Contribution (1987-2019) and Stocks (1963-2019) 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 the private nonfarm business sector is derived by cumulating constant dollar measures of research and development expenditures and by allowing for depreciation. Current dollar expenditures for privately financed research and development 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 publishes measures of research and development investments in each industry that include estimates of the direct returns to firms conducting such research and development activities. In contrast to the BLS concept, the BEA measures the value of R&D investment 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. BLS stocks are larger because spillovers, associated with the diffusion of knowledge, typically take more time to occur, and therefore depreciate more slowly. Section I of the 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.

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: 1987-2019
(percent per year)

Year	R&D contribution
1987	0.25
1988	0.22
1989	0.20
1990	0.21
1991	0.24
1992	0.26
1993	0.25
1994	0.24
1995	0.20
1996	0.20
1997	0.23
1998	0.25
1999	0.26
2000	0.28
2001	0.31
2002	0.34
2003	0.28
2004	0.21
2005	0.19
2006	0.18
2007	0.19
2008	0.21
2009	0.23
2010	0.14
2011	0.10
2012	0.07
2013	0.11
2014	0.11
2015	0.12
2016	0.13
2017	0.13
2018	0.15
2019	0.15

Data are based on the results discussed in Multifactor Productivity Trends, March 23, 2021

Table 2. Long-term Contribution of Research and Development to Multifactor Productivity: 1987-2019 (percent)

Period	R&D Contribution
1987-2019	0.20
1987-1990	0.21
1990-2000	0.24
2000-2007	0.24
2007-2019	0.14
2018-2019	0.15

Data are based on the results discussed in Multifactor Productivity Trends, March 23, 2021

Table 3. Research and Development Stocks: 1963-2019
(in billions of 2012 dollars)
((1) plus (2) equals (3))

Year	Basic Research	Applied Research	Total R&D Stocks
	(1)	(2)	(3)
1963	19.9	165.4	185.3
1968	31.5	240.4	271.8
1973	45.6	335.2	380.8
1978	58.7	419.8	478.5
1981	66.4	478.3	544.6
1983	71.9	530.7	602.7
1986	81.7	633.1	714.8
1987	85.6	676.7	762.3
1988	90.1	716.2	806.3
1989	95.2	751.8	847.0
1990	100.9	789.9	890.8
1991	108.7	832.1	940.8
1992	116.6	879.5	996.0
1993	124.2	928.4	1052.6
1994	132.3	974.9	1107.1
1995	140.1	1014.4	1154.5
1996	151.6	1051.8	1203.4
1997	162.4	1101.7	1264.1
1998	173.3	1160.3	1333.6
1999	184.4	1225.3	1409.8
2000	194.4	1300.7	1495.1
2001	206.6	1385.0	1591.6
2002	221.5	1479.5	1701.1
2003	230.8	1561.5	1792.2
2004	240.9	1623.8	1864.7
2005	251.6	1681.8	1933.4
2006	263.6	1734.5	1998.1
2007	274.6	1793.2	2067.8
2008	285.7	1862.1	2147.8
2009	296.4	1936.6	2233.0
2010	307.9	1977.6	2285.5
2011	318.5	2003.7	2322.3
2012	330.9	2020.0	2350.9
2013	344.5	2050.3	2394.8
2014	360.1	2079.0	2439.0
2015	376.5	2114.7	2491.2
2016	389.9	2157.9	2547.8
2017	403.5	2203.8	2607.3
2018	421.0	2256.1	2677.1
2019	439.0	2309.3	2748.4