

Table 1. How the National Accounts Change when R&D is treated as Investment

R&D Imputations R&D Funded by:	Gross Domestic Product			Gross Domestic Income	
	Treatment in Current Measure GDP	Adjusted GDP	Change in Current Measure GDP	Adjusted GDI	Change in Current Measure GDI
Business	Intermediate consumption	Reclassify to investment	Increase	1) Increase in business income equal to R&D investment less CFC 2) Increase in CFC	Increase
Government enterprises ¹	Deduction from current surplus of government enterprises	Reclassify to investment	Increase	1) Increase in surplus of government enterprises equal to R&D investment less CFC 2) Increase in CFC	Increase
Nonprofit institutions serving households	Consumption (PCE)	1) Reclassify to investment 2) R&D CFC added	Increase	Increase in returns to R&D capital	Increase
General government	Government consumption	1) Reclassify to investment 2) R&D CFC added	Increase	Increase in returns to R&D capital	Increase

¹ While this row describes the way that R&D in government enterprises would be treated, the current data and methodology does not identify any R&D in these enterprises, therefore the relevant line in Table 8 shows no impact.

Table 2. Summary of Estimated Rates of Return to Private R&D

Estimated Industry Rates of Return to Private R&D (%)		
Source	Private	
Minasian (1969)	54	
Griliches (1980)	27	
Mansfield (1980)	28	
Nadiri and Bitros (1980)	26	
Schankerman (1981)	24-73	
Griliches and Mairesse (1983)	19	
Link (1983)	5	
Clark and Griliches (1984)	18-20	
Griliches and Mairesse (1984)	30	
Griliches (1986)	33-39	
Griliches and Mairesse (1986)	25-41	
Jaffe (1986)	25	
Schankerman and Nadiri (1986)	10-15	
Griliches and Mairesse (1990)	27-41	
Lichtenberg and Siegel (1991)	13	
Source: Nadiri, (1993).		
Estimated Aggregate Rates of Return to Private R&D (%)		
Source	Private	Social
Sveikauskas (1981)	7-25	50
Bernstein and Nadiri (1988)	10-27	11-111
Bernstein and Nadiri (1991)	15-28	20-110
Nadiri (1993)	20-30	50
Mansfield et al. (1977)	25 ⁽¹⁾	56 ⁽¹⁾
Goto and Suzuki (1989)	26	80
Terleckyj (1974)	29	48-78
Scherer (1982,1984)	29-43	64-147
Source: Table 8.1, 12. Fraumeni, Barbara M., and Okubo, Sumiye. "R&D in the National Accounts: A First Look at Its Effect on GDP." National Bureau of Economic Research, Studies in Income and Wealth, Volume 65, <i>Measuring Capital in the New Economy</i> , Edited by Carol Corrado, John Haltiwanger, and Daniel Sichel, 2005.		
(1) These rates are median rates.		

Average Rates of Return to Private R&D from All Studies (%)		
Source	Private	Social
Average of Above	26	66

Table 3. Assumptions for the Scenarios in the R&D Satellite Account

Parameter	A	B	C	D
depreciation of R&D	15 percent	before 1987: change in private fixed investment in nonresidential equipment and software depreciation after 1987: information processing equipment depreciation	Same as B	Same as B
price index	Input cost-component based	cost-based price index adjusted to proxy high-productivity growth in manufacturing	composite price index based on the value added of five high-productivity service industries	composite price index based on the value added of the four industries that perform the most R&D
net return to business R&D (capital services)	same as to other fixed assets	average net rate of 15 percent	Same as B	Same as B
net return to government and nonprofit R&D (capital services)	none	estimated net return based on long-term average in the real 10-year treasury rate, plus a higher premium for R&D investment	Same as B	Same as B

Table 4. Contribution of R&D investment to growth in adjusted real GDP

	Scenario B High-MFP adjustment to input cost price index	Scenario C High- productivity service industries price index	Scenario D R&D performing industries price index
Years	Contribution	Contribution	Contribution
1959-1973	4.46	3.88	4.03
1974-1994	4.68	3.86	4.33
1995-2002	6.77	6.25	6.69
1959-2002	4.94	4.28	4.61

Table 5. Overall Impact of Capitalized R&D on GDP Level

	NIPA treatment	with R&D capitalized					
GDP [billions of dollars]		Scenario B level	Scenario B percent difference	Scenario C	Scenario C percent difference	Scenario D level	Scenario D percent difference
1960	526.4	537.4	2.1	537.8	2.2	538.0	2.2
1970	1,038.5	1,068.6	2.9	1,067.1	2.8	1,069.0	2.9
1980	2,789.5	2,859.3	2.5	2,856.0	2.4	2,857.5	2.4
1990	5,803.1	5,963.3	2.8	5,961.6	2.7	5,961.9	2.7
2002	10,469.6	10,751.5	2.7	10,743.5	2.6	10,747.3	2.7
average change, all years			2.6		2.6		2.6

Table 6. Impact on Gross Private Domestic Investment and the Saving Rate

Gross Private Domestic Investment GPDI			National Saving Rate (Note 1)	
	NIPA treatment	With R&D as investment	NIPA treatment	with R&D as investment
Period	(millions)	All Scenarios	saving rate	Percentage point difference All Scenarios
1960	7,8891	7.5	21.0	2.1
1970	15,2378	7.1	18.6	2.0
1980	47,9252	6.8	19.7	1.8
1990	86,0968	9.8	16.3	2.2
2002	1,582,129	11.3	14.2	2.2

Table 7. Comparison of Key Assumptions of R&D Satellite Accounts

Country	Average service life in years	R&D input price index	Depreciation rate of R&D capital	Source of net operating surplus estimate	Gestation lag	Impact on Level of Current GDP
Australia (Note 1)	9	component-based input price index	10 percent	based on a normal return to capital	0	1.5 percent
Canada (Note 2)	5 to 10	GDP deflator	10 and 25 percent	R&D Services Industry	NA	1.2 percent
Israel (Note 3, 5)	7	component-based input price index	15 percent	R&D Services Industry	2	3 percent
Netherlands (Note 4)	NA	component-based input price index	11 to 25 percent	Other business services industry	1	1.1–1.2 percent
UK (Note 6)	NA	GDP deflator	10 to 25 percent	NA	NA	NA
U.S.	13.3	input-cost based deflator and three high-productivity proxy price indexes	15 percent, information-processing equipment and software	none	0	2.3 to 2.6 percent

Note 1. Australia. Australian Bureau of Statistics. National Accounts Research Section. Capitalising Research and Development in the National Accounts. March 2004.

Note 2. Siddiqi, Yusuf and M. Salem: “Treating Research and Development as Capital Expenditure in the Canadian SNA.” System of National Accounts Statistics Canada. March 2005.

Note 3. Brenner, Nava; Peleg, Soli; and Galit Zalewsky: Updated version of the exercise to examine the impact of capitalization of R&D in the national accounts.” Prepared for the Canberra II Group: On the Measurement of Non-Financial Assets. August 2005.

Note 4. de Haan, Mark and Myriam van Rooijen –Horsten Measuring R&D Output and Knowledge Capital Formation in Open Economies. Conference paper, 28th General Conference of the International Association for Research in Income and Wealth, Cork, Ireland, August 22-24, 2004.

Note 5 Peleg, Soli: “Harmonization between R&D Statistics and the National Accounts.” Central Bureau of Statistics, Israel. Paper presented at the NESTI/Canberra II meeting in Berlin, Germany, May 2006.

Note 6 Clayton, Tony and Prabhat Vaze. Capitalising Research and Development in the UK National Accounts, Undated Manuscript.

