

EMIGRATION OF U.S.-BORN S&E DOCTORATE RECIPIENTS

by Joan S. Burrelli

Participation in international S&E research can provide opportunities for younger scientists and engineers to learn more about other cultures and to improve their S&E skills and knowledge (NSB 2001). Despite efforts of science and technology groups in the United States and abroad to encourage American scientists to work overseas (NSB 2003, Agrawal 2001), relatively few U.S.-born S&E doctorate recipients from U.S. universities plan to work or study abroad at the time of receiving their doctorates. In contrast, a large number of students come to the United States to earn S&E doctorate degrees, and many foreign-born U.S.-trained S&E doctorate recipients remain in the United States.

In 2002, 24,558 people earned S&E research doctorates from U.S. universities. Two-thirds (66 percent) of them had definite plans¹ for work or study, and of those, 10 percent had definite plans for work or study abroad. Among U.S.-born S&E doctorate recipients with definite plans, 289, or 3 percent, “intended” or “planned” to work or study abroad in 2002 (table 1).

More non-U.S. citizens than U.S.-born citizens plan to go abroad after graduation. Among non-U.S. citizens in 2002 with definite plans, 5 percent of S&E doctorate recipients with permanent residency visas and 25 percent of S&E doctorate recipients on temporary

TABLE 1. Doctorate recipients with definite plans, by location of plans, broad field, and citizenship: 2002

Broad field and citizenship	All with definite plans		Definite plans in United States		Definite plans abroad	
	Number	Percent	Number	Percent	Number	Percent
S&E doctorate	16,239	100.0	14,481	89.2	1,668	10.3
U.S. native born	9,338	100.0	9,007	96.5	289	3.1
U.S. naturalized	875	100.0	827	94.5	41	4.7
Non-U.S., permanent resident	744	100.0	706	94.9	34	4.6
Non-U.S., temporary visa	5,234	100.0	3,910	74.7	1,294	24.7
Visa status unknown	48	100.0	31	64.6	10	20.8
Non-S&E doctorate	9,745	100.0	8,965	92.0	742	7.6
U.S. native born	7,805	100.0	7,645	98.0	135	1.7
U.S. naturalized	396	100.0	373	94.2	20	5.1
Non-U.S., permanent resident	286	100.0	263	92.0	23	8.0
Non-U.S., temporary visa	1,233	100.0	674	54.7	551	44.7
Visa status unknown	25	100.0	10	40.0	13	52.0

NOTE: Detail does not add to total because all with definite plans includes missing or unknown location.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates, 2002.

¹Those who have definite plans are those who reported they are “returning to, or continuing in, predoctoral employment” or who “have signed contract or made definite commitment for other work or study.”



visas had definite plans for work or study abroad (table 1). Non-U.S. citizens with non-S&E doctorates and definite plans were more likely than those with S&E doctorates to plan work or study abroad—8 percent of non-S&E doctorate recipients with permanent residency and 45 percent of those on temporary visas had definite plans for work or study abroad.

Trends in Plans to Work or Study Abroad

Except for two brief upturns, the number of U.S.-born S&E doctorate recipients with definite plans to work or study abroad has been about 300–400 each year since the mid-1960's (figure 1). The two brief exceptions were the Vietnam era of the early 1970s, in which the numbers going to Canada increased dramatically, and another upturn in the early 1990s. The percentage of those planning work or study abroad ranged between 2 percent and 4 percent from 1958 through 2002.

Destinations

The top postdoctoral study or employment destinations of U.S.-born S&E doctorate recipients from 1998 to 2002 who had definite plans abroad were Canada, the United Kingdom, Germany, France, Japan, Switzerland, and Australia (figure 2). These seven countries accounted for 61 percent of the 1,624 U.S. born S&E doctorate

recipients in that 5-year period who reported that they planned to work or study abroad. The three top countries, Canada, the United Kingdom, and Germany, accounted for 38 percent.

