Introduction to the U.S. Federal Budget Process and R&D Investment

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for EEP’s How Government Works

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

See the “Seminars and Presentations” section for copies of this presentation.
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
  - $96b borrowed from Social Security
Federal Spending and Revenues
(percentage of GDP)


FY 2010 data are estimates. FY 2011-2015 data are budget projections.

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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

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

Source: Budget of the United States Government FY 2011.
Projected unified deficit is $1.3 trillion.
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Source: *Budget of the United States Government, FY 2011.*
FY 2010-2015 data are budget projections.
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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
  - 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

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

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

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<th>Oct</th>
<th>Nov</th>
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<tr>
<td><strong>Stategic 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>Negociate and finalize budget proposal with OMB via passbacks</strong></td>
<td><strong>Budget Release</strong></td>
<td><strong>Write, pass, and conference twelve appropriation bills</strong></td>
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- Discussions within agencies among upper management about possible priorities and initiatives
- Budget Resolution
- 302(a) and (b)
- Hearings
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 2011 R&D Practical Challenges

- Apply S&T to drive economic recovery, job creation, and economic growth
- Promote energy technologies to reduce energy imports and create green jobs and business
- Apply biomedical science and information to help Americans live longer and healthier lives while reducing health care costs
- Assert that we have the technology to protect our troops, citizens, and national interests
The Federal Budget Cycle

- Agencies deliver budget justifications to OMB
The Federal Budget Cycle

- 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 are subject to reconciliation
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) - $787b for economic recovery
  - June 2009 - $106b for war operations and flu preparations
  - August 2009 - $2b to extend “cash for clunkers” program
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%)
- Role of federal R&D
  - Supports federal missions
  - Drives U.S. innovation
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

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.
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FY 2011 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
R&D in the FY 2011 Budget Request
percent change from FY 2010

- NOAA: 22.0%
- NIST: 21.6%
- NASA: 17.8%
- NSF: 9.4%
- DOE Energy: 6.8%
- DOE Defense: 5.0%
- DOE Science: 3.8%
- NIH: 3.1%
- USGS: 2.8%
- EPA: 1.8%
- VA: 1.5%
- DOT: -1.3%
- DOD: -5.2%
- USDA: -5.5%
- DHS: -9.0%

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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Earmarks

- Early February - Senate Republicans introduce amendment to make earmarks a point of order requiring 60 votes to overcome
- March 9/10 - House Democrat leaders announce ban on earmarks to for-profit entities
- March 10/11 - House Republicans vote in closed-door session to ban all earmarks
- March 17 - Senate amendment fails
- Early April - Three House Republicans break rank and request earmarks
NASA

- Retire space shuttle and cancel Constellation Program
- Frees $6.5b over 2 yrs to...
- 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
- Hutchison (R-TX) Bill - Extends Space Shuttle & Space Station
- Administration Response
  - Use Orion technology for Space Station rescue vehicle
  - Heavy lift and propulsion: $3b over next few years
    - Final design by 2015
  - Job assistance: $40m
**Funding Shifts**

- **Department of Defense**
  - Basic Research: +6.7% to $2.0b
  - Development: -5.0% to $71.0b
  - DARPA: +3.7% to $3.1b

- **US Dept of Agriculture**
  - Buildings and Facilities: -$147m decrease in R&D after rescissions
  - Agriculture and Food Research Initiative (AFRI)
    - +$166m (63.4%) to $429m in total budget

- **Dept of Energy**
  - Decreases: Fossil (-$53m), Nuclear (-$122m)
  - Increases: Off of Sci (+$172m), EERE (+$35m), Electric Grid (+$22m)
  - ARPA-E: $300m (R&D, $273m)
Funding Doubling for Basic Research

- **DOE Office of Science**
  - Total Budget: +4.4% to $5.1b
  - R&D: +3.8% to $4.6b
  - New Energy Innovation Hub - Batteries and Energy Storage

- **National Institute of Standards and Technology**
  - Total Budget: +7.3% to $919m
  - R&D: +21.7% to $706m
  - NIST Labs (STRS): +13.5% to $585m

- **National Science Foundation**
  - Total Budget: +8.0% to $7.4b
  - R&D: +9.4% to $5.5b
  - National Innovation Strategy
National Institutes of Health

- Total Budget: +2.8% to $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
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
Total World R&D, 2007
in billions of PPP $

Total World R&D = $1,054 billion

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

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/

The AAAS Forum on
Science and Technology Policy
is May 13-14, 2010
in Washington, DC