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The Global Mobility of International Students: Competitive Effects

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Today the world appears to be entering a new phase in phenomenon of globalization. Rapid advances in information technology and the fast-paced removal of barriers to international business are converging to create new patterns. In this new globalization, multinational enterprises are increasingly locating advanced engineering activities in emerging economies.

The emerging and newly industrializing economies (NIEs) benefit from this and, the more successful, facilitate the growth of NIE-based innovation. Strategic vision often seems less likely a precursor than a result of increasing NIE-based capacity in terms of human capital and structural reform in their economic, political, and educational systems. And educational institutions play an important role with university/industry collaborations creating an "innovation community" in which practice, theory, work and learning are established in an integrated context. Spatial proximity is crucial for innovation and generates global cities or hubs of knowledge of inter-connected industries.

The international mobility of students and workers, which in part has contributed larger developments, is increasingly conditioned by these emergent patterns. The apparently independent actions of multinational business actors, national governments, educational institutions, and the international mobility of students and workers are all part of the third

generation globalization. In short, third generation globalization appears to be leading to and increasing NIE-based innovation capacity and demand for STEM workers supported by the increasing density of communications and transportation, a “triple helix” of industry-university-government innovation, and the improved supply of the quantity and quality of human capital from domestic sources and the international mobility of students and workers.

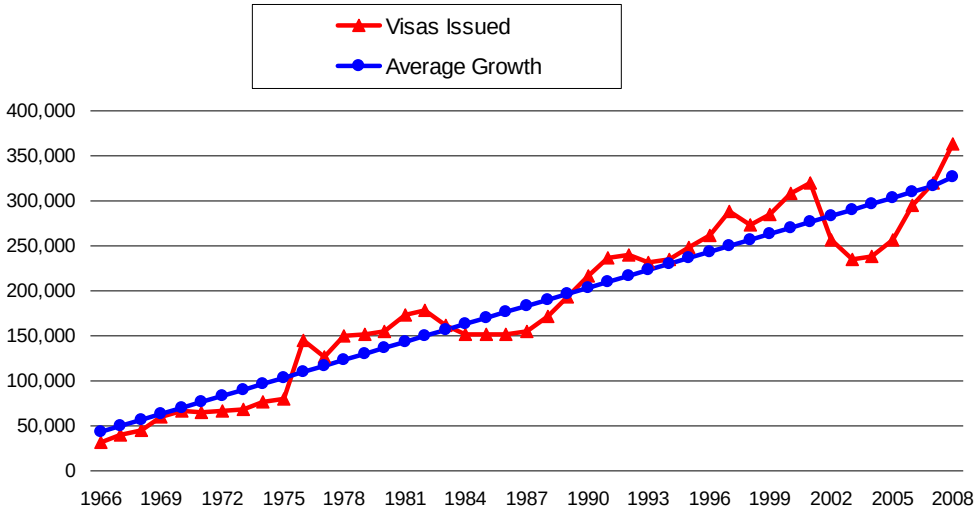
The consequences of increased NIE capacity are not fully understood as yet. Certainly, one concern is that the U.S. will no longer dominate innovation and, in a related fashion, that the U.S. will not longer dominate the international supply of the best and brightest foreign students and workers. Changes and concerns about the future supply of scientists and engineers can be best understood through the analysis of human capital development in a global system of firms, governments, and educational institutions. It is not clear what, if any, factors remain that provide a nation an comparative advantage in technological innovation and other knowledge work. But there is no pre-determined and finite set of pathways into the future. We need to better understand the complex interplay of factors that shape the decision making of business actors, educational administrators, workers, and students themselves.

The U.S. STEM workforce has been supplied by foreign born, typically entering via graduate and post-graduate education then into the workforce. Since the mid-1980s much of the increase in STEM employment, and particularly of the STEM student body, has been almost exclusively foreign born.

Historical concern has been about brain drain from the sending countries and it is estimated that 30 to 50 percent of the NIE STEM-educated labor force is working in the develope4d world. But there is also some evidence of brain circulation/repatriation, as well as theories of optimal brain drain in which emigration creates market pressure on education institutions to expand educational opportunity and stimulate demand for higher education in the source nations.

This is based on a wage seeking model of migration causality (demand) and education supply as thus responding to the market. The “system” in this model is composed of migration for education as means of obtaining higher wages and the education capacity/supply in sending and receiving countries. Thus, education supply in the home country can substitute for education in receiving/industrial country.

Figure 1. Total Student Visa Issuances, 1966 to 2008



Source: Authors' tabulations, State Department

This paper first describes recent trends in the admission of foreign students to the United States and the growing international competition for foreign students. This is the background that is relevant to the third-generation model in as much as growing international capacity in R&D and STEM production is thought to increase the flows of students to places other than the United States. Next, a regression model is presented to test this expectation.

Trends and Concerns Over the Admission of Foreign Students

Following a period of sustained growth, the number of foreign students coming to America declined in 2002 and the numbers did not begin to rebound strongly until 2005.[1] That trough in the supply of enrollees raised alarms on America's campuses and beyond to stakeholders who advocate for foreign students to supply business, science, and engineering jobs after graduation.

