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Federal Government is Largest Source of University R&D Funding in S&E; Share Drops in FY 2008

by Ronda Britt[1]

The federal government remains the largest source of academic R&D funding; however, its share has dropped in recent years, from 64% in FY 2005 to 60% in FY 2008, according to FY 2008 data from the National Science Foundation (NSF) Survey of Research and Development Expenditures at Universities and Colleges.[2] This level represents a return to the average share held by the federal government throughout the late 1980s and 1990s. In current dollars, federally funded academic R&D expenditures rose 2.5% in FY 2008 to $31.2 billion. After adjusting for inflation, this represents a 0.2% increase from FY 2007 and follows 2 years of real declines since FY 2005 (figure 1).

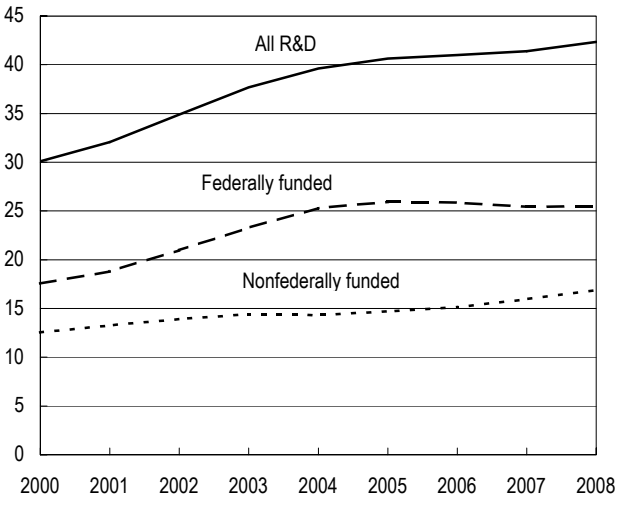
Overall, universities and colleges reported S&E R&D expenditures of $51.9 billion in FY 2008, 4.8% more than in the previous year (table 1). When adjusted for inflation, academic R&D rose by 2.3% in FY 2008.

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

Nonfederal Sources of R&D Funding

Funding from all nonfederal sources combined grew by 8.3% in FY 2008. R&D expenditures financed by state and local government funding increased by 8.8% in FY 2008, and expenditures funded by industry (7.1%) and academic institution's own funds (7.0%) were also up.[3] Industry funding as a share of the total increased in recent years after a period of decline or no growth, reaching $2.9 billion in FY 2008 and 5.5% of total academic R&D funding.

FIGURE 1. Science and engineering R&D expenditures at universities and colleges, by source of funds: FY 2000–08



SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

Information and data from the Division of Science Resources Statistics are available on the web at http://www.nsf.gov/statistics/.
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TABLE 1. S&E R&D expenditures at universities and colleges: FY 2003–08

(Millions of current dollars)

Source of funds and character of work	2003	2004	2005	2006	2007	2008
All R&D expenditures	40,100	43,258	45,799	47,751	49,554	51,909
Source of funds						
Federal government	24,771	27,644	29,209	30,129	30,458	31,231
State and local government	2,647	2,879	2,940	2,962	3,143	3,418
Industry	2,162	2,129	2,291	2,402	2,680	2,870
Institutional funds	7,664	7,753	8,266	9,062	9,748	10,435
Other	2,857	2,852	3,093	3,196	3,525	3,954
Character of work						
Basic research	30,121	31,968	34,368	36,096	37,842	39,408
Applied research and development	9,979	11,290	11,432	11,656	11,712	12,501

S&E = science and engineering.

NOTE: Because of rounding, detail may not add to total.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

Funding by Federal Agency

The Department of Health and Human Services (HHS), including the National Institutes of Health, historically has been the largest provider of federal R&D funding to universities and colleges. In FY 2008 HHS funding constituted 56% of total federally funded expenditures ($17.5 billion) and was concentrated within the medical and biological sciences (table 2). NSF was the next largest provider in FY 2008, funding $3.8 billion across numerous academic R&D fields. NSF was the largest single-agency funder of academic R&D in the environmental and physical sciences. The Department of Defense (DOD) provided $3.1 billion in FY 2008, almost half of it in support of engineering R&D.

