- **[Nondefense R&D]**: $71

Source: Budget of the United States Government FY 2011.

Projected unified deficit is $1.3 trillion.

© 2010 AAAS
Deficit Spending

- The U.S. national debt dates back to our inception
  - Was zero briefly in 1835
  - Tends to expand quickly during wartime
- 33 percent of the FY 2011 budget is funded by loans
  - Government bonds
  - Other federal government accounts
  - Auctioned internationally - China, Japan, and UK are major lenders
- Debt limit is raised regularly
  - Currently at $14.3t (set in February 2010)
FY 2011 Budget by Source of Funds
Total Outlays = $3.8 trillion
Total Receipts (without borrowing) = $2.6 trillion

- Borrowing: $1,267
- Income taxes: $1,121
- Corporate taxes: $297
- Other taxes (excise, gas, estate, etc.): $214
- Social insurance and retirement (payroll taxes): $935

Source: Budget of the United States Government FY 2011.
© 2010 AAAS
FY 2011 Budget Projections
outlays in billions of constant FY 2010 dollars

Source: Budget of the United States Government FY 2011.
© 2010 AAAS
**The Federal Budget Cycle**

<table>
<thead>
<tr>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic planning within Agency</td>
<td>Agencies receive strategic guidance from OMB</td>
<td>Agencies submit budget proposals to OMB</td>
<td>Negotiate and finalize budget proposal with OMB via passbacks</td>
<td>Budget Release</td>
<td>Write, pass, and conference twelve appropriation bills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Discussions within agencies among upper management about possible priorities and initiatives
The Federal Budget Cycle

- Joint memorandum from Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP) lays out Presidential priorities and provides broad guidance
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
The Federal Budget Cycle

- Agencies deliver budget justifications to OMB
### The Federal Budget Cycle

<table>
<thead>
<tr>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic planning within Agency</strong></td>
<td><strong>Agencies receive strategic guidance from OMB</strong></td>
<td><strong>Agencies submit budget proposals to OMB</strong></td>
<td><strong>Negotiate and finalize budget proposal with OMB via passbacks</strong></td>
<td><strong>Budget Resolution</strong>&lt;br&gt;• 302(a) and (b)&lt;br&gt;• Hearings</td>
<td><strong>Write, pass, and conference twelve appropriation bills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Agencies negotiate with OMB over their budget proposals with OSTP serving an advisory role.
- Budget proposals are finalized in January.
The Federal Budget Cycle

- President presents the proposed budget to Congress on the first Monday of February
The Federal Budget Cycle

- Congress holds hearings on agency budgets and initiatives
- Authorizing committees create authorizations for agencies
- Congress approves budget resolution, the big-picture spending plan
- Appropriations committees receive 302(a) allocations and determine 302(b) allocations for each appropriations bill
- Determine need to allow for reconciliation bill
Reconciliation Bill

- A special bill which modifies tax law or mandatory programs to reconcile with the budget resolution
- Reconciliation is optional, and not always necessary
- Reconciliation bills have special procedural rules
  - Can not filibuster, so the Senate only needs 51 votes to pass a reconciliation bill
- In FY 2010, both health care and education were subject to reconciliation
- No traditional budget resolution for FY 2011
The Federal Budget Cycle

- Appropriation committees write and approve appropriations bills
- Bills have to pass the full chamber by majority vote
- The different versions passed by both chambers are conferenced
- Each chamber then has to agree to the conference report before President can sign
- The fiscal year ends on Sept 30, any unfunded agency must shutdown unless a continuing resolution (CR) is passed
- Omnibus bill is created to pass remaining appropriations bills
The Federal Budget Cycle

- Agencies are working on 3 budgets at any given time
Supplemental Appropriations

- Throughout the year, as necessary, Congress can introduce a supplemental appropriation bill
  - Usually for natural disasters or emergencies

- Examples
  - February 2009 - The American Recovery and Reinvestment Act (ARRA) - $814b for economic recovery
  - June 2009 - $106b for war operations and flu preparations
  - August 2009 - $2b to extend “cash for clunkers” program
  - July 2010 - $59b for war operations, FEMA, and Haiti aid
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

- Net Interest $251
- Defense Discretionary $661
- Defense R&D $83
- Nondefense Discretionary $599
- Nondefense R&D $71
- Social Security $730
- Medicare $491
- Medicaid $297
- Other Mandatory $647