Our primary interest is in the supply of foreign students in the fields of Science, Technology, Engineering and Mathematics (STEM). Foreign students made up about one-third (35 percent) of core-STEM enrollees in the 2000/01 academic year with social science enrollees adding another twelfth (for a total of 42 percent). Those proportions remain roughly the same, even though there have been enrollment losses in the computer

[1] Keil, Janine, 2007. "Voices of Hope, Voices of Frustration," Institute for the Study of Diplomacy, Georgetown University (http://isd.georgetown.edu/ISD_Visa_Report.pdf).

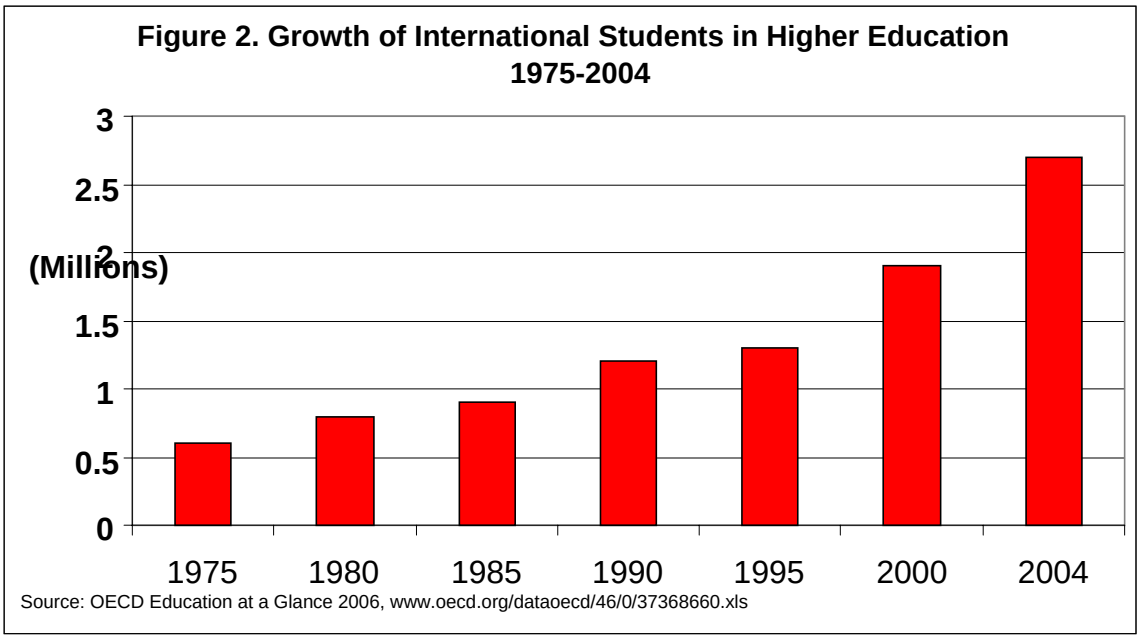
sciences and engineering, because enrollments in physical and life science increased.[2] Foreign students make up roughly 4 percent of STEM bachelor graduates, 28 percent of STEM master graduates, and 32 percent of STEM doctorate graduates.[3] In short, foreign students are a significant share of the U.S. STEM student body.

While concern about the decline in foreign student numbers went beyond STEM fields, the possibility of declines in STEM is thought to be of particular concern. It is echoed in concerns that the U.S. is losing its dominance in research and development, or in its trade balance, or its stock markets; or its energy independence. The start of this century is not only about the economic recession which this report highlights, it is also about a pronounced expansion of globalization. China and India, in particular, are projected to surpass the United States economically in just a few decades. The European Union has pledged itself to rebuild its educational institutions and to boost its research capacity. Many observers argue that there are putative domestic shortages of U.S. students while, at the same time, they believe that the STEM labor force will continue to grow at a breakneck speed. Thus, foreign students are thought to be critical to retaining U.S. dominance in the evolving global economy.

The International Competition for Foreign Students

The global marketplace for international students has been on an upward trend for the past three decades. Figure 2 shows that there was tremendous growth during the last decade with the number of international students jumping from a little over 1 million in 1994 to 2.7 million in 2004. The U.S. has traditionally been the leader in attracting the largest number of the world's brightest science and engineering students. However, the past decade has witnessed increasing competition for international students. Much of the competition for foreign students is concentrated in schools where instruction is carried out in English, namely the U.S., the U.K., Canada, Australia, and New Zealand which have had about half of the global international student population.

[2] At the same time, enrollments in business and other disciplines declined (IIE, Open Doors, Data Tables, http://opendoors.iienetwork.org/page/28633/).
[3] Data for the year 2002 (NSF, S&E Indicators 2006, Appendix tables, http://www.nsf.gov/statistics/seind06/pdf_v2.htm).



Many of the major European and English speaking nations, other than the United States, have implemented policies explicitly designed to attract students. America's competitors have made changes in three general areas:

(1) student admissions policies;
(2) student outreach and university marketing programs; and
(3) retention policies to keep desirable students in the country.[4]

Additionally, among large nations, France and Germany increasingly provide instruction in English and have redesigned their curriculum to fit in with the more universal bachelors and masters' degree format.

