



U.S. R&D Spending Resumes Growth in 2010 and 2011 but Still Lags Behind the Pace of Expansion of the National Economy

by Mark Boroush¹

Research and development performed in the United States totaled \$406.7 billion (current dollars) in 2010, \$2.9 billion above the 2009 level of \$403.8 billion (table 1). The preliminary estimate for U.S. total R&D in 2011 is \$414.0 billion, a further increase of \$7.3 billion. This growth in U.S. R&D expenditures in 2010 and 2011 follows a \$1.8 billion decline in 2009. This was only the second such decline in current dollars since the early 1950s, and it resulted chiefly from a drop in business R&D in the face of the national and international financial crisis and economic downturn that started in late 2008 (figure 1).

Although R&D performance resumed growth in 2010–11, other measures indicate that this expansion is weak. First, although U.S. total R&D expanded by 0.7% between 2009 and 2010 and by 1.8% between 2010 and 2011, these growth rates were well behind the pace of gross domestic product (GDP) expansion in both of these years (4.2% and 3.9%, respectively) (table 2). This is in marked contrast to the historical norm where trend growth in total R&D spending outpaces that of GDP—regardless

of whether the averaging period is the past 5, 10, or 20 years (table 2). A consequence of these recent disparate growth rates is that the R&D intensity of the national economy (the ratio of R&D spending to GDP) has exhibited a noticeable decline in 2010 and 2011, compared with earlier years.

A second concern arises when the R&D expenditure figures are adjusted for inflation (table 1). On a constant dollar basis, U.S. total R&D in 2009, 2010, and 2011 remains below the 2008 level, and the same is true for R&D performance by the business sector, which accounts for just over two-thirds of all U.S. R&D performance. In short, the total of U.S. R&D and the largest component of U.S. R&D performance have not yet returned to keeping pace with (or exceeding) general inflation in the national economy.

R&D Performers and Funders

The U.S. R&D system consists of a variety of performers and sources of funding, including businesses, the federal government, universities and colleges, other government (nonfederal) agencies, and nonprofit organizations.²

A mix of performing and funding roles exists across this diverse group of organizations. Organizations that perform R&D often receive significant levels of outside funding; those that fund R&D may also be significant performers.

R&D Performers

In 2011, the business sector continued to be the largest performer of U.S. R&D, conducting \$283.8 billion, or 68.5%, of the national total (table 1, figure 2). The 2011 level (preliminary) of business R&D performance rose over the 2010 level (\$279.0 billion), and reversed successive declines in both 2009 and 2010. Over the 5-year period 2006–11, business R&D performance grew an average of 2.8% annually, somewhat behind the 3.3% rate of growth of overall U.S. R&D (table 2). The business sector's predominance in the composition of national R&D has long been the case, with its annual share ranging between 68% and 74% over the 20-year period 1991–2011 (figure 3).

Universities and colleges performed \$63.1 billion, or 15.2%, of U.S. R&D in 2011 (table 1, figure 2). The total of academic R&D performance has

TABLE 1. U.S. R&D expenditures, by performing sector and source of funding: 2006–11

Sector	2006	2007	2008	2009	2010	2011 ^a
Current \$millions						
All performing sectors	352,567	379,454	405,630	403,803	406,708	414,035
Business	247,669	269,267	290,681	282,393	278,977	283,784
Federal government	41,611	43,906	44,669	46,469	48,939	49,394
Federal intramural ^b	28,240	29,859	29,839	30,560	31,217	31,505
FFRDCs	13,371	14,047	14,830	15,910	17,722	17,889
Industry-administered ^c	3,122	5,165	6,346	6,646	7,214	7,037
U&C-administered ^c	7,306	5,567	4,766	5,052	5,052	5,294
Nonprofit-administered	2,943	3,316	3,718	4,212	5,457	5,558
Universities and colleges	48,951	51,149	53,917	56,939	60,235	63,102
Other nonprofit organizations	14,336	15,132	16,363	18,002	18,294	17,756
All funding sources	352,567	379,454	405,630	403,803	406,708	414,035
Business	227,110	246,741	258,691	247,274	249,182	248,947
Federal government	101,558	106,631	118,443	126,572	126,962	133,651
Universities and colleges	10,076	10,833	11,640	11,884	11,990	12,488
Nonfederal government	3,182	3,438	3,706	3,808	3,782	3,832
Other nonprofit organizations	10,641	11,810	13,151	14,264	14,793	15,117
2005 constant \$millions						
All performing sectors	341,532	357,212	373,569	368,000	366,434	365,239
Business	239,917	253,484	267,706	257,355	251,351	250,339
Federal government	40,308	41,332	41,138	42,349	44,330	43,572
Federal intramural ^b	27,356	28,109	27,480	27,850	28,126	27,792
FFRDCs	12,953	13,224	13,658	14,499	16,204	15,780
Industry-administered ^c	3,024	4,862	5,844	6,057	6,499	6,207
U&C-administered ^c	7,078	5,241	4,389	4,604	4,789	4,670
Nonprofit-administered	2,851	3,121	3,424	3,838	4,916	4,903
Universities and colleges	47,419	48,151	49,656	51,891	54,270	55,665
Other nonprofit organizations	13,888	14,245	15,070	16,406	16,482	15,663
All funding sources	341,532	357,212	373,569	368,000	366,434	365,239
Business	220,002	232,278	238,244	225,349	224,506	219,607
Federal government	98,379	100,381	109,081	115,350	114,390	117,900
Universities and colleges	9,760	10,198	10,720	10,831	10,802	11,016
Nonfederal government	3,083	3,237	3,413	3,471	3,408	3,381
Other nonprofit organizations	10,308	11,118	12,111	12,999	13,328	13,335