Funding by Field

Medical sciences ($17.3 billion) and biological sciences ($9.8 billion) once again accounted for more than one-half of all R&D at universities and colleges in FY 2008 (table 3). Each had modest increases of 4.3% and

TABLE 2. Federally funded R&D expenditures at universities and colleges, by S&E field and agency: FY 2008

(Millions of current dollars)

Field	All agencies	DOD	DOE	HHS	NASA	NSF	USDA	Other[a]
All fields	31,231	3,077	1,134	17,508	1,061	3,768	893	2,868
Computer sciences	1,031	302	34	55	21	437	3	115
Environmental sciences	1,826	166	90	60	243	628	77	532
Life sciences	18,664	523	140	15,530	93	579	722	968
Agricultural sciences	864	13	25	68	11	82	483	168
Biological sciences	6,358	157	66	5,142	41	429	188	291
Medical sciences	10,757	326	42	9,788	38	46	30	435
Life sciences nec	685	27	7	532	3	21	21	74
Mathematical sciences	445	48	13	114	5	210	4	25
Physical sciences	2,739	344	415	483	389	806	7	183
Psychology	637	31	3	475	9	52	1	59
Social sciences	810	64	20	294	9	130	37	250
Sciences nec	373	97	16	59	13	86	3	79
Engineering	4,705	1,502	402	437	278	835	39	652

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; nec = not elsewhere classified; NSF = National Science Foundation; S&E = science and engineering; USDA = Department of Agriculture.

[a] Includes all other agencies reported.

NOTES: Not all subfields reported in this table. Agency detail may not add to field totals because some institutions were unable to provide federally funded R&D field totals by agency.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

TABLE 3. R&D expenditures at universities and colleges, by S&E field: FY 2007–08

(Millions of current dollars)

Field	FY 2007	FY 2008	% change 2007–08
All S&E R&D expenditures	49,554	51,909	4.8
Computer sciences	1,421	1,468	3.3
Environmental sciences	2,724	2,800	2.8
Atmospheric sciences	492	422	-14.2
Earth sciences	909	956	5.1
Oceanography	996	1,051	5.5
Environmental sciences, nec	327	371	13.4
Life sciences	29,838	31,215	4.6
Agricultural sciences	2,916	2,994	2.7
Biological sciences	9,229	9,769	5.9
Medical sciences	16,562	17,271	4.3
Life sciences, nec	1,131	1,180	4.4
Mathematical sciences	573	621	8.3
Physical sciences	3,859	3,933	1.9
Astronomy	463	537	15.9
Chemistry	1,461	1,486	1.7
Physics	1,616	1,604	-0.8
Physical sciences, nec	320	307	-4.0
Psychology	872	929	6.5
Social sciences	1,798	1,940	7.9
Economics	349	398	14.0
Political science	348	337	-3.0
Sociology	397	403	1.5
Social sciences, nec	703	801	13.9
Sciences, nec	943	1,046	10.9
Engineering	7,525	7,957	5.7
Aeronautical/astronautical engineering	471	538	14.2
Bioengineering/biomedical engineering	540	604	11.8
Chemical engineering	601	658	9.5
Civil engineering	869	922	6.0
Electrical engineering	1,632	1,708	4.7
Mechanical engineering	1,129	1,159	2.7
Metallurgical/materials engineering	634	643	1.4
Engineering, nec	1,650	1,725	4.6

nec = not elsewhere classified; S&E = science and engineering.

NOTE: Percentages are calculated on unrounded data.

