

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Academic Sector							
	Cross-sectoral authored articles (number)	Percent of cross-sectoral coauthorships with:						
		Industry	Federal Govt.	University FFRDC	Industry FFRDC	Nonprofit FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	30,160	20.3	35.0	7.3	2.0	0.5	7.2	34.6
1999	35,535	24.9	32.1	9.5	2.6	0.7	5.6	35.7
Physics								
1988	2,945	36.5	7.3	39.0	8.0	1.0	0.0	5.0
1999	3,786	29.7	7.3	42.0	10.0	2.0	0.1	5.1
Chemistry								
1988	1,116	47.6	7.5	18.0	7.0	1.0	0.3	6.3
1999	1,568	43.8	5.4	22.0	8.0	3.0	0.3	7.8
Earth and space sciences								
1988	1,630	22.5	19.1	23.0	2.0	1.0	2.1	20.2
1999	3,059	18.5	20.6	27.0	2.0	2.0	1.9	24.7
Mathematics								
1998	224	42.0	24.1	13.0	6.0	1.0	1.3	16.5
1999	194	47.9	13.4	9.0	4.0	0.0	1.0	25.8
Clinical medicine								
1988	14,190	10.9	38.5	0.7	0.3	0.1	9.7	47.8
1999	15,131	20.2	32.7	0.8	0.5	0.1	7.5	50.8
Biomedical research								
1988	4,580	19.3	12.8	3.0	2.0	0.0	1.9	41.6
1999	5,858	22.2	11.1	4.0	2.0	1.0	1.3	43.5
Biology								
1988	1,116	47.6	25.5	18.0	7.0	1.0	1.1	6.3
1999	1,568	43.8	18.7	22.0	8.0	3.0	1.1	7.8
Engineering and technology								
1988	1,490	56.8	22.8	12.0	6.0	2.0	1.7	6.4
1999	1,902	63.7	21.0	10.0	7.0	1.0	0.8	3.3
Psychology								
1988	806	14.1	25.9	0.0	0.0	1.0	12.9	35.9
1999	642	17.0	28.8	0.0	0.0	0.0	11.7	43.3
Social sciences								
1988	589	19.0	29.4	2.0	0.0	1.0	5.8	38.7
1999	537	15.8	26.8	1.0	1.0	0.0	5.8	48.2
Health and professional fields								
1988	969	29.9	16.3	1.0	0.0	1.0	13.3	30.7
1999	963	27.6	20.4	0.0	0.0	1.0	14.7	39.8

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Industry Sector							
	Cross-sectoral authored articles (number)	Percent of cross-sectoral coauthorships with:						
		Academia	Federal Govt.	University FFRDC	Industry FFRDC	Nonprofit FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	7,609	80.5	17.1	4.1	1.9	0.6	2.1	10.7
1999	10,755	82.1	17.3	4.1	2.2	0.6	2.4	16.3
Physics								
1988	1,335	57.7	9.5	13.0	4.0	1.0	0.1	1.6
1999	1,422	58.2	13.1	14.0	6.0	1.0	0.0	1.7
Chemistry								
1988	638	59.2	9.7	4.0	2.0	1.0	0.1	3.6
1999	814	55.8	8.9	3.0	3.0	1.0	0.3	3.3
Earth and space sciences								
1988	542	59.6	33.2	9.4	0.2	0.9	3.7	7.7
1999	818	57.1	33.5	11.4	0.9	1.8	4.2	8.2
Mathematics								
1988	108	87.0	4.6	4.0	1.0	1.0	0.0	8.3
1999	100	93.0	8.0	5.0	1.0	0.0	0.0	3.0
Clinical medicine								
1988	1,913	80.7	19.0	0.2	0.9	0.3	4.0	21.7
1999	3,706	82.5	15.8	0.2	0.6	0.1	3.7	30.3
Biomedical research								
1988	1,090	63.7	14.5	2.0	2.0	0.0	1.1	16.4
1999	1,528	64.0	12.0	2.0	2.0	1.0	1.1	21.5
Biology								
1988	638	83.2	13.6	4.0	2.0	1.0	6.2	3.6
1999	814	84.4	13.5	3.0	3.0	1.0	0.5	3.3
Engineering and technology								
1988	1,065	79.5	13.4	4.0	3.0	1.0	0.6	5.7
1999	1,442	84.0	13.1	5.0	4.0	1.0	0.8	2.5
Psychology								
1988	134	85.1	8.2	0.0	0.0	1.0	3.7	6.7
1999	119	91.6	10.1	0.0	0.0	0.0	3.4	24.4
Social sciences								
1988	129	86.8	10.1	1.0	0.0	1.0	3.1	9.3
1999	100	85.0	8.0	1.0	0.0	0.0	5.0	13.0
Health and professional fields								
1988	337	86.1	6.8	1.0	0.0	0.0	3.0	8.0
1999	306	86.9	10.8	0.0	0.0	0.0	4.2	20.3

