America's Other Immigration Crisis

We are bringing the world's smartest people to our shores, training them, and then making them leave.

From his early childhood, Sanjay Mavinkurve dreamed of coming to America and making it big. So his parents, who are from India, sent him to boarding school in Cleveland, Ohio when he was 14. He did so well that he gained a scholarship to Harvard, where he completed both a bachelor's and a master's degree in computer science. In his spare time, he helped conceive the design for Facebook and wrote its first computer code. After graduating, Sanjay joined Google and designed key parts of their mapping software for mobile devices.

Then Sanjay fell in love and had to choose between his heart and the American dream. He was in the United States on a temporary visa and was years away from obtaining permanent resident status. His fiancée had graduated from a top university in Singapore and started work as an investment banker. The only U.S. visa they could obtain for her would not allow her to work, and that would force her to abandon her ambitions. Instead, they decided to abandon America and move to Canada, which welcomed them with open arms.

The U.S. immigration system allows highly educated workers to enter the country for up to six years on a visa called the H-1B. But this visa imposes many restrictions. If these workers want to stay longer and enjoy the same rights as Americans, they need to obtain a permanent resident visa. And then after five years as a permanent resident, they can apply to become naturalized American citizens.

Over a million skilled workers and their families in the U.S. are waiting for permanent resident visas. But few visas are available and the backlog is rapidly increasing.

The problem is that there are more than a million skilled workers and their families in the United States who are waiting for these permanent resident visas, but there are hardly any visas available and the backlog is rapidly increasing. So, over the next few years, Sanjay's story is likely to be repeated many times.

These engineers, scientists, doctors, and researchers entered the country legally to study or to work. They contributed to U.S. economic growth and global competitiveness. Now we've set the stage for them to return to countries such as India and China, where the economies are booming and their skills are in great demand. U.S. businesses large and small stand to lose critical talent, and workers who have gained valuable experience and knowledge of American industry will become potential competitors.

My team at Duke University has been researching the impact of globalization on U.S. competitiveness and the sources of the U.S. advantage. We had many surprises in store when we looked at the role of immigrants in the tech sector.

In 1999, AnnaLee Saxenian of the University of California at Berkeley published a groundbreaking report on the economic contributions of skilled immigrants to California's economy. She found that Chinese and Indian engineers ran a growing share of Silicon Valley companies started during the 1980s and 1990s and that they were at the helm of 24 percent of the technology businesses started from 1980 to 1998. Saxenian concluded that foreign-born scientists and engineers were generating new jobs and wealth for the California economy.

We decided to update and expand her study and focus on engineering and technology firms started in the United States from 1995 to 2005. Over a period of two years, we surveyed thousands of companies and interviewed hundreds of company founders.
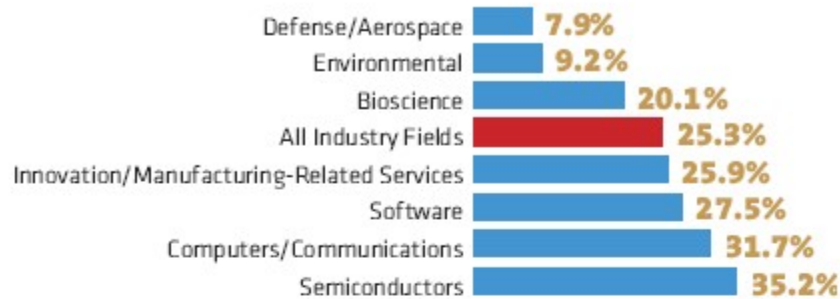
We found that the trend Saxenian documented had become a nationwide phenomenon. In over 25 percent of tech companies founded in the United States from 1995 to 2005, the chief executive or lead technologist was foreign-born. In 2005, these companies generated $52 billion in revenue and employed 450,000 workers. In some industries, such as semiconductors, the numbers were much higher—immigrants founded 35 percent of start-ups. In Silicon Valley, the percentage of immigrant-founded start-ups had increased to 52 percent.

When we looked into the backgrounds of these immigrant founders, we found that they tended to be highly educated—96 percent held bachelor's degrees and 74 percent held a graduate or postgraduate degree. And 75 percent of these degrees were in fields related to science, technology, engineering, and mathematics.

The vast majority of these company founders didn't come to the United States as entrepreneurs—52 percent came to study, 40 percent came to work, and 6 percent came for family reasons. Only 1.6 percent came to start companies in America. They found that the United States provided a fertile environment for entrepreneurship.

