Foreign National Doctoral Students In U.S. Economics Programs

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Abstract

This paper examines why enrollment of foreign national students in U.S. economics graduate programs increased so dramatically since the 1960s. New information regarding the "stay rates" of foreign national students is examined. The paper concludes that growth in the number of foreign national economics graduate students was related to the quality of U.S. graduate programs, growth in foreign social science baccalaureate degree awards, growing foreign incomes, and movement of foreign economies towards markets. These trends were especially pronounced in Asia, where most foreign national economics students are from.

Introduction

The year 1993 marked a watershed for U.S. graduate education in economics: for the first time, over one-half of all Ph.D. awards were to temporary resident students.[1] When one includes permanent and temporary residents, as of 2001, almost six of every 10 U.S. economics doctorates were awarded to foreign-born students. These numbers have been increasing steadily since 1966, when 21 percent of economics doctorates were awarded to temporary resident students.

What accounts for this transformation in economics graduate education? With the exception of papers by Rao (1995) and Aslanbeigui and Montecino (1998, hereafter A&M) this topic has received scant attention. However, the Rao and A&M papers offer conflicting reasons for the growth in foreign national enrollments. Rao's basic thesis is that most foreign students seek U.S. residence; these students see a U.S. economics graduate degree as a means to a high-paying career in the U.S. Based upon survey data, A&M found that most foreign students indicated they enrolled in U.S. graduate programs because of the perceived high quality of the economics education; further, most foreign students did not plan to stay in the U.S. after graduation.

This purpose of this paper is to assess the validity of Rao and A&M papers based upon available data. A major contribution of this paper is that it offers new information regarding the "stay rates" (the proportion of foreign doctorates from U.S. universities that stayed in the Unites States after graduation for any reason) of foreign graduate students in economics and other selected science and engineering fields. High stay rates are consistent with Rao, lower stay rates consistent with A&M.

This paper is organized as follows. First, the Rao and A&M papers are discussed. This is followed by an assessment of theses papers in light of empirical evidence, including stay rates. The available evidence tends to support A&M more than Rao; it also appears that the growth in foreign national enrollments have reached their limit.

A Summary of Rao and A&M

Rao states that "the standard argument for the presence of foreign students in American Ph.D. programs is that the U.S. has a comparative advantage in graduate economic education" (p. 274). Rao rejects this "standard

[1] The most common definition of foreign students is "temporary residents" (i.e., temporary visa); permanent resident students are not considered "foreign."

argument" and suggests that the rise in foreign national economics Ph.D.s resulted mainly from four factors. First, Rao argues that many foreign students see a U.S. graduate degree as a means to a high-paying (relative to their home country) career in the U.S. Secondly, U.S. immigration laws give preferential treatment to applications by college and university teachers; thus, having a Ph.D. increases the chance of obtaining a permanent visa. Third, it is much easier for foreign graduate students to get financial assistance in economics (and the so-called "hard sciences") than in the humanities or professional school. Finally, Rao argues that the "best and brightest" U.S. students are opting for professional degrees leaving economics graduate programs to choose between "second tier U.S. talent" (Rao's words) and top foreign talent.

A&M surveyed approximately 2500 foreign students in U.S. doctoral programs in 1996 (it is not clear if the A&M sample was restricted to temporary residents or included permanent residents). The survey response was 22 percent (555 records). A&M collected data on student characteristics, reasons for U.S. graduate study, career interests and post-graduation plans, and perceptions regarding graduate economic education in the U.S. They found that most foreign students indicated they enrolled in U.S. graduate programs because of the high quality of the economics education; further, most foreign students did not plan to stay in the U.S. after graduation.

A&M speculated that the worldwide demand for U.S. graduate economics education is being driven by four factors. First, the economics profession has adopted English as its "lingua franca." Second, the abstract nature of economics allows it to be transferable to different cultures. Third, there is a sort of "intellectual chain migration" where U.S.-trained economists that return to their home country are providing a base for recruitment and admission of additional foreign students in U.S. programs. Finally, there is a worldwide trend to pattern economics programs after the U.S. model. In sum, the A&M survey found evidence largely rejecting Rao's model and supporting the "standard argument:" foreign students matriculate in U.S. programs because these programs have the most to offer.