In some cases, changes in admission policies have been coupled with marketing targets. For example, in 1998 France simplified its student visa procedures and in 2000, the French Ministry of National Education announced it would double the number of foreign student visas it made available. There has been a lot of educational marketing.[5] Some governments have created and funded NGOs to do the marketing while others have carried out the task themselves. For instance, the U.K. in the mid 1990s launched a £5

[4] International Centre for Migration Policy Development, 2006. "Comparative Study on Policies Toward Foreign Students: Study on Admission and Retention Policies towards Foreign Students in Industrialized Counties," International Center for Migration Policy Development, Vienna Austria.
[5] See IIE's Atlas of Student Mobility, Promotional Activities and Policies (http://opendoors.iienetwork.org/).

million global promotional campaign to educate 25 percent of students in the global market in English-speaking countries.

While not marketing *per se*, it should be pointed out that the U.S. provides extensive programs for potential students.[6] The Department of State has 450 Regional Educational Advising Coordinators (REACs) who provide information and consult with U.S. embassies, as well as extensive State Department/ECA cooperative arrangements with NGOs and others. In the wake of the visa downturn, the State Department conducted an assertive outreach campaign that has been credited with helping to turn around perceptions of visa difficulties and unwelcome.

However, the federal government has not actively marketed U.S. education.[7] Our interviews with stakeholders find conflicting views on a government run marketing program. Some advocacy groups believe that a government-run promotional and marketing campaign is essential to maintaining U.S. domination of the marketplace. Some university officials do not see the need because their foreign student flows are built on the prestige of their institution, and on contacts between alumni.[8] Then again, most other national governments have responsibility for higher education, whereas the 50 states and a substantial private sector operate in the United States.

In terms of student retention policies, most of the countries studied have recently modified their laws to allow for an easier transition from student to worker, especially for science and engineering students. This is the case for France, Germany, Australia and Canada. For instance, Australia recently amended its point system for admitting immigrants to allot extra points to students graduating from an Australian on-shore university. Canada awards points to students who stay to work in Provinces with skill shortages.

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[6] Schneider, Michael, 2000. "Other's Open Doors: How Other Nations Attract International Students Implications for U.S. Educational Exchange," Maxwell-Washington International Relations, Syracuse University; Harty, Maura, 2004. "Assistant Secretary Harty's Remarks to the Houston World Affairs Council," Before the Houston World Affairs Council (http://travel.state.gov/law/legal/testimony/testimony_810.html).

[7] Note that in October of 2005 the Senate Passes Coleman/Bingaman Amendment Aimed at Attracting International Students.

[8] This may only be the sentiment at top tier universities and perhaps some of the second and third tier universities would benefit from increased marketing.

Ranking National Policies and American's Competitive Status

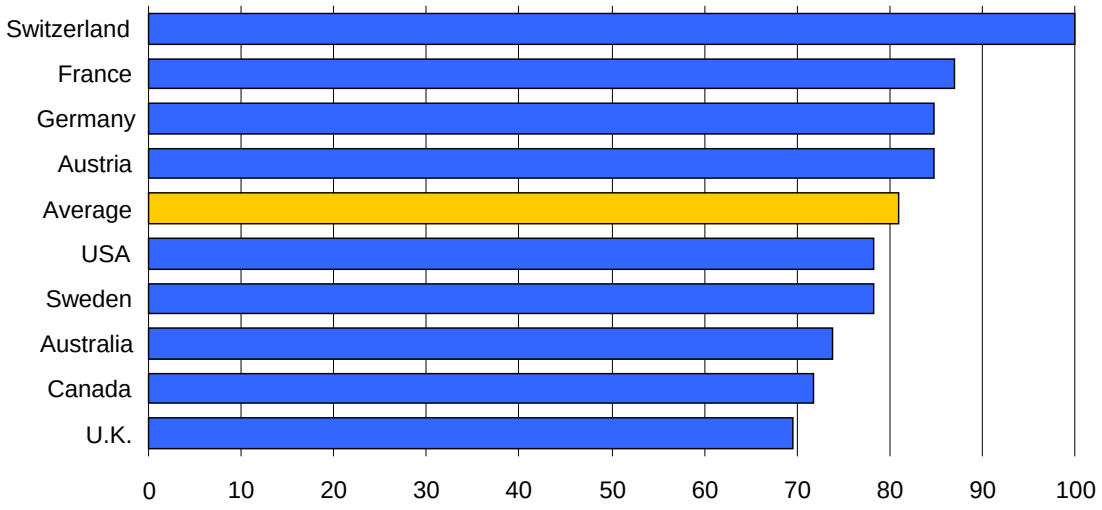
Arguably, by these standards the U.S. has long had in place policies that have been competitive. There have been no caps on the U.S. admission of students and visa requirements, compared with those of other nations, have been relatively straight forward. Indeed, no one in the current debate has suggested easing educational or English requirements. And while the U.S. has had no *de facto* retention policies, in practice it has facilitated retention. All foreign students may avail themselves of year practical training after graduation, many students transition to the H-1B six-year working status, and close to three-quarters of foreign doctoral students stay for extended stays.

In order to evaluate the competitive nature of U.S. admission policy, we ranked the student admission policies of 10 major host nations.[9] First, we constructed a list of the various policy elements that govern admission with six major elements and 14 sub-elements. The major elements are allocation of numbers, screening procedures, employment opportunities, family rights, retention after graduation, and miscellaneous other requirements. Next, we assigned points to each nation's 14 separate policy elements according to whether they are very controlling or restrictive, or whether they are competitive or open (maximum of four points for highly controlled).

