InfoBrief
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Higher Education R&D Expenditures Remain Flat in FY 2012

by Ronda Britt[1]

University spending on research and development in all fields totaled $65.8 billion in FY 2012, according to data from the National Science Foundation (NSF) Higher Education Research and Development (HERD) Survey. When adjusted for inflation, higher education R&D declined by 1.1% in FY 2012 (figure 1).

This represents the first constant-dollar decline since FY 1974 and ends a period of modest growth during FYs 2009–11, when R&D expenditures increased an average of 5% each year.

The expenditures funded by the one-time American Recovery and Reinvestment Act of 2009 (ARRA) decreased from $4.2 billion in FY 2011 to $2.4 billion in FY 2012.[2] ARRA funding represented 6.1% of the federally funded R&D expenditures for FY 2012. Including ARRA funding, the total federal funding for higher education R&D declined from $40.8 billion in FY 2011 to $40.1 billion in FY 2012, falling from 62.5% to 61.0% of total R&D expenditures. In constant dollars, federally funded R&D expenditures declined 3.3% in FY 2012.

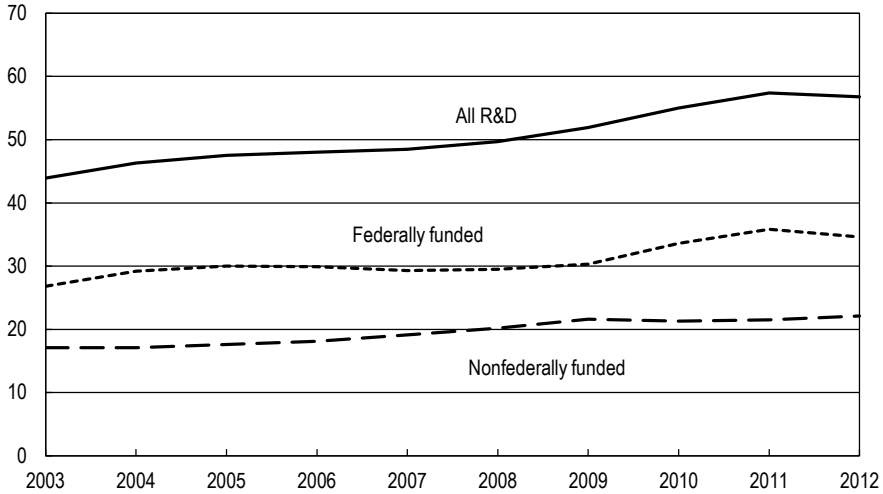
Unless otherwise indicated, references to dollar amounts or percentages for the remainder of this InfoBrief are in current dollars.

R&D Expenditures by Source

Most nongovernmental funding sources showed increases between FY 2011 and FY 2012. Institution-funded R&D showed the most significant growth and rose by over $1 billion to $13.7 billion in FY 2012.[3] Institution funds include three components: institutionally financed research ($7.7 billion), cost sharing on sponsored projects ($1.3 billion), and unrecovered indirect costs on sponsored projects ($4.6 billion). Expenditures funded by nonprofit organizations increased by $180 million

FIGURE 1. Higher education R&D expenditures, by source of funds: FYs 2003–12

Billions of constant 2005 dollars



NOTES: Because of rounding, detail may not add to total. Beginning in FY 2012, institutions reporting less than $1 million in total R&D expenditures were asked to complete a shorter version of the survey questionnaire. These institutions reported $145 million in total R&D expenditures and are not included above.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

to $4.0 billion, and business-funded R&D increased by $101 million to $3.3 billion in FY 2012. By contrast, expenditures funded by state and local governments showed a modest decline for the second year in a row (table 1). R&D expenditures funded by state and local governments decreased from $3.9 billion in FY 2010 to $3.7 billion in FY 2012.

TABLE 1. Higher education R&D expenditures, by source of funds: FYs 2010–12

(Millions of current dollars)

Fiscal year	All R&D expenditures	Federal government	State and local government	Institution funds	Business	Nonprofit organizations	All other sources
2010	61,257	37,477	3,853	11,941	3,198	3,740	1,048
2011	65,274	40,771	3,831	12,601	3,181	3,854	1,036
2012	65,775	40,130	3,704	13,674	3,282	4,033	951

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

Among the federal agencies, the Department of Health and Human Services (HHS) and the National Aeronautics and Space Administration (NASA) accounted for all of the drop in the federally funded total, showing declines of 4.7% and 6.5%, respectively, from 2011 to 2012 (table 2). HHS-funded expenditures declined by almost $1.1 billion to $21.9 billion in FY 2012; that total comprises 54.5% of the total R&D expenditures funded by the federal government.