Foreign National Economics Doctorates: The Evidence

Stay Rates. Rao argued that one of the major forces causing increased foreign student involvement in economics graduate programs is the desire for academic employment in United States; this is the central thesis of his paper. To obtain this, a Ph.D. from a U.S. institution is required. As evidence, Rao cites data (Ries and Thurgood 1993) indicating that over 60 percent of foreign graduate students remain in the United States after receipt of their Ph.D.s (Rao, p. 274). A&M's survey indicated that most foreign national students planned to return home upon graduation.

Neither Rao nor A&M had information on the stay rate of economics Ph.D. recipients after graduation. Both constructed their estimates from intentions stated at, or prior to, graduation. Rao used an estimate from a survey which has an excellent response rate, but which applied to all scientists and engineers, not specifically to economics doctorate recipients. A&M focused on economics doctoral students, but their survey had only a 22 percent response rate. However, even with a good response rate, estimates of the stated intentions of foreign students are inferior to estimates of actual stay rates. Stated intentions are not necessarily good predictors of student's subsequent behavior. People change their minds and are sometimes unable to find jobs in their preferred locations. Also, some foreign students may see this is as sensitive topic (they may have promised to return home) and are unlikely to be completely candid.

We solve these problems by estimating actual stay rates one to five years after graduation. These estimates are calculated by a simple but accurate method: information from tax authorities on the proportion of foreign national degree recipients that paid social security or income taxes to the U.S. government in years following their graduation (please see the appendix for a detailed discussion of the method). These estimates are superior for several reasons. There is no sampling error because we inquired about the behavior of all foreign citizens receiving economics doctorates in 1994, 1995, and 1997. There is small margin of error in our estimates because only 93 percent of the economics foreign national doctorate recipients reported valid social security numbers, and we had to make assumptions about the behavior of the others. Because we did not interview doctoral recipients, our estimates do not require candid responses.

Table 1 shows stay rates for temporary residents receiving doctorates in 1997. Two years later 63 percent of all science and engineering Ph.D.s were in the United States. However, economics doctorate recipients had stay rates of only 34 percent, slightly less than the stay rate of the other social sciences and far less than most of the natural science and engineering fields.

Table 1. Temporary Residents Receiving Doctorates from U.S. Universities in 1997 Who Were in the U.S. in 1998 or 1999, by Degree Field

Degree Field	Number of 1997 Doctorate Recipients	Percent in the U.S. 1998	Percent in the U.S. 1999
Physical Sciences	1232	74	73
Mathematics	416	68	66
Computer Science	315	74	73
Agricultural Science	351	48	46
Life Sciences	1283	71	69
Computer/EE Engineering	649	82	81
Other Engineering	1746	63	60
Economics	449	35	34
Other Social Sciences	500	39	37
Total	6941	65	63

Source: Authors' estimates

The finding of low stay rates for economists is not unique to this cohort. Table 2 shows 1999 stay rates for temporary residents who received doctorates in 1994 or 1995. In these cohorts the stay rate for temporary residents receiving economics doctorates was only 26 percent, only about half of the stay rate for all scientists and engineers.

Table 2. Temporary Residents Receiving Doctorates from U.S. Universities in 1994–95 Who Were in the U.S. 1996 to 1999, by Degree Field

Degree Field	Number of 1994–95 Doctorate Recipients	Percent in the U.S. 1996	1997	1998	1999
Physical Sciences	2347	64	59	59	58
Mathematics	817	50	50	47	46
Computer Science	699	62	63	63	63
Agricultural Science	813	38	36	36	35
Life Sciences	2091	56	53	52	52
Computer/EE Engineering	1365	63	63	63	62
Other Engineering	3666	55	54	54	56
Economics	975	27	27	27	26
Other Social Sciences	1219	32	31	30	29
Total	13992	53	51	51	51

Source: Authors' estimates

The stay rates in Tables 1 and 2 reflect only doctorate recipients who have temporary resident status at the time of graduation. (Student visas are temporary and so are exchange visas sometimes used by students sponsored by a government.) Stay rates are somewhat higher for all foreign nationals receiving doctorates from U.S. universities because those on permanent resident visas at graduation have much higher stay rates than those on temporary visas. Table 3 shows that stay rates for doctoral recipients in economics with permanent resident visas at graduation was 71 or 73 percent, depending on the cohort.

