Contribution (1987-2007) and Stocks (1948-2007) of Research and Development (R&D)

Table 1 shows the year-to year contribution to private nonfarm business sector and Table 2 shows the long-term contribution of Research and Development (R&D) to multifactor productivity (MFP) growth. Table 3 shows R&D stocks. The stock of R&D in private nonfarm business sector is derived by cumulating constant dollar measures of research and development expenditures and allowing for depreciation. Current dollar expenditures for privately financed research and development for the years 1987-2007 are obtained from annual issues of Research and Development in Industry published by the National Science Foundation. The BLS develops price deflators and estimates of the rate of depreciation.

The Bureau of Labor Statistics (BLS) estimates of R&D spillover stocks are designed to measure the benefits of R&D that spill over from the original investors to other firms.[1] The Bureau of Economic Analysis (BEA) of the Department of Commerce has also prepared estimates of ownership stocks of U.S. R&D, as published in the December 2006 and October 2007 issues of the Survey of Current Business. In contrast to the BLS concept, the BEA measures the value of R&D stocks as an asset to its owners, the private firms, government, or colleges and universities which finance and conduct research; spillover effects are not included. In terms of coverage, BEA includes R&D financed by private firms, government, colleges and universities, and non-profit institutions, whereas the BLS considers only R&D financed by private firms.

Because of these differences in concept and coverage, the BEA and BLS R&D stocks utilize different lags[2] and rates of depreciation, and report different magnitudes for the U.S. national R&D stock. For example, the BEA reported that in 2002 the R&D stock was $931 billion, of which R&D financed by private firms was $581 billion.[3] In contrast, in 2002 the BLS R&D stock, limited to the R&D of private firms, was $1295 billion. BLS stocks are larger because spillovers, associated with the diffusion of knowledge, typically take more time to occur, and therefore depreciate more slowly.[4] Section I of BLS Working Paper 408, at http://www.bls.gov/ore/pdf/ec070070.pdf, contains a further discussion of differences between the BLS and BEA concepts.

Users of R&D data should view the BEA and BLS measures as complementary, since asset and spillover effects both have to be taken into account to describe the total effect of R&D on the economy. The BEA stocks provide information on how much value R&D stocks bring to their owners who hold R&D as an asset. The BLS data show how much R&D spills over to create value for other firms in the economy. Since R&D brings both direct benefits to holders of R&D and indirect benefits to other firms who eventually utilize this same knowledge, both elements have to be included to understand the total impact of R&D.

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[1] U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 2331, The Impact of Research and Development on Productivity Growth, available on request, reports the methodology underlying Bureau of Labor Statistics R&D stocks.

[2] Lags refer to the period of time between an investment in R&D and its ability to contribute to production. R&D stocks often incorporate a lag before R&D is assumed to affect production.

[3] Survey of Current Business, December 2006, Table 2.5, page 37. All stocks mentioned here are in 2000 dollars.

[4] In addition, differences in the R&D deflator also have an important influence upon differences between the BLS and BEA R&D stocks. For example, if the main BEA deflator (BEA Assumption D) were used together with BLS estimates of private R&D expenditures, and their depreciation, the 2002 BLS R&D stock for private business would be 961 billions rather than 1295 billions. The Bureau of Economic Analysis discusses the R&D deflator and several related issues in their article on "BEA's 2006 Research and Development Satellite Account" in the December 2006 Survey of Current Business.

Further description of these data and methods can be found in the BLS Bulletin 2331, *The Impact of Research and Development on Productivity Growth,* (September 1989). Copies can be obtained by sending an email or calling:

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Table 1 Contribution of Research and Development to Multifactor Productivity: 1987-2007
(Percent per year)

Year	R&D contribution
1987	0.24
1988	0.21
1989	0.19
1990	0.20
1991	0.23
1992	0.24
1993	0.24
1994	0.22
1995	0.19
1996	0.18
1997	0.22
1998	0.24
1999	0.25
2000	0.27
2001	0.30
2002	0.33
2003	0.27
2004	0.20
2005	0.18
2006	0.16
2007	0.17

Data are based on the results discussed in Multifactor Productivity Trends, March 25, 2009, www.bls.gov/news.release/pdf/prod3.pdf.

Table 2 Long-term Contribution of Research and Development to Multifactor Productivity: 1987-2007 (percent)

Period	R&D Contribution
1987-2007	0.22
1987-1990	0.20
1990-1995	0.22
1995-2000	0.23
2000-2007	0.23

Data are based on the results discussed in Multifactor Productivity Trends, March 25, 2009, www.bls.gov/news.release/pdf/prod3.pdf.

Table 3. Research and Development Stocks: 1948-2007
(in billions of 2000 dollars)
((1) plus (2) equals (3))

Year	Basic Research	Applied Research	Total R&D Stocks
	(1)	(2)	(3)
1948	4.625	37.737	42.363
1949	5.005	41.421	46.425
1950	5.513	44.915	50.427
1951	6.042	46.861	52.903
1952	6.632	49.639	56.271
1953	7.234	52.415	59.649
1954	7.739	57.058	64.797
1955	8.326	64.045	72.371
1956	8.936	70.737	79.672
1957	9.716	77.072	86.789
1958	10.650	86.507	97.157
1959	11.654	94.955	106.608
1960	12.758	103.216	115.975
1961	14.149	112.181	126.330
1962	15.580	121.941	137.521
1963	17.098	131.558	148.656
1964	18.580	141.483	160.063
1965	20.304	151.558	171.862
1966	22.095	162.355	184.450
1967	24.018	174.534	198.552
1968	26.064	187.858	213.922
1969	28.129	202.399	230.529
1970	30.286	217.290	247.576
1971	32.597	232.864	265.460
1972	34.753	246.670	281.423
1973	36.980	258.710	295.690
1974	39.111	271.150	310.261
1975	41.097	284.999	326.096
1976	43.066	298.398	341.464
1977	45.007	309.112	354.119
1978	46.966	321.077	368.043
1979	48.898	333.700	382.598
1980	50.786	347.837	398.623
1981	52.746	364.059	416.806
1982	54.800	382.734	437.533
1983	56.946	402.939	459.886
1984	59.208	424.899	484.107
1985	61.598	449.633	511.230
1986	64.323	479.417	543.740
1987	67.294	512.137	579.430
1988	70.641	541.964	612.605
1989	74.535	568.889	643.423
1990	78.806	597.949	676.755
1991	84.693	630.324	715.016
1992	90.651	666.469	757.120
1993	96.419	703.639	800.058
1994	102.573	739.237	841.810
1995	108.524	769.328	877.852
1996	117.252	797.488	914.740
1997	125.469	835.364	960.832
1998	133.770	879.853	1013.623
1999	142.146	929.548	1071.694
2000	149.728	987.043	1136.771
2001	158.968	1051.809	1210.777
2002	170.336	1124.529	1294.865
2003	177.428	1186.271	1363.699
2004	185.234	1231.569	1416.803
2005	193.469	1272.911	1466.380
2006	202.662	1310.901	1513.563
2007	211.007	1353.521	1564.528

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