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Federal Government							
	Percent of cross-sectoral coauthorships with:							
	Cross-sectoral authored articles (number)	Academia	Industry	University FFRDC	Industry FFRDC	Nonprofit FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	12,024	87.9	10.8	2.0	1.1	0.3	3.3	10.4
1999	13,150	86.9	14.2	3.7	1.8	0.3	3.4	13.6
Physics								
1988	713	64.4	24.7	10.0	3.0	1.0	0.1	3.2
1999	1,020	61.4	24.9	10.0	4.0	1.0	0.1	2.7
Chemistry								
1988	368	59.1	23.6	2.0	2.0	1.0	0.6	3.8
1999	401	54.7	27.4	5.0	2.0	0.0	0.6	3.7
Earth and space sciences								
1988	913	61.2	22.5	10.0	2.0	1.0	1.4	10.2
1999	1,695	65.9	19.6	17.0	1.0	1.0	1.5	13.8
Mathematics								
1988	58	93.1	8.6	2.0	0.0	0.0	1.7	3.4
1999	33	78.8	24.2	3.0	0.0	0.0	3.0	6.1
Clinical medicine								
1988	5,900	92.7	6.2	0.3	0.6	0.2	4.2	13.0
1999	5,477	90.3	10.7	0.4	1.3	0.2	5.0	19.2
Biomedical research								
1988	1,954	66.8	10.3	1.0	2.0	0.0	1.4	12.1
1999	2,246	68.9	10.9	1.0	3.0	0.0	1.7	13.1
Biology								
1988	368	77.4	23.6	2.0	2.0	1.0	0.8	3.8
1999	401	73.1	27.4	5.0	2.0	0.0	0.7	3.7
Engineering and technology								
1988	466	72.7	30.7	3.0	1.0	0.0	0.6	3.9
1999	561	71.3	33.7	5.0	5.0	1.0	0.5	2.0
Psychology								
1988	219	95.4	5.0	0.0	0.0	0.0	4.1	4.6
1999	191	96.9	6.3	0.0	0.0	0.0	2.6	9.9
Social sciences								
1988	197	87.8	6.6	2.0	0.0	1.0	3.0	10.7
1999	164	87.8	4.9	0.0	1.0	0.0	0.6	17.7
Health and professional fields								
1988	205	77.1	11.2	1.0	0.0	1.0	10.7	12.7
1999	229	85.6	14.4	0.0	0.0	1.0	12.7	20.1