R&D Expenditures by Field

The largest broad field, life sciences, declined slightly from $37.3 billion in FY 2011 to $37.2 billion in FY 2012 (table 3). The majority of the funding was spent within the subfields of medical sciences ($20.4 billion) and biological sciences ($11.6 billion), both of which experienced small declines in FY 2012. Engineering was the next largest broad field and increased 2.6% to $10.3 billion in reported R&D expenditures in FY 2012. Bioengineering/biomedical engineering experienced the largest percentage growth of the engineering subfields, rising 7.4% to $879 million. R&D within non-science and engineering (non-S&E) fields also grew, showing a 7.0% increase to $3.5 billion in FY 2012. Within the non-S&E fields, education continues to be the largest subfield, and R&D expenditures within this discipline rose 10.2% to $1.2 billion in FY 2012.[4]

R&D Spending for Top 30 Performers

Of the 907 institutions surveyed, the top 30 in terms of R&D expenditures in all fields accounted for 40% of total academic R&D spending (table 4). There was only one change to the top 30 between FY 2011 and FY 2012. The University of Southern California moved back into the top 30, displacing the University of Texas at Austin, now at number 31. Twelve of the top 30 reported expenditure declines in FY 2012, ranging from -0.1% (Yale University) to -7.9% (Ohio State University). Harvard University showed a significant increase of 23% in FY 2012 as a result of increased expenditures from federal, business, and nonprofit sources and also a first-time reporting of $69 million in institution-funded R&D. The Massachusetts Institute of Technology also showed a significant increase relative to its peers, rising 13.9% to $824 million in FY 2012. This increase was also due in large part to a new reporting of institution funds previously omitted. There are now eight institutions reporting over $1 billion each in R&D spending, compared with four such institutions in FY 2010.

R&D Personnel

In FY 2012, institutions reported a total headcount of 916,822 personnel paid from the $28.3 billion in R&D

TABLE 2. Federally financed higher education R&D expenditures, by federal agency: FYs 2010–12

(Millions of current dollars)

Agency	FY 2010	FY 2011	FY 2012	% change 2011–12
All federal R&D	37,477	40,771	40,130	-1.6
Department of Health and Human Services	21,096	22,984	21,895	-4.7
National Science Foundation	4,733	5,138	5,271	2.6
Department of Defense	4,493	4,826	4,924	2.0
Department of Energy	1,555	1,867	1,953	4.6
National Aeronautics and Space Administration	1,474	1,423	1,331	-6.5
Department of Agriculture	954	1,006	1,094	8.7
Other[a]	3,172	3,527	3,664	3.9

[a] Includes all other agencies reported.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

TABLE 3. Higher education R&D expenditures, by R&D field: FYs 2011–12

(Millions of current dollars)

Field	FY 2011	FY 2012	% change 2011–12
All R&D fields	65,274	65,775	0.8
Science	51,953	51,964	0.0
Computer sciences	1,740	1,821	4.7
Environmental sciences	3,159	3,173	0.4
Atmospheric sciences	481	476	-1.0
Earth sciences	1,140	1,167	2.4
Oceanography	1,050	1,022	-2.7
Environmental sciences, nec	489	508	3.9
Life sciences	37,319	37,215	-0.3
Agricultural sciences	3,112	3,296	5.9
Biological sciences	11,842	11,596	-2.1
Medical sciences	20,401	20,358	-0.2
Life sciences, nec	1,964	1,965	0.1
Mathematical sciences	640	675	5.4
Physical sciences	4,781	4,721	-1.3
Astronomy	583	706	21.1
Chemistry	1,784	1,750	-1.9
Physics	2,121	1,996	-5.9
Physical sciences, nec	293	269	-8.3
Psychology	1,157	1,188	2.7
Social sciences	2,063	2,056	-0.4
Economics	387	383	-1.0
Political sciences	372	392	5.3
Sociology	433	460	6.2
Social sciences, nec	871	821	-5.8
Sciences, nec	1,093	1,115	2.1
Engineering	10,044	10,302	2.6
Aeronautical/astronautical engineering	668	662	-0.8
Bioengineering/biomedical engineering	818	879	7.4
Chemical engineering	918	909	-1.0
Civil engineering	1,210	1,234	2.0
Electrical engineering	2,210	2,315	4.8
Mechanical engineering	1,557	1,551	-0.4
Metallurgical/materials engineering	738	757	2.6
Engineering, nec	1,924	1,996	3.7
Non-science and engineering	3,278	3,508	7.0
Business and management	400	442	10.5
Communications, journalism, and library science	153	159	4.2
Education	1,115	1,229	10.2
Humanities	313	341	9.0
Law	125	132	4.9
Social work	194	199	2.6
Visual and performing arts	77	85	9.8
Non-science and engineering, nec	901	922	2.4

nec = not elsewhere classified.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

salaries and wages reported on the survey. Of this total, 153,653 (16.8%) were designated as principal investigators (including co-investigators). The remainder (763,169) included other personnel, such as research fellows, student research assistants, and support staff.