Table 3. Foreign Nationals Receiving Economic Doctorates from U.S. Universities Who Were in the United States in 1999, by Visa Status at Graduation

	Number of Doctorate Recipients	Percent in the U.S.
1994–95 grads in 1999		
temporary visa	975	26
permanent visa	257	73
total, temp. and perm. visas	1,232	36
1997 grads in 1999		
temporary visa	449	34
permanent visa	103	71
total, temp. and perm. visas	552	41

Source: Author's estimates

Some persons came to the United States and received permanent resident status (including the right to work) before enrolling in a graduate program. They shouldn't be viewed as foreign students for purposes of evaluating Rao's hypothesis that foreign students in economics come here to get a Ph.D. so that they can stay. These students could stay without enrolling in a graduate program. However, students who came here on temporary visas and obtained a permanent visa while they were graduate students probably should be viewed as foreign students for purposes of evaluating Rao's hypothesis. If it were true that all permanent residents receiving Ph.D.s had come to the United States for the express purpose of obtaining Ph.D.s, it would be appropriate to use the total stay rates in Table 3. In 1999, this rate was 36 percent for the 1994 and 1995 degree recipients and 41 percent for the 1997 cohorts. A weighted average of these rates is 38.5 percent. However, since we know that at least some of those on permanent resident visas at graduation came to the United States for other reasons and acquired permanent resident status prior to their graduate school enrollment, 38.5 percent is the upper bound on the 1999 stay rate. If we were able to appropriately adjust this rate for those acquiring permanent resident status before graduate school, then the rate would be lower.

In summary, our actual stay rate estimates and the A&M finding that 85 percent of economics foreign national students planned to eventually leave the U.S. (A&M, p. 178) provide strong evidence inconsistent with Rao's main hypothesis. These stay rates are less than half of Rao's estimates and indicate that most temporary resident foreign students return home after graduation.

Foreign National Academic Employment. Rao argues that most foreign national graduate students seek academic positions and would therefore predict a relatively high percentage of foreign national economists in academic positions. However, 1999 data on recent doctorate recipients from the National Science Foundation Survey of Doctorate Recipients indicates that only about half (50.3 percent) of non-citizen Ph.D. economists were employed in the educational sector, compared to 49.1 percent of citizens.[2] Further, the A&M survey of intentions indicated that 62 percent of foreign national students surveyed were "highly interested" in an academic career; this is

[2] These data were calculated from the SESTAT data base on the National Science Foundation Web site.

