



Education, Entrepreneurship and Immigration: America's New Immigrant Entrepreneurs, Part II



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Introduction and Overview

Skilled immigrants provide one of America's greatest advantages. They contribute to the economy, create jobs, and lead innovation. In January 2007, we published a report titled "America's New Immigrant Entrepreneurs,"¹ which showed that immigrants are fuelling the creation of hi-tech business across the nation and creating a wealth of intellectual property. Our research produced some startling statistics: in 25.3 percent of technology and engineering companies started in the United States from 1995 to 2005, at least one key founder was foreign-born; in California, this percentage was 38.8; in North Carolina, the percentage was only 13.9. Our analysis of Silicon Valley and Research Triangle Park (RTP) showed greater concentrations of immigrant founders. In Silicon Valley, 52.4 percent of companies had an immigrant as a key founder, as did 18.7 percent of RTP. Nationwide, these immigrant-founded companies produced \$52 billion in sales and employed 450,000 workers in 2005.

This research raised a number of questions. What was the education background of these immigrants? What brought them to the United States? Was there a correlation between education, immigration, and entrepreneurship? Was it just the elite universities in India and China that were graduating these company founders? Was there any correlation between entrepreneurship and immigrant populations in technology centers?

To get a better understanding of these issues, we conducted three new sets of surveys of engineering and technology companies founded from 1995 to 2005. Of these more than 28,000 startups:

1. We conducted in-depth interviews with 144 immigrant company founders on their educational attainment, degree types, reasons for entering the United States, and other factors related to their entrepreneurial activities.
2. We interviewed eighty-seven Indian, fifty-seven Chinese, and twenty-nine Taiwanese company founders to ask where they received their undergraduate education.
3. We surveyed 1,572 companies in eleven of the leading centers of technology in the United States to determine whether a key founder was foreign-born and, if so, that founder's country of birth.

Our Findings

We found a strong relationship between educational attainment (particularly in science, technology, engineering, and mathematics), entrepreneurship, and innovation among foreign-born founders of U.S.-based engineering and technology firms. In addition, our findings reinforce earlier research showing the tendency of immigrant entrepreneurs to be geographically concentrated in established technology clusters. Our findings include the following:

Education levels of immigrant founders of engineering and technology companies

Immigrant founders are very well-educated, with higher degrees in science, technology, engineering, and mathematics (STEM)-related disciplines.

- 96 percent held bachelor's degrees and 74 percent held graduate or postgraduate

degrees (26.8 percent held PhDs and 47.2 percent held master's degrees).

- 75 percent of their highest degrees were in STEM fields: applied sciences (10.2 percent), engineering (43.5 percent), mathematics (2.8 percent), and computer science and information technology (18.5 percent).

The largest non-STEM degree field was business, accounting, and finance, which primarily includes MBA recipients.

Proportion of immigrant founders of engineering and technology companies educated in the United States

More than half (53 percent) of the immigrant founders of U.S.-based technology and engineering companies completed their highest degrees in U.S. universities.

Motivation and timing of immigrant founders of engineering and technology companies who move to the United States

The majority of immigrant founders came to the United States as students. They ended up staying in the United States after graduation, and they founded companies an average of thirteen years after their arrival.

- 52.3 percent of immigrant founders initially came to the United States primarily for higher education, 39.8 percent entered the country because of a job opportunity, 5.5 percent came for family reasons, and only 1.6 percent came to start a business.
- 76.7 percent of immigrant founders in this study entered the United States after 1980.

Undergraduate education in India, China, and Taiwan

There is a common belief that most Indian and Chinese entrepreneurs in the United States are graduates of a small cadre of elite institutions in their native countries such as the Indian Institutes of Technology (IITs) in India, and Peking and Tsinghua Universities in China. In reality:

- 91.3 percent of Indian founders completed their undergraduate degrees in their home country, as did 35.1 percent of Chinese and

96.5 percent of Taiwanese founders.

- Indian and Chinese founders graduated from a diverse set of schools in their native countries, many of which are considered second- or third-tier universities.
- Only 15 percent of Indian founders were graduates of the IIT.
- Chinese founders who were educated in China were somewhat more likely to hold degrees from Peking University (20 percent) or Shanghai Jiao Tong University (15 percent) than other Chinese universities.
- A majority of Taiwanese entrepreneurs (55 percent) received bachelor's degrees from two elite universities (National Taiwan University and National Chiao Tung University.)

A more nuanced proposition that we were not able to test in this research might be that the alumni and entrepreneurial networks from these elite institutions are either more effective or more influential than those of their less highly ranked counterparts.

Immigrant entrepreneurship in technology centers

Our research supports earlier findings that immigrant-founded companies, like their domestic counterparts, are more likely to be located in technology centers than elsewhere in the United States.

- 31 percent of the startups in tech centers had an immigrant key founder, compared with the national average of 25.3 percent.
- Technology centers with a greater concentration of immigrant-founded companies than the nation include Silicon Valley (52.4 percent), New York City (43.8 percent), and Chicago (35.8 percent).
- Three technology centers with the lowest average rate of immigrant-founded companies: Portland, Ore. (17.8 percent), Research Triangle Park, N.C. (18.7 percent), and Denver (19.4 percent).

Methodology: Immigrant Key Founders

We conducted three distinct sets of interviews to learn more about the role of U.S.-immigrant entrepreneurs in engineering and technology companies established from 1995 to 2005.

For all three of these research projects, our team made use of corporate records tracked in Dun & Bradstreet's (D&B) Million Dollar Database. Through this database, we obtained a listing of the engineering and technology companies founded from 1995 to 2005. These listings contain U.S. companies with more than \$1 million in sales, twenty or more employees, and company branches with fifty or more employees.

Definitions

Engineering and Technology Firms

For the purposes of our study, the phrase "engineering and technology" indicates that the main work of the company focuses on design, manufacturing, or services. Our definition of engineering and technology firms thus includes the following industry groups, defined with three- and four-digit U.S. Government Standard Industrial Classification (SIC) codes: semiconductors, computers/communications, biosciences, defense/aerospace, environmental, software, and innovation/manufacturing-related services. A full listing of the SIC codes associated with each industry group is present in Appendix A. These engineering and technology SIC codes also were used in Saxenian's "Silicon Valley's New Immigrant Entrepreneurs" (1999) and Duke's "America's New Immigrant Entrepreneurs" (2007). Please note that some professional services SIC codes that were included in Saxenian's 1999 study have been excluded from subsequent studies

because they were outside the purview of engineering and technology disciplines.

Key Founder

In most engineering or technology companies, the key founders are the president/chief executive officer or the head of development/chief technology officer. An individual can simultaneously perform both of these roles. Other roles such as finance, marketing, human resources, and legal can be very important in startups. For the purposes of our research, however, we chose to use a narrow definition of key founder and exclude the latter roles.

U.S. Immigrant and Immigrant-Founded Company

An immigrant is a person who was born as a citizen of another country and subsequently moved to the United States at some point in his or her lifetime. Immigrant-founded companies are those having one or more immigrants as key founders.

Study 1—Immigrant Entrepreneur Backgrounds

This research consisted of 144 follow-up interviews with immigrant-founded companies that had responded to our 2007 "America's New Immigrant Entrepreneurs" survey, with a response rate of 85.2 percent. During these interviews, we spoke directly with a company's key founder or an executive assistant. We gathered information on the founder's country of origin, highest degree level, type of degree attained, country in which his or her highest education was completed, and

reason for entering the United States. In some cases we also were able to gather information on the year a given founder entered the United States and on the type of entry visa.

Study 2—Undergraduate Degrees of Indian, Chinese, Taiwanese Founders

We interviewed eighty-seven Indian, fifty-seven Chinese, and twenty-nine Taiwanese key founders to gather information on where they had obtained undergraduate degrees, whether in their home countries or in the United States. Our goal was to determine whether company founders were disproportionately graduates of a small group of elite universities. The founders we interviewed were randomly selected from the list of companies that we had previously identified as having key founders from these countries.

Study 3—U.S. Technology Centers

Our team made unsolicited phone calls to thousands of engineering and technology startups located in eleven major U.S. technology centers and achieved a 92.7 percent response rate. These technology centers and their surrounding suburbs were identified by their zip codes. A full listing of the zip codes used for each technology center is present in Appendix B. Corporate listings obtained through our D&B records were scanned against these zip codes to identify the startups located in each technology center. Startups within each technology center were then randomized and contacted via telephone. After our first rounds of data-gathering were completed, we over-sampled four technology centers (Denver, Boston, Portland,

and Austin) to ensure that each center gave a minimum of 100 responses. During phone calls, we asked whether a company had one or more immigrant key founder; if the answer was “Yes,” we also obtained the founder’s country of origin. Ultimately, we obtained 1,572 responses from the following eleven technology centers:

- Austin, Texas
- Boston, Massachusetts
- Chicago, Illinois
- Denver, Colorado
- New York, New York
- Portland, Oregon
- Research Triangle Park, North Carolina
- San Diego, California
- Seattle, Washington
- Silicon Valley, California
- Washington, DC

Our Findings

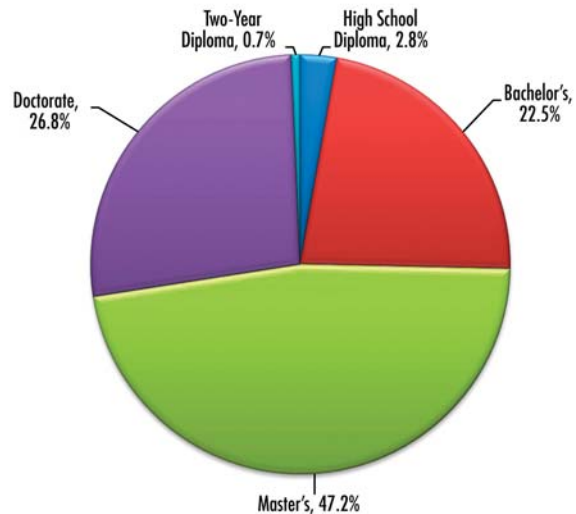
Immigrant Founder Education Levels

The purpose of our research was to gather more detailed information about the immigrant entrepreneurs involved in engineering and technology startups.

