

## INDUSTRIAL FUNDING OF ACADEMIC R&D REBOUNDS IN FY 2005

by Ronda Britt

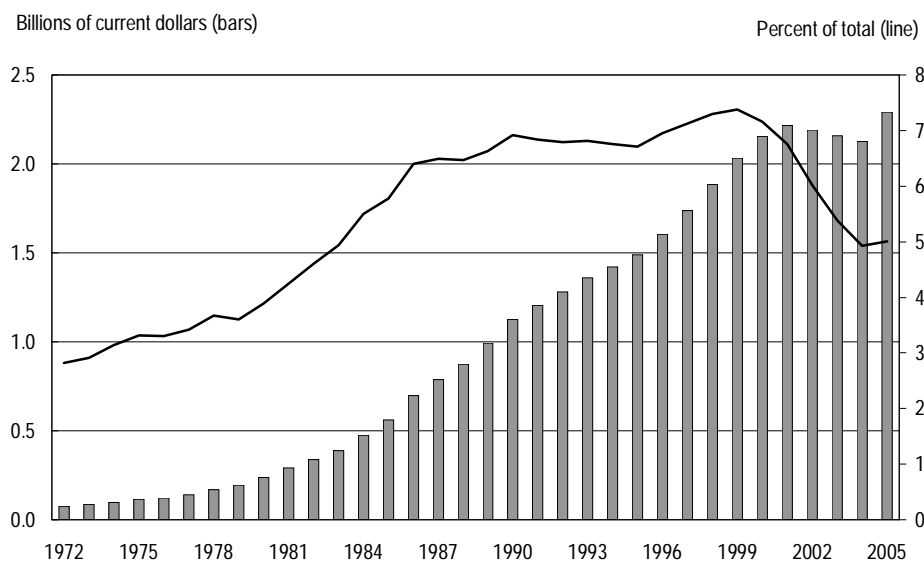
Industrial funding for research and development in academic science and engineering (S&E) fields rebounded from a 3-year decline and grew by 7.7%, reaching an all-time high of \$2.3 billion in FY 2005, according to data from the National Science Foundation (NSF) Survey of Research and Development Expenditures at Universities and Colleges. This increase was enough to stabilize the corresponding decline in industry's share of total academic R&D funding, which had dropped from a high of 7.4% in FY 1999 to 4.9% in FY 2004 (figure 1). Industry's share in FY 2005 of 5.0% is comparable to the share it held in FY 1983.

Overall, universities and colleges reported R&D expenditures of \$45.8 billion in FY 2005, 5.8% more than in the previous year (\$43.2 billion) (table 1). This total represents an increase of 52.1% over the \$30.1 billion reported in FY 2000. When adjusted for inflation, academic R&D rose 3.0% in FY 2005.

### Other Sources of R&D Funding

Federal funding of academic R&D reached \$29.2 billion in FY 2005 and maintained its 64% share of total academic R&D support. Federally financed R&D grew by a relatively modest 5.6% in FY 2005, ending

FIGURE 1. Industry financed R&D expenditures at universities and colleges: FY 1972–2005



NOTE: Survey began annual data collection in FY 1972.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2005.



TABLE 1. Science and engineering R&amp;D expenditures at universities and colleges: FY 2000–05

(Millions of current dollars)

Source of funds and character of work	2000	2001	2002	2003	2004	2005
All R&D expenditures	30,070	32,805	36,385	40,075	43,229	45,750
Source of funds						
Federal government	17,536	19,229	21,857	24,750	27,620	29,167
State and local government	2,200	2,320	2,505	2,645	2,877	2,940
Industry	2,156	2,218	2,191	2,162	2,129	2,292
Institutional funds	5,924	6,613	7,131	7,661	7,751	8,258
All other sources	2,254	2,425	2,700	2,857	2,852	3,093
Character of work						
Basic research	22,454	24,382	27,304	29,986	32,515	34,384
Applied research and development	7,616	8,423	9,081	10,088	10,714	11,367

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 2005.

the trend of annual double-digit growth in recent years (13.7% in FY 2002, 13.2% in FY 2003, and 11.6% in FY 2004). R&D expenditures financed by state and local government funding grew by 2.2% in FY 2005, to \$2.9 billion.<sup>1</sup> R&D expenditures funded by nongovernmental sources experienced the largest percentage increases in FY 2005. In addition to the increase in industrial funding, institutional funding increased 6.5% in FY 2005 to \$8.3 billion, and funding from all other sources combined (nonprofit organizations and other nongovernmental entities) increased 8.4% to \$3.1 billion.

