The BEA-NSF R&D Satellite Account:

Overview, Methods, and Issues

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Introduction

- Background and overview of R&D satellite account project at BEA
- Implications for BEA
- Data, methodology and interesting questions
- Future research issues

Background

- Carson, Moylan, and Grimm (1994) - Satellite Account for Research and Development using NSF expenditure data
- Fraumeni and Okubo (2002, 2005) – measured contribution of R&D using R&D data and a national accounts framework
- The National Science Foundation provided funds to produce an official satellite account (2004).

Table 1 – Changes to National Accounts

	Gross Domestic Product			Gross Domestic Income	
	Treatment in Current Measure of GDP	Adjusted GDP	Change in Current Measure of GDP	Adjusted GDI	Capitalizing R&D Change in Current Measure GDI
R&D Imputations, R&D performed by:					
Business	Intermediate input	Reallocate to investment	Increase	Increase in profits and depreciation	Increase
Nonprofit Institutions	Consumption (PCE)	1) Reallocate to investment 2) Increase consumption = Returns to R&D capital	No change Increase	Increase in returns to R&D capital	Increase
General Government	Government consumption	1) Reallocation to investment 2) Increase consumption = Returns to R&D capital	No change Increase	Increase in returns to R&D capital	Increase

Results of Fraumeni/Okubo Account: 1961-2002

- Capitalizing R&D
  - Increases current dollar GDP by 2 percent.
  - Increases the real GDP rate of growth by 0.1 percentage point.
- The estimated contribution of R&D investment to overall GDP growth is 4 percent.
- The adjusted national savings rate is 2 percentage points higher than the current measure (of 19 percent).

Progress and Changes

- Produced Frascati Manual-SNA bridge
- Began research on methodologies including rates of return, depreciation rates & deflators
- Expanded and updated R&D satellite account estimates first produced by BEA in 1994
- Began research to develop an I-O based R&D satellite account
- Advisory Expert Group recommended that R&D output be treated as a fixed asset (July 2005) in the SNA

Treating R&D as a Fixed Asset

- The upcoming SNA revision is likely to adopt capitalizing R&D in the national accounts system because of work by BEA and others.
- The R&D satellite account would provide the basis for experimenting in capitalizing R&D in the NIPAs and the Industry Accounts.

Schedule for R&D Satellite Account

- Release of preliminary R&D Satellite Account, September 2006
- Technical conference on the R&D account, October/November 2006
- Feasibility study on producing an Industry R&D Satellite Account, Spring 2007
- Release of final R&D Satellite Account, September 2007
- User conference, November 2007

Inputs from Users

- Develop professional consensus on concepts and methods for capitalizing R&D in the national accounts.
- Obtain feedback on the approach used to estimate the preliminary R&D Satellite Account.
- Develop solutions to methodological and conceptual challenges for FY 2007.

Impact on BEA Accounts

- Treating R&D as an asset will have wide ranging effects on the national accounts:
  - Annual and quarterly data on R&D.
  - Detailed industry data on R&D investment.
  - Impact on Regional Accounts.
  - R&D assets and capital services in the international accounts.

Methods, Data, and Interesting Problems

- Data
- Methods
- What decisions have we made?
- What are the research questions left to resolve?

R&D receipts in the 2002 Economic Census

- NAICS 5417 Scientific Research and Development Services
  - Product line receipts $64.4 billion dollars
    - R&D in physical and engineering sciences $27.9
    - R&D in the life sciences $21.5
    - R&D in the social sciences $ 3.1
    - Contributions, gifts, grants (Gov) $ 4.7
    - Contributions, gifts, grants (Private) $ 2.4
    - Management and consulting services, testing services, engineering services, other $ 4.8

R&D Expenditures in the National Science Foundation Data 2002 in billions

- Funded and Performed by Industry $175.3
- Funded by Federal Government $80.5
  - Performed by Federal Government $23.8
  - Performed by Industry $17.1
  - Performed by Academic Institutions $22.1
  - Performed by NPs and FFRDCS $17.6
- Funded and Performed by others $20.6
- Total $276.4

What decisions have we made?

- The R&D Satellite Accounts will be consistent with the NIPAs—base case
  - Valuation of own account output
  - Returns to government and non-profit capital : only CFC, no net return
  - Zero Lags between creation of R&D and its impact as investment
  - No Externalities (Spillovers)
- The funder of R&D is the best current proxy for ownership

How are we going to actually do it?

- Estimate the value of R&D output with input costs
  - R&D compensation
  - R&D supplies and materials
  - Consumption of fixed capital on the assets used to create R&D
- Apply input deflators
- Chain together the reals
- Create capital stock estimates

What are the big questions now?

- Short term 2007
  1) Improve the input deflators
  2) Improve estimates of consumption of fixed capital
  3) Improve assignment of ownership of R&D

1) Improve the Input Deflators

- Deflators for 2006 (Performer-based)
  - Industry R&D—NAICS 5417 input deflators
  - Federal Intramural R&D
    - Federal defense and non-defense activity input deflators
    - NIH -BIRDPI
  - Academic R&D
    - Academic R&D price index
  - State and Local and Non-Profit R&D
    - PCE deflator for education and research
  - FFRDCS
    - Based on the department funding the FFRDC

2) Improve Consistency of CFC Measures

- Limited survey data on fixed capital used for R&D
- No estimates of software used to create R&D

3) Improve Identification of R&D Assets

- Improve Identification of Ownership of R&D Assets
  - Funder-performer transactions
  - Intellectual property rights
- The scope of capitalized R&D
  - Identify freely available R&D

Longer Term Issues

- Measuring R&D output
- Identifying freely available R&D
- Depreciation of R&D and lag structure by industry
- Estimating private rates of return and spillovers from R&D
- Estimating rates of return for government and non-profit R&D
- Improving R&D source data for national accounting purposes

Discussion Topics

- Advice on better deflators
- How important are capital services to the R&D satellite account research?
- Advice on assigning ownership to R&D assets
- Is the 15% depreciation rate for R&D assets reasonable?
- How important is it to include lags between R&D investment and recognition of the return?