Even though these founders didn't come to the United States with the intent, they typically started their companies around 13 years after arriving in the country.
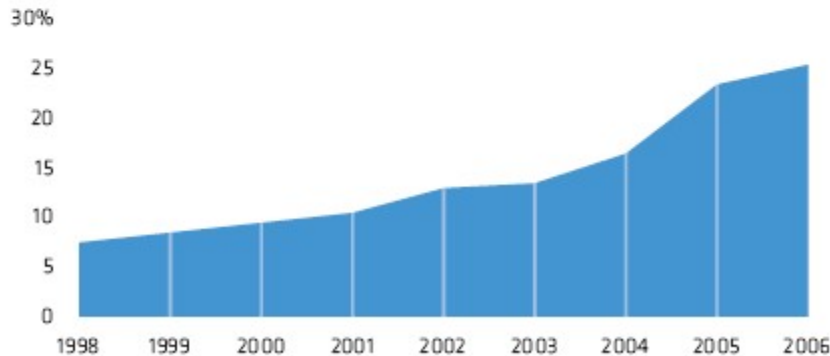
Percentage of Companies Founded by Immigrants

Defense/Aerospace	7.9%
Environmental	9.2%
Bioscience	20.1%
All Industry Fields	25.3%
Innovation/Manufacturing-Related Services	25.9%
Software	27.5%
Computers/Communications	31.7%
Semiconductors	35.2%

Immigrant-Founded Start-Ups
as Percent of Total in Tech Centers

Portland, Research Triangle Park, Denver, Seattle, Austin, D.C., Boston, San Diego, Chicago, New York, Silicon Valley

Foreign-National Contribution to U.S. Global Patent Applications, 1998–2006

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006

We uncoered some puzzling data in the World Intellectual Property Organization (WIPO) database, which is the starting point for obtaining information on global intellectual property protection. In 2006, foreign nationals residing in the United States were named as inventors or co-inventors in an astounding 26 percent of patent applications filed in the United States. This increased from 8 percent in 1998. Some U.S. corporations had foreign nationals contribute to a majority of their patent applications—such as Qualcomm at 72 percent, Merck at 65 percent, GE at 64 percent, and Cisco at 60 percent. Over 40 percent of the international patent applications filed by the U.S. government had foreign authors.

In 1998, 11 percent of these global patent applications had a Chinese inventor or co-inventor. By 2006 this percentage had increased to almost 17 percent. The contribution of Indians increased from 9 percent to 14 percent in the same period. To put these numbers into perspective, it is worth noting that Indians and Chinese both constitute less than 1 percent of the U.S. population, and census data show that 82 percent of Indian immigrants arrived in the United States after 1980.

But our concern was that these were foreign nationals and there was no certainty that they would stay and become U.S. citizens. These foreign-national inventors were also not from the same immigrant group that was founding high-tech companies—those were permanent residents or naturalized citizens. These inventors were likely to be Ph.D. researchers on student visas and employees of U.S. corporations on temporary visas like the H-1B, as Sanjay Mavinkurve was.

The question was: Why was the number of foreign-national inventors increasing so dramatically—337 percent over 8 years?

To answer this, we had to develop our own methodology to estimate the population of skilled immigrants from which such inventors may originate.

We found that at the end of 2006, there were 200,000 employment-based principals waiting for labor certification, which is the first step in the U.S. immigration process. The number of pending I-140 applications, the second step of the immigration process, stood at 50,132. This was over seven times the number in 1996. The number of employment-based principals with approved I-140 applications and unfiled or pending I-485s, or the last step in the immigration process, was 309,823, a threefold increase from a decade earlier. Overall, there were 500,040 employment-based principals (in the three main employment visa categories of EB-1, EB-2, and EB-3) waiting for legal permanent residence. And the total including family members was 1,055,084.

These numbers are particularly troubling when you consider there are only around 120,000 visas available for skilled immigrants in the EB-1, EB-2, and EB-3 categories. To make things worse, no more than 7 percent of the visas are allocated to immigrants from any one country. So immigrants from countries with large populations like India and China have the same number of visas available (8,400) as those from Iceland and Poland.

Visit a state-of-the-art lab in China and you will meet many highly skilled workers who received their education and training in top U.S. universities and corporations.

This means that immigrants like Sanjay who file for permanent resident visas today could be waiting indefinitely. H-1B visas are valid for up to six years and can be extended if the applicant has filed for a permanent resident visa. The problem is that once these workers have started the process, they can't change employers or even be promoted to a different job in the same company without taking the risk of having to restart the application process and move to the back of the line. Their spouses aren't allowed to work or obtain Social Security numbers, which are usually needed for things like bank accounts and driver's licenses. And these workers can't lay deep roots in American society because of the uncertainty about their future.

We also researched the trends in globalization and what was happening in India and China. We met dozens of executives of top companies in several industries in these countries and toured their R&D labs.

In Hyderabad, India, companies like Satyam Computer Services and Hindustan Computers are designing navigation control and in-flight entertainment systems and other key components of jetliners for American and European corporations. In New Delhi, Indian scientists are discovering drugs for GlaxoSmithKline. In Pune, Indians are helping design bodies, dashboards, and power trains for Detroit automakers. In Bangalore, Cisco Systems, IBM, and other U.S. tech giants have made the Indian city their global base for developing new telecom solutions.