### Funding by Field and Federal Agency

Including all sources of funding, the medical sciences (\$14.9 billion) and biological sciences (\$8.8 billion) once again accounted for the largest field shares of academia's R&D performance total (table 2). Together, these two fields accounted for about one-half of R&D at universities and colleges. The fields showing the largest percentage increases for FY 2005 were life sciences not elsewhere classified (15.3%) and bioengineering/biomedical engineering (13.4%). Academic spending on bioengineering/biomedical engineering R&D has risen substan-

<sup>1</sup> 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.

TABLE 2. R&amp;D expenditures at universities and colleges, by science and engineering field: FY 2004–05

(Millions of current dollars)

Field	FY 2004	FY 2005	% change 2004–05
All R&D expenditures	43,229	45,750	5.8
Computer sciences	1,404	1,406	0.1
Environmental sciences	2,353	2,546	8.2
Atmospheric sciences	414	457	10.3
Earth sciences	828	916	10.6
Oceanography	778	812	4.3
Environmental sciences nec	332	362	8.9
Life sciences	25,944	27,603	6.4
Agricultural sciences	2,696	2,657	-1.4
Biological sciences	8,148	8,846	8.6
Medical sciences	14,037	14,874	6.0
Life sciences nec	1,063	1,226	15.3
Mathematical sciences	449	495	10.2
Physical sciences	3,545	3,704	4.5
Astronomy	420	454	8.0
Chemistry	1,317	1,364	3.6
Physics	1,522	1,607	5.6
Physical sciences nec	286	280	-2.3
Psychology	782	826	5.6
Social sciences	1,667	1,675	0.5
Economics	317	324	2.4
Political sciences	301	315	4.7
Sociology	355	371	4.5
Social sciences nec	694	665	-4.1
Sciences nec	775	767	-1.0
Engineering	6,310	6,728	6.6
Aeronautical/astronautical engineering	432	441	1.9
Bioengineering/biomedical engineering	370	420	13.4
Chemical engineering	493	503	2.1
Civil engineering	789	788	-0.1
Electrical engineering	1,437	1,579	9.9
Mechanical engineering	875	935	6.8
Metallurgical/materials engineering	565	611	8.1
Engineering nec	1,348	1,451	7.6

nec = not elsewhere classified.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2005.

tially in the last several years, almost doubling between FY 2001 (\$213 million) and FY 2005 (\$420 million).

The Department of Health and Human Services provided the largest share of federal funding in FY 2005 (\$15.9 billion), primarily in support of the medical and biological sciences (table 3). NSF provided the second largest amount of federal funding (\$3.5 billion), with most (84%) of the funding going toward R&D in engineering

TABLE 3. Federally financed R&amp;D expenditures at universities and colleges, by source of funds and science and engineering field: FY 2005 (Millions of current dollars)

Field	Federal R&D expenditures	DOD	DOE	HHS	NASA	NSF	USDA	Other <sup>a</sup>
All science and engineering	29,167	2,615	1,055	15,869	1,130	3,533	814	3,327
Computer sciences	1,023	302	29	36	28	427	2	129
Environmental sciences	1,725	141	96	60	218	590	54	522
Life sciences	17,691	428	153	14,197	114	568	673	1,421
Agricultural sciences	845	11	19	52	15	100	453	188
Biological sciences	6,194	139	68	4,913	46	407	180	385
Medical sciences	9,898	258	57	8,622	49	44	27	773
Life sciences nec	753	20	9	609	4	17	13	76
Mathematical sciences	346	41	10	62	4	174	4	25
Physical sciences	2,674	319	379	452	353	779	7	244
Psychology	611	29	1	451	12	51	0	61
Social sciences	691	25	19	256	12	98	35	229
Engineering	4,116	1,278	354	291	380	772	35	599

<sup>a</sup> Includes all other agencies reported.

nec = not elsewhere classified.