Chart 1. Economics Ph.D. Awards by Citizenship

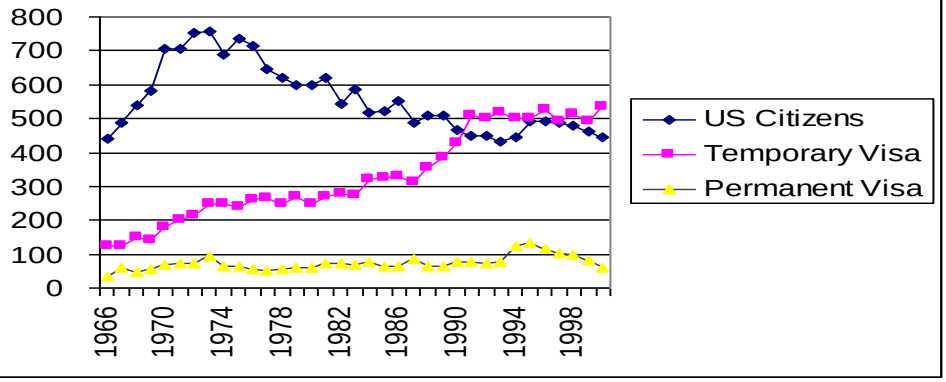


Chart 2. Economics Graduate Student Support

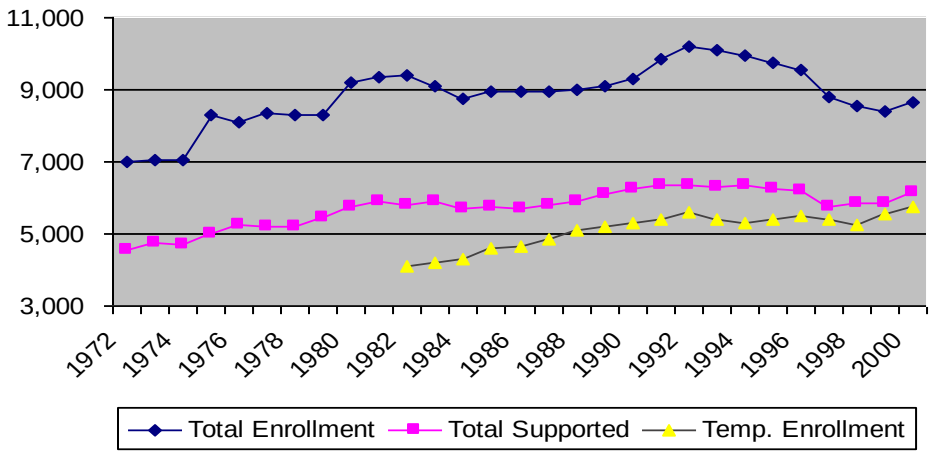
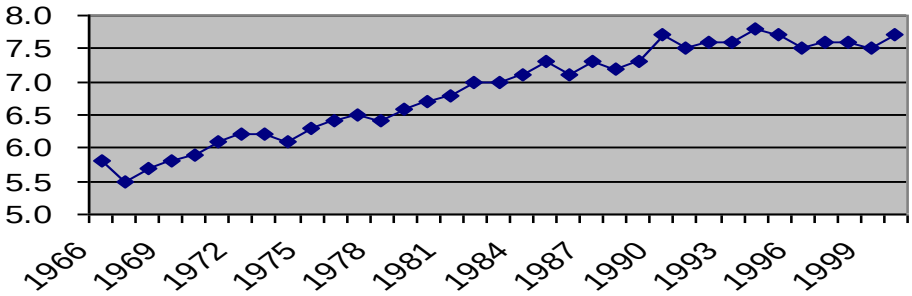


Chart 3. Mean Years Enrolled: Economics Ph.D.



less than the 69 percent who were "highly interested" in a career in a research institution (p. 177). These data do not support Rao's hypothesis.

Table 4. 1989 Employment Characteristics of Economics Bachelor's Recipients by Highest Degrees

	Highest Degree		
	Law	MBA	Economics Ph.D.
FT Employment	48298	51766	14224
Mean Age	42.7	40.4	45.0
Mean Weekly Hours	47.6	47.5	48.7
Median Earnings:			
All Sectors	$67,200	$57,000	$60,783
Non-Academic Sectors	$72,000	$59,025	$67,000
Median Earnings Age 35 to 44:			
All Sectors	$90,000	$63,000	$60,000
Non-Academic Sectors	$90,000	$68,000	$70,000

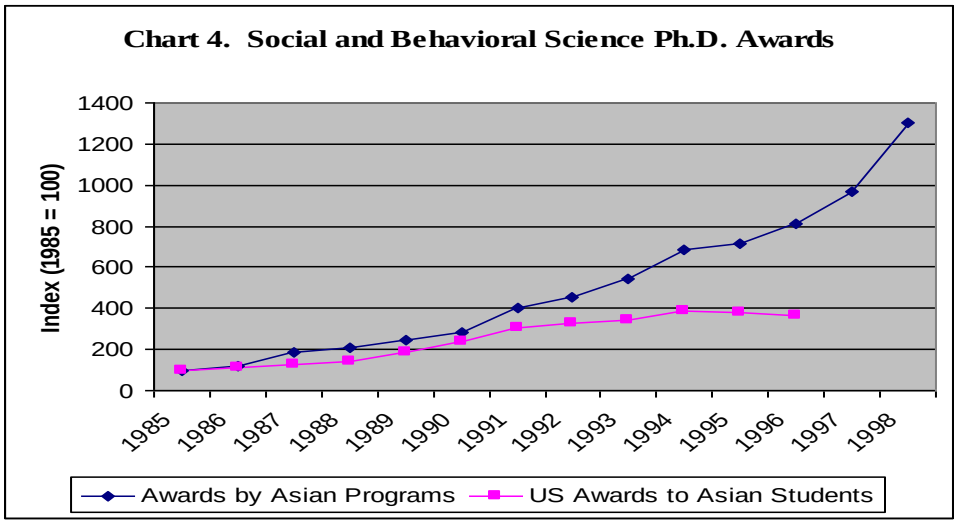
Source: 1993 National Survey of College Graduates.