Today, all of the 10 countries have no numerical caps or quotas on their admission of foreign students. As far as procedures are concerned, all 10 nations require that students demonstrate an intent to return before a visa is issued; and all require proof they have been admitted to college and that they can pay their way. The U.S. appears to have the most stringent requirements for the presentation of documents by the applicant abroad, but it among the more lenient in terms of permitting student applications from within country. The 10 nations differ little in terms of the employment opportunities they offer, with the U.S. being the most open in terms of permitting employment post-graduation. All nations but Switzerland permit spouses to accompany the student, but the U.S. restricts spouse employment like Sweden whereas the U.K. and Australia permit it. The U.S. ranks very well in terms of retention, both in terms of visa avenues and particularly in terms of actual rates of stay. Finally, Australia has a mandatory health exam, while other nations are more lenient on this requirement.

[9] Lowell, B. Lindsay and Micah Bump, 2007. "Ranking Student Admission Policies," Institute for the Study of International Migration, Georgetown University (forthcoming).

Figure 3. Competitive Policy Ranking on Student Admissions (Controlled = 100)

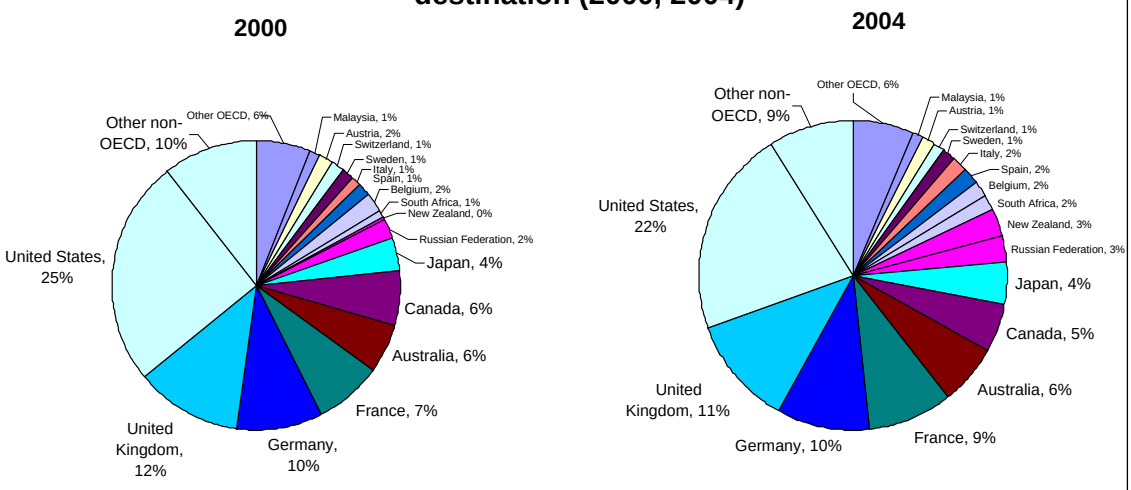


Source: Lowell and Bump 2007

Figure 3 shows how the 10 nations rank relative to each other. The points awarded are summed up and an index constructed where 100 defines the nation with the most points, in this case Switzerland, with the most controlled admission policy. This is a straightforward ranking with no differential weighting given to the six elements, albeit the number of sub-elements is a de facto weighting and screening procedures count heavily. At any rate, the United States is neither the most restrictive nor the most receptive nation; rather it ranks about in the middle albeit on the receptive side together with the traditional nations of immigration and the United Kingdom. This is not surprising insofar as the United States also falls toward the receptive side when ranked against a larger number of national policies for the admission of highly skilled permanent and temporary workers.[10] As a group, these latter nations have much more open policies than nations like France or Germany that are frequently thought to have changed toward a more competitive stance.

[10] Lowell, B. Lindsay, 2005. "Policies and Regulations for Managing Skilled International Migration for Work," United Nations, Mortality and Migration Section of the Population Division/DESA, New York, (http://www.un.org/esa/population/publications/ittmigdev2005/P03-LLowell.pdf).

Figure 4. Distribution of foreign students by country of destination (2000, 2004)



Source: OECD Education Database www.oecd.org/dataoecd/46/0/37368660.xls

The Loss of "Market Share"

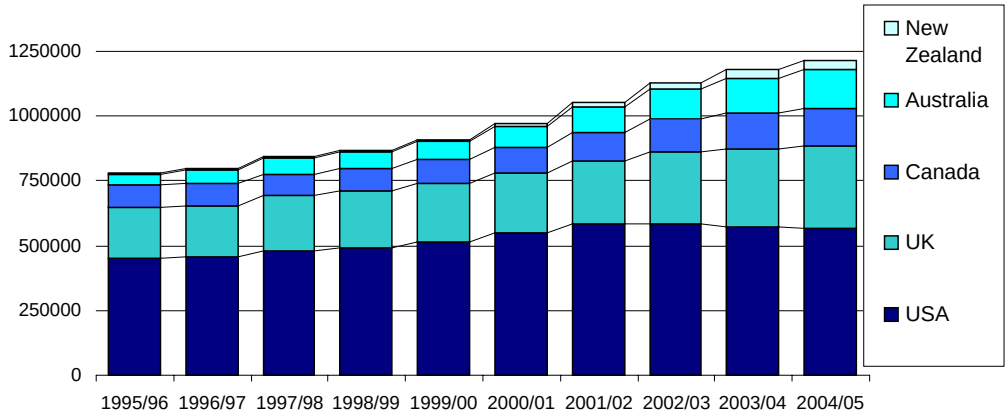
What this suggests is that the United States' student admission policies are about as attractive as those of our English-speaking competitors, although those other nations have been both more aggressive in designing competitive policies and reaching out to students. While foreign student enrollments fell in academic years 2004 and 2005 in the United States,[11] they continued to increase in other major education markets. And even though U.S. enrollments did not fall markedly in the 2006 academic year, the rate of increase in many other nations has been sustained over the past several years.