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = U.S. Department of Agriculture.

NOTES: Not all fields are reported in this table. Also, agency detail may not add to total because some institutions did not break out their federal expenditures by agency.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2005.

and in the biological, computer, environmental, and physical sciences.

### Top Academic Research Performers

Of the 640 institutions surveyed, the top 20 in terms of total R&D expenditures accounted for 30% of total academic R&D spending (table 4). The top 100 research performers accounted for 80% of all R&D dollars in FY 2005. Two universities were displaced from the top 20 in FY 2005: the University of Colorado slipped from 20th in FY 2004 to 22nd in FY 2005, and the University of Illinois at Urbana-Champaign dropped from 18th in FY 2004 to 24th in FY 2005. Replacing them were Columbia University in the City of New York, which moved from 23rd in FY 2004 to 18th in FY 2005, and the University of Florida, which climbed from 27th to 20th. Duke University had the most significant change of rank within the top 20, an increase of over \$100 million in academic R&D spending moved them from 14th in FY 2004 to 10th in FY 2005.

### Passed-through Funds

To measure the extent of collaboration among institutions, the survey collects the portion of academic R&D expenditures passed through to other institutions for

joint work on an R&D project, as well as the amount received as a subrecipient on such a project. Academic R&D expenditures that were passed through to higher education subrecipients increased from \$1.3 billion in FY 2004 to \$1.5 billion in FY 2005. R&D expenditures that were passed through to non-higher education subrecipients remained steady from FY 2004 to FY 2005 at \$1.0 billion. Almost 90% (\$1.4 billion) of the funds passed through to higher education subrecipients and 83% (\$0.9 billion) of the funds passed through to non-higher education subrecipients were from federal sources.

Universities also reported an increase in R&D expenditures received as a subrecipient from other higher education pass-through entities, from \$1.4 billion in FY 2004 to \$1.5 billion in FY 2005.<sup>2</sup> R&D expenditures received as a subrecipient from non-higher education

<sup>2</sup> Amounts reported as passed through to higher education subrecipients often do not equal amounts reported as received by those subrecipients, due to differences in the item response rates for these two survey questions each year. Although the rounded amounts appear equal in FY 2005, the actual amounts reported as passed through to higher education subrecipients and received by higher education subrecipients are \$1.54 billion and \$1.49 billion, respectively.

TABLE 4. Twenty institutions reporting the largest FY 2005 academic R&amp;D expenditures in science and engineering fields: FY 2004–05

(Millions of current dollars)

Rank	Institution	2004	2005
	All R&D expenditures <sup>a</sup>	43,229	45,750
	Leading 20 institutions	12,826	13,691
1	Johns Hopkins U., The <sup>b</sup>	1,375	1,444
2	U. MI all campuses	769	809
3	U. WI Madison	764	798
4	U. CA, Los Angeles	773	786
5	U. CA, San Francisco	728	754
6	U. CA, San Diego	709	721
7	Stanford U.	671	715
8	U. WA	714	708
9	U. PA	597	655
10	Duke U.	521	631
11	PA State U. all campuses	600	626
12	OH State U. all campuses	518	609
13	Cornell U. all campuses	576	607
14	MA Institute of Technology	543	581
15	U. CA, Berkeley	526	555
16	U. MN all campuses	526	549
17	U. CA, Davis	512	547
18	Columbia U. in the City of NY	468	535
19	Washington U. St. Louis	490	532
20	U. FL	447	531
	All other institutions	30,403	32,059

<sup>a</sup> Excludes R&D performed by university-administered federally funded research and development centers.

<sup>b</sup> Includes the Applied Physics Laboratory, with \$670 million and \$678 million, respectively, in total R&D expenditures in FY 2004 and FY 2005.

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 2005.

entities also increased from \$1.3 billion in FY 2004 to \$1.5 billion in FY 2005. More than 90% (\$1.4 billion) of the funds received from higher education pass-through entities and 86% (\$1.3 billion) of the funds received from non-higher education entities originated from federal sources.