Data Sources, Limitations, and Availability

The fiscal year referred to throughout this report is the academic fiscal year; for most institutions, FY 2012 represents the period 1 July 2011 through 30 June 2012. The higher education R&D expenditures data were collected from 907 universities and colleges that grant bachelor's or higher degrees and expended at least $150,000 in R&D in the survey period. In order to reduce respondent burden, the HERD Survey was revised in FY 2012 to request abbreviated data from institutions reporting less than $1 million in R&D expenditures during the previous fiscal year. The totals shown in this InfoBrief do not include expenditures reported by 252 institutions that completed a short form version of the survey in FY 2012. These institutions accounted for only an additional $145 million to the U.S. total of higher education R&D expenditures in FY 2012; however, combined results will be shown within a limited set of detailed tables.

The amounts reported include all funds expended for activities specifically organized to produce research outcomes and sponsored by an outside organization or separately budgeted using institution funds. R&D expenditures at university-administered federally funded research and development centers (FFRDCs) are collected in a separate survey, the FFRDC R&D

Survey, and these data are available at http://www.nsf.gov/statistics/ffrdc/.

The full set of detailed tables from this survey will be available at http://www.nsf.gov/statistics/srvyherd/. Individual detailed tables from the 2012 survey may be available in advance of release. For further information, please contact the author.

Notes

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2. Although the funding was awarded to institutions in federal FY 2009, much of the funding was for multiyear projects. ARRA funds accounted for $2.6 billion of the FY 2010 academic R&D total of $61.2 billion. ARRA expenditures are expected to appear in HERD Survey totals through academic FY 2014.

3. To improve the consistency of reporting across institutions, the FY 2012 survey asked institutions to specify which types of institution-funded R&D other than cost sharing and unrecovered indirect costs were reported in both FY 2011 and FY 2012. The four types of funding choices included (1) competitively awarded internal grants, (2) startup packages or bridge funding, (3) other departmental funds designated for research, or (4) tuition assistance for research personnel. The results showed that 13% of institutions began reporting one or more of the funding types listed for the first time in FY 2012. These institutions accounted for 16% of the total R&D expenditures reported in FY 2012. Although it is not possible to determine the effect of this reporting change on the significant increase in FY 2012 institution-funded R&D, it is likely that some of the increase may be due to improved reporting rather than an increase in available funds.

4. For more details on the specific fields within each of these broad field categories, see pages 10–15 of the FY 2012 Higher Education R&D Survey questionnaire, http://www.nsf.gov/statistics/srvyherd/surveys/srvyherd_2012.pdf.

TABLE 4. Thirty institutions reporting the largest FY 2012 R&D expenditures in all fields: FYs 2010–12
(Millions of current dollars)

Rank	Institution	FY 2010	FY 2011	FY 2012	% change 2011–12
	All institutions	61,257	65,274	65,775	0.8
	Leading 30 institutions	24,458	26,160	26,487	1.3
1	Johns Hopkins U.[a]	2,004	2,145	2,106	-1.8
2	U. MI, Ann Arbor	1,184	1,279	1,323	3.4
3	U. WI, Madison	1,029	1,112	1,170	5.2
4	U. WA, Seattle	1,023	1,149	1,109	-3.4
5	U. CA, San Diego	943	1,009	1,074	6.4
6	U. CA, San Francisco	936	995	1,033	3.8
7	Duke U.	983	1,022	1,010	-1.2
8	U. CA, Los Angeles	937	982	1,003	2.1
9	Stanford U.	840	908	903	-0.5
10	Columbia U. in the City of New York	807	879	889	1.2
11	U. NC, Chapel Hill	755	869	885	1.8
12	U. Pittsburgh, Pittsburgh	822	899	867	-3.6
13	U. PA	836	886	847	-4.4
14	U. MN, Twin Cities	786	847	826	-2.5
15	MA Institute of Technology	677	724	824	13.9
16	Cornell U.	750	782	802	2.7
17	Harvard U.	583	650	799	23.0
18	PA State U., University Park and Hershey Medical Ctr.	770	795	798	0.4
19	OH State U.	755	832	767	-7.9
20	U. CA, Berkeley	694	708	730	3.2
21	U. CA, Davis	680	708	713	0.8
22	Washington U., St. Louis	696	725	706	-2.6
23	U. FL	682	740	697	-5.8
24	TX A&M U., College Station	690	706	693	-1.7
25	GA Institute of Technology	616	655	689	5.1
26	U. TX, M. D. Anderson Cancer Ctr.	600	663	686	3.4
27	Yale U.	624	657	657	-0.1
28	Northwestern U.	575	619	631	2.0
29	U. AZ	587	611	625	2.4
30	U. Southern CA	593	603	624	3.4

[a] Johns Hopkins University includes Applied Physics Laboratory, with $1,121 million in total R&D expenditures in FY 2012.

NOTES: Because of rounding, detail may not add to total. Institutions ranked are geographically separate campuses headed by a campus-level president, chancellor, or equivalent.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

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