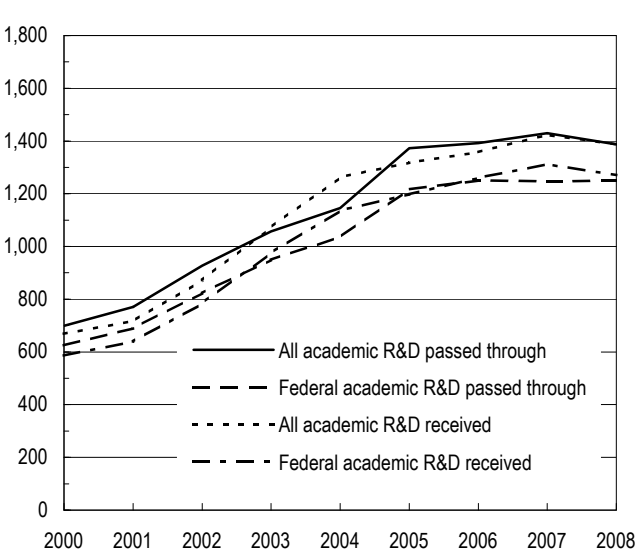
SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

5.9%, respectively, from FY 2007 totals. R&D spending in seven fields showed double-digit percentage increases between FY 2007 and 2008, led by astronomy at 15.9%. The field of atmospheric sciences showed the largest decline (-14.2%) between FY 2007 and FY 2008.

Pass-through Funding

R&D funds for joint projects that were passed through primary university recipients to other university subrecipients about doubled from FY 2000 to FY 2008, from $0.7 billion to $1.4 billion in constant 2000 dollars (figure 2). The current dollar amount ($1.7 billion) represents 3.3% of total academic R&D expenditures in FY 2008, compared with 2.3% of the total in FY 2000. In FY 2008, 90% of these pass-through funds originated from federal sources.

FIGURE 2. Total and federally funded academic R&D passed through to or received by other universities: FY 2000–08



SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

Universities receiving pass-through funds from other universities likewise reported a rapid increase in subrecipient R&D expenditures between FY 2000 and FY 2008, with over 90% of the funding originating from federal sources.

Top Academic Research Performers

Of the 690 institutions surveyed, the top 20 in terms of total S&E R&D expenditures accounted for 30% of total academic R&D spending (table 4). Three institutions within this group reported a decline in R&D expenditures from FY 2007 to FY 2008 (Duke University, Ohio State University, and the University of Florida). Washington University in St. Louis was not included among the top 20 for the first time since FY 1999. With a reported spending decline of $9 million between 2007 and 2008, it fell 3 spots to number 21 with $564 million. Replacing it was Texas A&M University, which moved from number 22 in FY 2007 to number 20 in FY 2008. The institutions constituting the top 5 have remained the same since FY 2004.

Public institutions spent a total of $35.3 billion on R&D in FY 2008, with 55% funded by the federal government (table 5). The University of California San

TABLE 4. Twenty institutions reporting the largest FY 2008 R&D expenditures in S&E fields: FY 2007–08

(Millions of current dollars)

Rank 2008	Institution	2007	2008
	All S&E R&D expenditures[a]	49,554	51,909
	Leading 20 institutions	14,645	15,363
1	Johns Hopkins U., The[b]	1,554	1,681
2	U. CA, San Francisco	843	885
3	U. WI Madison	841	882
4	U. MI all campuses	809	876
5	U. CA, Los Angeles	823	871
6	U. CA, San Diego	799	842
7	Duke U.	782	767
8	U. WA	757	765
9	U. PA	648	708
10	OH State U. all campuses	720	703
11	PA State U. all campuses	652	701
12	Stanford U.	688	688
13	U. MN all campuses	624	683
14	MA Institute of Technology	614	660
15	Cornell U. all campuses	642	654
16	U. CA, Davis	601	643
17	U. Pittsburgh all campuses	559	596
18	U. CA, Berkeley	552	592
19	U. FL	593	584
20	TX A&M U.	544	582
	All other institutions	34,909	36,546

S&E = science and engineering.

[a] Excludes R&D performed by university-administered federally funded research and development centers.