We conducted 144 follow-up interviews with immigrant-founded companies that had responded to our January 2007 “America’s New Immigrant Entrepreneurs” survey. Our interviews showed that immigrant founders are among the most highly educated of the immigrant population. A breakout of the educational backgrounds of immigrant founders appears in Figure 1. Of the immigrant founders we interviewed, 96 percent had completed college, and 74 percent had completed graduate school.

Immigrant founders of technology and engineering firms also have strong backgrounds in science, technology, engineering, and mathematics (STEM) fields. We found that 75 percent had completed their highest degree in a STEM field. The largest non-STEM degree field was business, accounting, and finance, which primarily includes MBA recipients. These data suggest that STEM education plays a large role in business foundation and new-technology generation. Figure 2 shows the fields in which immigrant founders of technology and engineering firms received their highest degrees.

Figure 1
Highest Completed Degree by Immigrant Founders of Engineering and Technology Companies



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

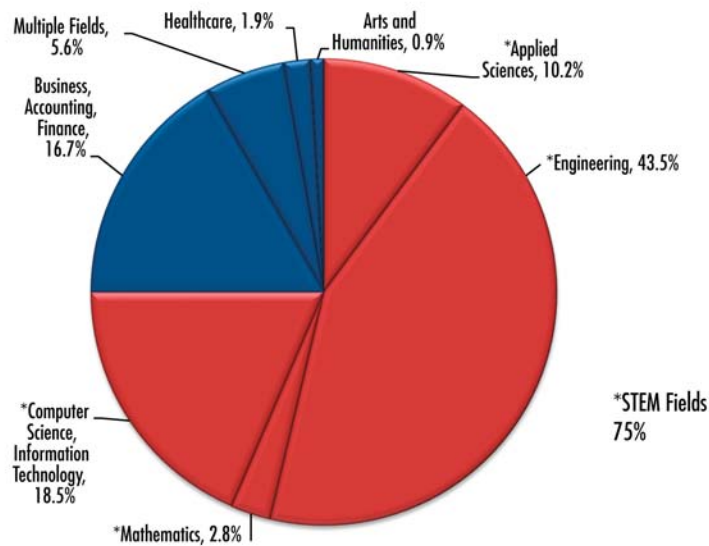
Immigrant Entrepreneur Education Background and Location

We found that 53 percent of immigrant founders of engineering and technology firms received their highest degree from a university inside the United States. See Figure 3. The list of U.S. universities at which immigrant founders studied includes dozens of large and small public and private universities across the nation, including those in the top tier like the Massachusetts Institute of Technology, Berkeley, and Stanford, and many in the second and third tiers. No single U.S. school dominated this list.

Educational attainment of select immigrant groups (2000 U.S. Census)

Our January 2007 study showed that immigrants from India, the United Kingdom, China, Taiwan, Japan, and Germany were the leading immigrant founders of technology and engineering companies established from 1995 to 2005. Indians founded more companies than the next four nationalities combined.

Figure 2
Fields of Highest Degree by Immigrant Founders of Engineering and Technology Companies

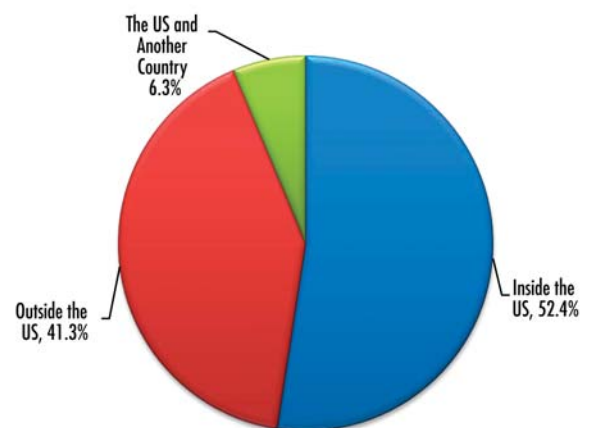


Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

Comparing these data with data from the 2000 U.S. Census, we can observe that these immigrants are also disproportionately founders of engineering and technology companies relative to their representation in the national population. Indian immigrants, for example, were only .36 percent of the U.S. population in 2000, but started 6.57 percent of all technology and engineering companies founded between 1995 and 2000. Likewise Taiwanese immigrants were 6.9 percent of the population, but they started 1.46 percent of total engineering and technology firms.

Census data also show that immigrants from India, the UK, China, Taiwan, Japan, and Germany tend to be better-educated than native U.S. citizens. Immigrants from India and Taiwan are the most highly educated of these immigrants, reflecting immigration patterns that are biased toward the well-educated. This contrasts, for example, with Chinese and European immigration, which has historically drawn from a significantly wider range of socio-economic and educational strata.

Figure 3
Where Immigrant Founders of Engineering and Technology Companies Received Their Highest Degrees



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

OUR FINDINGS

In 2000, less than a quarter of all native U.S.- and foreign-born residents held a bachelor's degree or higher, while 69.1 percent of Indian immigrants held such degrees, as did 66.6 percent of those from Taiwan and 42.7 percent from China. See Figure 4 for more detail.

Why They Came to the United States

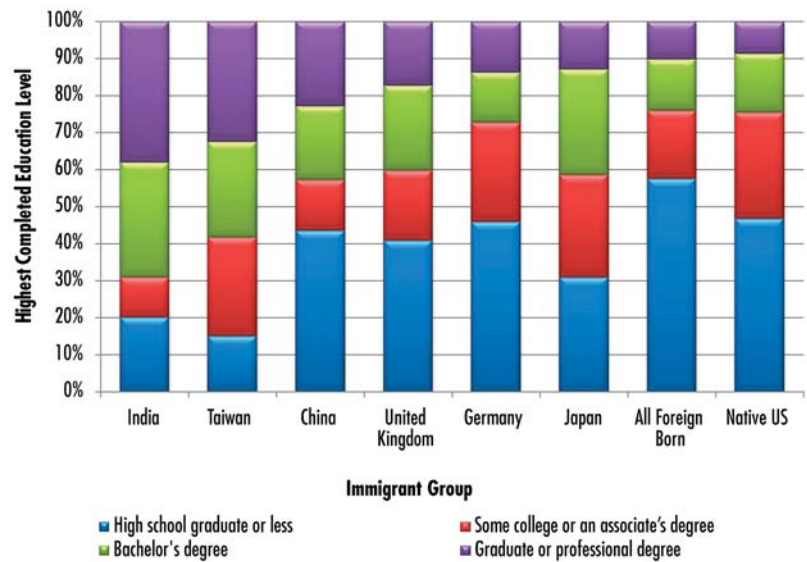
Very few immigrant key founders of engineering and high-technology companies say they entered the United States with the express intention of starting a new company. We found that 52.3 percent primarily came to study, 39.8 percent because of a job opportunity, and only 1.6 percent entered the United States for the sole purpose of entrepreneurship. See Figure 5. Those founders who were willing to disclose their entry-visa information cited the F1 student academic visa and the H1 temporary worker visa.

When They Came to the United States

The majority of the key founders who established engineering and technology businesses from 1995 to 2005 entered the country from 1980 to 1999. Moreover, a substantial majority (76.7 percent) entered the United States after 1980. See Figure 6.

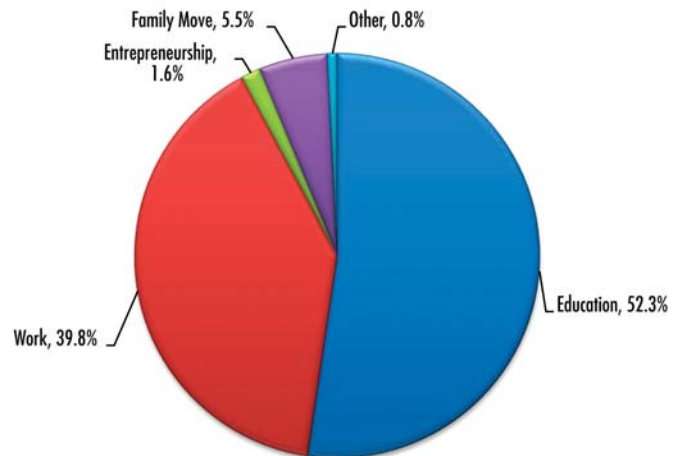
Together, these responses paint an interesting portrait of America's immigrant entrepreneurs. These are individuals who initially entered the United States either as students or as employees of corporations that sponsored their visas, but eventually they created new businesses. These founders are very well-educated, particularly in STEM disciplines, suggesting that research, technical education, and thought leadership are drivers of new-business generation. Additionally, we found an average 13.25-year lag between a key founder's arrival in the United States and firm formation.

