

Student Visa Policy and the Scientific Workforce

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Students from around the world come to the U.S. to enroll in colleges and universities at the undergraduate and graduate levels. In the fall of 2015, about 983,000 students from abroad enrolled in U.S. colleges and universities, with 58% at the undergraduate level, up from 305,000 students in 1980 (Figure 1). Many of the students from abroad enrolling at U.S. colleges and universities enter on F-1 student visas, with 644,233 new F-1 visas awarded in 2015. Foreign students who study at U.S. institutions may expand the supply of skilled workers to the U.S. economy particularly in science and engineering fields, ultimately affecting productivity and innovation. Foreign students may also affect both educational and labor market outcomes for natives, with the signs and magnitudes of such effects potentially differing across programs of study and level of degrees.

This research report describes how student visas are used as a path to skill acquisition at U.S. universities, documenting recent trends in source countries, degree programs, and the distribution of students among institutions.

The major empirical points include:

- *Overall Enrollment and Degrees:* “Internationalization” and the flow of students across borders is not a new phenomenon in higher education, but the scale of foreign student enrollment has increased dramatically. While foreign undergraduates are a modest share of total U.S. undergraduate enrollment (3.3% in our sample of 4-year public and private non-profit institutions), while foreign graduate students are a large share of U.S. graduate enrollment, particularly in advanced scientific fields. According to the National Science Foundation’s (NSF) Survey of Earned Doctorates data, 27% of all doctorate degrees and 34% of science and engineering doctorate degrees awarded in 2013 went to temporary visa holders. Data at the country level make clear that the trajectories of graduate and undergraduate enrollment growth differ markedly (Figure 2). While the average annual growth rate of foreign graduate enrollment exceeded the growth rate of undergraduate enrollment in the 25 years from 1980 to 2005, since 2005 undergraduate enrollment has grown at annual pace of 4.6% compared to 2.5% for graduate enrollment. Countries from which there has been dramatic growth in undergraduate enrollment in recent years include China, Saudi Arabia, India and South Korea. In academic year 2013-14, these four countries accounted for more than 50% of undergraduate enrollment of foreign students. China alone is particularly noteworthy: with 110,550 (30%) of the 370,724 undergraduate students enrolled in 2013-14, the expansion in enrollment of undergraduate students from China from just 8034 students in 2003-04 accounts for 90% of the increase in foreign undergraduate over this decade.
- *Choice of Institution of Foreign Students in the U.S.:* Within the U.S., there are substantial differences among colleges and universities in institutional resources, college selectivity, curricular focus and institutional scale. At each degree level, foreign students are more likely than their domestic counterparts to be represented at the most research

intensive universities in the U.S. At the undergraduate level, public research universities draw more than a quarter (28.6%) of foreign students and 18.3% of domestic students, while the AAU institutions (which are generally the most resource-intensive institutions) draw the vast majority of these students. Indeed, it is this sector which has experienced the greatest expansion in students since 2005. Among the institutions drawing the largest numbers of foreign undergraduates are large public research universities including Michigan State, Purdue, and University of Illinois-Urbana Champaign. While selective private research universities and private liberal arts colleges also have relatively large shares of foreign students, these institutions tend to be smaller in scale than their public counterparts. There are substantial differences across countries in the distribution of students among U.S. colleges and universities. Students from China, where there is a relatively limited supply of resource-institutions, attend a wider variety of U.S. colleges and universities than students from Western European countries, which have a number of universities that are at least as strong as the top-public universities in the U.S.

- *Patterns of Field of Study among Foreign Students Study in the U.S.* Among students from abroad, fields of study differ markedly from domestic counterparts with foreign students much more likely to pursue STEM degrees. At the undergraduate level, foreign students are much more likely to pursue degrees in engineering (10.1% foreign versus 4.6% for natives), math (1.6% versus 0.9%), computer science (1% versus 0.7%) economics (5.6% versus 1.5%) and business (1.9% versus 1.3%). In turn, foreign students tend to be underrepresented among those concentrating in education (1.8% versus 6.1%) and many of the humanities such as English (1% versus 2.5%), history (0.4% versus 2%) and other social sciences like politics (1.3% versus 2.3%). Using data at the country level from F visa recipients, it is evident that there are also large differences in major choice by country. Students from China are particularly concentrated in math (4.3%) and economics (9% versus 1.5% for natives); students from India are overrepresented in engineering (26% versus 4.6% for natives); and students from the Middle East appear to concentrate in engineering and computer science. At the doctorate level, the concentration of students from abroad in STEM fields is yet more striking. While foreign students (temporary residents) represent about 27% of all doctorate recipients in 2013, they are more than half of doctorate recipients in some scientific fields including computer science, math and economics.

