Table 4-5. R&D expenditures, by industry, 1960-73

Industry	Current dollars in millions													
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Total	$10,509	$10,908	$11,464	$12,630	$13,512	$14,185	$15,548	$16,385	$17,429	$18,308	$18,062	$18,311	$19,383	$20,921
Food and kindred products	104	125	121	130	144	157	164	183	187	205	235	245	260	270
Textiles and apparel	38	30	28	30	32	38	51	57	58	60	58	59	61	64
Lumber, wood products, and furniture	10	10	10	11	12	11	12	12	19	15	48	48	51	55
Paper and allied products	56	59	65	69	77	94	117	128	144	188	178	187	186	198
Chemicals and allied products	980	1,101	1,175	1,239	1,284	1,356	1,407	1,507	1,588	1,659	1,766	1,819	1,896	2,081
Industrial chemicals	666	706	738	809	865	908	918	966	985	1,013	1,040	1,020	1,042	1,133
Drugs and medicines	162	180	195	216	234	267	308	343	393	434	464	510	547	618
Other chemicals	152	215	242	214	185	181	181	198	210	212	262	289	307	330
Petroleum refining and extraction	296	299	310	317	393	397	371	371	437	467	515	505	468	504
Rubber products	121	138	141	156	158	162	168	182	205	217	220	230	264	285
Stone, clay, and glass products	88	88	96	100	109	112	117	136	142	159	157	155	165	176
Primary metals	177	177	171	183	195	213	232	242	251	257	275	272	261	272
Ferrous metals and products	102	98	97	106	116	128	139	135	135	136	149	144	138	147
Nonferrous metals and products	75	79	74	77	79	85	93	107	115	121	126	128	122	125
Fabricated metal products	145	136	146	153	148	145	154	163	183	182	200	233	241	267
Machinery	949	901	914	958	1,015	1,065	1,217	1,326	1,477	1,536	1,649	1,773	1,960	2,144
Electrical equipment and communication	2,532	2,483	2,639	2,866	2,972	3,200	3,626	3,867	4,105	4,401	4,352	4,534	4,916	5,333
Radio and TV receiving equipment	(1)	(1)	(1)	(1)	(1)	(1)	47	45	55	57	70	64	48	51
Communication equipment and electronic components	1,324	1,404	1,591	1,773	1,872	1,989	2,249	2,425	2,538	2,713	2,736	2,881	3,159	3,420
Other electrical equipment	1,208	1,079	1,048	1,093	1,100	1,211	1,330	1,397	1,512	1,631	1,546	1,589	1,710	1,861
Motor vehicles and other transportation equipment	884	936	999	1,090	1,182	1,230	1,344	1,354	1,491	1,558	1,582	1,756	1,983	2,438
Aircraft and missiles	3,514	3,829	4,042	4,712	5,078	5,148	5,526	5,669	5,776	5,909	5,245	4,912	4,992	5,051
Professional and scientific instruments	329	297	309	284	331	403	468	542	660	734	745	744	817	914
Scientific and mechanical measuring instruments	160	119	101	70	74	80	87	104	112	109	118	110	124	118
Optical, surgical, photographic, and other instruments	169	178	208	214	257	323	381	438	548	625	627	633	694	796
Other manufacturing industries	119	105	65	54	65	71	77	90	102	107	132	136	150	157
Nonmanufacturing industries	168	194	234	276	319	384	497	559	603	655	705	704	707	714

(Continued)

Table 4-6. Industrial R&D expenditures, percent change, 1971-73

Industry	Percent change	
	Current dollars	Constant 1967 dollars[1]
Motor vehicles and other transportation equipment	38.8	27.2
Rubber products	23.9	13.6
Professional and scientific instruments	22.9	12.4
Machinery	20.9	10.8
Electrical equipment and communication	17.6	7.7
Fabricated metal products	14.6	4.6
Lumber, wood products, and furniture	14.6	5.0
Chemicals and allied products	14.4	4.8
Stone, clay, and glass products	13.6	3.9
Food and kindred products	10.2	1.0
Textiles and apparel	8.5	0.0
Paper and allied products	5.9	-3.2
Aircraft and missiles	2.9	-5.8

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973*, (NSF 75-315).

