



by Lawrence
Burton and Jack
Wang¹

Division of Science Resources Studies

ISSUE BRIEF

February 11, 1999

Current data suggest that while the number of immigrant engineers in the U.S. has increased over the years, their percentage of working engineers has changed hardly at all.

Electronic Dissemination

SRS data are available through the World Wide Web (<http://www.nsf.gov/sbe/srs/>). For more information about obtaining reports, contact pubs@nsf.gov or call (301) 947-2722. For NSF's Telephonic Device for the Deaf, dial (703) 306-0090.

NSF 99-327

HOW MUCH DOES THE U.S. RELY ON IMMIGRANT ENGINEERS?

As of April 1995, about 15 percent of working U.S. scientists, and 17 percent of working U.S. engineers, were non-native born.^{2,3} These percentages significantly exceeded the 10 percent of the total U.S. employed population aged 25 and older that was born abroad.⁴ This Issue Brief discusses further data on nativity of U.S. engineers, who make up almost 50 percent of the nation's science and engineering workforce (table 1).

As shown in table 2, the ratio of native-born to non-native-born engineers is the same—about five to one—across 10-year age groups. By contrast, increasingly large numbers of persons born abroad have become engineers in the United States over the decades. While these cross-sectional data reveal nothing about changes of individuals over time, they can be used to in-

¹Lawrence Burton is a senior analyst in the National Science Foundation's Division of Science Resources Studies; Jack Wang is a Research Associate at Westat, Inc.

²In this Issue Brief, data on engineers are from the 1995 system of surveys referred to as SESTAT, the Scientists and Engineers Statistical Data System of the Division of Science Resources Studies, NSF. SESTAT estimates, which are obtained from individuals who identify their occupations, may differ from estimates of the Bureau of Labor Statistics, which relies on employers to identify job classifications. In this Issue Brief,

- "non-native born" refers to survey respondents who did not identify themselves as native-born U.S. citizens;
- "engineers" are those people who identified their principal occupation as "engineer," some of whom are students;
- data refer to people who have obtained a baccalaureate or higher degree; and
- data are as of April, 1995; engineers who entered the U.S. after 1990, and did not obtain a degree in the U.S. between 1990 and 1995, are not covered in the data.

For further details on the population discussed and the surveys used to measure this population, see the Scientists and Engineers Statistical Data System (SESTAT) at <http://sestat.nsf.gov>.

³All comparisons made in the text of this Issue Brief are statistically significant at the .95 confidence level.

⁴U.S. Bureau of the Census, March 1995 Current Population Survey, table 1, Selected Characteristics of the Population by Citizenship: 1995, released April 1997, at <http://www.census.gov/population/socdemo/foreign/95/95tab-1.txt>.

fer changes about the population that have occurred over time. Even allowing for some switching by non-natives from engineering to other occupations, and for some emigration back to their native countries in older age groups, the data in table 2 suggest that, along with growth in the profession overall, the total number of U.S. engineers born abroad has increased sharply over recent decades. But the percentage of immigrant engineers was about the same when viewed across 10-year age groups of working engineers in 1995. In short, current data suggest that while the number of immigrant engineers in the U.S. has increased over the years, their percentage of working engineers has changed hardly at all.

Educational Background

Non-native-born engineers have attained higher levels of education than U.S.-born engineers: 12 percent of the former versus 4 percent of the latter have a doctorate. Reflecting these higher levels of academic cre-

Table 1. U.S. scientists and engineers, by occupation and percent non-native born: 1995

Occupation	Total	Non-native born (percent)
Total scientists and engineers....	3,186,000	15
Computer scientists.....	641,000	12
Mathematical scientists.....	87,000	16
Life scientists.....	305,000	16
Chemical and physical scientists.....	274,000	17
Social scientists.....	318,000	9
Engineers.....	1,560,000	17

NOTE: Totals for engineers and computer scientists differ from totals in other National Science Foundation/Division of Science Resources Studies publications; here, computer software engineers have been counted as engineers.