FFRDC = federally funded research and development center; U&C = universities and colleges.

^a Some figures for 2011 are preliminary and may later be revised.

^b Includes expenditures of federal intramural R&D as well as costs associated with administering extramural R&D.

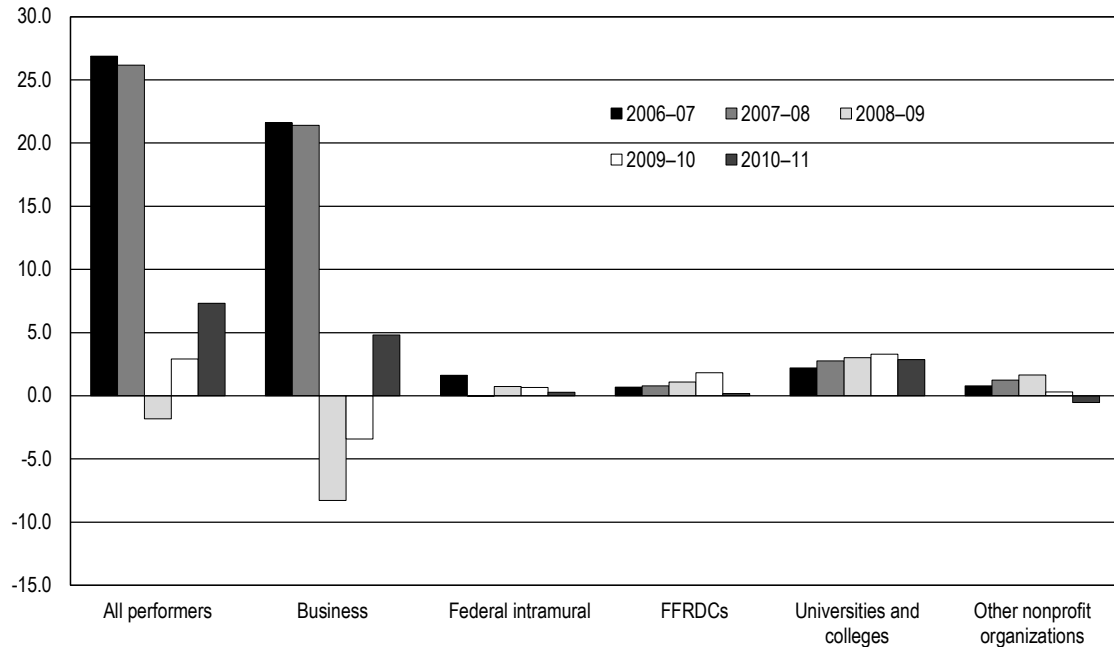
^c Los Alamos National Laboratory (some \$2 billion in annual R&D expenditures in recent years) became industry-administered in June 2006; previously, it was U&C administered. Lawrence Livermore National Laboratory (more than \$1 billion in annual R&D expenditures in recent years) became industry administered in October 2007; previously, it was U&C administered. These shifts in administration category are a main reason for the changes apparent in the R&D performer figures across 2006, 2007, and 2008.

NOTES: Data are based on annual reports by performers except for the nonprofit sector. Expenditure levels for academic and federal government performers are calendar-year approximations based on fiscal year data. For federal government expenditures, the approximation is equal to 75% of the amount reported in same fiscal year plus 25% of the amount reported in the subsequent fiscal year. For academic expenditures, the respective amounts are 50% and 50%, because those fiscal years generally begin on July 1 instead of October 1.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources .

FIGURE 1. Year-to-year changes in U.S. R&D, by performing sector: 2006–11

Current dollars (billions)



FFRDC = federally funded research and development center.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

TABLE 2. Annual rates of growth in U.S. R&D expenditures, total and by performing sectors: 1991–2011 (Percent)

Expenditures and gross domestic product	Longer-term trend			Most recent years		
	1991–2011	2001–11	2006–11	2008–09	2009–10	2010–11 ^a
Current \$						
Total R&D, all performers	4.8	4.0	3.3	-0.5	0.7	1.8
Business	4.6	3.5	2.8	-2.9	-1.2	1.7
Federal government	3.8	4.2	3.5	4.0	5.9	0.4
Federal intramural ^b	3.7	3.5	2.2	2.4	2.2	0.9
FFRDCs	4.0	5.5	6.0	7.3	13.0	-0.5
Universities and colleges	6.4	6.5	5.2	5.6	5.8	4.8
Other nonprofit organizations	6.9	4.7	4.4	10.0	1.6	-2.9
Gross domestic product	4.7	3.9	2.4	-2.5	4.2	3.9
2005 constant \$						
Total R&D, all performers	2.7	1.7	1.4	-1.5	-0.4	-0.3
Business	2.5	1.2	0.9	-3.9	-2.3	-0.4
Federal government	1.7	1.9	1.6	2.9	4.7	-1.7
Federal intramural ^b	1.6	1.2	0.3	1.3	1.0	-1.2
FFRDCs	1.9	3.2	4.0	6.2	11.8	-2.6
Universities and colleges	4.2	4.1	3.3	4.5	4.6	2.6
Other nonprofit organizations	4.7	2.4	2.4	8.9	0.5	-5.0
Gross domestic product	2.6	1.6	0.5	-3.5	3.0	1.7

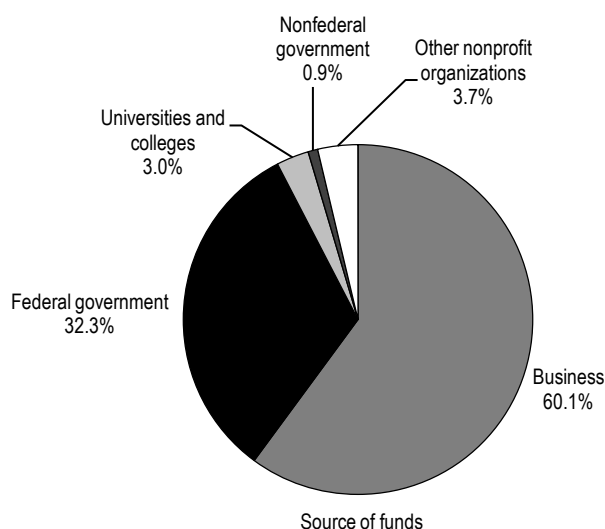
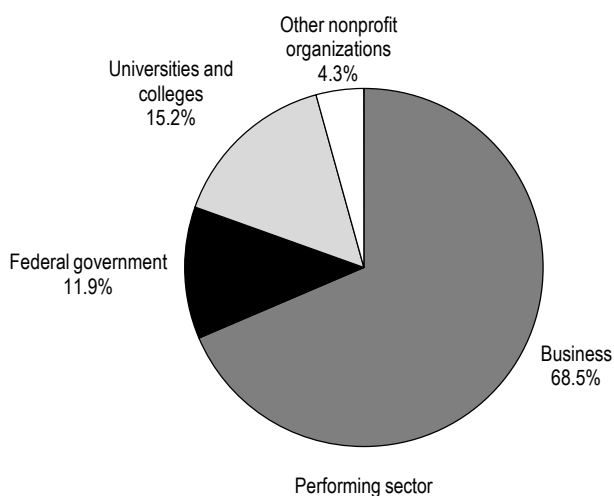
^a R&D expenditure figures for 2011 involve estimates and may later be revised.

^b Includes expenditures of federal intramural R&D as well as costs associated with administering extramural R&D.

NOTE: Longer-term trend rates are calculated as compound annual growth rates.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

FIGURE 2. Shares of U.S. total R&D expenditures, by performing sector and funding source: 2011



NOTES: Some figures for 2011 are estimates and may later be revised. National R&D expenditures are estimated to be \$414.0 billion in 2011. Federal performing sector includes federal agencies and federally funded research and development centers (FFRDCs). State and local government support to business is included in business support for business performance.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

increased by several billion dollars each year since 2006. Annual growth of R&D in this sector has averaged 5.2% over the 2006–11 period, well ahead of the rate of total national R&D (table 2). Over the 20-year period 1991–2011,

the academic sector’s share in U.S. R&D has ranged between 11% and 15% annually.

The federal government conducted \$49.4 billion, or 11.9%, of U.S. R&D in

2011 (table 1, figure 2). This includes the intramural R&D performed by federal agencies in their own research facilities (\$31.5 billion), as well as the R&D performed by the 39 federally funded research and development centers (FFRDCs) (\$17.9 billion). The federal total was up only barely in 2011 (an increase of \$0.5 billion over the prior year), but more generally in the 2006–11 period has increased \$1 billion to \$2 billion annually (table 1). In 1991, the federal performance share was 15%, but it gradually declined in the years since, ranging annually between 11% and 12% since 2006.

Other nonprofit organizations are estimated to have performed \$17.8 billion, or 4.3%, of U.S. R&D in 2011 (table 1, figure 2).

