

Attracting Talent

Location Choices of Foreign-Born PhDs in the US



In brief

- Graduates of science and engineering (S&E) are key for the production of knowledge in an economy, contributing to innovation and the productive potential of an economy.
- Previously, the share of S&E PhDs graduating from the US was 47% in 1975. This fell to 25% by 2004, reflecting the internationalization of higher education. Furthermore, the share of US S&E PhDs who are foreign-born has increased to 53%, up from 21% in 1960; the majority of this increase has come from low and middle-income countries.
- Despite the increase in the share of foreign-born PhD students in the US, the percentage of students who remained in the US after completing their degrees fell in the 2000s.
- This research examines the post-degree location choices of foreign-born PhD students at US universities.
- Foreign students are more likely to stay in the US if they have stronger US ties, or if they have a stronger academic ability. They are also more likely to stay in the US if in recent years the US economy has had strong GDP growth, their birth country has had weak GDP growth, or their birth country has had recent natural disasters.
- They are less likely to stay in the US if they are from countries with higher average GDP levels or their birth country develops more, suggesting a potential virtuous cycle whereby returning students enhance prospects for economic growth, hence, raising attractiveness for return.
- There is a positive selection in migration location choices, and selectivity is pro-cyclical.

The Internationalization of Higher Education

In the global competition for talent, workers trained in science and engineering have great allure. They are key inputs in the production of knowledge, with graduates in S&E fields patenting at much higher rates than graduates in other fields, thereby enhancing a country's potential for economic growth. During the last half century, obtaining an advanced degree in science and engineering, especially for individuals from low-income regions, often meant studying in the United States, the country which has produced more S&E doctorates than any other. In 1975, the share of science and engineering PhDs graduating from US universities was 47% of the total among students from major Asian nations and advanced European economies. While this share fell to 25% in 2004, reflecting a broader internationalization of higher education, the United States remains a major location for S&E training.

“While the two-year “stay rate” for foreign-born PhDs rose in the 1990s, it fell over the 2000s”

The population of students pursuing S&E PhDs has globalized, making it common for individuals to study in one country and to work in another. In 2007, students born outside the United States accounted for 53% of US PhDs awarded in S&E fields, up from 21% in 1960. Growth in the foreign-born share of US PhDs has come entirely from low and middle-income countries. Many of these countries are now growing at much faster rates than the United States. Students from emerging and frontier economies who go abroad for advanced training may find it increasingly attractive to return home after completing their degrees. For the 2005 cohort of US PhDs, 67% of foreign-born doctorates were working in the United States two years after graduation. While the two-year “stay rate” for foreign-born PhDs rose in the 1990s, it fell over the 2000s.

Results

In our research, we examine the post-degree location choices of foreign-born students receiving PhDs from US universities. Data are from the NSF Survey of Earned Doctorates (SED), which contains information on the characteristics of all individuals receiving a PhD from a US university over the period 1958 to 2008. The SED asks individuals if they plan to stay in the United States after completing their degree. Over the sample period, 77% of foreign-born S&E PhDs state that they plan to stay in the US, signalling intent, and 43% plan to stay and have made a commitment or signed a contract with an employer, signalling intent plus success in finding a job. We consider both outcomes, as well as the selection of foreign-born PhDs into broad sectors of employment (academia, private sector, public sector).

“43% plan to stay and have made a commitment or signed a contract with an employer”

Combining the SED with data on economic conditions in the birth country of foreign students, we examine how location choices relate to student ability and to economic conditions in the US and in the birth country. The foreign students more likely to stay in the United States are those with stronger US ties, measured in terms of having a permanent residence visa or completed their BA degree at a US college or university, and stronger academic ability, measured in terms of parental educational attainment, the student's success in obtaining graduate fellowships or scholarships, and the rank of the student's university and department. Foreign students staying in the United States therefore appear to be positively selected in

terms of ability. These results are stronger for the joint outcome of intending to stay and having obtained a job, reinforcing the interpretation of positive selection.

“We also find that foreign students are more likely to stay in the United States if in recent years the US economy has had strong GDP growth”

We also find that foreign students are more likely to stay in the United States if in recent years the US economy has had strong GDP growth, their birth country has had weak GDP growth, or their birth country has had recent natural disasters. Foreign students are less likely to remain in the US if they are from countries with higher average GDP levels. For a developing country, its students studying abroad are less likely to stay in the US, the more developed the country becomes. Our findings suggest that there is potential for a virtuous cycle in education and innovation, with returning S&E PhDs increasing innovation in the home country, thereby enhancing prospects for economic growth and raising the attractiveness of the home country as a location for future PhD recipients.

Positive Selection and Procyclicality

Our work helps push the analysis of international migration in developing countries to realm of very highly skilled labor. Previous research suggests that emigrants from poor countries are positively selected in terms of schooling and that more-educated migrants favor destination countries that reward skill more heavily. Our work shows that there is positive selection in migrant location choices even among the most highly educated individuals and that selectivity is pro-cyclical. We know that top scientists are relatively likely to launch high-technology companies. The countries that attract more able PhD recipients may therefore enjoy a larger boost to innovation.

“The tendency of the most able PhDs to remain in the United States may in part explain the positive impact of high-skilled immigration on patenting”

Other recent research examines the impact of high-skilled immigration on economic outcomes in sending and receiving countries. Greater opportunities for high-skilled emigration in low-income countries may increase incentives for educational attainment sufficiently to offset the human capital lost to labor outflows. Further, flows of students to the US for PhD training may improve the quality of higher education in sending countries, further enhancing local human-capital accumulation. Our work indicates that the increase in incentives for educational attainment in low-income countries may be strongest among the most able, which enhances the quality of local human capital, but also that the highly talented who do succeed in going abroad for advanced training are the least likely to return home, at least immediately following their education. In the United States, regions that attract more high-skilled immigrants produce larger numbers of S&E patents. The tendency of the most able PhDs to remain in the United States may in part explain the positive impact of high-skilled immigration on patenting, given the proclivity on these individuals for innovation. These location patterns also imply that poor countries sending students to the US for advanced S&E training may see those with the greatest innovative potential choose not to return home. 2

About the authors

Jeff Grogger is the Irving Harris Professor in Urban Policy at Chicago Harris, has authored dozens of scholarly articles focusing on problems of low-income populations. An applied microeconomist, he has worked on issues including crime, education, migration, and various aspects of racial inequality. He is a leading authority on social insurance programs and on US welfare reform. Grogger received a PhD in economics from the University of California, San Diego. Before joining Chicago Harris, he taught at the University of California, Los Angeles and the University of California, Santa Barbara. He has served a co-editor of the *Journal of Human Resources*, as Chair of the National Longitudinal Surveys Technical Review Committee, as a research associate for the National Bureau of Economic Research, and as a research fellow with the Institute for the Study of Labor.

Gordon Hanson is the Director of the Center on Pacific Economies and is a professor of economics at UC San Diego. Hanson is a research associate at the NBER and co-editor of the *Journal of Development Economics*. He is also a member of the Council on Foreign Relations and a senior research fellow at the Bureau for Research and Economic Analysis of Development. He received his Ph.D. from MIT in 1992. Hanson has published on the international migration of skilled labour, the economics of illegal immigration, the relationship between business cycles and global outsourcing, and international trade in motion pictures. In recent work, he has studied the impact of trade and immigration on wages, the origins of political opposition to immigration, and the implications of China's growth for the export performance of Mexico and other developing countries.

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