The terms of student visa policies impact the scientific workforce in the U.S. There are opportunities to improve functioning of the student visa program and better understand of the link between student visa policy and the productivity of the scientific workforce. There are a number of challenges -- largely related to the availability of data -- that limit how social science evidence can inform policy related to student visas and the scientific workforce. While this analysis produced some descriptive insights from data currently in the public domain and available from FOIA requests, what is known about the transition from higher education institutions to the labor market is limited by the absence of data resources. Most important for future work is linked administrative data which would connect the resources of SEVIS to

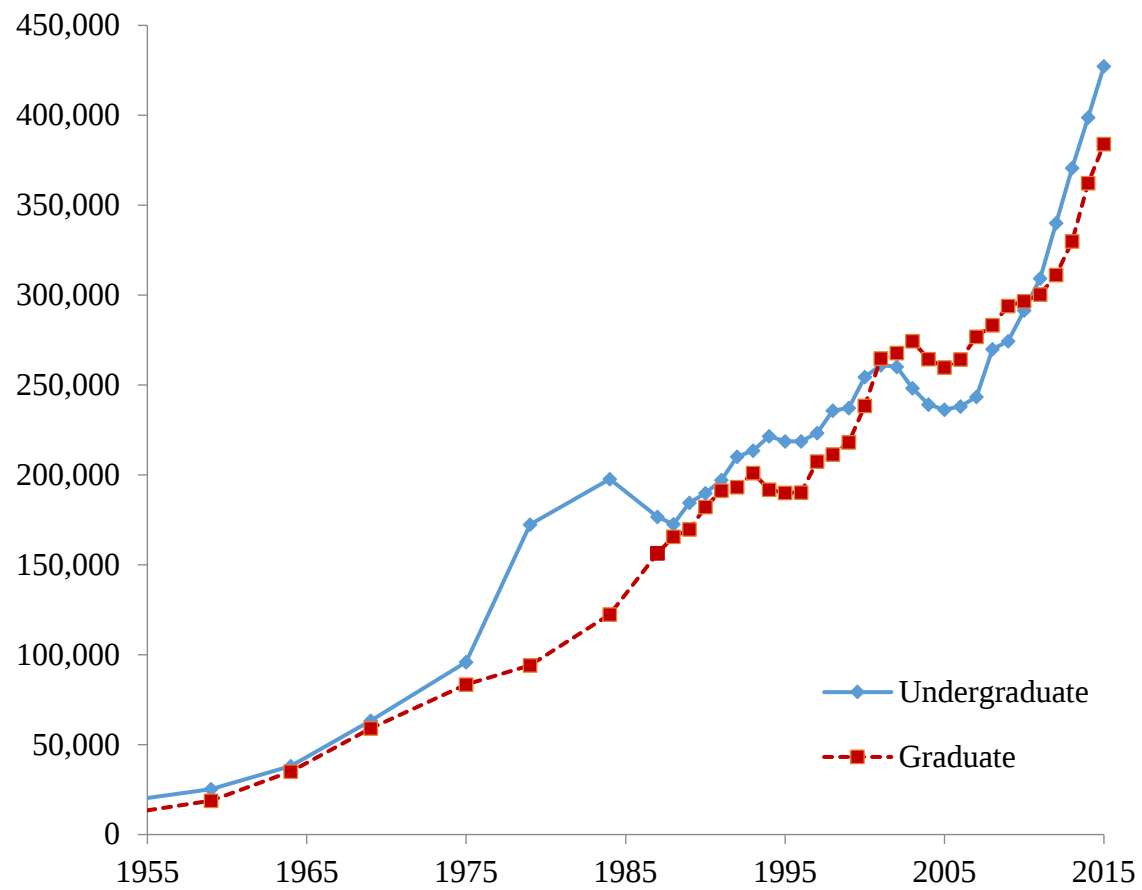
employment visas like the H-1B are an important first step. In addition, it would be ideal to align immigration data aligned with IRS and SSA data and available for restricted use by researchers.

As a matter of research and policy design, more effort needs to be devoted to understanding and improving the articulation between student visa programs and employment visa programs as the current provisions may discourage enrollment and persistence among those students with skills most valuable in the U.S. economy. Not only does the transition from "student" to "work" status lacks well-articulated policy parameters, but it is difficult to ascertain basic measures of retention and employment in the U.S. Insufficient data collection limits the capacity to measure benefits in productivity and innovation to the retention of foreign students in the U.S. labor market or to assess potential costs to U.S. workers.