[b] The Johns Hopkins University includes the Applied Physics Laboratory, with $778 million (FY 2007) and $845 million (FY 2008) in total R&D expenditures.

NOTE: Because of rounding, detail may not add to total.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

TABLE 5. Total and federally funded R&D expenditures in S&E fields at the 20 public universities and colleges that led in total R&D: FY 2008

(Millions of current dollars)

		R&D expenditures	
Rank	Institution	Total	Federal
	All public institutions	35,292	19,335
	Leading 20 institutions	13,395	7,505
1	U. CA, San Francisco	885	473
2	U. WI Madison	882	474
3	U. MI all campuses	876	593
4	U. CA, Los Angeles	871	472
5	U. CA, San Diego	842	491
6	U. WA	765	614
7	OH State U. all campuses	703	335
8	PA State U. all campuses	701	407
9	U. MN all campuses	683	364
10	U. CA, Davis	643	269
11	U. Pittsburgh all campuses	596	456
12	U. CA, Berkeley	592	249
13	U. FL	584	231
14	TX A&M U.	582	246
15	U. TX M. D. Anderson Cancer Ctr.	559	195
16	U. AZ	546	278
17	U. CO all campuses	536	437
18	U. NC Chapel Hill	526	373
19	GA Institute of Technology all campuses	522	281
20	U. IL Urbana-Champaign	501	267
	All other surveyed public institutions	21,897	11,830

S&E = science and engineering.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

Francisco was the largest R&D-performing public institution in FY 2008, spending $834 million, or 94% of its $885 million total, in the field of medical sciences.

Private institutions spent $16.6 billion on R&D in FY 2008, with 72% funded by the federal government (table 6). The Johns Hopkins University remains the largest R&D-performing institution both among private institutions and overall, with $1.7 billion in R&D expenditures in FY 2008.

Non-S&E R&D Expenditures

Academic institutions spent a total of $2.2 billion on R&D in non-S&E fields in FY 2008 (table 7).[4] This amount is in addition to the $51.9 billion expended on S&E R&D. The largest amounts reported for individual non-S&E fields were in education ($880 million), business and management ($325 million), and humanities ($254 million). The top 20 performers of non-S&E R&D accounted for 36% of the total non-S&E R&D expenditures in FY 2008. Purdue University, ranked 36th in S&E R&D expenditures, held the number one spot in FY 2008 non-S&E R&D with $65 million. The University of South Florida was at number two for the second year in a row with $64 million.

TABLE 6. Total and federally funded R&D expenditures in S&E fields at the 20 private universities and colleges that led in total R&D: FY 2008

(Millions of current dollars)

		R&D expenditures	
Rank	Institution	Total	Federal
	All private institutions	16,617	11,896
	Leading 20 institutions	11,353	8,163
1	Johns Hopkins U., The[a]	1,681	1,425
2	Duke U.	767	451
3	U. PA	708	482
4	Stanford U.	688	509
5	MA Institute of Technology	660	495
6	Cornell U. all campuses	654	359
7	Washington U. St. Louis	564	394
8	Columbia U. in the City of New York	549	461
9	U. Southern CA	520	349
10	Yale U.	487	375
11	Northwestern U.	484	265
12	Harvard U.	453	383
13	Baylor C. of Medicine	449	262
14	Emory U.	441	291
15	Vanderbilt U.	423	331
16	Case Western Reserve U.	416	305
17	U. Rochester	375	276
18	Scripps Research Institute, The	366	266
19	U. Chicago	357	285
20	NY U.	311	199
	All other surveyed private institutions	5,264	3,733

S&E = science and engineering.

[a] The Johns Hopkins University includes the Applied Physics Laboratory, with $845 million in total R&D expenditures in FY 2008.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

Data Comments and Availability

The academic R&D expenditures data presented in this InfoBrief were obtained from 690 universities and colleges that grant degrees in the sciences or engineering and expended at least $150,000 in S&E R&D in the survey period. The amounts reported include all funds expended for S&E activities specifically organized to produce research outcomes and sponsored by an outside organization or separately budgeted using institution funds. Non-S&E R&D expenditures are reported separately in the survey and are not included in the overall R&D expenditure totals. For a complete listing of the fields included under the S&E and non-S&E categories, refer to the FY 2008 survey questionnaire, available at http://www.nsf.gov/statistics/question.cfm#12.