Figure 4 shows that the OECD estimates that the U.S. share of the global population of foreign students fell slightly more than three percentage points from 25 percent in 2000 to 22 percent in 2004. However, there were only marginal gains in market share by any of the competitors and even some small single digit losses. For all nations, there was more stability of their share of the total than there were significant losses or gains by any one nation.

Nevertheless, America's loss of foreign students may be greatest among the English speaking nations. Figure 5 shows that foreign students in the U.S. among these nations fell a far more significant 56 to 46 percent between 2000/01 and 2004/05. At the same

[11] Recall that visa applications and issuances which are "flow" data start to level off and rebound during this same period of stasis in "stock" or enrollment numbers.

Figure 5. Total Foreign Student Enrollments, English Speaking Nations



Source: Roberts 2006 and IIE 2006

time, only Australia gained an advantage during this period while numerical gains by the others were marginal. The largest players, the United Kingdom and Canada, gained no more than two percentage points. Australia gained the most numerically increasing from 8 to 12 percent, although a substantial but unknown part of that increase was due to offshore education that is credited to Australia.

These figures cover all foreign students, both undergraduate and graduate, whereas many observers are most interested in graduate students. After all, graduate students have attained the greatest skill levels and may offer some of the greatest benefits if offered retention opportunities. And the U.S. loss of foreign graduate students may have been greater. One estimate suggests that, for just the English speaking nations, the U.S. share declined from about 62 to 50 percent during this period.[12] Nevertheless, the United States still retains a commanding share of the graduate student market, especially in science and engineering.

What is more, the English speaking nations as a group saw their share of the global foreign student population decline from about 49 to 47 percent between 2000 and 2004.[13] So because the U.S. loss of the global total was 3 percentage points, the English speaking

[12] Roberts, Bryan, 2006. "Foreign Student Enrollments in the U.S. Since 9/11," Private Sector Office, Department of Homeland Security, Presentation to NAFSA: Association of International Educators, October.
[13] OECD, 2006. *Educational Outlook 2006*, table C3.8.

nations as a group only gained one percentage point of the U.S. loss; or only about one-third of the number of students that the U.S. might have otherwise enrolled. Given the much larger flow of students into the U.S., those enrollment numbers could also return in favor of the United States. The data on student visa issuances indicates that such a rebound is now taking place. Then again, the relative losses of the English speaking nations also suggests that other non-English speaking may have attracted, and may continue to attract, more foreign students than the have in prior decades.

The Size of the Future Student Marketplace

Many of the major source nations are expanding their college educational systems and are educating ever greater proportions of their growing populations. Their job markets are expanding, particularly their export industries, as well as outsourcing and high technology industries. Their college graduates may be more able to avail themselves of education at home and to find employment there after graduation. Other than a projected decline in the domestic student body of today's host nations, there are at least three dimensions to consider in the competition for foreign students in the future.[14]

First, the United States is not equally in competition with other English or Western nations. Over 60 percent of the U.S. foreign student population comes from Asia and another 12 percent from South America. Competition for Asians is primarily with smaller Australia, increasingly the U.K. colleges, and some Asian colleges. Only Spain has substantial numbers of South American students, but less than one third the numbers that is in America. At least half of the foreign students in Germany and other nations come from within Europe, while France or Belgium draw half of the majority of their foreign students from Africa. The market is heavily segmented and our competition is not so much with "Europe" or transitional "Asia," as it is with specific host/source nations.

Secondly, many developing nations have markedly expanded their tertiary education systems. India tripled the number of its institutions of higher education from 6,000 to 18,000 between 1990 and 2006; enrollments more than doubled from roughly 4.5 to 10.5

[14] Not at all mentioned by those who decry a loss in the market share of foreign born students is the fact that the OECD projects that the U.S. will loose about 4.5 percentage points of the OECD'S *total* (foreign *and* native born) college educated population by 2014 (OCED, 2006. *Educational Outlook 2006*, Chart A1.4). It would be as quixotic to imagine that immigration could resolve that "loss" as it is to imagine that immigration can replace the growing number of dependent persons created by population aging; see Meyerson, Frederick A. B., 2001. "Replacement Migration: A Questionable Tactic for Delaying the Inevitable Effects of Fertility Transition," *Population and Environment*, 22 (4): 401-409.

million during the same period.[15] During the recent attenuation of foreign enrollments in the U.S. between 2000 and 2004, the percentage of the college aged population enrolled in tertiary education throughout East Asia and the Pacific increased from 9 to 19 percent; that of middle income countries from 16 to 27 percent.[16] One can readily see that educational capacity is ramping up, as well as that the pool of students is growing.