Source: Budget of the United States Government FY 2011.
Projected unified deficit is $1.3 trillion.
© 2010 AAAS
Trends in Discretionary Spending
budget authority in billions of constant FY 2010 dollars

FY 2010-2015 data are budget projections.
© 2010 AAAS
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.
© 2010 AAAS
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.
© 2010 AAAS
INTRODUCTION TO THE FEDERAL BUDGET

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.
© 2010 AAAS
Total R&D by Agency, FY 2011

budget authority in billions of dollars

- DOD, $78.0
- HHS (NIH), $32.2
- DOE, $11.2
- NASA, $11.0
- All Other, $6.6
- NSF, $5.5
- USDA, $2.4
- DHS, $1.0

Total R&D = $148.1 billion

Source: OMB R&D budget data, agency budget justifications, and other agency documents.
R&D includes conduct of R&D and R&D facilities.
© 2010 AAAS
Trends in R&D by Agency

in billions of constant FY 2010 dollars

FY 2010 and FY 2011 figures are latest estimates.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
© 2010 AAAS
R&D in the FY 2011 Budget Request

percent change from FY 2010

<table>
<thead>
<tr>
<th>Agency</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOAA</td>
<td>22.0%</td>
</tr>
<tr>
<td>NIST</td>
<td>21.6%</td>
</tr>
<tr>
<td>NASA</td>
<td>17.8%</td>
</tr>
<tr>
<td>NSF</td>
<td>9.4%</td>
</tr>
<tr>
<td>DOE Energy</td>
<td>6.8%</td>
</tr>
<tr>
<td>DOE Defense</td>
<td>5.0%</td>
</tr>
<tr>
<td>DOE Science</td>
<td>3.8%</td>
</tr>
<tr>
<td>NIH</td>
<td>3.1%</td>
</tr>
<tr>
<td>USGS</td>
<td>2.8%</td>
</tr>
<tr>
<td>EPA</td>
<td>1.8%</td>
</tr>
<tr>
<td>VA</td>
<td>1.5%</td>
</tr>
<tr>
<td>DOT</td>
<td>-1.3%</td>
</tr>
<tr>
<td>DOD</td>
<td>-5.2%</td>
</tr>
<tr>
<td>USDA</td>
<td>-5.5%</td>
</tr>
<tr>
<td>DHS</td>
<td>-9.0%</td>
</tr>
</tbody>
</table>

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

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

© 2010 AAAS
Funding Shifts: Function

- Defense
  - -$4.1b to $82.2b
  - 4.8% decrease
- Nondefense
  - +3.6b to $65.9b
  - 5.8% increase
Funding Shifts: Character

- Development
  - -$2.9b to $81.5b
  - 3.5% decrease
- Research
  - +$2.5b to $62.0b
  - 4.1% increase
Funding Shifts: NASA

- Retire space shuttle and cancel Constellation Program
- Frees $6.5b over 2 yrs
- Near-earth orbit through private industry
  - +$6.1b over 5 yrs
- Heavy Lift and Propulsion
  - +$559m
- International Space Station
  - +$905m to $3.2b over 4 yrs
NASA Update

- Congressional Concerns
  - U.S. space leadership
  - Reliance on industry/Russia for near-earth orbit
  - Jobs

- Administration Response - Kennedy Space Center - April 15
  - Use Orion technology for Space Station rescue vehicle
  - Heavy lift and propulsion: $3b over next few years
    - Final design by 2015
    - Job assistance: $40m

- NASA Reauthorization - August 5
  - International Space Station through 2020; one additional shuttle mission
  - Commercial cargo capability and crew services
  - International effort for beyond-Earth orbit; Heavy-lift and crew exploration vehicles
Funding Shifts: USDA

- **Buildings and Facilities**
  - -$147m to -$76m in R&D after rescissions
  - Request: -$76m
  - House: $20m (est)
  - Senate: $34m

- **Agriculture and Food Research Initiative (AFRI)**
  - +$166m to $429m in total budget, 63.4% increase
  - House: $312m
  - Senate: $310m
Funding Shifts: Dept of Energy