SOURCE: National Science Foundation/Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

How Much Does the U.S. Rely on Immigrant Engineers?—page 2

Table 2. U.S. engineers, by native-born status, employment sector, age, and highest degree: 1995

Characteristic	Total	Percent native-born	Percent non-native born
Total engineers ^a	1,560,000	83	17
Employment sector ^b			
Private industry.....	1,151,000	84	16
Academia.....	71,000	66	34
Government (all levels).....	199,000	84	16
Age			
Under 30.....	213,000	85	15
30-39.....	598,000	83	17
40-49.....	419,000	83	17
50-59.....	226,000	81	19
60 and over.....	105,000	85	15
Highest degree ^c			
Bachelor's.....	1,042,000	88	12
Master's.....	434,000	75	25
Doctorate.....	76,000	59	41

^aIncludes computer software engineers, who are counted as computer scientists in other National Science Foundation/Division of Science Resources Studies publications.

^bAbout 139,000 engineers worked in other sectors.

^cThe highest degrees of about 8,000 engineers did not fall into these categories.

SOURCE: National Science Foundation/Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995

In the past, higher percentages of immigrants who became engineers in the United States had finished their formal education abroad compared to more recent immigrant engineers.

dentials, non-native-born engineers comprise about one-third of the engineers working in the academic sector—twice the level of their representation overall.

Table 2 shows that immigrant engineers have more often gone on to obtain a master's or doctorate degree than their representation in the occupation of engineering would suggest. Table 3 displays the highest degree levels of non-native engineers by age. Overall, 53 percent of non-native versus 29 percent of native-born engineers have attained a postbaccalaureate degree. In all age groups including the youngest—many of whose members have not finished their education—non-native engineers have reached higher levels of education than their native-born colleagues.

Table 4 shows a sharp increase from older to younger groups in the percentage of engineers born abroad who earned their most recent or highest⁵ degree in the United States. This pattern suggests the speculation that younger immigrant

⁵Some engineers have not finished their formal education; thus, the degree referred to here is their most recent, not necessarily their last, degree.

engineers have taken a quite different route into U.S. engineering practice than their older colleagues: more often, they have come to the United States to obtain or finish their education and have subsequently become practicing engineers. In the past, larger percentages of immigrants who became engineers in the United States had finished their formal education abroad. The table also shows that the higher their degree level, the higher the proportion of immigrant engineers who earned that degree at a U.S. college or university.

Socioeconomic Background

Parental education has traditionally been used as one measure of an individual's socioeconomic background, and the relationships between parental levels of education and careers of their children have been analyzed in studies of intergenerational social mobility.⁶ NSF data reflect increasing levels of education throughout the general population both in the United States and abroad.

⁶See, e.g., Lipset, Seymour Martin, *Social Mobility in Industrial Society*. Berkeley: University of California Press, 1964, pp. 189-199.

How Much Does the U.S. Rely on Immigrant Engineers?—page 3

Table 3. U.S. engineers, by highest degree in any field, native-born status, and age: 1995

Age (percent)	Highest degree in any field ^a					
	Native born			Non-native born		
	Bachelor's	Master's	Doctorate	Bachelor's	Master's	Doctorate
Under 30.....	85	14	1	59	40	s ^b
30-39.....	73	24	3	46	41	13
40-49.....	66	30	4	44	42	14
50-59.....	61	33	6	47	40	13
60 and over.....	75	19	6	49	38	13
Total.....	71	25	4	47	41	12

^aThe highest degrees of about 8,000 engineers did not fit into these categories.

^bSuppressed due to small cell count.

SOURCE: National Science Foundation/Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

Table 4. Non-native-born U.S. engineers, by age, employment sector, highest degree, and percent earning their highest degree in the United States: 1995

Characteristic	Non-native-born U.S. engineers	Highest degree earned in U.S. (percent)
Total.....	267,000	77
Age		
Under 30.....	32,000	98
30 to 39.....	102,000	86
40 to 49.....	73,000	72
50 to 59.....	44,000	58
60 and over.....	16,000	54
Employment sector ^a		
Private industry.....	189,000	77
Academia.....	24,000	84
Government (all levels).....	32,000	78
Highest degree ^b		
Bachelor's.....	126,000	68
Master's.....	109,000	85
Doctorate.....	31,000	86

^a About 22,500 non-native-born engineers were employed in other sectors.