Thirdly, econometric research indicates that increases in educational capacity in source countries, in the number of institutions and teachers, are likely to increase the flow of students to the United States.[17] That is primarily because student migration is strongly affected by the promise of wage opportunities, not constraints in the domestic educational capacity of the source countries. Students from today's low-wage, source countries appear to seek schooling in high-wage countries as a means of "augmenting their chances of obtaining a high-wage job" in the United States and other nations. In fact, increasing educational capacity prepares more students to seek education abroad. The research finds that an increase in the number of colleges and educational capacity in source countries actually increases the flow of foreign students to the United States.

Fourthly, a growing population of college-aged persons should also translate into a significant growth in the numbers of internationally mobile students, even if their migration rates stay constant. But the potential numbers will grow very rapidly if the rate of student migration increases as the research above suggests; and/or if host nations aggressively market. In nations like China and India the majority of the population is under the age of 20. The future will unfold a baby boom generation of unprecedented proportions. There are striking changes projected in the age profile of developing nations with rapidly growing numbers of persons in the college-ages. The United Nations projects that the Indian college age population 18-23 years of age today is 125 million and will growth to 139 million within one decade by 2015.

[15] Agarwal, Pawan, 2006. "Higher Education in India: The Need for Change," ICRIER WP (http://www.icrier.org/pdf/ICRIER_WP180__Higher_Education_in_India_.pdf).
[16] World Bank, Key Development Data & Statistics, Country Profiles (http://web.worldbank.org).
[17] Rosenzweig, Mark R., 2006. "Global Wage Differences and International Student Flows," Yale University (http://www.nyu.edu/africahouse/forresearchers/africana/Mig120506Rosensweig.pdf)

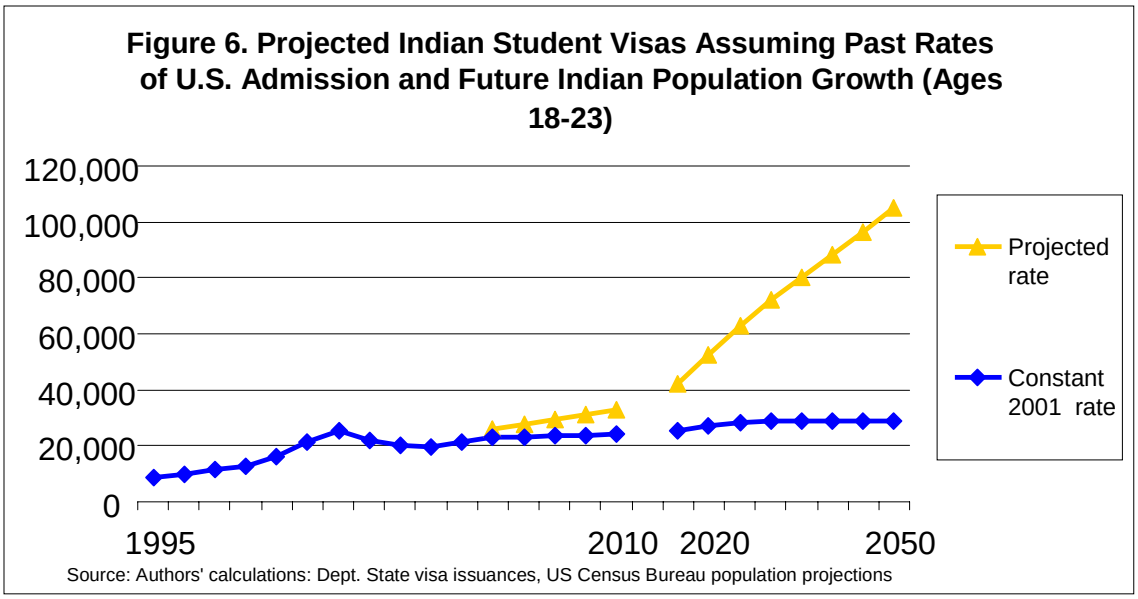


Figure 6 shows projections of Indian visas. One projection assumes that the rate of admission holds constant at the 2002 rate. The high projection assumes that admission rates grow as they did from 1995 to 2005.[18] The constant rate projection yields a 19 percent growth of Indian visa issuances and the high projection 91 percent growth between 2002 and 2014. In comparison, the Institute for Education Sciences projects 17 percent growth of total U.S. enrollments 2002 to 2014.[19] This suggests that the current rates of Indian visa issuances are in line with expected U.S. enrollment projections, while the high projection exceeds the anticipated rate of growth of the U.S. total student body five times over.[20] To admit yet more Indian students should lead to questions about U.S. institutional capacity and related issues which the university system may want to consider.

A Regression Model of Student Migration to America

The following exercise attempts to shed lights on how the F1 visa issuances over the period 1999-2003 are systematically related with economic, demographic and other

[18] Indian student admission rates, or the student out migration rate, is calculated by dividing F visas by the Indian population ages 18-23.
[19] Institute for Educational Sciences, 2004. Projections of Education Statistics to 2014, National Center for Educational Statistics, U.S. Department of Education (http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005074).
[20] Even at current rates of growth some observers expect that Indian students could make up as much as one third of the U.S. student body within just a few years (Agarwal op cit.).

variables in the source and the destination countries. The destination country of interest is the US. The data is available for 173 countries.[21]

We estimate a model of the general form:

$$Fvisas_{tj} = a + XB_{tj} + EB_{tj} + e,$$

where the flow of U.S. foreign student visas issued is expected to covary with a vector of standard variables (B) of the determinants of international migration including per capita income of the source country, international trade, and distance; as well as, a vector of variables capturing enrollments (E), and an error term. We estimate a pooled cross-sectional model that is log-log in order to simplify interpretation.