Table 5. Professional Degree Awards to Non-Residents, 1977–2000

	Law Degrees			Masters in Business		
Year	Total	Non-Resident	Percent	Total	Non-Resident	Percent
1977	34,363	158	0.5%	46,650	3,783	8.1%
1979	35,387	133	0.4%	50,646	4,401	8.7%
1981	36,500	116	0.3%	58,192	5,052	8.7%
1985	37,655	144	0.4%	68,456	6,026	8.8%
1987	36,202	173	0.5%	68,447	7,086	10.4%
1989	35,795	209	0.6%	74,029	7,737	10.5%
1990	36,648	257	0.7%	78,157	8,083	10.3%
1991	38,325	295	0.8%	79,676	8,932	11.2%
1992	39,230	259	0.7%	85,680	9,824	11.5%
1993	40,719	323	0.8%	90,707	12,012	13.2%
1994	40,353	271	0.7%	94,664	13,260	14.0%
1995	39,719	344	0.9%	94,629	14,375	15.2%
1996	40,191	387	1.0%	95,158	14,302	15.0%
1997	40,360	413	1.0%	98,226	14,604	14.9%
1998	39,415	397	1.0%	102,718	16,287	15.9%
2000	37,629	463	1.2%	112,217	17,094	15.2%

Source: National Center for Education Statistics.

Time-to-Degree. Average time to complete an economics doctorate has been increasing over the past few decades, from 5.8 years in 1966 to 7.7 years in 2000 (Chart 3).[3] Rao speculates that foreign national students have above average time-to-degree, and therefore have contributed to this increase.



Rao argues that foreign nationals should have longer time-to-degree than U.S. students for several reasons. The opportunity cost of foreign students is lower than U.S. students (most foreign nationals are from low-wage countries). Foreign nationals can legally reside in the U.S. as long as they are full-time students, thus foreign national students have an additional incentive to stay in a graduate program over likeminded U.S. students. Finally, Rao argues that foreign national students must leave the U.S upon completion of their doctorate unless they have employment. This creates an incentive to delay degree completion until a U.S. position is obtained.

There is a problem with Rao's model: available evidence indicates that foreign nationals do not have longer time-to-degree in economics; in fact, they have substantially shorter time-to-degree. In a 1997 article, Espenshade and Rodriquez examined the comparative performances of U.S. and temporary resident graduate students by fitting a hazard model to approximately 35,000 students (6,617 in economics) who started graduate school in the arts and sciences between 1962 and 1986. The mean Ph.D. completion time for temporary resident students was 6.1 years compared to 7.2 for all others. This result held when Espenshade and Rodriquez controlled for factors such as institution, field of study, class size, and gender. The authors concluded that "foreign students do not lower the average effectiveness of graduate education, if effectiveness is measured in terms of the proportion of entry cohorts that eventually receive their Ph.D.s and how many years of study are needed to earn the degree" (p. 593).

U.S. Graduate Student "Brain Drain." Rao argues that the "best and brightest" U.S. students opting for professional school, forcing economics graduate programs to turn to foreign national students in order to maintain quality. This "brain drain" issue has received considerable attention, but the data supporting it are largely anecdotal or limited.