Figure 4
Educational Attainment of Select Immigrant Groups
(2000 U.S. Census)



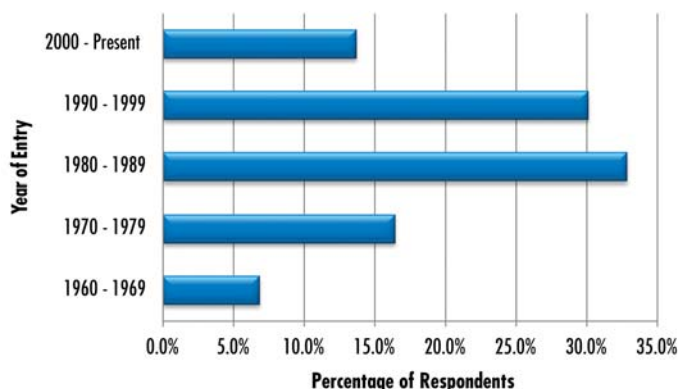
Source: U.S. Census Bureau (2000)^{2,3,4,5,6,7,8,9}

Figure 5
Primary Reason for Which Immigrant Founders of Engineering and Technology Companies Came to the United States



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

Figure 6
U.S. Immigrant Founders of Engineering and Technology Companies Year of Entry



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

Undergraduate Education of Immigrant Founders from India, China, and Taiwan

Immigrant groups from India, China, and Taiwan are of particular interest because of their strong presence within the U.S. engineering and technology workforce. Moreover, these groups are unique in terms of their educational and professional attainment. U.S. Census data reveal that the median household income for foreign-born individuals living in the United States is \$39,000, while Indian, Taiwanese, and Chinese foreign-borns enjoy median household incomes of \$69,000, \$59,000, and \$46,000, respectively. Thus this group is also relatively affluent.

There is a common belief that most Indian and Chinese entrepreneurs are graduates of a small cadre of elite institutions in their native countries. In reality, top-tier universities in these countries, such as the Indian Institutes of Technology (IIT) and Chinese universities such as Tsinghua and Fudan, produce only a small fraction of each country's engineering and technology graduates.

Our research team interviewed eighty-seven Indian, fifty-seven Chinese, and twenty-nine Taiwanese executives whom we had previously identified as key founders of U.S. engineering and technology companies founded from 1995 to

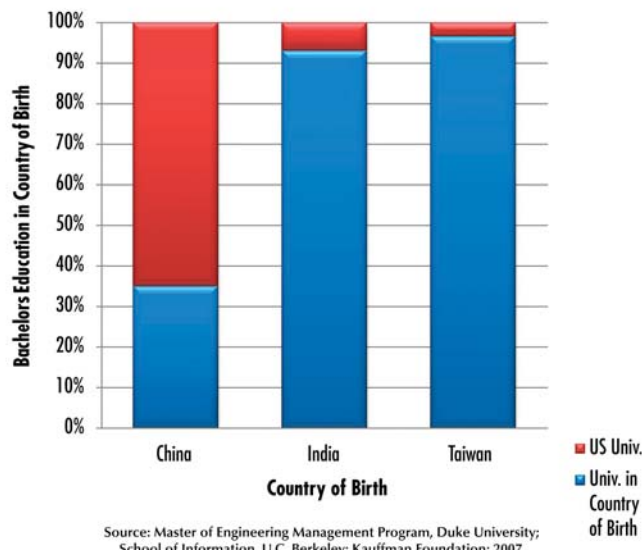
2005, and we asked where these individuals received their undergraduate education.

We found that a significantly greater number of Chinese founders received their education in the United States than those from Taiwan and India. This is due in part to the effects of the closure of all of the universities in China during the Cultural Revolution (1966–1976). University entrance exams were reinstated in the late 1970s, but it took decades to rebuild university faculty and programs.

Of those we interviewed, 64.9 percent of Chinese founders had received their undergraduate education in the United States, compared with 12 percent of those from India and 3.5 percent of those from Taiwan. A full breakdown of these statistics can be found in Figure 7.

The list of universities at which these immigrant founders received their U.S. education was as broad and diverse as the list of U.S. universities we observed for all immigrant groups. No single U.S. school dominated this list. We saw a similar pattern in India and to a lesser extent in China.

Figure 7
Undergraduate Education of Chinese, Indian, and Taiwanese Founders of Engineering and Technology Companies



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

India:

We found that India-born company founders of technology and engineering firms had received their education at a wide variety of universities in India. Only 15 percent had received their undergraduate education at one of the seven IIT campuses. The eighty-seven Indian founders surveyed accounted collectively for forty-two different institutions across the country, many of which are considered to be second- or third-tier universities. See Figure 8 (which excludes those with U.S. undergraduate degrees).

China:

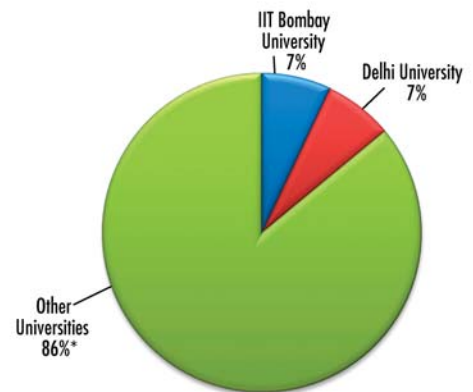
China-born founders of technology and engineering companies are more likely than their Indian counterparts to hold undergraduate degrees from a small group of elite universities, with 20 percent graduating from Peking University and 10 percent each from Nanjing, Shanghai Jiao Tong, and Tianjin University. This reflects the more centralized nature of the Chinese higher-education system. Nevertheless, the founders we surveyed who had earned bachelor's degrees from Chinese institutions represented thirteen different universities. See Figure 9 for details.

Taiwan:

A majority (55.2 percent) of Taiwanese founders received undergraduate degrees from two elite universities. National Taiwan University alone graduated nearly half (44.8 percent) of the company founders we interviewed. Nevertheless the diversity of educational institutions represented by the Taiwanese founders is striking for a nation of only 23 million people. See Figure 10.

These statistics reflect the differing educational systems in China, Taiwan, and India. India is home to a multitude of accredited and non-accredited colleges and universities. An ambitious undergraduate will likely be able to find entry into one of the country's many technical colleges. Though many undergraduate opportunities exist in India,¹⁰ master's programs are far fewer in number, and doctoral offerings are small and limited to the most exclusive universities.^{11,12} As a result, more Indian key founders enter the United States to pursue graduate rather than undergraduate degrees.

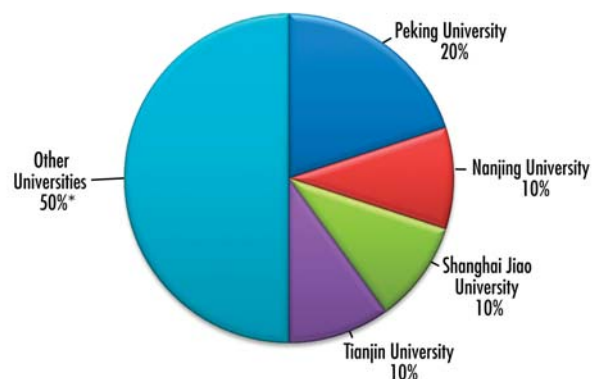
Figure 8
Undergraduate Education of Indian Founders in India



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

*Each university is less than 5% of the total: Bangalore University, BITS, Bombay University, Gujarat University, Hyderabad University, IIT Delhi, IIT Madras, Kurukshetra University, Madras University, Osmania University, Pune University, University of Mysore, plus 28 other universities.

Figure 9
Undergraduate Education of Chinese Founders in China



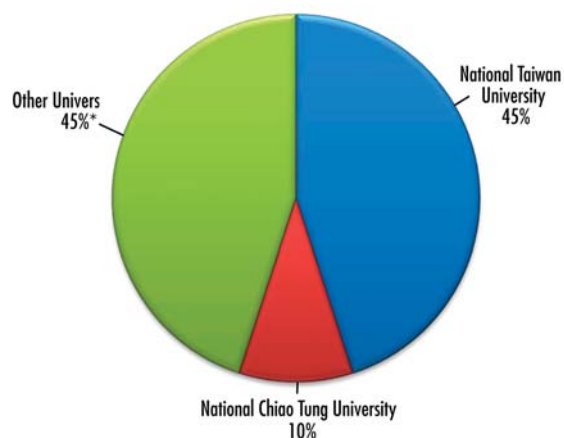
Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

*Each university is less than 5% of the total: Beijing Institute of Technology, Changsha Institute of Technology, Fudan University, Harbin Institute University, North China University of Water Conservancy and Electric Power, Shanghai Tongji University, University of Science and Technology of China, Xizmen University, Zhengzhou University

China has invested aggressively in expanding university enrollments in recent years. This accelerated expansion, along with the lasting effects of the closure of universities during the Cultural Revolution, means that educational quality is quite uneven among all but the top institutions. The graduates of lower-tier universities are often considered unemployable by multinational firms and may have difficulty in gaining admission to U.S. colleges. This helps explain why many students choose to come to the United States for undergraduate as well as graduate education.