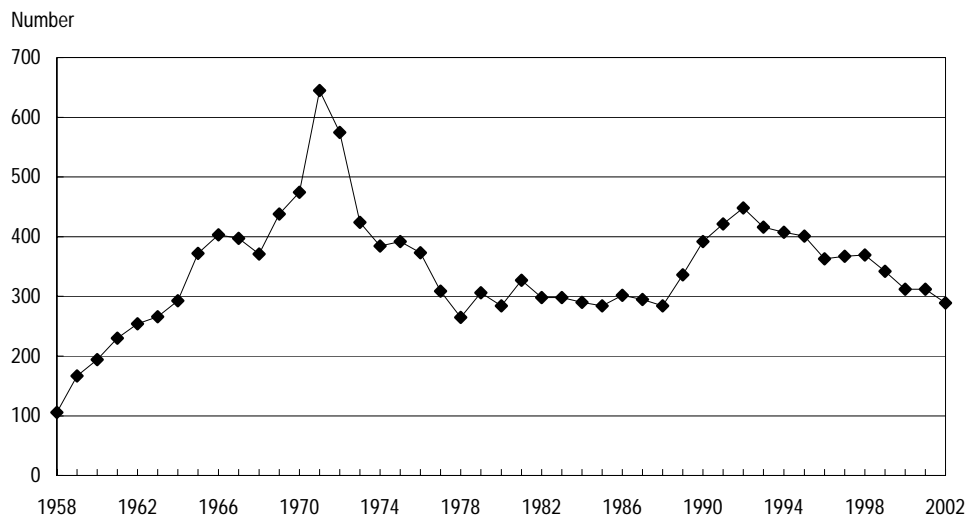
Field of Doctorate

The three largest fields of the 1998–2002 U.S.-born S&E doctorate recipients who reported that they planned to work or study abroad were biological sciences (27 percent), physical sciences (25 percent), and social sciences (22 percent) (table 2). A much larger percentage of those with definite plans abroad than of those who planned to stay in the United States had doctorates in the physical and social sciences and a much smaller percentage had doctorates in psychology. Those destined for Australia and the United Kingdom were more likely than other U.S.-born S&E doctorate recipients to have doctorates in the biological sciences (about 40 percent), and those destined for Germany or Switzerland were more likely than other U.S.-born S&E doctorate recipients to have doctorates in the physical sciences (37 and 39 percent, respectively).

Type of Plan

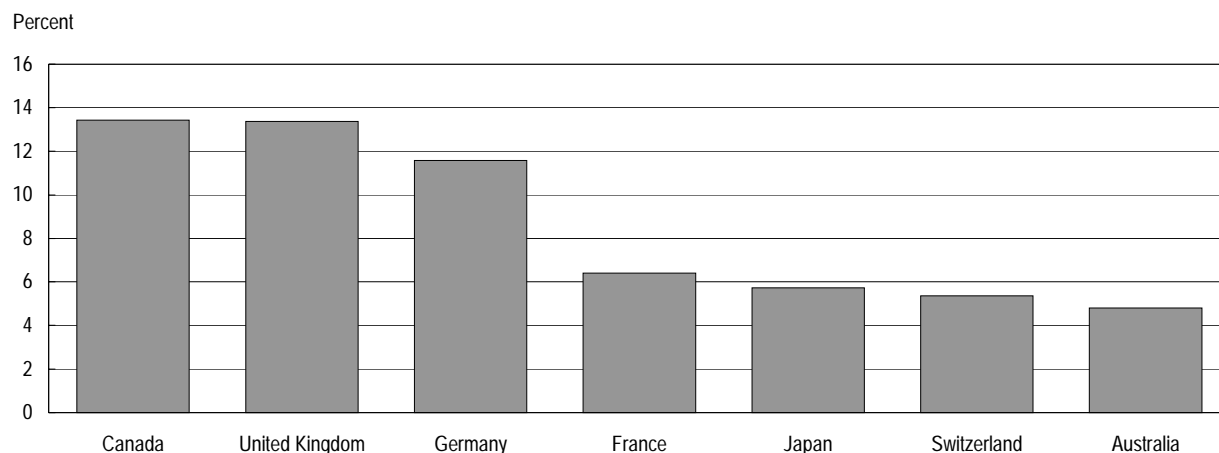
The majority (71 percent) of U.S.-born S&E doctorates in 2002 who had definite plans for work or study abroad

FIGURE 1. U.S.-born S&E doctorate recipients with definite plans to work or study abroad: 1958–2002



SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates.