Table 4-9a. Percent distribution of scientists and engineers[1] engaged in industrial R&D, for selected industries, January, 1961-74

Industry	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Five industry total	79	80	82	81	81	80	80	79	79	78	77	79	78	77
Aircraft and missiles	25	26	28	30	29	28	27	27	26	24	21	20	20	20
Electrical equipment and communication	25	26	26	26	26	26	27	26	26	27	26	25	26	26
Chemicals and allied products	12	12	12	11	11	11	10	10	10	10	12	13	11	12
Machinery	11	10	10	8	9	9	9	10	10	11	11	12	12	12
Motor vehicles and other transportation equipment	6	7	6	7	7	7	7	6	7	7	8	8	8	8

[1] Full-time equivalent basis.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973,* (NSF 75-315).

Table 4-10. R&D intensity of U.S. manufacturing industries, 1961-72

Industry groups	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	Total R&D as a percent of net sales											
Group I	9.4	9.2	10.0	10.1	9.4	8.8	8.7	8.1	7.9	7.1	6.9	6.8
Group II	2.1	2.1	2.1	2.2	2.0	1.9	1.9	1.8	1.8	1.9	1.8	1.8
Group III	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.6	0.6
	Company funds for R&D as a percent of net sales											
Group I	3.2	3.2	3.4	3.4	3.5	3.4	3.6	3.5	3.7	3.5	3.5	3.4
Group II	1.7	1.6	1.6	1.7	1.6	1.6	1.5	1.5	1.6	1.7	1.6	1.6
Group III	0.4	0.5	0.4	0.5	0.5	0.4	0.6	0.4	0.4	0.5	0.4	0.4
	R&D scientists and engineers per 1,000 employees											
Group I	53.0	49.8	54.0	54.6	52.6	46.2	46.0	44.7	43.8	44.0	43.1	40.4
Group II	17.1	17.6	17.0	17.1	16.7	15.9	15.8	15.5	15.9	15.7	16.7	16.5
Group III	6.4	5.8	5.4	5.9	6.0	5.9	6.2	6.3	6.2	5.8	6.2	6.0

SOURCE: National Science Foundation, *Research and Development in Industry, 1973*, (NSF 75-315).

Table 4-11. U.S. patents granted for inventions, 1960-73

Year	All patents	U.S. residents				Foreign residents
		Total	U.S. corporations	U.S. individuals	U.S. Government	
1960	47,170	40,472	28,187	11,041	1,244	7,698
1961	48,368	40,154	28,351	10,330	1,473	8,214
1962	55,691	45,579	32,560	11,738	1,281	10,112
1963	45,679	37,174	26,632	9,521	1,021	8,505
1964	47,376	38,410	27,836	9,392	1,182	8,966
1965	62,857	50,332	37,158	11,634	1,540	12,525
1966	68,406	54,634	41,634	11,468	1,532	13,772
1967	65,652	51,274	38,353	11,164	1,757	14,378
1968	59,102	45,782	34,886	9,407	1,489	13,320
1969	67,557	50,395	38,847	9,798	1,750	17,162
1970	64,427	47,073	36,896	8,451	1,726	17,354
1971	78,316	55,988	43,022	11,019	1,947	22,328
1972	74,808	51,515	38,890	10,981	1,644	23,293
1973	74,139	51,501	38,615	11,073	1,813	22,638

SOURCE: Department of Commerce, *Statistical Abstracts of the U.S., 1960-74*.

Table 4-12. U.S. patents granted for inventions,[1] by selected major product field, 1963-73