Taiwan's top universities provide high-quality undergraduate education that prepares them for both higher education and work in the United States.

Figure 10
Undergraduate Education
of Taiwanese Founders in Taiwan



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

*Each university is less than 7% of the total: Chinese Cultural University, Eternal-life Christ College, Taiwan, Fun-Jen Catholic University, Hsiuping Institute of Technology, National Chengchi University, National Cheng Kung University, National Chung Hsien University, Taipei Vocational Commercial School, Taiwan Taugtung University

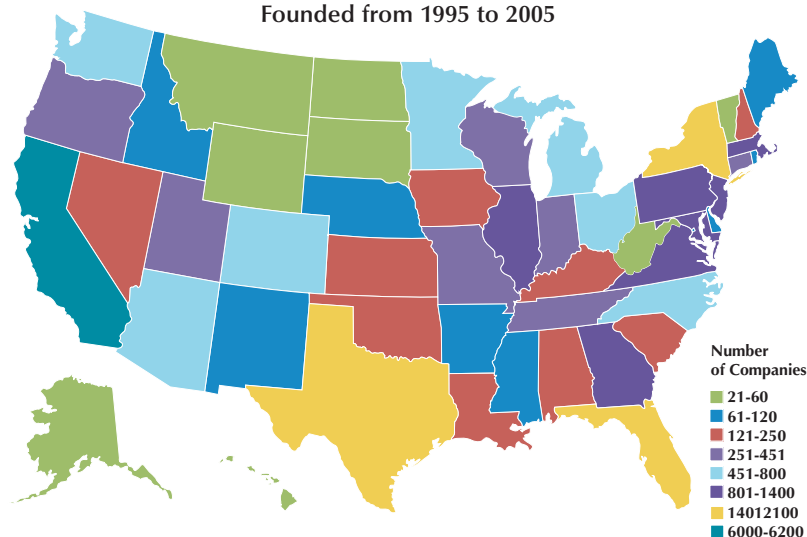
Immigration Patterns in Technology Centers

Our previous report showed that Silicon Valley and Research Triangle Park (RTP) had significantly higher concentrations of immigrants than their state averages. Census data show rapid increases in immigrant populations in these and other leading U.S. technology centers. We wanted to analyze this trend nationwide and establish a basis for future research.

From 1995 to 2005, more than 28,000 engineering and technology startups were created in the United States. By analyzing the address associated with each of these startups' headquarters, we were able to determine startup contributions at a state level. Figure 11 graphically portrays the number of startups associated with each of the fifty U.S. states from 1995 to 2005.

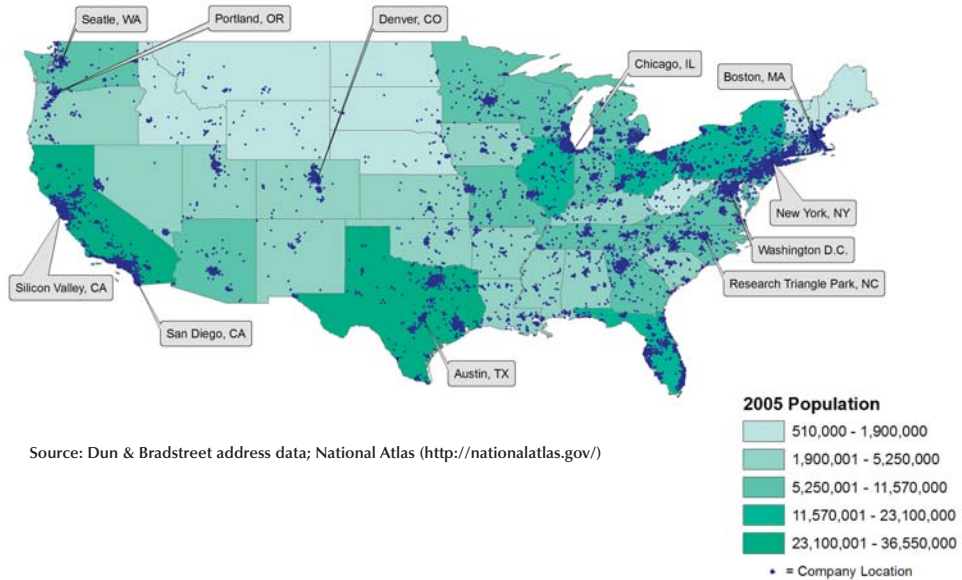
We examined engineering and technology startups in eleven of the largest centers of technology activity in the United States. Figure 12 shows a dot-density map, by county, of the 28,000 engineering and technology companies founded from 1995 to

Figure 11
Distribution of Engineering and Technology Companies
Founded from 1995 to 2005



Source: Dun & Bradstreet address data; National Atlas (<http://nationalatlas.gov/>)

Figure 12
The Location of Engineering and Technology Companies
Founded from 1995 to 2005



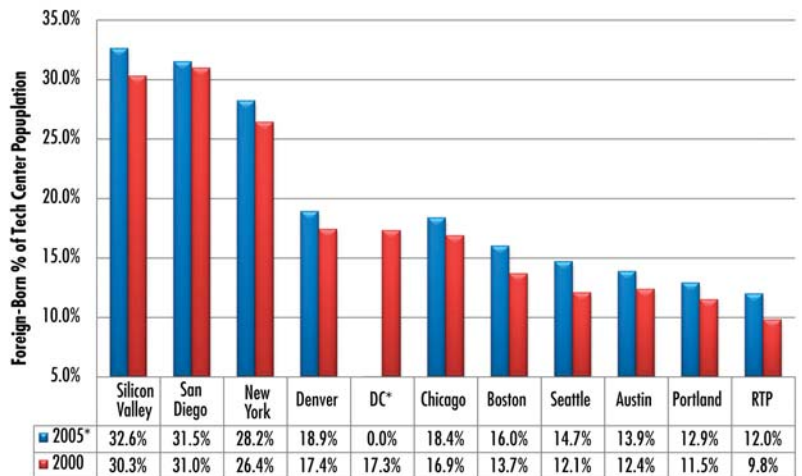
Source: Dun & Bradstreet address data; National Atlas (<http://nationalatlas.gov/>)

2005, along with the location of the eleven technology centers we analyzed.

The U.S. Census tracks foreign-born individuals living in counties throughout the country. Using the same zip code and county definitions employed to identify our eleven target tech centers, we tracked the growth in foreign-born populations from 2000 to 2005. These data, presented in Figure 13, show a 2 percent to 5 percent growth in the foreign-born populations in our target technology centers from 2000 to 2005. California's Silicon Valley and San Diego have the largest 2005 percentage of foreign-born populations, at 32.6 percent and 31.5 percent respectively. North Carolina's RTP had the lowest foreign-born population of the group, at 12 percent. A breakdown of these statistics by county can be found in Appendix D.

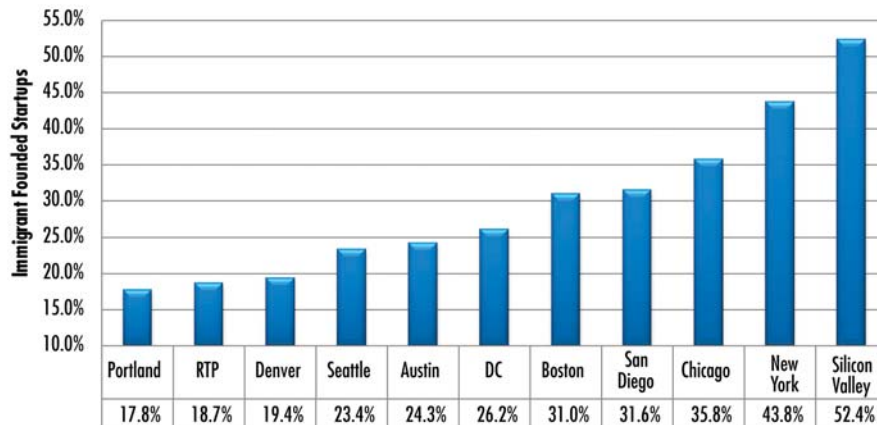
Our team interviewed representatives of more than 1,500 engineering and technology startups in eleven technology centers to learn

Figure 13
Foreign-Born as Percentage of Tech-Center Populations



Source: U.S. Census (2000 and 2005)^{13,14}; *2005 data is currently unavailable for many Washington DC and metro counties

Figure 14
Immigrant-Founded Engineering and Technology Companies
as Percent of Total Startups in Tech Centers



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007

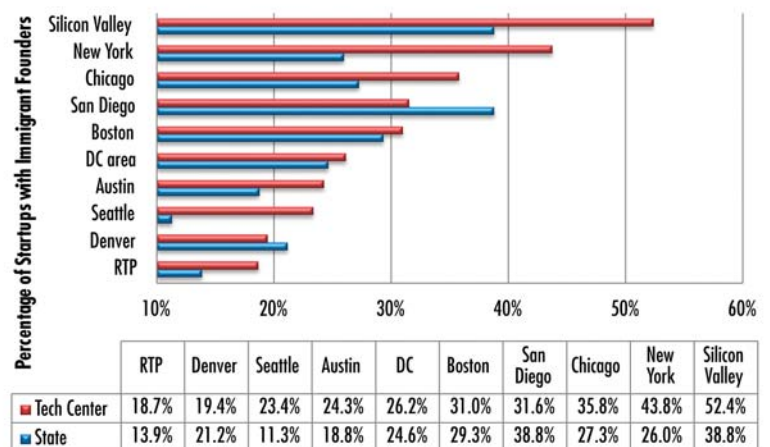
whether one or more of the company’s key founders were immigrants. We found that, on average, 31.4 percent of the startups located in these technology clusters had an immigrant key founder, compared with the national average of 25.3 percent.