FIGURE 2. Postdoctoral location of U.S.-born 1998–2002 S&E doctorate recipients with definite plans abroad



SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates.

TABLE 2. U.S.-born 1998–2002 S&E doctorate recipients with definite plans, by location of plans and field (Percent distribution)

Location	All recipients		Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences
	Number	Percent								
Abroad	1,624	100.0	3.4	26.9	1.5	11.8	3.5	25.2	6.2	21.5
Australia	78	100.0	0.0	38.5	0.0	11.5	2.6	21.8	2.6	23.1
Canada	218	100.0	2.8	24.3	2.8	7.8	7.3	28.4	11.0	15.6
France	104	100.0	5.8	27.9	1.9	21.2	2.9	31.7	1.9	6.7
Germany	188	100.0	0.0	26.6	1.6	14.9	5.3	36.7	6.9	8.0
Japan	93	100.0	1.1	23.7	1.1	17.2	0.0	23.7	9.7	23.7
Switzerland	87	100.0	0.0	34.5	3.4	14.9	1.1	39.1	0.0	6.9
United Kingdom	217	100.0	0.9	41.9	0.9	6.9	2.8	23.5	5.1	18.0
Other	639	100.0	6.4	20.7	1.1	11.3	3.0	18.9	6.1	32.6
United States	48,481	100.0	2.7	25.1	2.6	14.2	3.4	16.2	19.5	16.3

NOTE: Table does not include those with unknown location.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates, 1998-2002.

were planning postdoctoral fellowships, research associateships, traineeships, or other study (table 3). Another 26 percent had definite plans for employment abroad, with 60 percent of those planning employment in foreign academic institutions. The remaining 3 percent had definite plans for military service or other plans.

Of those who planned study abroad, most were funded by colleges or universities (39 percent) or “other” sources (24 percent). Only 12 percent were funded by the U.S. government. The remainder reported industry/business, private foundations, nonprofits or unknown sources as their main source of financial support for postdoctoral study or research.

Data presented in this InfoBrief are from the Survey of Earned Doctorates. These data are collected from all individual doctorate recipients via a questionnaire distributed by graduate deans to persons completing their doctorates. The survey has been conducted annually since 1957 for the National Science Foundation and five other Federal agencies. The data for a given academic year include all research doctorates awarded in the 12-month period ending June 30 of that year. For further information on the survey methodology or for detailed statistical tables, see <http://www.nsf.gov/sbe/srs/ssed/start.htm>.

TABLE 3. U.S.-born S&E doctorate recipients with definite plans for work or study abroad, by type of plan and source of postdoctoral study support: 2002

Type of plan and source of support	Percent
All plans	100.0
Employment	26.3
Military/other	3.1
Postdoctoral study	70.6
All sources of support	100.0
U.S. Government	11.8
Industry/business	2.5
College or university	38.7
Private foundation	7.4
Nonprofit, other than private foundation	5.9
Other	24.0
Unknown	9.8

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates, 2002.

References

Agrawal, Alka. "American Postdocs Abroad" *Science's Next Wave*, October 2001. Washington, DC: American Association for the Advancement of Science. <http://nextwave.sciencemag.org/cgi/content/full/2001/10/04/5> accessed 3/29/04.

National Science Board (NSB), *Toward a More Effective Role for the U.S. Government in International Science and Engineering*. NSB 01-187. Arlington, VA.

National Science Board (NSB), *The Science and Engineering Workforce: Realizing America's Potential*. NSB 03-69. Arlington, VA.

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