Zumeta and Babco (1999) did find a decline in high-scoring U.S. graduate students, but little evidence that graduate departments turned to foreign national students to fill the void. Hartnett (1987) examined the same issue with SAT and ACT data for the period 1976–81 and found similar results: there was a decline in test scores for

[3] These data are mean enrolled years to complete a doctorate. See the National Science Foundation Survey of Earned Doctorates, available on the WebCASPAR data base.

those entering graduate school in the arts and sciences as well as for those entering professional school. Ehrenberg (1999) cited data showing a decline in economics bachelor's graduates from selective colleges who planned graduate study in economics (1999, p. 137). Data from the Association of American Universities and the Association of Graduate Schools Project for Research on Doctoral Education indicates that GRE scores of domestic economics graduate students increased from 1991 to 1997 (AAU/AGS Project, 1991 and 1997). However, these data are of questionable quality.[4]

Professional School Enrollment. Rao argues that foreign national students are attracted to economics because most graduate economics students receive support and permanent visas are easier to obtain for academic employment. However, data on professional degree awards in master's in business and law indicate that foreign national student enrollment has been increasing at a faster rate than economics enrollment. For the period 1977–2000, law degree awards to non-resident students increased from 158 to 463 (193 percent); master's in business increased from 3,783 to 17,094 (351 percent). This compares to an increase in non-resident economics Ph.D.s of 101 percent during the same period. While percents of non-resident degree awards in law (1.2 percent) and master's in business (15.2 percent) in the year 2000 are small compared to economics doctoral degrees (51.6 percent), the absolute number of non-resident degrees in law (463) is similar to non-resident economics Ph.D. awards (536); both of these are dwarfed by non-resident master's in business awards (17,094). One explanation for this is that, contrary to Rao's hypothesis, many non-resident students can afford to pay for professional school.

Discussion

It seems clear that Rao's hypothesis that non-resident enrollment is driven by demand for U.S. academic employment can be rejected, although it is possible that students came here for Raovian reasons and changed their mind. The evidence is more consistent with A&M' survey: non-residents are attracted to U.S. graduate programs because of their perceived quality.

What then explains the growth in non-resident enrollments and degrees? These are some possible hypotheses that require further research.

Rising Incomes. If one assumes that higher education is a normal good, higher foreign incomes would translate into increased demand at both the baccalaureate and graduate level. Incomes in much of the world were increasing, particularly in Asian economies.[5] For example, China's real GDP quadrupled from 1978 to 2000. Data (National Science Board 2002, table 2-33) on social science bachelor's degree awards support this: from 1975 to 1998, Asian social science degree awards grew from 137,245 to 295,556 (115 percent increase) compared to U.S. social science degree award growth from 163,147 to 185,263 (14 percent growth). Data on the number of social and behavioral science doctorates awarded by Asian universities show even more remarkable growth, increasing from just 66 in 1985 to 860 in 1998, a 13-fold increase (National Science Board 2002, table 2-39). This compares to social and behavioral science doctorate awards by U.S. universities to Asian foreign national students growing from 216 to 790 from 1985 to 1996 (NSF 1998, appendix B). When viewed in this context, social and behavioral science Ph.D. awards to Asian students worldwide have been growing dramatically over the past two decades; those awarded by U.S. universities are simply a part of this larger phenomenon. Growing foreign incomes also increased the attractiveness of employment in one's home country relative to the U.S.[6] The growth in foreign incomes is also consistent with the dramatic increases in non-resident students in U.S. professional programs.

Market-Based Economies. During the period of increasing foreign national enrollment there has been a movement toward market-based economic systems in many foreign countries, in particular the breakup of the

[4] The number of programs reporting fell by almost half between 1991 (40 programs) and 1997 (21 programs). Also, some of the 21 programs reporting in 1997 had not reported in 1991. In addition, an unknown number of the programs reporting were unable to provide GRE data.

[5] According to Rao (1995), 72 percent of foreign graduate students are from Asia (p. 274).

[6] See for example, "India's Brightest Technology Graduates Begin to Staunch the Brain Drain" (Lloyd, 1998).

eastern bloc and the wave of market reforms in Asia. As a result, training in market economics became more valuable. The A&M survey asked non-resident graduate students why a U.S. doctoral degree was valued in their home country. While the dominant response (70 percent) was "improving the quality of economic research," other reasons were "rationality in public policy" (35 percent), and "market-related reforms" (30 percent).