Product Field	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973 (est.)
Food and kindred products	675	657	743	916	748	719	802	714	908	963	774
Textile mill products	882	786	884	1,112	1,026	953	1,129	1,070	1,275	1,267	914
Chemicals, except drugs and medicines	6,310	6,374	7,871	10,551	9,953	8,482	9,672	8,374	8,079	10,736	7,872
Basic industrial inorganic and organic chemicals	4,147	4,317	5,134	6,600	6,365	5,541	6,176	5,258	4,880	6,535	4,676
Plastics materials and synthetic resins	2,049	2,019	2,883	4,113	3,732	3,112	3,507	2,814	2,523	3,401	2,382
Agricultural chemicals	926	1,030	972	1,388	1,235	832	1,443	1,454	1,425	2,077	1,598
All other chemicals	1,605	1,560	1,920	2,523	2,414	1,953	2,166	1,990	2,205	2,648	2,062
Drugs and medicines	1,201	1,427	1,401	1,915	1,810	1,212	1,793	1,700	1,568	2,281	1,696
Petroleum and natural gas extraction and petroleum refining	852	890	1,157	1,324	1,195	1,083	1,113	1,074	1,073	1,148	912
Rubber and miscellaneous plastics products	4,318	4,331	5,606	6,403	6,190	5,483	6,219	5,422	6,129	6,096	4,976
Stone, clay, glass and concrete products	2,420	2,394	3,277	3,961	3,666	3,234	3,859	3,474	3,921	3,863	3,210
Primary metals	976	1,049	1,293	1,366	1,353	1,149	1,163	1,136	1,330	1,251	1,154
Primary ferrous products	816	843	1,069	1,129	1,159	963	954	969	1,101	1,018	982
Primary and secondary nonferrous metals	561	674	789	856	834	758	773	715	856	861	734
Fabricated metal products	9,613	9,988	13,151	13,739	12,833	11,205	12,045	10,453	12,252	11,283	10,650
Machinery, except electrical	17,096	17,756	22,974	23,988	21,651	19,420	20,647	18,560	22,752	19,636	19,206
Engines and turbines	1,373	1,432	1,768	1,656	1,397	1,336	1,262	1,154	1,399	1,171	1,226
Farm and garden machinery and equipment	2,147	2,276	2,875	2,741	2,435	2,173	2,314	2,093	2,571	2,157	2,152
Construction, mining and material handling machinery and equipment	3,710	3,761	5,124	4,885	4,545	3,805	4,018	3,485	4,426	3,596	3,814
Metalworking machinery and equipment	1,925	2,170	2,642	2,547	2,315	1,967	2,328	1,909	2,513	2,041	1,976
Office, computing and accounting machines	2,071	2,325	2,992	3,367	2,907	2,352	2,830	2,615	3,235	2,940	2,616
Other machinery, except electrical	11,936	12,470	15,906	17,122	14,995	13,949	14,344	12,676	15,546	13,424	13,068

(Continued)

Table 4-9b. Scientists and engineers[1] engaged in industrial R&D, January, 1961-74
(In thousands)