### Non-S&E R&D Expenditures

For the third consecutive year, the survey reported information at the institution level on non-S&E R&D expenditures in addition to expenditures on S&E R&D. In FY 2003, 81.7% of the survey respondents provided data on R&D expenditures by non-S&E field, reporting

a total of \$1.4 billion in non-S&E R&D expenditures. In FY 2004 a slightly higher percentage of institutions provided data (85.3%), and the reported amount of non-S&E R&D expenditures increased to \$1.6 billion. In FY 2005 the percentage of institutions providing non-S&E expenditures increased to 94.1%, and the reported amount of non-S&E R&D expenditures also increased, to \$1.8 billion (table 5). This amount is in addition to the \$45.8 billion expended on S&E R&D. The largest amounts reported for individual non-S&E fields were in education (\$761 million), business and management (\$220 million), and humanities (\$194 million). More than half of the federally financed non-S&E R&D expenditures (55.8%, or \$426 million) were in the field of education.

### Data Notes

The academic R&D expenditures data presented in this InfoBrief were obtained from 640 universities and colleges that grant degrees in the sciences or engineering and expend at least \$150 thousand in S&E R&D in the survey period. The survey collects the separately budgeted R&D expenditures within S&E fields reported by universities and colleges. This includes all funds expended for S&E activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. Unless noted differently, expenditures analyzed in this report refer to S&E R&D activities only. Non-S&E expenditures are reported separately in the survey and are not included in the overall expenditure totals.

Universities have been asked to identify specific agency sources of federal funding since FY 2003. The response rate for this item has increased greatly within the past 2 years as more institutions have begun to track R&D expenditures at this level of detail, and in FY 2005 virtually all (99.6% or \$29.0 billion) of the \$29.1 billion federal total was identified by agency source. However, the data for this item still represent slightly lower-bound estimates of agencies' actual support totals for FY 2005, because 23 of the 597 institutions that reported overall federal totals did not report agency sources, and NSF did not attempt to allocate the undistributed amounts to individual agencies.

TABLE 5. R&D expenditures in non-science and engineering fields at universities and colleges: FY 2005

(Millions of current dollars)

Field	All non-S&E R&D expenditures	Federal non-S&E R&D expenditures
All non-S&E fields	1,750	764
Business and management	220	52
Communications, journalism, and library science	75	26
Education	761	426
Humanities	194	58
Law	62	27
Social work	87	26
Visual and performing arts	42	4
Other non-S&E fields	309	145

NOTE: Detail may not add to total because some respondents reporting non-S&E R&D expenditures did not break out total and federal funds by non-S&E fields.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2005.

Data reported on non-S&E R&D expenditures are also lower-bound estimates for the national totals because 35 of the 597 institutions who reported overall S&E totals did not report their non-S&E R&D expenditures, and NSF did not attempt to estimate for item nonresponse. Also, only institutions that conducted at least \$150,000 of S&E R&D were surveyed. The activities of institutions that do not perform S&E R&D (but may conduct substantial amounts of non-S&E R&D) are not reflected here.

Profiles for institutions of higher education with S&E departments that grant master’s degrees or higher are available at <http://www.nsf.gov/statistics/profiles/>. The profiles contain data from this survey as well as from two other NSF academic S&E surveys: the Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions and the Survey of Graduate Students and Postdoctorates in Science and Engineering. Data from the three surveys are available at <http://www.nsf.gov/statistics/> and through the WebCASPAR database system, a Web tool for retrieval and analysis of statistical 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 2005* at <http://www.nsf.gov/statistics/rdexpenditures/>. Individual detailed tables from the 2005 survey may be available in advance of publication of the full report. For further information, contact

Ronda Britt  
 Research and Development Statistics Program  
 Division of Science Resources Statistics  
 National Science Foundation  
 4201 Wilson Boulevard, Suite 965  
 Arlington, VA 22230  
 703-292-7765  
[rbritt@nsf.gov](mailto:rbritt@nsf.gov)

**NATIONAL SCIENCE FOUNDATION**  
ARLINGTON, VA 22230  
OFFICIAL BUSINESS

RETURN THIS COVER SHEET TO ROOM P35 IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL , OR IF CHANGE OF ADDRESS IS NEEDED , INDICATE CHANGE INCLUDING ZIP CODE ON THE LABEL (DO NOT REMOVE LABEL).

**PRESORTED STANDARD  
U.S. POSTAGE PAID  
National Science Foundation**

NSF 07-311