^b About 1,500 highest degrees did not fit into these categories.

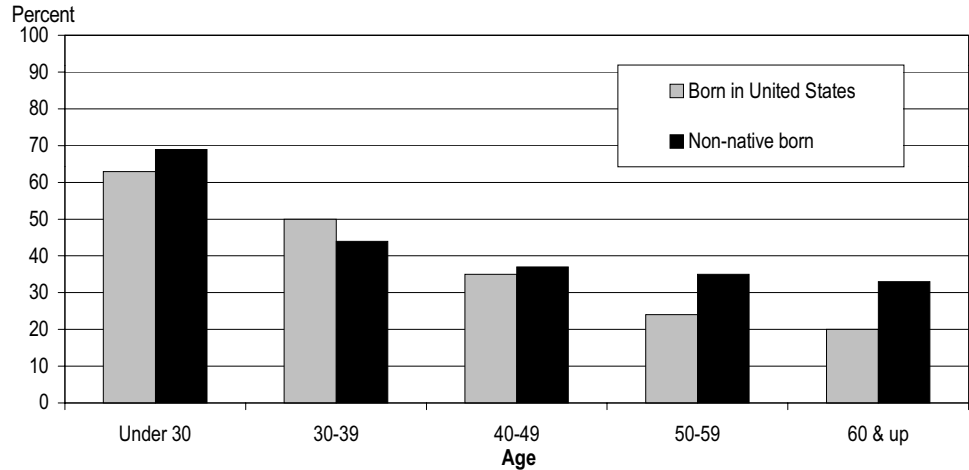
SOURCE: National Science Foundation/Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

Figure 1 shows that the parents of older engineers were much less likely than those of younger engineers to have obtained a college degree. Thus, among engineers 50 years and older, less than one-fourth of native-born engineers, and about one-third of non-native-born engineers, had at least one parent with a baccalaureate or higher degree. Sharp increases in parental education are evident in each younger cohort, especially among

the baby boomers aged 30-49. The percentage of native-born engineers in their 30s with at least one parent with a 4-year degree was twice as high as for those in their 50s. And in contrast to older engineers, native-born engineers in younger cohorts are about as likely as immigrant engineers to come from parents who have already attained the socioeconomic status that a 4-year degree brings.

How Much Does the U.S. Rely on Immigrant Engineers?—page 4

Figure 1. Percentage of U.S. engineers with at least one parent with a bachelor's or higher degree, by age and native-born status: 1995



SOURCE: National Science Foundation/Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

Summary

NSF data indicate that:

- The United States has relied on people born outside the country for its engineering workforce, but at about the same rate as the growth in the occupation of engineering as a whole.
- Younger immigrant engineers are more likely to have received their highest degree in the United States than their older immigrant colleagues.
- Immigrant engineers have more often obtained postbaccalaureate degrees than native-born engineers.
- Like native-born engineers, immigrant engineers have increasingly been born of a parent with a high educational level.

- Among younger cohorts of engineers, U.S.-born and non-native-born engineers had parents with more similar socioeconomic status; among older cohorts, non-native-born engineers more often came from a parent with a higher level of education.

Copies of reports related to the topic of this Issue Brief can be obtained from:

Lawrence Burton
Division of Science Resources Studies
National Science Foundation
4201 Wilson Boulevard, Suite 965
Arlington, VA 22230

703-306-1774 x6913
lburton@nsf.gov

NSF 99-327

BULK RATE
POSTAGE & FEES PAID
National Science Foundation
Permit No. G-69

NATIONAL SCIENCE FOUNDATION
 ARLINGTON, VA 22230
 OFFICIAL BUSINESS
 PENALTY FOR PRIVATE USE \$300
 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).