We prefer the flow measure of visas issued as the dependent variable as it is more dynamic than enrollments. Furthermore, enrollments on the right hand side of the equation can be considered to be lagged endogenous which eliminates concerns of simultaneity bias (or the need to instrument enrollments).

The enrollment variables in particular capture the effect of international competition and source capacity. First, we include the number of students enrolled in the source nation along with the population of the source nation. This controls for obvious scale issues insofar as major source nations such as China or India are much larger than others like South Korea or Argentina. Secondly, we include the number of students from each source nation in the data set who are enrolled in nations other than the United States.

Variables.

The dependent variable (**lnF**) is regressed on subsets of independent variables from the following:

lnF	*log of the number of F1 visa issued by US*
lnENROLL:	*log of the number of students enrollent in tertiary education in the origin country.*
lnPopT :	*log of Total Population.*
lngdpppc:	*log of gdp per capita (ppp adjusted).*
lnimbyex:	*log of US imports divided by US exports.*
lnrr_1:	*log of visa refusal rate lagged by 1 year.*

[21] It is an unbalanced panel although it is not too serious. For some missing values, for example enrollment in the US for 2000, the mean for available years are used.

lnOECen: *log of the student enrollent from a given source country in a given year in Canada, the UK, Australia and New Zealand, i.e. Other English Speaking Countries (OEC).*

lnONCen: *log of the student enrollent from a given source country in a given year in France, Germany and Japan, i.e. Other non- English Speaking Countries (ONC).*

post911: *indicator that takes value of 1 for year 2002 and 2003.*

trend: *value =0 if year==1999, 1 if 2000, 2 if 2001 and so on.*

lndist: *log of distance in km.*

year99: *year dummy for 1999. (used as base year in panel data regression)*

year00: *year dummy for 2000.*

year01: *year dummy for 2001.*

year02: *year dummy for 2002.*

year03: *year dummy for 2003.*

Model Estimations

We test for fixed effect (two-way for time and nation), as well as random effects in the analysis. The Hausman test rejects the random effect model in favor of fixed effect in all exercises. Otherwise, the only difference in the following models is that distance is included as an interacted variable with trend so that that, distance, which is a non-time varying variable, can be included in the two-way fixed effect model.

Tables 1.1 and 1.2 include the same variables, but differ in that table 1.1 is a two-way fixed effect specification and table 1.2 is a random effects model. The Hausman test no systematic difference in the coefficients of the two models and suggests that the fixed effect model is preferable.

Table 1.1 Fixed Effects (within) Regression

lnF	Coef.	Std. Err	t	P>|t|
lnENROLL	0.143	0.106	1.35	0.18
lnPopT	-1.112	0.769	-1.45	0.15
lngdpppc	**0.569**	**0.265**	**2.15**	**0.03**
lnimbyex	**-0.053**	**0.024**	**-2.19**	**0.03**
lnrr_1	**-0.158**	**0.042**	**-3.78**	**0.00**
lnOECen	0.120	0.066	1.81	0.07
lnONCen	-0.082	0.048	-1.72	0.09
year00	0.034	0.041	0.83	0.41
year01	0.034	0.054	0.63	0.53
year02	**-0.201**	**0.069**	**-2.90**	**0.00**
year03	**-0.276**	**0.084**	**-3.29**	**0.00**
_cons	17.054	13.189	1.29	0.20

[#Obs=554 (138groups) ; R-sq: within = 0.2986; between = 0.1323; overall = 0.1330;]

Table 1.2 Random-effects GLS regression

lnF	Coef.	Std. Err	t	P>|t|
lnENROLL	**0.216**	**0.068**	**3.17**	**0.00**
lnPopT	**0.473**	**0.102**	**4.62**	**0.00**
lngdpppc	**0.388**	**0.099**	**3.91**	**0.00**
lnimbyex	**-0.066**	**0.022**	**-2.97**	**0.00**
lnrr_1	**-0.117**	**0.041**	**-2.90**	**0.00**
lnOECen	**0.147**	**0.045**	**3.26**	**0.00**
lnONCen	-0.055	0.034	-1.62	0.11
year00	0.011	0.037	0.30	0.77
year01	-0.018	0.039	-0.47	0.64
year02	**-0.281**	**0.043**	**-6.48**	**0.00**
year03	**-0.378**	**0.045**	**-8.46**	**0.00**
_cons	**-7.853**	**1.595**	**-4.92**	**0.00**

[#Obs=554 (138 groups); R-sq: within = 0.2785; between= 0.6933; overall= 0.6950]
Hausman Test: Prob>Chi2=0.0001

Tables 2.1 and 2.2 also include the same variables; in this case the add distance between nations interacted with a trend variable. The two tables differ in that table 2.1 is a two-way fixed effect specification and table 2.2 is a random effects model.