Silicon Valley leads the nation in immigrant entrepreneurship: 52.4 percent of its technology and engineering firms have immigrant key founders. Silicon Valley is followed by New York City at 43.8 percent and Chicago at 35.8 percent. The technology centers with the lowest immigrant key founder presence were Denver at 19.4 percent, RTP at 18.7 percent, and Portland at 17.8 percent. A visual representation of these statistics can be found in Figure 14.

We compared these statistics with state-wide data that we gathered in our January 2007 study. The results in Figure 15 show that startups in and around major tech centers usually have a higher concentration of immigrant-founded startups than their state average. These data underscore the importance of the

localized clusters of technology and engineering activity in both attracting and supporting immigrant startup activity. The notable exceptions are Denver and San Diego. In both centers, a significant proportion of the technology and engineering activity is related to military activities, from which immigrants are often excluded.

Figure 15
Immigrant-Founded Engineering and Technology Companies
in Tech Centers vs. State Averages



Source: Master of Engineering Management Program, Duke University; School of Information, U.C. Berkeley; Kauffman Foundation; 2007. Insufficient data were available for the state of Oregon for a comparison with Portland.

Summary of Findings and Conclusions

Skilled immigrants have achieved great success in starting engineering and technology companies in the United States, and they contribute significantly to the country's economic growth over time. The purpose of this study was to understand in greater detail the educational backgrounds and career trajectories of these immigrant entrepreneurs, as well as to identify lessons for enhancing the competitiveness of the U.S. economy.

Census data show that the immigrants who are most likely to start engineering and technology businesses—from India, the UK, China, Taiwan, Japan, and Germany—are better educated than their native-born counterparts. Our research shows that these company founders are also better-educated than the norm in their respective immigrant groups. In fact, 96 percent of all immigrant entrepreneurs involved in engineering and technology in our study have completed a bachelor's degree, and 74 percent hold master's or PhD degrees. The great majority (75 percent) of their highest degrees are in science, technology, engineering, and mathematics-related fields.

Immigrant founders were educated in a diverse set of universities in their home countries and across the United States. No single U.S. institution stands out as a source of immigrant founders. Similarly, those who received their undergraduate degrees in India or China graduated from a diverse assortment of institutions. Even the famed Indian Institutes of Technology educated only 15 percent of Indian company founders.

More than half of the foreign-born founders of U.S. technology and engineering businesses initially came to the United States to study. Very few came with the sole purpose of starting a company. They typically founded companies after working and residing in America for an average of thirteen years.

Immigrant entrepreneurs are concentrated in the nation's leading technology centers. The regions with the largest immigrant populations also tend to have the greatest number of technology startups. On average, 31 percent of the engineering and technology companies founded from 1995 to 2005 in the eleven technology centers that we surveyed had an immigrant as a key founder. This contrasts with the national average of 25.4 percent. Tech centers with a disproportionate percentage of immigrant startups relative to their state averages include Silicon Valley, with 52.4 percent (compared with a state average of 38.8 percent); New York City with 43.8 percent (vs. 26 percent); Seattle with 23.4 percent (vs. 11.3 percent); and Research Triangle Park with 18.7 percent (vs. 13.9 percent).

Our research confirms that advanced education in science, technology, engineering, and mathematics is correlated with high rates of entrepreneurship and innovation. The U.S. economy depends upon these high rates of entrepreneurship and innovation to maintain its global edge.

Author Biographies

Dr. Gary Gereffi

Dr. Gary Gereffi is professor of sociology and director of the Center on Globalization, Governance & Competitiveness at Duke University. He holds a bachelor's degree from the University of Notre Dame and a PhD from Yale University. He has published several books and articles on business-government relations in various parts of the world. His recent books include: *The Value of Value Chains: Spreading the Gains from Globalization* (special issue of the *IDS Bulletin*, vol. 32, no. 3, July 2001), *Free Trade and Uneven Development: The North American Apparel Industry after NAFTA* (Temple University Press, 2002); and *The New Offshoring of Jobs and Global Development* (International Labor Organization, 2006).

Ben Rissing

Ben Rissing is a research scholar with Duke University's Pratt School of Engineering and the project manager of Duke's engineering outsourcing and immigration research teams. He has a bachelor's in mechanical engineering from the University of Virginia and a master's in engineering management from Duke University. He has been involved in a variety of initiatives ranging from engineering design/technology commercialization to cardiovascular laboratory research and public-policy development in Washington, DC.

Dr. AnnaLee Saxenian

AnnaLee Saxenian has made a career of studying regional economies and the conditions under which people, ideas, and geographies combine and connect to hubs of economic activity. Her latest book, *The New Argonauts:*

Regional Advantage in a Global Economy (Harvard University Press, 2006), explores how and why immigrant engineers from Silicon Valley are transferring their technology entrepreneurship to emerging regions in their home countries—China and India in particular—and launching companies far from established centers of skill and technology. The “brain drain,” she argues, has now become “brain circulation”—a powerful economic force for the development of formerly peripheral regions that is sparking profound transformations in the global economy. Saxenian also is the author of *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Harvard University Press, 1994). She is currently dean and professor at the U.C. Berkeley School of Information, and she has a PhD from MIT and a bachelor's from Williams College.

Vivek Wadhwa

Vivek Wadhwa is a technology entrepreneur and an executive-in-residence/adjunct professor for the Pratt School of Engineering at Duke University. He is an active mentor and advisor to various startups and also is a columnist for *BusinessWeek.com*. Wadhwa was named a “Leader of Tomorrow” by *Forbes.com*, and his company, Relativity Technologies, was named one of the twenty-five “coolest” companies in the world by *Fortune* magazine. Mr. Wadhwa holds a bachelor's in Computing Studies from Canberra University in Australia and a master's degree from New York University.

Appendix A: High Technology Industry Definition

U.S. Government-defined Standard Industrial Classification (SIC) Codes

| Industry | SIC |
|--|---|
| Semiconductors | |
| Special industry machinery | 3559 |
| Semiconductors and related devices | 3674 |
| Instruments for measuring and testing electricity and electrical signals | 3825 |
| Computers/Communications | |
| Electronic computers | 571 |
| Computer storage devices | 3572 |
| Computer peripheral equipment, n.e.c. | 3577 |
| Printed circuit boards | 3672 |
| Electronic components, n.e.c. | 3679 |
| Magnetic and optical recording media | 3695 |
| Telephone and telegraph apparatus | 3661 |
| Radio and television broadcasting and communications equipment | 3663 |
| Communications equipment, n.e.c. | 3669 |
| Bioscience | |
| Drugs | 283 |
| Surgical medical and dental instruments and supplies | 384 |
| Medical laboratories | 8071 |
| Laboratory apparatus and analytical, optical, measuring, and controlling | 382 (except instruments 3822, 3825 and 3826) |
| Defense/Aerospace | |
| Small arms ammunition | 348 |
| Electron tube | 3671 |
| Aircraft and parts | 372 |
| Guided missiles and space vehicles | 376 |
| Tanks and tank components | 3795 |
| Search, detection, navigation, guidance, aeronautical, and nautical systems Instruments and equipment | 381 |

Environmental

| | |
|---|------|
| Industrial and commercial fans and blowers and air-purification equipment | 3564 |
| Service industry machinery, n.e.c. | 3589 |
| Sanitary services | 495 |
| Scrap and waste materials | 5093 |

Software

| | |
|--|------|
| Computer programming services | 7371 |
| Prepackaged software | 7372 |
| Computer-integrated systems design | 7373 |
| Computer processing, and data-preparation and -processing services | 7374 |
| Information-retrieval services | 7375 |

Innovation/Manufacturing-Related Services

| | |
|--|------|
| Computers and computer peripheral equipment and software (wholesale trade) | 5045 |
| Electronics parts and equipment, n.e.c. (wholesale trade) | 5065 |
| Computer facilities management services | 7376 |
| Computer rental and leasing | 7377 |
| Computer maintenance and repair | 7378 |
| Computer-related services, n.e.c. | 7379 |
| Engineering services | 8711 |
| Research and testing services | 873 |

Note: Our SIC listings differ slightly from those employed by AnnaLee Saxenian in her 1999 report "Silicon Valley's New Immigrant Entrepreneurs." Our present research focuses strictly on engineering and technology companies. As a result, we did not analyze professional services companies (SIC 275, 276, 279, 731, 732, 733, 736, 81, 8721, 8713, 872, and 874), which were included in Saxenian's 1999 study but were outside the purview of the engineering and technology disciplines.