China is already the world's biggest exporter of computers, telecom equipment, and other high-tech electronics. Multinationals and government-backed companies are pouring hundreds of billions of dollars into next-generation plants to turn China into an export power in semiconductors, passenger cars, and specialty chemicals. China is lavishly subsidizing state-of-the-art labs in biochemistry, nanotech materials, computing, and aerospace.

Visit any of these labs, and you will meet dozens of workers returned from the United States—highly educated and skilled workers who received their education and training in top U.S. universities and corporations. In GE's Jack Welch Technology Center in Bangalore, 34 percent of the R&D staff have returned from the United States. So have 50 percent of those with a Ph.D. at IBM research in Bangalore. And so are the managers of China's top engineering, technology, and biotech companies.

These returnees have fueled much of the innovation and growth in R&D in China and India. And the executives of these companies will tell you that the number of résumés they receive from the United States has increased tenfold over the last few years.

We need to do all we can to attract and keep skilled immigrants rather than bring them here temporarily, train them, and send them home.

Most students and skilled temporary workers who come to the United States want to stay, as is evident from the backlog for permanent resident visas. Yet we're leaving these potential immigrants little choice but to return home. "The New Immigrant Survey," by Guillermina Jasso of New York University and other leading academics, found that approximately one in five new legal immigrants and about one in three employment principals either plan to leave the United States or are uncertain about remaining. These surveys were done in 2003, before the backlog increased so dramatically.

Additionally, there are over 250,000 foreign students studying in our universities. In our engineering schools, 60 percent of Ph.D. candidates and 42 percent of master's candidates are foreign nationals. These students are often the best of their home countries. But there are few visas available for U.S. companies to hire these students when they graduate. Foreign students can work temporarily when they graduate on practical training visas. But if they want to stay long term, they need to get H-1B visas and then file for permanent residence.

The yearly allocation of H-1B visas for foreign students who graduate at the master's level and above is 20,000. But 31,200 people filed applications for these visas in the first week they became available in April of this year. Bachelor's-level graduates had even worse odds, as they had to compete in the general pool with only 65,000 visas available, less than half the number of applications for that visa category.

The result is that employers are now reluctant to hire foreign students. Why recruit and train new hires when there is less than a 50 percent chance that they will be able to stay? These students are getting increasingly frustrated and applying for jobs back home or in other countries.

So we have set the stage for hundreds of thousands of highly educated and skilled workers to become our competitors. Indian and Chinese industry benefited in a big way from the trickle of returnees over the last few years. Now we're looking at a flood.

Immigration has been a hot topic in the media, but the focus has been on the plight of the estimated 12 million unskilled workers who entered the United States illegally. Emotions have been running high on the issues of amnesty and border control.

At the same time, a debate rages about H-1B visas and this gets considerable press coverage. Companies such as Microsoft, Intel, and Oracle have been lobbying for visas to bring in skilled immigrants, but have focused on expanding the numbers of H-1B visas available. Why? Perhaps because workers on these visas are desirable, as they are less likely to leave their employers during the decade or more they are waiting for permanent residence.

Moreover, I know from my experience as a tech CEO that H-1Bs are cheaper than domestic hires. Technically, these workers are supposed to be paid a "prevailing wage," but this mechanism is riddled with loopholes. In the tech world, salaries vary widely based on skill and competence. Yet the prevailing wage concept works on average

salaries, so you can hire a superstar for the cost of an average worker. Add to this the inability of an H-1B employee to jump ship and you have a strong incentive to hire workers on these visas. (To be fair, the lobbying platform of these tech companies does include recommendations that the government expand the number of permanent resident visas.)

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Opponents of H-1B visas complain that these visas cause job losses and damage the engineering profession. To some extent, they are right. If we bring in too many workers at the lower end of the scale, we could end up causing a reduction of salaries to the point that Americans don't consider the profession worthwhile. And there are indications that enrollments in computer science have already dropped. The fact is that if we flood the market with workers with any skill, we end up hurting individual members of the profession; if we brought in 100,000 doctors, dentists, or plumbers, we would cause salaries to drop, create unemployment, and discourage Americans from studying these professions.

So we want skilled immigrants, but we want them to come on the right visas as permanent residents. The battles being fought are about bringing in more people with H-1B visas—not about those who are already here with them and stranded in "immigration limbo." Which means that we're going to be compounding the hardship on workers who are already here and forcing more, like Sanjay, to abandon America.

Unlike many of the problems facing the United States, this one isn't hard to fix. All we have to do is to increase the number of visas offered to skilled workers in the EB-1, EB-2, and EB-3 categories from 120,000 to around 300,000 per year. And we need to remove the per-country limits. Instead of requiring graduates from top universities who receive jobs from American corporations to go through the tedious H-1B visa process, we should provide a direct path to permanent residence. We are now competing with the rest of the world for the best talent. We need to do all we can to attract and keep skilled immigrants, rather than bring them here temporarily, train them, and send them home.

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Illustrations by John Weber.