Data reported on non-S&E R&D expenditures are lower-bound estimates for the national totals because NSF did not attempt to estimate for nonresponse on this item. Also, only institutions that conducted at least $150,000 of S&E R&D were surveyed. The activities of institutions that do not spend at least $150,000 on S&E R&D (but may conduct substantial amounts of non-S&E R&D) are not reflected here.

NSF makes available institutional profiles for institutions of higher education with S&E departments that grant master's degrees or higher (http://www.nsf.gov/statistics/profiles/). The profiles contain data from this survey and three other NSF academic S&E surveys: the Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions; the Survey of Graduate Students and Postdoctorates in Science and Engineering; and the Survey of Earned Doctorates. Data from the four surveys are available on the Web at http://www.nsf.gov/statistics/ and through

TABLE 7. Twenty institutions reporting the largest non-S&E R&D expenditures, by non-S&E field: FY 2008
(Millions of current dollars)

Rank	Institution	All non-S&E fields	Education	Business and management	Humanities	Other[a]
	All non-S&E R&D expenditures	2,241	880	325	254	783
	Leading 20 institutions	805	274	146	57	329
1	Purdue U. all campuses	65	8	14	2	41
2	U. South FL	64	30	9	2	24
3	U. WI Madison	63	5	38	11	9
4	U. TX Austin	60	26	6	1	27
5	Harvard U.	53	8	0	1	44
6	U. FL	49	5	2	2	39
7	OR State U.	45	1	0	0	44
8	U. MI all campuses	39	18	11	2	8
9	U. Central FL	39	22	11	0	6
10	MI State U.	35	19	4	2	10
11	Northwestern U.	35	5	22	1	6
12	U. CA, Los Angeles	33	18	7	5	3
13	U. PA	32	12	8	4	9
14	U. WA	31	13	0	3	15
15	FL State U.	29	24	2	1	3
16	U. CA, Berkeley	29	12	4	4	9
17	U. CA, Santa Cruz	27	24	0	2	1
18	NY U.	26	10	2	1	14
19	IN U. all campuses	26	7	5	0	13
20	Brown U.	25	7	1	13	4
	All other institutions	1,436	606	179	197	454

S&E = science and engineering.

[a] Includes the combined total from the following fields: communication, journalism, and library science ($89 million), law ($88 million), social work ($124 million), visual and performing arts ($59 million), and all other non-S&E R&D not elsewhere classified ($422 million).

NOTE: Tied institutions are ranked based on unrounded data.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges: FY 2008.

the NSF WebCASPAR database system, a Web tool for retrieval and analysis of institutional data on academic S&E resources (http://webcaspar.nsf.gov/).

The full set of detailed tables from this survey will be available in the report *Academic Research and Development Expenditures: Fiscal Year 2008* at http://www.nsf.gov/statistics/rdexpenditures/. Individual detailed tables from the 2008 survey may be available in advance of publication of the full report. For further information, please contact the author.

Notes

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2. Fiscal year throughout this report is the academic fiscal year. For most institutions this is 1 July 2007 through 30 June 2008; thus, these data show spending that

occurred before the downturn in economic conditions that intensified in late 2008. The effect of this crisis and the subsequent recession on academic R&D spending will not be seen until FY 2009 data are reported. Also, most of the increase in R&D expenditures due to American Recovery and Reinvestment Act funding will not be seen until the FY 2010 data.

3. Figures reported for state and local government support of academic R&D exclude general-purpose funds that schools receive from these sources and devote to R&D activities. These funds are included in figures reported as institutional funds.

4. Only institutions reporting S&E R&D expenditures are surveyed for non-S&E R&D spending. See "Data Comments and Availability."

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