- Fossil, -$53m
- Nuclear, -$122m
- EERE, +$35m
- Electric Grid, +$22m
- Office of Science, +$172m
- ARPA-E, +$273m
  - Hse/Sen: $220m/$200m
Funding Shifts: Dept of Defense

- Basic Research
  - +6.7% to $2.0b
- Development
  - -5.0% to $71.0b
- DARPA
  - +3.7% to $3.1b
- From major weapons systems to counter insurgency in future years
Funding Doubling for Basic Research

- National Science Foundation
  - Total Budget: +8.0% to $7.4b
    - Hse/Sen: $7.4b/$7.4b
  - R&D: +9.4% to $5.5b
- National Innovation Strategy
  - Next-Generation Information and Communications Technology
  - Innovation-Based Entrepreneurship
- Workforce Development
- Broadening Participation
Funding Doubling for Basic Research

- DOE Office of Science
  - Total Budget: +4.4% to $5.1b
    - Hse/Sen: $4.9b/$5.0b
  - R&D: +3.8% to $4.6b
  - New Energy Innovation Hub
    - Batteries and Energy Storage
  - Energy Frontier Research Centers (EFRCs)
  - Advanced Computing
  - Scientific User Facilities
  - Education and Workforce Development
Funding Doubling for Basic Research

- National Institute of Standards and Technology
  - Total Budget: +7.3% to $919 million
    - Hse/Sen: $883m/$941m
  - NIST Labs (STRS)
    - +13.5% to $585 million
  - R&D
    - +21.7% to $706 million
  - Competitive Manufacturing and Construction in a Clean-Energy Economy
    - +$34.6 million
Trends in Nondefense R&D by Agency

in billions of constant FY 2010 dollars

FY 2010 and FY 2011 figures are latest estimates.
FY 2012 through FY 2015 are projections.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.

© 2010 AAAS

NIH

ARRA - NIH

ARRA - All Other Agencies

All Other Agencies
National Institutes of Health

- Total Budget: +2.8% to $32.2b
  - Hse/Sen: $32.2b/$32.2b
- R&D: +2.8% to $31.4b
- Cancer and autism spectrum disorders
- AIDS research - Global Fund
- National Nanotechnology Initiative: +6.0% to $382m
- Therapeutics for Rare and Neglected Diseases (TRND)
  - +$26m to $50m
- National Synchrotron Light Source-II (NSLS-II): $33m
R&D Investment Priorities

- **New Industries and Jobs**
  - Advanced materials and manufacturing methods
  - $6.1b over 5 years for commercial earth orbit
- **Cleaner Energy**
  - +$155m (+6.8%) for DOE Energy R&D
- **Healthier America**
  - +$956m (+3.1%) for National Institutes of Health R&D
- **Enhanced Security**
  - DOD Basic Research: +6.7% to $2.0b
FY 2011 R&D Budget Request by Function
percent change from FY 2010

- Transportation: 43.0%
- Commerce: 17.3%
- Space: 12.0%
- Environment: 7.4%
- Energy: 6.5%
- Health: 6.5%
- General Science: 6.3%
- International: 0.0%
- Defense: -4.8%
- Agriculture: -5.8%
- Justice: -31.8%

Source: OMB and agency budget data.
Environment includes natural resources R&D
© 2010 AAAS
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
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

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.
© 2010 AAAS
Total World R&D, 2007

in billions of PPP $

- US, $369
- Japan, $148
- Germany, $72
- China, $102
- Korea, $42
- All Other, $186
- Other EU, $97
- U.K., $39

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.

© 2010 AAAS
National R&D Investment
percent of GDP

Source: OECD, Main Science and Technology Indicators, May 2009.
© 2010 AAAS
Next Steps

- Fall elections might push budget action back to November, December, or even 2011.

- So far, the House has passed 2 appropriation bills and have subcommittee approval of 9 others. The Senate Appropriations Committee has reported on 9 bills, but none have passed the full Senate.

- FY 2012: OMB Memos: 5% reduction; list of low-impact programs totaling 5% of discretionary budget. Initial budget submissions are due to OMB by September 13.
For More Information...

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

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

- Conference the Commerce, Justice, Science and Related Agencies (CJS) appropriations bill
- Determine mechanism for compromise
- Fill in final conference numbers
- Appoint a spokesperson to hold a press conference and take questions
- Spreadsheet available at http://www.aaas.org/spp/rd/