Review of the available data resources also identifies some potential "unintended consequences" in policies like the extension of OPT, which are intended to help high-skill students engage with the U.S. labor market but may generate incentives for predatory behavior and fraud among a small number of institutions, particularly as the oversight links between SEVIS and the Department of Education appear to be minimal.

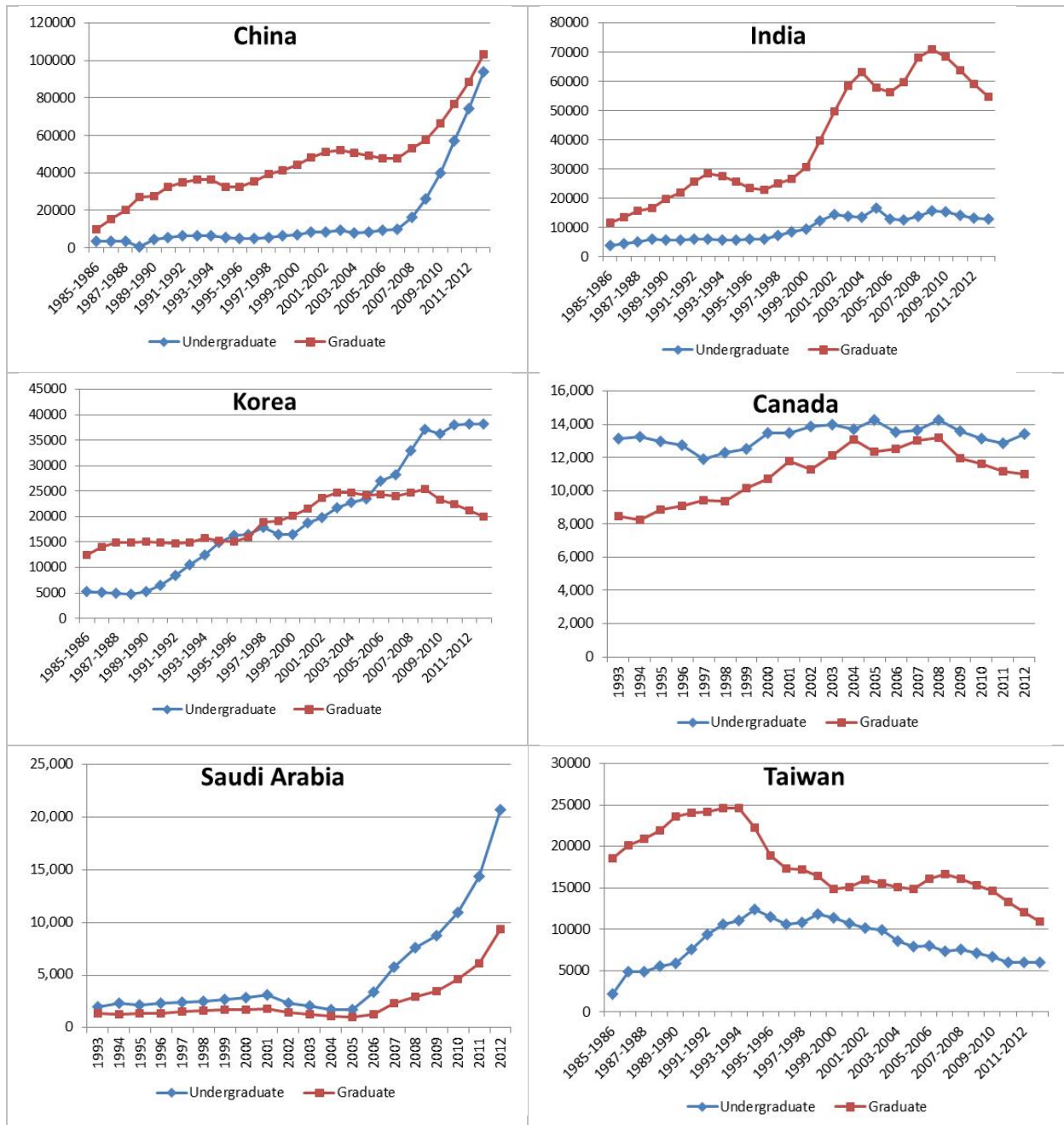
While the narrative over the past two decades has emphasized the expansion in enrollment of foreign students, [recent indicators](#) point to declines in the enrollment of students from abroad at U.S. institutions of higher education. If continued, future assessments must consider the financial considerations for colleges and universities as well as implications for the supply of skilled labor in the U.S. economy.

Figure 1. Overall Trends in Foreign Enrollment at U.S. colleges and universities



Source: *Open Doors*, Institute for International Education, various years.

Figure 2: Country trends in foreign enrollment at U.S. higher education institutions



Source: *Open Doors*, Institute for International Education, various years.