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Academic FFRDCs							
	Percent of cross-sectoral coauthorships with:							
	Cross-sectoral authored articles (number)	Academia	Industry	Federal Govt.	Industry FFRDC	Nonprofit FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	2,578	85.8	12.1	9.2	4.0	0.8	0.3	4.5
1999	3,850	87.8	11.3	12.8	4.4	1.2	0.2	7.5
Physics								
1988	1,310	87.6	12.7	5.3	5.0	0.0	0.1	1.1
1999	1,778	65.5	10.9	4.3	6.0	1.0	0.0	1.9
Chemistry								
1988	218	92.2	10.6	2.8	2.0	1.0	0.0	0.9
1999	375	69.2	7.5	3.7	4.0	2.0	0.0	0.3
Earth and space sciences								
1988	449	82.0	11.4	20.9	1.0	1.0	0.7	12.7
1999	972	69.6	9.6	23.4	1.0	1.0	0.3	19.3
Mathematics								
1988	33	84.8	12.1	3.0	0.0	0.0	0.0	3.0
1999	20	85.0	25.0	5.0	0.0	0.0	0.0	5.0
Clinical medicine								
1988	120	87.5	3.3	16.7	4.0	1.0	3.0	14.2
1999	130	89.2	6.9	16.9	4.0	0.0	2.3	15.4
Biomedical research								
1988	174	83.9	10.3	14.9	3.0	2.0	0.6	8.0
1999	277	71.1	10.8	9.2	1.0	1.0	0.0	14.8
Biology								
1988	218	92.2	10.6	2.8	2.0	1.0	0.0	0.9
1999	375	89.9	7.5	4.8	4.0	2.0	0.0	0.3
Engineering and technology								
1988	221	77.4	17.6	7.2	8.0	3.0	0.0	4.1
1999	263	73.8	27.4	10.3	11.0	2.0	0.0	1.1
Psychology								
1988	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0
1999	0	na	na	na	na	na	na	na
Social sciences								
1988	16	87.5	6.3	18.8	0.0	0.0	0.0	6.3
1999	4	75.0	25.0	0.0	0.0	0.0	0.0	0.0
Health and professional fields								
1988	9	77.8	22.2	11.1	0.0	0.0	0.0	0.0
1999	3	100.0	33.3	33.3	0.0	0.0	33.3	0.0

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Industry FFRDCs							
	Cross-sectoral authored articles (number)	Percent of cross-sectoral coauthorships with:						
		Academia	Industry	Federal Govt.	University FFRDC	Nonprofit FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	825	72.2	17.3	16.6	12.6	1.1	0.2	4.0
1999	1,223	75.7	19.4	18.9	13.7	1.5	0.7	6.5
Physics								
1988	318	64.9	16.4	6.0	21.0	1.0	0.0	0.6
1999	460	69.0	18.9	7.3	22.0	1.0	0.0	2.6
Chemistry								
1988	88	70.6	17.0	5.9	6.0	0.0	0.0	0.0
1999	156	72.6	14.1	5.0	8.0	6.0	0.0	2.6
Earth and space sciences								
1988	36	55.8	2.8	37.2	11.0	3.0	2.3	5.6
1999	60	70.6	11.7	13.2	22.0	0.0	2.9	6.7
Mathematics								
1988	13	100.0	7.7	0.0	0.0	0.0	0.0	0.0
1999	7	100.0	14.3	0.0	0.0	0.0	0.0	0.0
Clinical medicine								
1988	81	55.6	21.0	44.4	6.2	0.0	0.0	9.9
1999	123	56.1	18.7	59.3	4.1	0.0	1.6	14.6
Biomedical research								
1988	119	55.0	18.5	32.1	4.0	1.0	0.0	12.6
1999	191	52.7	18.8	26.9	2.0	2.0	1.6	17.3
Biology								
1988	88	81.8	17.0	6.8	6.0	0.0	0.0	0.0
1999	156	83.3	14.1	5.8	8.0	2.0	0.0	2.6
Engineering and technology								
1988	127	66.1	25.2	4.7	13.0	4.0	0.0	4.7
1999	187	68.4	31.6	14.4	16.0	4.0	0.0	1.6
Psychology								
1988	0	na	na	na	na	na	na	na
1999	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Social sciences								
1988	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0
1999	5	100.0	0.0	40.0	0.0	0.0	0.0	20.0
Health and professional fields								
1988	0	na	na	na	na	na	na	na
1999	3	100.0	33.3	0.0	0.0	0.0	0.0	0.0