Globalization. Foreign countries are becoming more inter-related with the major market economies of the world; training in market economics is therefore of value regardless of the nature of the home country economic system. The A&M survey found "integration into the global economy" was a reason given for pursuing a U.S. economics degree by 29 percent of the respondents. This increased globalization is also consistent with growth in non-resident students in U.S. MBA programs and law schools.

In summary, a possible reason that the demand for U.S. economics graduate education has grown is that the rest of the world is becoming like the West in terms of both increasing incomes and market-based economies. Foreign students come to the U.S. because graduate training here allows them to return home to a rewarding career. This explanation is also consistent with the growing enrollment of foreign students in U.S. professional programs. This explanation is also consistent with the shorter time-to-degree of foreign students. These hypotheses await further testing.

References

1. Aslanbeigui, Nahid and Veronica Montecinos. 1998. "Foreign Students in U.S. Doctoral Programs." *Journal of Economic Perspectives* 12 (Summer 1998): 171–182.
2. Association of American Universities-Association of Graduate Schools. "AAU/AGS Project for Research on Doctoral Education Report Series." Princeton, NJ: Educational Testing Service, 1991 and 1997. www.tulane.edu/~aau/agsindex.html
3. Baker, Joe G. 2002. "Employment Characteristics of Economics Bachelor's Degree Recipients." Paper given at the 2002 Western Economics Association Meetings, Seattle WA.
4. College and University Professional Association. Various years. *National Faculty Salary Survey*.
5. Ehrenberg, Ronald G. 1999. "The Changing Distributions of New Ph.D. Economists and Their Employment: Implications for the Future." *Journal of Economic Perspectives* 13 (Summer 1999): 135-138.
6. Ehrenberg, Ronald G. and Pangiotis G. Mavros. 1995. "Do Doctoral Students' Financial Support Patterns Affect Their Time-to-Degree and Completion Rates?" *Journal of Human Resources* 30 (Spring 1995): 581–610.
7. Ehrenberg, Ronald G. 1992. "The Flow of New Doctorates." *Journal of Economic Literature* 30 (June 1992): 830–875.
8. Espanshade, Thomas J. and German Rodriquez. 1997. "Completing the Ph.D.: Comparative Performances of U.S. and Foreign Students." *Social Science Quarterly* 78 (June 1997): 593–605.
9. Finn, Michael G. 2001. "Stay Rates of Foreign Doctorate Recipients from U.S. Universities, 1999." Oak Ridge, TN: Oak Ridge Institute for Science and Education.
10. Hartnett, Rodney T. 1987. "Has there been a Graduate Student 'Brain Drain' in the Arts and Sciences?" *Journal of Higher Education* 58 (September/October): 562–85.
11. Hilsenrath, Jon E. 2001. "In Hot Pursuit of Economics Ph.D.s." *Wall Street Journal*, February 20, 2001: p. B1.
12. Lloyd, Marion. 1998. "India's Brightest Technology Graduates Begin to Staunch the Brain Drain." *Chronicle of Higher Education* 44 (July 17): A57–A58.
13. National Science Board. 2002. *Science and Engineering Indicators – 2002*. Arlington, VA: National Science Foundation, 2002 (NSB–02–1).
14. National Science Foundation, Division of Science Resources Studies. 1998. *Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plans to Stay in the United States*. Arlington, VA: National Science Foundation, 1998 (NSF 99–304).
15. Rao, Milind. 1995. Foreign Students and Graduate Economic Education in the United States. *Journal of Economic Education* 26 (Summer): 274–81.

16. Ries, P. and D.H. Thurgood. 1993. *Summary Report 1991: Doctorate recipients from United States universities.* Washington, D.C.: National Academy Press.
17. Siegfried, John J. and Wendy A. Stock. 1999. "The Labor Market for New Ph.D. Economists." *Journal of Economic Perspectives* 13 (Summer): pp. 115–134.
18. Wilson, Robin. 1999. "A University Uses Quotas to Limit and Diversify Its Graduate Enrollments." *Chronicle of Higher Education*: 45 (May 14): A15–A16.
19. Zumeta, William and Eleanor Babco. 1999. "Best and Brightest Part Two: Are Sciences and Engineering Graduate Programs Still Attracting the Best Students?" Report to the Alfred P. Sloan Foundation. New York: Alfred P. Sloan Foundation.

Notes