R&D Funders

The business sector is also the predominant source of funding for the R&D performed in the United States. In 2011, \$248.9 billion (60.1%) of the \$414.0 billion total U.S. R&D performance was supported by business sector funding (table 1, figure 2). In addition to business-performed R&D, this business funding also supported R&D performed by universities and colleges, as well as other nonprofit organizations (table 3).

Funds from the federal government accounted for \$133.7 billion, or 32.3%, of the U.S. R&D total (table 1, figure 2). This was split primarily among performers in the federal, business, and academic sectors, but some funds were given to other nonprofit organizations (table 3).

Funds from universities and colleges accounted for \$12.5 billion (3.0%) of the national R&D total (table 1, figure 2). All of these funds remained within the academic sector (table 3). Funding from nonfederal government agencies and other nonprofit organizations accounted for the remainder of

the U.S. R&D total (0.9% and 3.7%, respectively) (figure 2).

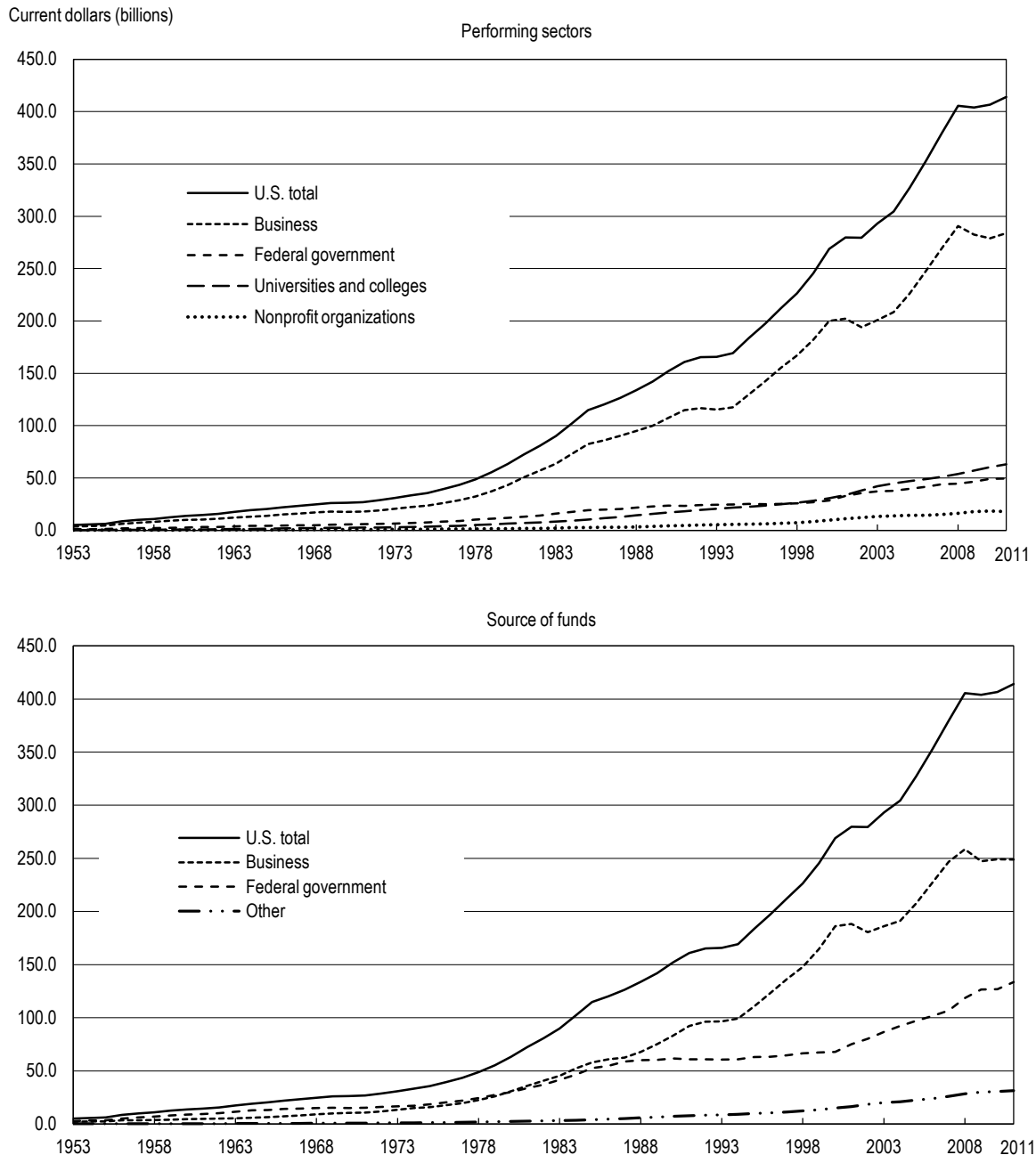
These funding shares for universities and colleges, other nonprofit organizations, and nonfederal government

remained fairly stable over the 5-year period 2006–11 (figure 3). But over the same period, the business sector’s share declined (64% to 60%), and the federal government’s funding share increased (29% to 32%).