Appendix B:

Technology Center Zip Codes

Chicago, Illinois

Cook County

| | |
|--------------|---|
| Berwyn | 60402 |
| Blue Island | 60406, 60827 |
| Burbank | 60459 |
| Calumet City | 60409 |
| Chicago | 60601-26, 60628-34, 60636-41, 60643-47, 60649, 60651-57, 60659-61, 60663-64, 60666, 60668-70, 60673-75, 60677-82, 60684-91, 60693-97, 60699, 60701-02, 60706-07, 60712, 60803-05, 60827 |

| | |
|------------------------------|---------------------------|
| Chicago Hght. Ctry Club Hill | 60411-12 |
| Des Plaines | 60478 |
| Elgin | 60016-19 |
| Evanston | 60120-21, 60123-24, 60192 |
| Harvey | 60201-04, 60208, 60209 |
| Hickory Hills | 60426, 60428 |
| North Lake | 60457 |
| Oak Forest | 60164 |
| Palos Heights | 60452 |
| Palos Hills | 60463 |
| Park Ridges | 60465 |
| Rolling Mdws | 60068 |
| | 60008 |

DuPage County

| | |
|--------------|--|
| Adisson | 60101 |
| Aurora | 60502-07, 60568, 60572, 60598-99 |
| Bartlett | 60103, 60133 |
| Batavia | 60510, 60539 |
| Bensenville | 60105-06, 60399 |
| Bolingbrook | 60439-40, 60490 |
| Burr Ridge | 60527 |
| Carol Stream | 60116, 60122, 60125, 60128, 60132, 60188, 60197, 60199 |

| | |
|---------------|---|
| Clarendon Hls | 60514 |
| Darien | 60516 |
| Downers Grv. | 60515-17 |
| Elk Grove Vlg | 60007, 60009 |
| Elmhurst | 60126 |
| Glen Ellyn | 60137, 60138 |
| Glendale Hght | 60137, 60139 |
| Hanover Park | 60133 |
| Hinsdale | 60521-22, 60570 |
| Itasca | 60143 |
| Lisle | 60532 |
| Lombard | 60148 |
| Naperville | 60540, 60563-67 |
| Oak Brook | 60521-23, 60561, 60570 |
| Oakbrook Trc | 60181 |
| Roselle | 60172 |
| Schaumburg | 60159, 60168-69, 60173, 60179, 60193-96 |

| | |
|--------------|--------------|
| St. Charles | 60174-75 |
| Villa Park | 60181 |
| Warrenville | 60555 |
| Wayne | 60184 |
| West Chicago | 60185-86 |
| Westmont | 60559 |
| Wheaton | 60187, 60189 |
| Willowbrook | 60527 |
| Winfield | 60190 |
| Wood Dale | 60191, 60399 |
| Woodridge | 60517 |

| | |
|--------------------|---|
| Lake County | 60002, 60010-11, 60015, 60020-21, 60030-31, 60035, 60037, 60040-42, 60044-51, 60061, 60069, 60073-74, 60079, 60083-85, 60087, 60089, 60092, 60096, 60099, 60102 |
|--------------------|---|

| | |
|--------------------|---|
| Will County | 60401, 60403-04, 60408, 60410, 60417, 60421, 60423, 60431-36, 60439-42, 60446, 60448, 60449, 60451, 60468, 60481, 60490-91, 60544, 60585-86, 61841, 62707 |
|--------------------|---|

| | |
|--------------------|--|
| Lake County | 46303, 46307-08, 46311-12, 46373 |
| Gary | 46401-11 |
| Hammond | 46319-27, 47854, 46342, 46356, 46405, 46410-11, 46321, 46342, 46375-76, 46373, 46394 |

| | |
|-----------------------|---|
| Kenosha County | 53102, 53104, 53109, 53128, 53140-44, 53150, 53158-59, 53168, 53181 |
|-----------------------|---|

Silicon Valley, CA

Santa Carla County All

| | |
|-----------------------|-----------------|
| Alameda County | |
| Fremont | 94536-39, 94555 |
| Fremont | 94555 |
| Union City | 94587 |
| Newark | 94560 |

| | |
|-------------------------|----------|
| San Maten County | |
| Menlo Park | 94025 |
| Atherton | 94027 |
| Redwood City | 94061-65 |
| San Carlos | 94070 |
| Belmont | 94002 |
| San Mateo | 94400-03 |
| Foster City | 94404 |
| East Palo Alto | 94303 |

| | |
|--------------------------|----------|
| Santa Cruz County | |
| Scotts Valley | 95066-67 |

Research Triangle Park, NC

| | |
|-------------|-------------------------------|
| Apex | 27502 |
| Carborro | 27510 |
| Cary | 27511-13, 27518-19 |
| Chapel Hill | 27514-17, 27599 |
| Apex | 27523, 27539 |
| Morrisville | 27560 |
| Wake Forest | 27587-88 |
| Raleigh | 27601-26 |
| Durham | 27701-13, 27715, 27717, 27722 |

Denver, CO

| | |
|--------|--|
| Denver | 80299, 80295-93, 80291-90, 80281-79, 80274-73, 80271, 80266-59, 80257-56, 80252-46, 80244-43, 80241, 80239-14, 80212-01, 80127, 80123, 80033, 80031-30, 80022, 80014, 80012, 80002 |
|--------|--|

Seattle, WA**King County**

| | |
|---------------|--|
| Algona | 98001 |
| Beaux Arts | 98004 |
| Bellevue | 98004-09, 98015 |
| Black Diamond | 98010 |
| Bothell | 98011-12, 98021, 98028, 98041, 98082, 98146, 98148, 98166, 19168 |
| Carnation | 98014 |
| Clyde Hill | 98004 |
| Covington | 98042 |
| Des Moines | 98148, 98198 |
| Duvall | 98019 |
| Enumclaw | 98022 |
| Federal Way | 98001, 98003, 98023, 98063, 98093 |
| Hunts Point | 98004 |
| Issaquah | 98006, 98027, 98029, 98075 |
| Kenmore | 98028 |
| Kent | 98030-32, 98035, 98042, 98064, 98089 |
| Kirkland | 98033-34, 98083 |
| Lake Fst Park | 98155 |
| Maple Valley | 98038 |
| Medina | 98039 |
| Mercer Island | 98040 |
| Mill Creek | 98012, 98082 |
| Newcastle | 98056, 98059 |
| Normandy Prk | 98148, 98166, 98198 |
| North Bend | 98045, 98068 |
| Pacific | 98047 |
| Redmond | 98052-53, 98073, 98074 |
| Renton | 98055-59 |
| Seatac | 98148, 98158, 98168, 98188, 98198 |
| Seattle | 98101-19, 98121-22, 98124-27, 98129, 98131-34, 98136, 98138-39, 98141, 98144-46, 98148, 98151, 98154-55, 98158, 98160-61, 98164-66, 98168, 98170-71, 98174-75, 98177-78, 98181, 98184-85, 98188, 98190, 98194, |

| | |
|-----------------|-----------------------------------|
| 98195, 98198-99 | |
| Shoreline | 98133, 98155, 98177 |
| Skykomish | 98288 |
| Snoqualmie | 98065, 98068 |
| Tukwila | 98108, 98138, 98168, 98178, 98188 |
| Woodinville | 98072, 98077 |
| Yarrow Point | 98004 |

Kitsap County

| | |
|--------------|------------------------|
| Bainbridge | 98110 |
| Bremerton | 98310-12, 98314, 98337 |
| Port Orchard | 98366-67 |
| Poulsbo | 98370 |

Pierce County

| | |
|---------------|---|
| Bonney Lake | 98390-91 |
| Buckley | 98321 |
| Carbonado | 98323 |
| Dupont | 98303, 98327 |
| Eatonville | 98328 |
| Edgewood | 98371-72, 98390 |
| Fife | 98424 |
| Fircrest | 98466 |
| Gig Harbor | 98329, 98332, 98335 |
| Lakewood | 98409, 98439, 98492, 98496-99 |
| Milton | 98354 |
| Orting | 98360 |
| Puyallup | 98371-75 |
| Roy | 98580 |
| Ruston | 98407 |
| South Prairie | 98385 |
| Steilacoom | 98388 |
| Sumner | 98352, 98390-91 |
| Tacoma | 98401-19, 98421-22, 98424, 98430-31, 98433, 98438-39, 98442-48, 98450, 98455, 98460, 98464-67, 98471, 98477, 98481, 98490, 98492-93, 98496-99 |

| | |
|-------------|-----------------|
| Univ. Place | 98464, 98466-67 |
| Wilkeson | 98396 |

Snohomish County

| | |
|----------------|---|
| Arlington | 98223 |
| Bothell | 98011-12,, 98021, 98028, 98041, 98082, 98036 |
| Darrington | 98241 |
| Edmonds | 98020, 98026 |
| Everett | 98201, 98203-08, 98213 |
| Gold Bar | 98251 |
| Granite Falls | 98252 |
| Index | 98256 |
| Lake Stevens | 98258 |
| Lynnwood | 98036-37, 98046, 98087 |
| Marysville | 98270-71 |
| Mill Creek | 98012, 98082 |
| Monroe | 98272 |
| Mountlake Ter. | 98043 |
| Mukilteo | 98275 |
| Snohomish | 98290-91, 98296 |
| Stanwood | 98282, 98292 |
| Sultan | 98294 |
| Woodway | 98020 |