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Nonprofit FFRDCs							
	Percent of cross-sectoral coauthorships with:							
	Cross-sectoral authored articles (number)	Academia	Industry	Federal Govt.	University FFRDC	Industry FFRDC	Other govt.	Nonprofit
Total science and engineering								
1988	2,494	86.8	6.3	15.8	0.1	0.0	0.0	17.0
1999	2,312	85.8	10.9	19.4	0.4	0.1	0.0	20.1
Physics								
1988	4	75.0	25.0	25.0	25.0	0.0	0.0	0.0
1999	9	100.0	0.0	11.1	0.0	0.0	0.0	0.0
Chemistry								
1988	13	60.0	7.7	15.0	0.0	0.0	0.0	7.7
1999	28	54.5	14.3	9.1	0.0	0.0	0.0	21.4
Earth and space sciences								
1988	102	69.4	22.5	14.8	3.0	1.0	0.0	5.9
1999	168	70.6	25.0	18.1	2.0	1.0	0.0	3.6
Mathematics								
1988	3	100.0	0.0	33.3	0.0	0.0	0.0	0.0
1999	3	66.7	0.0	33.3	0.0	0.0	0.0	33.3
Clinical medicine								
1988	1,555	88.4	5.0	16.1	0.0	0.1	0.0	20.9
1999	1,296	87.3	10.6	21.1	0.2	0.0	0.0	25.6
Biomedical research								
1988	276	83.1	5.4	12.0	0.0	0.0	0.0	18.5
1999	268	76.5	8.6	15.8	0.0	2.0	1.0	20.9
Biology								
1988	13	92.3	7.7	23.1	0.0	0.0	0.0	7.7
1999	28	64.3	14.3	10.7	0.0	0.0	0.0	21.4
Engineering and technology								
1988	36	69.4	16.7	8.3	0.0	0.0	0.0	2.8
1999	27	59.3	44.4	11.1	0.0	0.0	0.0	3.7
Psychology								
1988	113	92.0	4.4	8.0	0.0	0.0	0.0	9.7
1999	78	96.2	5.1	6.4	0.0	0.0	0.0	10.3
Social sciences								
1988	41	82.9	0.8	14.6	0.0	0.0	0.0	7.3
1999	41	75.6	12.2	2.4	0.0	0.0	0.0	7.3
Health and professional fields								
1988	159	81.1	6.3	13.8	0.0	0.0	0.0	10.7
1999	162	87.7	8.0	17.9	1.0	0.0	0.0	19.8

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Other government							
	Percent of cross-sectoral coauthorships with:							
	Cross-sectoral authored articles (number)	Academia	Industry	Federal Govt.	University FFRDC	Industry FFRDC	Nonprofit FFRDC	Nonprofit
Total science and engineering								
1988	2,494	86.8	6.3	15.8	0.1	0.0	0.0	17.0
1999	2,312	85.8	10.9	19.4	0.4	0.1	0.0	20.1
Physics								
1988	4	75.0	25.0	25.0	25.0	0.0	0.0	0.0
1999	9	100.0	0.0	11.1	0.0	0.0	0.0	0.0
Chemistry								
1988	13	60.0	7.7	15.0	0.0	0.0	0.0	7.7
1999	28	54.5	14.3	9.1	0.0	0.0	0.0	21.4
Earth and space sciences								
1988	102	69.4	22.5	14.8	3.0	1.0	0.0	5.9
1999	168	70.6	25.0	18.1	2.0	1.0	0.0	3.6
Mathematics								
1988	3	100.0	0.0	33.3	0.0	0.0	0.0	0.0
1999	3	66.7	0.0	33.3	0.0	0.0	0.0	33.3
Clinical medicine								
1988	1,555	88.4	5.0	16.1	0.0	0.1	0.0	20.9
1999	1,296	87.3	10.6	21.1	0.2	0.0	0.0	25.6
Biomedical research								
1988	276	83.1	5.4	12.0	0.0	0.0	0.0	18.5
1999	268	76.5	8.6	15.8	0.0	2.0	1.0	20.9
Biology								
1988	13	92.3	7.7	23.1	0.0	0.0	0.0	7.7
1999	28	64.3	14.3	10.7	0.0	0.0	0.0	21.4
Engineering and technology								
1988	36	69.4	16.7	8.3	0.0	0.0	0.0	2.8
1999	27	59.3	44.4	11.1	0.0	0.0	0.0	3.7
Psychology								
1988	113	92.0	4.4	8.0	0.0	0.0	0.0	9.7
1999	78	96.2	5.1	6.4	0.0	0.0	0.0	10.3
Social sciences								
1988	41	82.9	0.8	14.6	0.0	0.0	0.0	7.3
1999	41	75.6	12.2	2.4	0.0	0.0	0.0	7.3
Health and professional fields								
1988	159	81.1	6.3	13.8	0.0	0.0	0.0	10.7
1999	162	87.7	8.0	17.9	1.0	0.0	0.0	19.8