R&D by Character of Work

Basic research activities accounted for \$78.5 billion, or 19.0%, of all U.S. R&D expenditures in 2011 (table 3). Applied research was \$80.7 billion, or 19.5%; development was \$254.8 billion, or 61.5%.

FIGURE 3. U.S. R&D, by performing and funding sectors: 1953–2011



NOTES: Some figures for 2011 involve estimates and may later be revised. Federal performers of R&D include federal agencies and federally funded research and development centers (FFRDCs). Other funding includes support from universities and colleges, nonfederal government, and other nonprofit organizations. State and local government funding to businesses is included in business support for business R&D performance.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

TABLE 3. U.S. R&D expenditures, by performing sector, source of funds, and character of work: 2011

Performing sector and character of work	Source of funds (\$ millions)					Total expenditures (% distribution)
	Total	Business	Federal government	Universities and colleges	Other nonprofit organizations	
R&D	414,035	248,947	133,651	16,320	15,117	100.0
Business	283,784	244,510	39,274	*	*	68.5
Federal government	49,394	*	49,394	*	*	11.9
Federal intramural	31,505	*	31,505	*	*	7.6
FFRDCs	17,889	*	17,889	*	*	4.3
FFRDCs, industry-administered	7,037	*	7,037	*	*	1.7
FFRDCs, U&C-administered	5,294	*	5,294	*	*	1.3
FFRDCs, nonprofit-administered	5,558	*	5,558	*	*	1.3
Universities and colleges	63,102	3,173	38,710	16,320	4,899	15.2
Other nonprofit organizations	17,756	1,264	6,274	*	10,218	4.3
Percent distribution by source	100.0	60.1	32.3	3.9	3.7	na
Basic research	78,466	17,639	41,851	10,231	8,744	100.0
Business	16,563	14,949	1,615	*	*	21.1
Federal government	11,467	*	11,467	*	*	14.6
Federal intramural	4,875	*	4,875	*	*	6.2
FFRDCs	6,592	*	6,592	*	*	8.4
FFRDCs, industry-administered	2,761	*	2,761	*	*	3.5
FFRDCs, U&C-administered	2,212	*	2,212	*	*	2.8
FFRDCs, nonprofit-administered	1,619	*	1,619	*	*	2.1
Universities and colleges	40,952	1,989	25,662	10,231	3,071	52.2
Other nonprofit organizations	9,483	702	3,108	*	5,673	12.1
Percent distribution by source	100.0	22.5	53.3	13.0	11.1	na
Applied research	80,735	41,304	31,311	4,254	3,866	100.0
Business	45,560	40,157	5,403	*	*	56.4
Federal government	12,885	*	12,885	*	*	16.0
Federal intramural	7,747	*	7,747	*	*	9.6
FFRDCs	5,138	*	5,138	*	*	6.4
FFRDCs, industry-administered	2,223	*	2,223	*	*	2.8
FFRDCs, U&C-administered	1,314	*	1,314	*	*	1.6
FFRDCs, nonprofit-administered	1,602	*	1,602	*	*	2.0
Universities and colleges	16,614	827	10,256	4,254	1,277	20.6
Other nonprofit organizations	5,676	320	2,766	*	2,590	7.0
Percent distribution by source	100.0	51.2	38.8	5.3	4.8	na
Development	254,835	190,003	60,489	1,836	2,506	100.0
Business	221,661	189,404	32,256	*	*	87.0
Federal government	25,041	*	25,041	*	*	9.8
Federal intramural	18,884	*	18,884	*	*	7.4
FFRDCs	6,158	*	6,158	*	*	2.4
FFRDCs, industry-administered	2,053	*	2,053	*	*	0.8
FFRDCs, U&C-administered	1,768	*	1,768	*	*	0.7
FFRDCs, nonprofit-administered	2,336	*	2,336	*	*	0.9
Universities and colleges	5,536	357	2,792	1,836	551	2.2
Other nonprofit organizations	2,597	242	400	*	1,955	1.0
Percent distribution by source	100.0	74.6	23.7	0.7	1.0	na

* = small to negligible amount, included as part of the funding provided by other sectors.

FFRDC = federally funded research and development center; U&C = universities and colleges.

NOTES: Some figures for 2011 are estimates and may later be revised. Funding for FFRDC performance is chiefly federal, but any nonfederal support is included in the federal figures. State and local government support to business are included in business support for business performance. State and local government support to U&C (\$3,832 million) included in U&C support for U&C performance.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

Universities and colleges remain the predominant performers (52.2%) of the \$78.5 billion of basic research total, with the federal government providing the largest share (53.3%) of the funding for basic research (table 3). The business sector performed more than half (56.4%) of the \$80.7 billion of applied research and was also the largest funder (51.2%). The business sector was even more predominant in development, where it both performed the vast majority (87.0%) and provided the largest share of funding (74.6%) of the nation's \$254.8 billion of development expenditures in 2011.