Industry	January													
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Total	312.1	312.0	327.3	340.2	343.6	353.2	367.2	376.7	387.1	384.1	366.8	349.9	356.6	360.6
Food and kindred products	5.2	5.4	5.1	5.7	6.2	6.2	6.1	6.3	6.3	6.3	6.7	6.6	6.7	6.8
Textiles and apparel	1.1	(2)	1.0	1.2	1.2	1.4	1.9	2.5	2.6	2.9	1.8	1.8	1.9	1.8
Lumber, wood products and furniture	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.9	1.0	1.7	1.7	1.6	1.6
Paper and allied products	2.6	2.6	2.5	3.8	3.8	4.3	4.7	4.8	4.8	4.9	5.0	4.9	4.9	5.1
Chemicals and allied products	37.0	36.5	38.3	35.8	37.9	38.0	36.9	38.9	40.3	40.2	42.8	40.9	40.7	42.3
Industrial chemicals	22.9	21.6	22.9	22.2	24.3	23.3	21.7	22.3	22.6	21.9	22.4	19.7	19.8	20.5
Drugs and medicines	6.2	6.8	6.9	6.9	7.2	7.5	8.7	9.8	10.1	11.4	11.6	11.8	11.2	12.0
Other chemicals	7.9	8.1	8.5	6.7	6.4	7.2	6.5	6.8	7.6	6.9	8.8	9.5	9.7	9.8
Petroleum refining and extraction	9.0	9.1	8.9	8.1	8.7	8.9	8.7	9.2	10.0	9.9	9.2	8.3	8.2	8.3
Rubber products	5.5	5.6	5.8	6.0	5.8	5.7	5.8	6.1	6.3	6.8	5.9	5.8	5.8	5.7
Stone, clay, and glass products	3.6	3.7	3.8	3.3	3.5	3.1	3.3	4.1	4.2	4.6	4.1	3.9	3.9	4.2
Primary metals	6.9	6.0	5.2	5.1	5.5	5.5	5.9	5.9	6.2	6.3	6.3	6.0	5.5	5.6
Ferrous metals and products[2]	3.9	3.0	2.9	2.8	3.2	3.2	3.3	3.1	3.2	3.2	3.4	3.4	3.1	3.2
Nonferrous metals and products	3.0	3.0	2.3	2.3	2.3	2.3	2.5	2.7	3.0	3.1	2.9	2.6	2.4	2.4
Fabricated metal products[2]	8.6	7.4	6.8	7.0	6.6	6.3	6.3	5.6	6.6	5.9	6.9	6.4	6.5	6.9
Machinery	33.0	31.5	31.4	27.3	29.4	30.5	33.6	37.4	39.4	41.4	40.5	41.1	41.7	43.3
Electrical equipment and communication	79.2	82.3	85.8	89.5	87.8	92.0	98.6	98.4	101.6	102.4	95.2	87.7	92.6	94.7
Radio and TV receiving equipment	(2)	(2)	(2)	(2)	(2)	(2)	0.9	1.0	1.2	1.9	2.4	2.1	1.4	1.3
Communication equipment & electronic components	47.5	52.6	55.1	60.4	58.8	62.3	66.7	67.4	67.4	66.3	63.6	57.2	61.5	63.2
Other electrical equipment	31.7	29.7	30.7	29.1	29.0	29.7	31.0	30.0	33.0	34.2	29.4	28.4	29.7	30.2
Motor vehicles and other transportation equipment	19.1	20.8	21.1	23.3	24.1	24.8	25.2	24.3	25.0	25.1	27.8	29.3	29.2	28.5
Aircraft and missiles	78.5	79.4	90.7	101.1	99.2	99.3	100.4	101.1	99.9	92.6	78.3	71.2	72.3	70.3
Professional and scientific instruments	11.1	9.8	9.4	10.8	11.5	12.5	13.0	14.1	15.1	14.8	15.1	15.1	15.9	16.9
Scientific and mechanical measuring instruments	5.7	4.8	3.9	3.8	3.6	3.8	3.6	3.8	3.9	3.7	4.2	4.1	4.3	4.4
Optical, surgical, photographic, and other instruments	5.4	5.0	5.5	7.0	7.9	8.7	9.4	10.3	11.2	11.1	10.9	10.9	11.6	12.5
Other manufacturing industries	3.5	3.1	2.8	2.0	2.4	2.3	2.2	2.4	2.8	2.7	3.9	3.7	3.9	4.0
Nonmanufacturing industries	7.5	7.0	8.2	9.8	9.6	11.7	14.1	15.1	15.1	16.3	15.6	15.7	15.3	14.6

[1] Full-time equivalent basis.
[2] Not separately available but included in total.
[3] Data included in the other manufacturing industries group.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315).

Table 4-7. Industrial R&D expenditures for basic research, applied research, and development, 1960-74

(Dollars in millions)

Year	Total	Basic research	Applied research	Development
	Current dollars			
1960	$10,509	$376	$2,029	$8,104
1961	10,908	395	1,977	8,536
1962	11,464	488	2,449	8,527
1963	12,630	522	2,457	9,651
1964	13,512	549	2,600	10,363
1965	14,185	592	2,658	10,935
1966	15,548	624	2,843	12,081
1967	16,385	629	2,915	12,841
1968	17,429	642	3,124	13,663
1969	18,308	618	3,287	14,403
1970	18,062	629	3,399	14,034
1971	18,311	610	3,384	14,317
1972	19,371	579	3,473	15,319
1973	20,937	605	3,759	16,573
1974(est.)	22,026	640	4,025	17,355
	Constant 1967 dollars[1]			
1960	$11,964	$428	$2,310	$9,226
1961	12,260	444	2,222	9,594
1962	12,743	542	2,722	9,478
1963	13,857	572	2,695	10,589
1964	14,596	593	2,809	11,195
1965	15,045	628	2,819	11,598
1966	16,045	644	2,934	12,467
1967	16,385	629	2,915	12,841
1968	16,803	617	3,003	13,136
1969	16,793	567	3,015	13,211
1970	15,704	547	2,955	12,202
1971	15,233	507	2,815	11,910
1972	15,589	466	2,795	12,328
1973	15,954	461	2,864	12,629
1974(est.)	15,220	442	2,781	11,992

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *National Patterns of R&D Resources 1953-75* (NSF 75-307).