APPENDIX B: TECHNOLOGY CENTER ZIP CODES

Austin, TX

Bastrop County

| | |
|------------|-------|
| Bastrop | 78602 |
| Elgin | 78621 |
| Smithville | 78957 |

Caldwell County

| | |
|------------|-------|
| Lockhart | 78644 |
| Luling | 78648 |
| Martindale | 78655 |

Hays County

| | |
|-----------------|----------|
| Buda | 78610 |
| Dripping Sprgs. | 78620 |
| Kyle | 78640 |
| Mountain City | 78610 |
| Niederwald | 78640 |
| San Marcos | 78666-67 |
| Uhland | 78640 |
| Wimberley | 78676 |
| Woodcreek | 78676 |

Travis County

| | |
|---------------|---|
| Austin | 73301, 73344, 78701-05, 78708-39, 78741-42, 78744-69, 78772, 78778-81, 78783, 78785-86, 78788-89, 78798-99 |
| Briarcliff | 78669 |
| Creedmoor | 78610 |
| Jonestown | 78645 |
| Lago Vista | 78645 |
| Lakeway | 78734, 78738 |
| Leander | 78641, 78645, 78646 |
| Manor | 78653 |
| Pflugerville | 78660, 78691 |
| Rollingwood | 78746 |
| San Leanna | 78748 |
| Sunset Valley | 78735, 78745 |
| The Hills | 78738 |
| Webberville | 78621, 78653 |
| W. Lake Hills | 78746 |
| Westlake | 76262 |

Williamson County

| | |
|--------------|---------------------|
| Cedar Park | 78613, 78630 |
| Florence | 76527 |
| Georgetown | 78626, 78627-28 |
| Granger | 76530 |
| Hutto | 78634 |
| Jarrell | 76537 |
| Leander | 78641, 78645, 78646 |
| Liberty Hill | 78642 |
| Taylor | 76574 |
| Thrall | 76578 |
| Weir | 78674 |

San Diego, CA

San Diego County

| | |
|-------------|------------------------|
| Carlsbad | 92008-11, 92013, 92018 |
| Chula Vista | 91909-15, 91921 |
| Coronado | 92118, 92178 |
| Del Mar | 92014 |
| El Cajon | 92019- 22, 92090 |

| | |
|---------------|---|
| Encinitas | 92023-24 |
| Escondido | 92025-27, 92029-30, 92033, 92046 |
| Imperial Bch. | 91932, 91933 |
| La Mesa | 91941-44 |
| Lemon Grove | 91945-46 |
| National City | 91950-51 |
| Oceanside | 92049, 92051-52, 92054-57 |
| Poway | 92064, 92074 |
| San Diego | 92101-24, 92126-40, 92142-43, 92145, 92147, 92149-50, 92152-55, 92158-79, 92182, 92184, 92186-87, 92190-99 |
| San Marcos | 92069, 92078-79, 92096 |
| Santee | 92071-72 |
| Salona beach | 92075 |
| Vista | 92081, 92083-85 |
| Ramona | 92065 |
| Rancho Santa | 92067, 92091 |
| Cardiff | 92007 |
| Spring Valley | 91976-79 |
| La Jolla | 92037-39, 92092-93 |

Imperial County

| | |
|---------------|--|
| Brawley | 92227 |
| Orange County | |
| Irvine | 92602-04, 92606, 92612, 92614, 92616-20, 92623, 92650, 92697, 92709-10 |

Riverside County

| | |
|--------------|---------------------------|
| Widomar | 92595 |
| Murrieta | 92562-64 |
| Palm Dessert | 92210-11, 92255, 92260-61 |

San Bernardino County

| | |
|-------|--------------|
| Chino | 91708, 91710 |
|-------|--------------|

Los Angeles County

| | |
|-------------|--|
| Los Angeles | 90001-84, 90086-89, 90093-96, 90099, 90101-03, 90189, 90230, 91331 |
|-------------|--|

Portland, OR

Multnomah County

| | |
|--------------|---|
| Fairview | 97024 |
| Gresham | 97030, 97080, 97089 |
| Happy Valley | 97015, 97086, 97089, 97266 |
| Maywood Prk. | 97220 |
| Portland | 97086, 97201-33, 92736, 92738-41, 92751, 92753-56, 92758-59, 92766-69, 92771-72, 92780-83, 92786, 92790-94, 92796, 92798-99 |
| Troutdale | 97060 |
| Wood Village | 97060 |

Clackamas County

| | |
|-------------|---|
| Canby | 97013 |
| Damascus | 97009, 97015, 97030, 97080, 97089, 97236 |
| Estacada | 97023 |
| Galdstone | 97027 |
| Lake Oswego | 97034-35 |
| Milwake | 97222, 97267, 97269 |

(continued next page)

Molalla 97038
 Oregon City 97045
 Sandy 97055
 West Linn 97034, 97068
 Wilsonville 97070

Washington County

Banks 97106, 97109, 97125
 Beaverton 97005-08, 97075-78
 Cornelius 97113
 Durham 97224
 Forest Grove 97116
 Gaston 97119
 Hillsboro 97006, 97123-24
 King City 97224
 North Plains 97133
 Sherwood 97140
 Tigard 97223-24, 97281
 Tualatin 97062

Tillamook County

Tillamook 97107, 97118, 97130-31, 97136,
 97141, 97147, 97135

Yamhill County

Yamhill 97101, 97111, 97114-15, 97127-28,
 97132, 97378, 97396, 97148

New York, NY

New York & Suburban

10001-07, 10009-41, 10044-45,
 10048, 10055, 10060, 10069, 10090,
 10095, 10098-99, 10103-07,
 10110-12, 10115, 10118-23, 10128,
 10151-55, 10158, 10161-62,
 10165-78, 10199, 10270-71,
 10278-82, 11201-49, 11251-52,
 11254-56, 10451-75, 10301-12,
 10314, 11351-52, 11354-75,
 11377-80, 11385-86, 08817, 08820,
 08837, 08899, 07102-08, 07112,
 07114, 07083, 07470, 10601,
 10603-11, 08618-20, 08628-29,
 08638, 08641, 08648, 08690-91,
 08618, 08628, 08638, 08014,
 06901-03, 06905-07, 06910,
 06850-51, 06853-55, 06810-12,
 06497, 06614-15, 06510-15,
 06510-15, 06517-19, 06524-25,
 06460-61, 12601, 12603, 12550,
 12553, 10940, 10941, 12401,
 06790-91

Boston, MA

Greater Boston & Suburban Areas

02108-11, 02113-22, 02124-36,
 02163, 02199, 02203, 02210, 02215,
 02222, 02283-84, 02301-02,
 01840-41, 01843, 01850-52, 01854,
 02138-39, 02140-42, 02163,

02445-46, 01830, 01832-33, 01835,
 02458-62, 02464-65, 02169-71,
 01701-02, 01420, 02148, 02155,
 00801, 02184, 01880, 02127,
 02451-53, 02143- 45

Washington, DC

Washington DC & Suburban Areas

20001-12, 20016-20, 20024, 20032,
 20036-37, 20045, 20260, 20374,
 20376, 20388, 20391, 20398

Arlington 22201-09

Alexandria 22301-15, 22331-32

Reston 20190-91, 20194, 20170-71,
 20190-91, 20194, 22401, 22405-08

Bethesda 20814-17, 20901-06, 20910, 20912,
 20877-79, 20882, 20886, 21701-04,
 20851-55, 20500

Appendix C:

T-tests for the Equality of Means

This appendix contains a series of independent sample t-tests that our group calculated to measure the similarity between our survey populations and the larger universe of startups. Our records from Dun & Bradstreet (D&B) contain information on engineering and technology startup companies' 2005 sales, total employees, and employees working at company headquarters. We utilized these statistics to compare the statistical similarity of our pool of startup survey respondents with the larger body of startups at the national, state, and tech-center level.

Table C.1 displays the similarity between all 1995–2005 startups listed in the D&B database and the 144 that shared in-depth founder data with our group. Based on the 2005 sales, total employees, and headquarter (HQ) employees, these two groups appear to be statistically similar.

C.1 In-Depth Founder Interviews

t-test for the equality of means, equal variance assumed

2005 Sales $t(26,963) = 0.24, p = 0.811$

Employees at HQ $t(26,964) = -.033, p = 0.739$

Total Employees $t(26,964) = 0.21, p = 0.833$

The C.2 tables contain t-tests comparing our startup respondents in a given technology center with the full population startups in each area. Based on the 2005 sales, total employees, and HQ employees, the survey respondents for each of our eleven target tech centers are statistically similar to the larger body of startups in the area.