R&D Intensity

The ratio of total national R&D expenditures to GDP is often reported as a measure of the intensity of a nation's overall R&D effort and is widely used as an international benchmark for comparing countries' R&D systems.

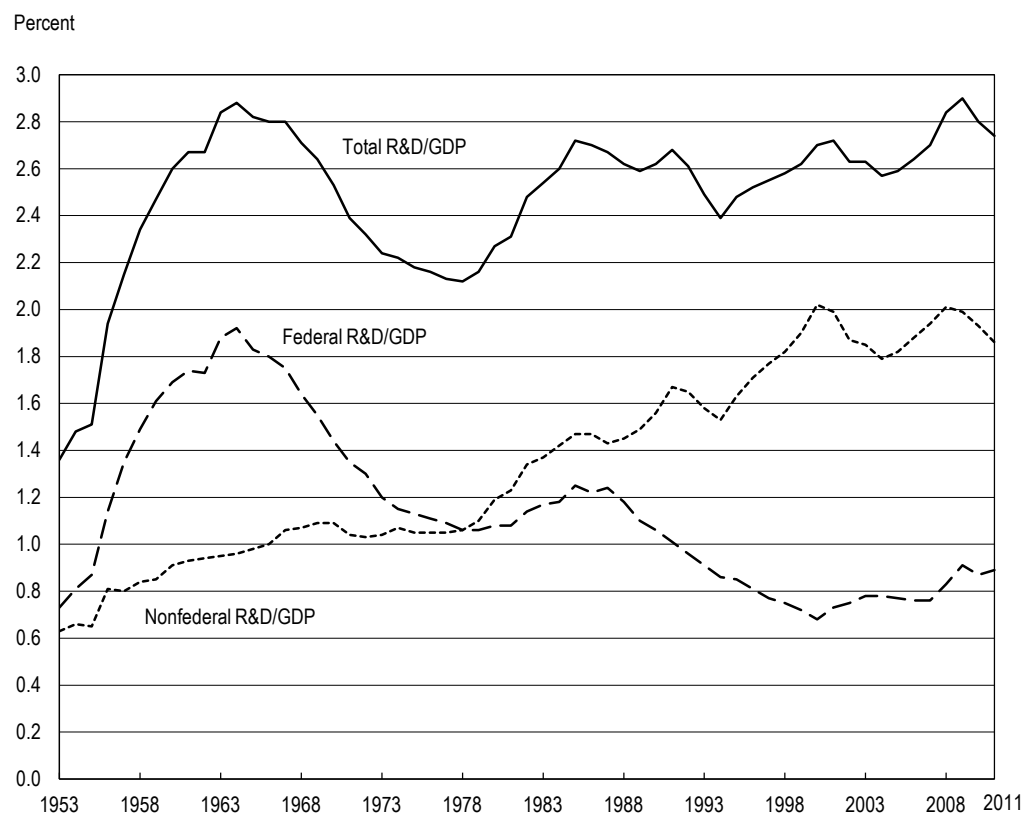
The new statistics discussed in this report indicate that U.S. expenditures on R&D totaled 2.80% of GDP in 2010 and 2.74% in 2011. Both of these figures are lower than the 2.90% ratio that prevailed in 2009 (figure 4). Although the total of national expenditures on R&D expanded in both 2010

and 2011, it did not match the pace of GDP expansion in either of these years.

Over the 10-year period from 2001 to 2011, the ratio has fluctuated to some degree year to year, between a low of 2.57% in 2004 and a high of 2.90% in 2009. The ratio had been rising since 2004 (figure 4). The drops in 2010 and 2011 represent a noticeable reversal.

As is evident from figure 4, most of the rise of the R&D/GDP ratio over the past several decades has come from the increase of nonfederal spending on R&D—particularly, that by the busi-

FIGURE 4. Ratio of U.S. R&D to gross domestic product, roles of federal and nonfederal funding for R&D: 1953–2011



GDP = gross domestic product.

NOTES: Figures for 2011 are preliminary. Federal R&D/GDP ratios represent the federal government as a funder of R&D by all performers; the nonfederal ratios reflect all other sources of R&D funding.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, National Patterns of R&D Resources.

ness sector. This reflects the growing role of business R&D in the national R&D system and, in turn, the growing prominence of R&D-derived goods and services in the national and global economies. By contrast, the ratio of federal R&D spending to GDP declined from the mid-1980s to the late 1990s—notably, from the continuing cuts in defense-related R&D. There had been a gradual uptick through 2009, the result of increased federal spending on biomedical and national security R&D and the one-time incremental funding for R&D provided by the American Recovery and Reinvestment Act of 2009.