Table 4-8. Percent distribution of industrial R&D expenditures among selected industries, 1960-73

Industry	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Five industry total	84	85	85	86	85	85	84	84	83	82	81	81	81	82
Aircraft and missiles	33	35	35	37	38	36	36	35	33	32	29	27	26	24
Electrical equipment and communication	24	23	23	23	22	23	23	24	24	24	24	25	25	26
Chemicals and allied products	9	10	10	10	10	10	9	9	9	9	10	10	10	10
Motor vehicles and other transportation equipment	8	9	9	9	9	9	9	8	9	9	9	10	10	12
Machinery	9	8	8	8	8	8	8	8	9	8	9	10	10	10

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315)

Table 4-5 (Continued)

Industry	Constant 1967 dollars in millions[2]													
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Total	$11,964	$12,260	$12,743	$13,858	$14,597	$15,046	$16,045	$16,385	$16,757	$16,793	$15,705	$15,233	$15,599	$15,942
Food and kindred products	118	141	135	143	156	167	169	183	180	188	204	204	209	206
Textiles and apparel	43	34	31	33	35	40	53	57	56	55	50	49	49	49
Lumber, wood products, and furniture	11	11	11	12	13	12	12	12	18	14	42	40	41	42
Paper and allied products	64	66	72	76	83	100	121	128	138	172	155	156	150	151
Chemicals and allied products	1,116	1,238	1,306	1,359	1,387	1,438	1,452	1,507	1,527	1,522	1,536	1,513	1,526	1,586
Industrial chemicals	758	794	820	888	934	963	947	966	947	929	904	849	839	863
Drugs and medicines	184	202	217	237	253	283	318	343	378	398	403	424	440	471
Other chemicals	173	242	269	235	200	192	187	198	202	195	228	240	247	251
Petroleum refining and extraction	337	336	345	348	425	421	383	371	420	428	448	420	377	384
Rubber products	138	155	157	171	171	172	173	182	197	199	191	191	212	217
Stone, clay, and glass products	100	99	107	110	118	119	121	136	137	146	137	129	133	134
Primary metals	202	199	190	201	211	226	239	242	241	236	239	226	210	207
Ferrous metals and products	116	110	108	116	125	136	143	135	130	125	130	120	111	112
Nonferrous metals and products	85	89	82	85	85	90	96	107	111	111	110	107	98	95
Fabricated metal products	165	153	162	168	160	154	159	163	176	167	174	194	194	203
Machinery	1,080	1,013	1,016	1,051	1,097	1,130	1,256	1,326	1,420	1,409	1,434	1,475	1,577	1,634
Electrical equipment and communication	2,883	2,791	2,934	3,145	3,211	3,394	3,742	3,867	3,947	4,037	3,784	3,772	3,956	4,064
Radio and TV receiving equipment	(1)	(1)	(1)	(1)	(1)	(1)	49	45	53	52	61	53	39	39
Communication equipment and electronic components	1,507	1,578	1,769	1,945	2,022	2,110	2,321	2,425	2,440	2,489	2,379	2,397	2,542	2,606
Other electrical equipment	1,375	1,213	1,165	1,199	1,188	1,285	1,373	1,397	1,454	1,496	1,344	1,322	1,376	1,418
Motor vehicles and other transportation equipment	1,006	1,052	1,111	1,196	1,277	1,305	1,387	1,354	1,434	1,429	1,376	1,461	1,596	1,858
Aircraft and missiles	4,001	4,304	4,493	5,170	5,486	5,460	5,703	5,669	5,553	5,420	4,561	4,086	4,017	3,849
Professional and scientific instruments	375	334	344	312	358	428	483	542	637	673	648	619	657	696
Scientific and mechanical measuring instruments	182	134	112	77	80	85	90	104	108	100	103	92	100	90
Optical, surgical, photographic, and other instruments	192	200	231	235	278	343	393	438	527	573	545	527	559	607
Other manufacturing industries	136	118	72	59	70	75	80	90	98	98	115	113	121	120
Nonmanufacturing industries	191	218	260	303	345	407	513	559	580	601	613	586	569	544

[1] Included in the other electrical equipment group.
[2] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315).