Table 2.1. Fixed Effect (within)

lnF	Coef.	Std. Err	t	P>|t|
lnENROLL	0.139	0.1064	1.31	0.19
lnPopT	-1.136	0.7703	-1.48	0.14
lngdpppc	**0.566**	**0.2654**	**2.13**	**0.03**
lnimbyex	**-0.053**	**0.0240**	**-2.20**	**0.03**
lnrr_1	**-0.157**	**0.0417**	**-3.77**	**0.00**
lnOECen	0.122	0.0665	1.84	0.07
lnONCen	-0.083	0.0478	-1.74	0.08
lndist_trend	0.014	0.0228	0.63	0.53
year00	-0.095	0.2083	-0.46	0.65
year01	-0.225	0.4124	-0.55	0.59
year02	-0.590	0.6174	-0.95	0.34
year03	**-0.274**	**0.0840**	**-3.26**	**0.00**
_cons	17.508	13.2177	1.32	0.19

[#Obs. 554 (138 groups); R-sq: within = 0.2993 between = 0.1399 overall = 0.1408]

Table 2.2. Random-effects GLS regression

lnF	Coef.	Std. Err	t	P>|t|
lnENROLL	**0.221**	**0.068**	**3.27**	**0.00**
lnPopT	**0.466**	**0.101**	**4.61**	**0.00**
lngdpppc	**0.381**	**0.098**	**3.87**	**0.00**
lnimbyex	**-0.067**	**0.022**	**-2.99**	**0.00**
lnrr_1	**-0.115**	**0.041**	**-2.81**	**0.01**
lnOECen	**0.149**	**0.045**	**3.32**	**0.00**
lnONCen	-0.055	0.034	-1.63	0.10
lndist_trend	-0.001	0.023	-0.06	0.95
year00	0.023	0.211	0.11	0.91
year01	0.005	0.417	0.01	0.99
year02	-0.245	0.625	-0.39	0.70
year03	**-0.379**	**0.045**	**-8.45**	**0.00**
_cons	-7.750	1.575	-4.92	0.00

[#Obs=554 (138 groups) ; R-sq: within = 0.2776, between = 0.6943 overall = 0.6961]
Hausman Test: Prob>Chi2 is 0.00.

We prefer table 1.1 because the Hausman test indicates that fixed effects are the preferred estimator and because the effect of distance interacted with trend is not statistically significant (neither in the fixed-effect where trend and the time fixed effect are clearly collinear nor in the random effects estimation), although the results are substantively the same.

Reading just the findings of the table 1.1 fixed-effect model, we see that per capita income is highly significant and has a strong effect: a 10 percent increase in per capita income increases the number of foreign student visas by 6 percent. A ten percent increase in the rate at which visa applications are rejected is also significant and a ten percent increase in rejection rates reduces student visas by 1.6 percent.

None of the enrollment variables are statistically significant in the fixed effect regressions at the conventional two-tailed and five percent level of significance. Nevertheless, in table 1.1 the variables capturing source country enrollments in nations other than the United States are significant at the one-tailed ten percent level. At the same time, the enrollment variables are significant in the random effects model.

The sign of the effect of the enrollment variables suggests that U.S. student migration is increased when a large number of students from a given source nation migrate to other English speaking nations. At the same time, U.S. student migration is decreased when a large number of students from a given source nation migrate to one of the other major non-English-speaking receiving nations. Furthermore, increasing enrollments in of

students who remain in the source nations is associated with increased migration to the United States in the random effects model.

These findings suggest that increasing levels of enrollments in source countries actually increases the flow of international migrants to the United States and other English speaking nations. In this regard, the U.S. does not appear to be a competitor with other English speaking nations, but rather a mutual beneficiary of increasing levels of foreign student mobility. Yet; it appears that flows to the major non-English-speaking nations are competitive, e.g., increased student migration to these destinations is associated with a declining number of student migrants to the United States.

Conclusion

International students are an important supply of future STEM workers and Western nations are beginning to compete for them. The policy impetus is to benefit from the fact that the foreign student has been educated in the host country; primed in the language and culture to succeed in the labor market. Policymakers recognize these advantages and, in the case of many European nations, also see foreign students as a source of tuition to help defray the cost publicly subsidized education. Otherwise, the interest groups that are driving this competition are the colleges themselves, as well as the business interests who want easy access to recruitment on in-country campuses. In the United States, graduate students in particular are part of the research laborforce on college campuses making up half and more of the student body and post-doctorates.

The data reviewed here show that the number of foreign students coming to the United States declined for several years in the wake of 9/11 and stepped up security–related admission procedures, but primarily due to the same climate of fear that chilled tourism and business travel, the high cost of U.S. education, and the impact of the 2001 recession. Simultaneously, the United States did loose some “market share” of international students to other English speaking nations and a trivial amount of market share on a worldwide basis. However, the loss of market share was not primarily due to increased competition as the regression results indicate. Rather, increased levels of enrollments in the source nations, as well as in other nations appear to be associated with increasing shares of the marketplace being distributed to the United States and, most likely, other nations with a pre-existing dominance of the marketplace. This analysis cannot completely resolve speculations about the future, but the varied parts of the analysis suggest that the United States will likely remain a large attractor of a growing body of college students

worldwide. Arguably, maintaining “market share” in the short-to-middle term will not be a major problem. Over the longer term, the U.S. will most likely lose market share but there will still remain a large number of foreign students desiring to study here; most likely as many students as the tertiary system can absorb. The third generation question then may be not how to attract yet more students, but rather how to attract the type of foreign student best prepared to benefit the national interest.