International Comparisons

Worldwide R&D expenditures totaled an estimated \$1.341 trillion in 2010.³ The corresponding estimate for 2005 was \$953 billion. Ten years earlier, in 2000, it was \$706 billion. By these figures, growth in total global R&D has averaged 7.1% annually over the past 5 years and 6.6% over the past 10 years.

Many countries conduct R&D, but global R&D performance is concentrated in a relatively small number of countries (table 4). Three countries account for more than half of global R&D. The United States was by far the largest R&D performer (\$409 billion) in 2010, accounting for just over 30% of the global total.⁴ China was the second-largest performer (\$179 billion) in 2010, accounting for about 13% of the global total. Japan was third, at 11% (\$141 billion). The other established performers spend comparatively less: Germany (\$86 billion, 6%), France (\$50 billion, 4%), South Korea (\$53 billion, 4%), and the United Kingdom (\$39 billion, 3%). Taken together, these top seven countries account for about 71% of the global total. The Russian Federation, Italy, Canada, India, Brazil, Taiwan, Spain, and Australia make

up the next rung of performers, with national R&D expenditures ranging from \$19 billion to \$33 billion.

With regard to R&D intensity, the U.S. R&D/GDP ratio was just over 2.8% in 2010 (table 4). At this level, the United States is tenth among the economies tracked by the Organisation for Economic Co-operation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization. Israel continues to have the highest ratio, at 4.4%. The R&D/GDP ratio for Finland is 3.9%, and for South Korea is 3.7%. Sweden, Japan, Denmark, and Switzerland have ratios at or well above 3%. Taiwan is at 2.9%, and Germany is slightly ahead of the United States.

Data Sources and Availability

The statistics on U.S. R&D presented here are derived chiefly from integrating the data on R&D expenditures and funding collected from the National Science Foundation's (NSF's) major national surveys of the organizations that perform the bulk of U.S. R&D. In some cases, the primary survey data are adjusted to enable consistent integration of the statistics from these separately conducted surveys. Estimated values may be used where final data from one or more of the surveys are not yet available and can reasonably be prepared.

The main R&D surveys utilized include NSF's Business R&D and Innovation Survey (for 2008 through 2011; for 2007 and earlier years, see the preceding Survey of Industrial R&D), the Higher Education R&D Survey (for 2010 and 2011; for 2009 and earlier years, see the Survey of R&D Expenditures at Universities and Colleges), the Survey of Federal Funds for R&D

(2010–12 and earlier years), and the Survey of R&D Expenditures at Federally Funded R&D Centers (FY 2011 and earlier years). Figures for R&D performed by other nonprofit organizations with funding from within the nonprofit sector and business sources are estimated, based on parameters from the Survey of R&D Funding and Performance by Nonprofit Organizations, 1996–97.

The data on federally funded R&D discussed in this report were derived from surveys of organizations that perform R&D, such as companies, universities, and FFRDCs. These amounts can differ substantially from the R&D that federal agencies have reported funding. In FY 2009, federal agencies reported obligating \$133 billion for R&D funding to all R&D performers (including \$53 billion to the business sector), compared with an estimated \$124 billion in federal funding reported by all performers of R&D (\$40 billion by businesses). Although NSF has not found a definitive explanation for this divergence, the National Academies' Committee on National Statistics (CNSTAT) notes that comparing federal outlays (as opposed to obligations) for R&D to performer expenditures results in a smaller discrepancy.⁵ For FY 2009, federal agencies reported R&D outlays of \$127 billion to all R&D performers.

A full set of detailed statistical tables associated with the National Patterns estimates will be available in the report *National Patterns of R&D Resources: 2010–11 Data Update*, at <http://www.nsf.gov/statistics/natlpatterns/>. Individual detailed tables may be available in advance of the full report. For further information on the National Patterns data and methodology, contact the author.

TABLE 4. International comparisons of gross domestic expenditures on R&D and R&D share of gross domestic product, by region and selected country/economy: 2010 or most recent year