C.2 Austin, TX

t-test for the equality of means, equal variance assumed

2005 Sales $t(350) = -0.55, p = 0.586$

Employees at HQ $t(350) = -0.37, p = 0.716$

Total Employees $t(350) = -0.53, p = 0.596$

C.2 Boston, MA

t-test for the equality of means, equal variance assumed

2005 Sales $t(491) = 0.67, p = 0.505$

Employees at HQ $t(491) = 0.53, p = 0.599$

Total Employees $t(491) = 0.11, p = 0.909$

C.2 Chicago, IL

t-test for the equality of means, equal variance assumed

2005 Sales $t(857) = 0.41, p = 0.680$

Employees at HQ $t(857) = -0.19, p = 0.850$

Total Employees $t(857) = -0.60, p = 0.549$

C.2 Denver, CO

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-----------------------------|
| 2005 Sales | $t(272) = 0.01, p = 0.995$ |
| Employees at HQ | $t(272) = 0.50, p = 0.619$ |
| Total Employees | $t(272) = -0.15, p = 0.883$ |

C.2 New York, NY

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-------------------------------|
| 2005 Sales | $t(1,241) = -0.62, p = 0.535$ |
| Employees at HQ | $t(1,242) = 0.38, p = 0.701$ |
| Total Employees | $t(1,242) = -0.48, p = 0.630$ |

C.2 Portland, OR

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-----------------------------|
| 2005 Sales | $t(326) = 0.41, p = 0.976$ |
| Employees at HQ | $t(326) = -0.40, p = 0.691$ |
| Total Employees | $t(326) = -0.13, p = 0.896$ |

C.2 RTP, NC

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-----------------------------|
| 2005 Sales | $t(289) = -0.86, p = 0.393$ |
| Employees at HQ | $t(289) = -0.72, p = 0.475$ |
| Total Employees | $t(289) = -0.58, p = 0.562$ |

C.2 San Diego, CA

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-------------------------------|
| 2005 Sales | $t(1,297) = 0.81, p = 0.420$ |
| Employees at HQ | $t(1,297) = -0.50, p = 0.618$ |
| Total Employees | $t(1,297) = -0.91, p = 0.364$ |

C.2 Seattle, WA

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-----------------------------|
| 2005 Sales | $t(578) = -0.26, p = 0.793$ |
| Employees at HQ | $t(578) = 0.28, p = 0.781$ |
| Total Employees | $t(578) = -0.37, p = 0.714$ |

C.2 Silicon Valley, CA

t-test for the equality of means, equal variance assumed

| | |
|-----------------|-----------------------------|
| 2005 Sales | $t(413) = 0.43, p = 0.669$ |
| Employees at HQ | $t(413) = -0.01, p = 0.989$ |
| Total Employees | $t(413) = 0.23, p = 0.820$ |

C.2 Washington DC

t-test for the equality of means, equal variance assumed

| | |
|-----------------|----------------------------|
| 2005 Sales | $t(882) = 0.19, p = 0.847$ |
| Employees at HQ | $t(882) = 0.61, p = 0.543$ |
| Total Employees | $t(882) = 1.06, p = 0.291$ |

APPENDIX C: T-TESTS FOR THE EQUALITY OF MEANS

The C.3 tables contain t-tests comparing statistical comparisons of data presented in our 2007 study “America’s New Immigrant Entrepreneurs.” Based on 2005 sales, total employees, and HQ employees, we show that our survey respondents at a state level are statistically similar to the larger population of state startups. Here we highlight the following states used in Figure 15 of this paper: Texas, Massachusetts, Illinois, Colorado, New York, Oregon, North Carolina, California, and Washington State. Please note that no t-test was conducted for Washington D.C., because its suburbs extend into both Virginia and Maryland areas.

C.3 Texas

t-test for the equality of means, equal variance assumed

2005 Sales $t(2,052) = -0.72, p = 0.467$

Employees at HQ $t(2,052) = -0.66, p = 0.510$

Total Employees $t(2,052) = -0.80, p = 0.422$

C.3 Texas

t-test for the equality of means, equal variance assumed

2005 Sales $t(2,052) = -0.72, p = 0.467$

Employees at HQ $t(2,052) = -0.66, p = 0.510$

Total Employees $t(2,052) = -0.80, p = 0.422$

C.3 Massachusetts

t-test for the equality of means, equal variance assumed

2005 Sales $t(1,264) = -0.50, p = 0.615$

Employees at HQ $t(1,264) = -0.18, p = 0.854$

Total Employees $t(1,264) = -0.30, p = 0.772$

C.3 Illinois

t-test for the equality of means, equal variance assumed

2005 Sales $t(1,010) = -0.57, p = 0.570$

Employees at HQ $t(1,010) = -0.39, p = 0.693$

Total Employees $t(1,010) = -0.64, p = 0.521$

C.3 Colorado

t-test for the equality of means, equal variance assumed

2005 Sales $t(636) = -0.07, p = 0.944$

Employees at HQ $t(636) = 0.52, p = 0.604$

Total Employees $t(636) = -0.01, p = 0.996$

C.3 New York

t-test for the equality of means, equal variance assumed

2005 Sales $t(1,800) = -0.37, p = 0.715$

Employees at HQ $t(1,800) = 0.10, p = 0.918$

Total Employees $t(1,800) = -0.19, p = 0.848$

C.3 Oregon

t-test for the equality of means, equal variance assumed

2005 Sales $t(306) = -0.71, p = 0.478$ Employees at HQ $t(306) = -0.13, p = 0.894$ Total Employees $t(306) = -0.39, p = 0.728$ **C.3 North Carolina**

t-test for the equality of means, equal variance assumed

2005 Sales $t(595) = -0.02, p = 0.982$ Employees at HQ $t(595) = -0.02, p = 0.981$ Total Employees $t(595) = -0.11, p = 0.910$ **C.3 California**

t-test for the equality of means, equal variance assumed

2005 Sales $t(6,203) = -0.61, p = 0.542$ Employees at HQ $t(6,203) = -1.30, p = 0.193$ Total Employees $t(6,203) = -0.71, p = 0.474$ **C.3 Washington State**

t-test for the equality of means, equal variance assumed

2005 Sales $t(679) = -0.42, p = 0.672$ Employees at HQ $t(679) = -0.81, p = 0.415$ Total Employees $t(679) = -0.26, p = 0.798$

*T-test data in C.1 – C.3 tables exclude companies with fewer than 2 percent of their total employees located in their HQ location.

Appendix D: Methodology for January 2007 Study—America’s New Immigrant Entrepreneurs

Data Acquisition

To quantify the economic contributions of immigrant entrepreneurs to the U.S. economy, we sought to identify the direct involvement of immigrants in the founding of engineering and technology companies. We obtained a list of all such companies founded in the United States in the last ten years (1995-2005) from Dun & Bradstreet’s (D&B) Million Dollar Database. This contains U.S. companies with more than \$1 million in sales; twenty or more employees; and company branches with fifty or more employees. This database is commonly used by researchers and is considered a source of reliable data.

This D&B database search produced a listing of 28,766 companies. A very small portion of these were older companies with recent changes in control or corporate restructurings/mergers, so these were omitted from our dataset. Included below is a list of key data that D&B provides:

- Company name
- Type of company
- City, state, zip code
- Phone number
- Company Web site
- Sales
- Total number of employees
- Select executive officer information
- Primary standard industrial classification

For the purposes of our study, the words technology and engineering indicate that the main work of the company is to use technology or engineering to design or manufacture products or services. Our definition of engineering and technology firms thus includes the following industry groups, defined with three- and four-digit U.S. Government Standard Industrial Classification (SIC) codes: semiconductors, computers/communications, biosciences, defense/aerospace, environmental, software, and innovation/manufacturing-related services. A full listing of the SIC codes associated with each industry group is present in Appendix A. These are the same engineering and technology SIC codes used in Saxenian’s original research. We excluded some professional services SIC codes, that were included in Saxenian’s 1999 study but were outside the purview of the engineering and technology disciplines.

Company entries within each SIC code were randomized using a Microsoft Excel random-number assignment. Researchers were then assigned random listings of 500 companies, with representative entries from each of the main engineering and technology industry groups.

Our research team then made thousands of unsolicited phone calls to these companies. We asked whether one or more immigrant key founders had established the company, and if so, what their nationality was. This became the source of the data presented in this report.

Definition of Key Founder

In most engineering or technology companies, the key founders are the president/chief executive officer or the head of development/chief technology officer. Other roles such as finance, marketing, human resources (HR), and legal can be very important in startups. For the purposes of our research, however, we chose to use a narrow definition of key founder and exclude the latter roles.

Definition of an Immigrant and Immigrant-Founded Company

An immigrant is a person who was born as a citizen of another country and subsequently moved to the United States at some point in his or her lifetime. Immigrant-founded companies are those having one or more immigrants as key founders.

Data Collection

A team of fifteen graduate students and research assistants telephoned CEOs, HR managers and other knowledgeable company employees. After a two-sentence introduction of the student researcher, Duke University, and the research project, they were asked:

- Were any of your company's key founders immigrants to the United States? If "Yes" they were asked:
- In what country was he or she born?

They followed the first question with the definition of "key founder" and "immigrant-founded company."

Quality Assurance and Data Analysis

After all of the data had been collected, we performed quality assurance on our records. Two criteria in particular were chosen to ensure the veracity of the collected data. First, companies listed in the D&B database with zero employees at their U.S. headquarters were omitted from consideration. Second, companies with 2005 sales greater than \$100 million were double checked to make certain that they had been founded after 1995.

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