See explanatory notes, if any, and SOURCE at end of table.

Appendix table 5-46

Patterns of cross-sectoral coauthorship of U.S. scientific and technical articles, by sector and field: 1988 and 1999

Years	Nonprofit							
	Percent of cross-sectoral coauthorships with:							
	Cross-sectoral authored articles (number)	Academia	Industry	Federal Govt.	University FFRDC	Industry FFRDC	Nonprofit FFRDC	Other govt.
Total science and engineering								
1988	11,441	91.2	7.1	10.9	1.0	0.1	0.0	3.7
1999	14,059	90.4	12.5	12.8	2.0	1.0	0.0	3.3
Physics								
1988	187	64.0	11.8	10.1	8.0	1.0	1.0	0.0
1999	232	65.0	10.3	9.4	14.0	5.0	0.0	0.0
Chemistry								
1988	100	55.6	23.0	11.1	2.0	0.0	1.0	0.8
1999	169	43.1	16.0	5.3	1.0	2.0	1.0	2.1
Earth and space sciences								
1988	413	61.2	10.2	17.3	14.0	1.0	1.0	1.1
1999	908	61.4	7.4	19.0	21.0	0.0	0.0	0.5
Mathematics								
1988	43	86.0	20.9	4.7	2.0	0.0	0.0	0.0
1999	51	98.0	5.9	3.9	2.0	0.0	0.0	2.0
Clinical medicine								
1988	7,266	93.4	18.8	10.5	0.1	0.1	0.0	4.5
1999	8,408	91.4	19.1	12.5	0.2	0.1	0.0	3.9
Biomedical research								
1988	2,083	77.7	8.6	9.7	1.0	1.0	0.0	2.1
1999	2,782	73.8	11.8	8.5	2.0	1.0	0.0	1.6
Biology								
1988	100	70.0	23.0	14.0	2.0	0.0	1.0	1.0
1999	169	72.2	16.0	8.9	1.0	2.0	1.0	3.6
Engineering and technology								
1988	157	61.1	38.9	11.5	6.0	4.0	0.0	0.6
1999	100	63.0	36.0	11.0	3.0	3.0	1.0	1.0
Psychology								
1988	304	95.1	3.0	3.3	0.0	0.0	0.0	3.6
1999	294	94.6	9.9	6.5	0.0	0.0	0.0	2.7
Social sciences								
1988	252	90.5	4.8	8.3	0.0	0.0	0.0	1.2
1999	284	91.2	4.6	10.2	0.0	0.0	0.0	1.1
Health and professional fields								
1988	347	85.6	7.8	7.5	0.0	0.0	0.0	4.9
1999	425	90.1	14.6	10.8	0.0	0.0	0.0	7.5

na = not applicable; FFRDC = Federally Funded Research and Development Center

NOTES: Counts are on a whole count basis; for example, an article with two authors in two sectors is counted as an article in each sector. Because of whole counts, sector shares exceed 100% in fields where there are articles with more than two sectoral authors.

SOURCES: Institute for Scientific Information, Science Citation and Social Science Citation Index; CHI Research, Inc., Science Indicators database; and National Science Foundation, Division of Science Resources Statistics (NSF/SRS).