Region/country/economy	GERD (PPP \$millions)	GERD/GDP (%)	Region/country/economy	GERD (PPP \$millions)	GERD/GDP (%)
North America			Middle East		
United States (2010) ^a	408,657.3	2.81	Israel (2010)	9,589.2	4.40
Canada (2010)	24,066.9	1.81	Turkey (2010)	9,582.5	0.84
Mexico (2007)	5,682.1	0.37	Iran (2008)	6,432.2	0.79
South America			Africa		
Brazil (2010)	25,340.2	1.16	South Africa (2008)	4,708.2	0.93
Argentina (2010)	3,995.4	0.62	Tunisia (2009)	1,055.9	1.10
Chile (2008)	963.5	0.37	Egypt (2009)	990.6	0.21
Colombia (2010)	676.7	0.16	Morocco (2006)	764.9	0.64
Europe			Central Asia		
Germany (2010)	86,299.4	2.82	Russian Federation (2010)	32,838.0	1.16
France (2010)	49,990.8	2.25	South Asia		
United Kingdom (2010)	39,137.8	1.76	India (2007)	24,305.9	0.76
Italy (2010)	24,269.2	1.26	Pakistan (2009)	2,049.5	0.46
Spain (2010)	20,386.1	1.39	East, Southeast Asia		
Netherlands (2010)	12,968.7	1.85	Japan (2010)	140,832.8	3.26
Sweden (2010)	12,535.5	3.40	China (2010)	178,980.7	1.77
Switzerland (2008)	10,525.2	2.99	South Korea (2010)	53,184.9	3.74
Austria (2010)	9,254.2	2.76	Taiwan (2010)	23,918.1	2.90
Belgium (2010)	8,154.2	1.99	Singapore (2010)	6,150.7	2.09
Finland (2010)	7,588.7	3.88	Malaysia (2006)	2,090.0	0.63
Denmark (2010)	6,816.0	3.06	Thailand (2007)	1,116.0	0.21
Poland (2010)	5,587.8	0.74	Indonesia (2009)	802.3	0.08
Norway (2010)	4,741.6	1.69	Australia, Oceania		
Portugal (2010)	4,304.6	1.59	Australia (2008)	19,028.9	2.24
Czech Republic (2010)	4,151.7	1.56	New Zealand (2009)	1,646.4	1.30
Ireland (2010)	3,197.6	1.77	Selected country groups		
Ukraine (2010)	2,494.0	0.86	European Union-27 (2010)	305,036.0	1.91
Hungary (2010)	2,382.8	1.16	OECD (2010)	991,399.1	2.40
Greece (2007)	1,867.8	0.60	G-20 countries (2010)	0.0	0.00
Romania (2010)	1,463.1	0.46			
Slovenia (2010)	1,162.0	2.11			
Belarus (2009)	776.6	0.64			
Slovak Republic (2010)	799.6	0.63			
Luxembourg (2010)	713.1	1.63			
Serbia (2010)	746.2	0.92			
Bulgaria (2010)	625.9	0.60			
Croatia (2010)	623.9	0.73			

GDP = gross domestic product; GERD = gross expenditures (domestic) on R&D; OECD = Organisation for Economic Co-operation and Development; PPP = purchasing power parity.

^a Figures for the United States in this table may differ slightly from those cited elsewhere in this InfoBrief. Data here reflect international standards for calculating GERD, which vary slightly from National Science Foundation protocol for tallying U.S. total R&D.

NOTES: Year of data listed in parentheses. Foreign currencies converted to dollars through purchasing power parities. Countries with annual GERD of \$500 million or more. Countries are grouped according to the regions described by *The CIA World Factbook*, <https://www.cia.gov/library/publications/the-world-factbook/index.html>. No countries in the Central America/Caribbean region had annual GERD of \$500 million or more. Data for Israel are civilian R&D only. See sources below for GERD statistics on additional countries.

SOURCES: OECD, *Main Science and Technology Indicators* (Volume 2012/1); United Nations Educational, Scientific, and Cultural Organization (UNESCO), Institute for Statistics, <http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx>, table 25, accessed 05 November 2012.

Notes

1. Mark Boroush, Research and Development Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (mboroush@nsf.gov; 703-292-8726).

2. NSF identifies the main categories of R&D performers to be the following: businesses, federal agency intramural R&D facilities, federally funded research and development centers (administered by businesses, universities/colleges, or nonprofit organizations), universities and colleges, and other nonprofit organizations. With regard to R&D funding, NSF identifies businesses, the federal government, other nonfederal government agencies, universities and colleges, and other nonprofit organizations as the main sources.

3. The figures cited here for total global R&D in 2000, 2005, and 2010 are all NSF estimates. R&D expenditures by all countries are denominated in U.S. dollars, based on purchasing power parities. These estimates are based on data from the Organisation for Economic Co-operation and Development (OECD), *Main Science and Technology Indicators* (Volume 2012/1) and from R&D statistics for additional countries assembled by the United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics (as of early November 2012). At present, there is no database on R&D spending that is comprehensive and consistent for all nations performing R&D. The OECD and UNESCO databases together provide R&D performance statistics for 214 countries, although the data are not current or complete for all. NSF's estimate of total global R&D reflects 87 countries, with reported annual R&D

expenditures of \$500 million or more, and that account for most all of current global R&D.

4. The \$409 billion cited here for U.S. R&D spending in 2010 reflects the OECD statistical conventions for calculating total national R&D (minor differences with the NSF approach) and results in a slightly higher figure than listed earlier in this report. For international comparisons and to ensure consistency, NSF reports the statistics for all countries based on the OECD conventions.

5. National Research Council. 2005. *Measuring Research and Development Expenditures in the U.S. Economy*. Panel on Research and Development Statistics at the National Science Foundation; Brown LD, Plewes TJ, Gerstein MA, editors. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academies Press.

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