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Imported Entrepreneurs: Foreign-Born Scientists and Engineers in U.S. STEM Fields Entrepreneurship

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Purpose

The STEM fields—science, technology, engineering and mathematics—are the source of tangible innovations in products and processes that help to spur economic growth. Though many of these advances may occur in established organizations, radical innovation has long been associated with entrepreneurial ventures. Several previous studies have shown that high-growth, high-tech STEM-based businesses in the United States are disproportionately founded by foreign-born scientists and engineers. However, recent data also suggest that immigrants' rate of participation in U.S. entrepreneurship is slowing.

This report investigates several explanations for differences in STEM entrepreneurship between U.S.-born and foreign-born college graduates. (Note that the definition of STEM entrepreneurs used in this study includes business owners as well as “joiners,” the employees of new startup ventures who share in some risk taking.)

In addition, the report explores reasons for differences in entrepreneurial participation among the foreign-born, including:

- Immigration status and visa eligibility,
- Age of arrival in the U.S. (as a child or an adult),
- Graduation from a U.S. or foreign university, and
- Differences in cultural support for entrepreneurship across countries-of-origin.

Finally, the report examines foreign-born workers' job satisfaction by citizenship and immigration status. Although it does not ascertain the causes of recent declines in foreign-born entrepreneurship rates, the report suggests opportunities for policy and further research to help spur greater participation in the future.

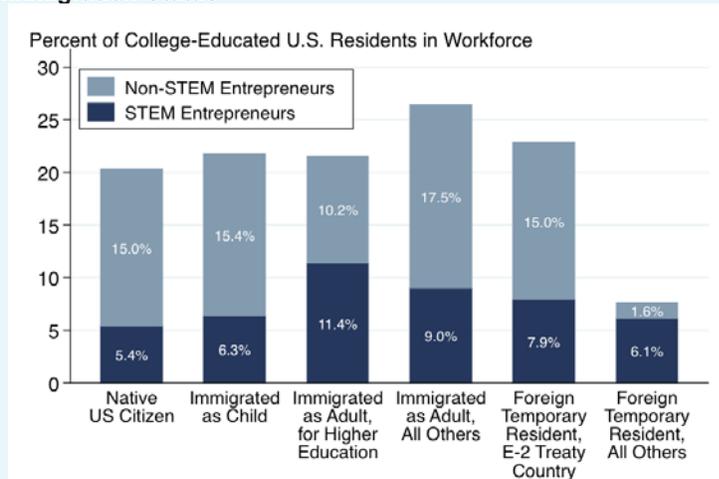
Overall Findings

U.S.–Foreign STEM Entrepreneurship Gap.

The report confirms that the rate of STEM entrepreneurship among U.S.-born college graduates is lower than among their foreign-born counterparts. (See Figure 1.) A substantial percentage of the gap can be attributed to differences in higher education attainment, particularly the choice of undergraduate major. Differences in the distribution of U.S. and foreign-born workers by age, experience, gender, and marital status explain most of the remaining gap, except among immigrants who earned their highest degree in the United States. For this group, the rate of STEM entrepreneurship is almost 4 percentage points higher than for otherwise-similar native-born citizens.

The U.S. Educational Edge. College-educated immigrants who earned their highest degree from a U.S. institution are more likely than native U.S. citizens and other foreign-born workers to engage in STEM entrepreneurship (see Figure 1). Retaining more of these students in the United States post-graduation would tend to boost STEM

Figure 1. STEM and Non-STEM Entrepreneurs by Citizenship and Immigration Status



Source: *Imported Entrepreneurs: Foreign-Born Scientists and Engineers in U.S. STEM Fields Entrepreneurship*, by Margaret E. Blume-Kohout. U.S. Small Business Administration, Office of Advocacy, 2016. Author's calculations from 2010 SESTAT data.

entrepreneurship rates. Interestingly, whether these U.S.-educated adult immigrants earned graduate degrees in STEM or non-STEM fields had no impact on their probability of STEM business ownership.

Foreign-Educated STEM Entrepreneurship Rates Lag. STEM entrepreneurship rates among those who earned their highest degree abroad were significantly *lower* than one would otherwise expect. In addition, immigrants in this group who were employed by established organizations were more likely to express dissatisfaction with their job's level of responsibility and intellectual challenge, indicative of skills-related underemployment. Occupational dissatisfaction and mismatch may spur some immigrants to transition into entrepreneurship, which is associated with significantly greater satisfaction. However, remaining in the U.S. may become increasingly unattractive for others.

Foreign-Educated STEM Grads Are Valuable Startup Employees. Foreign-born, foreign-educated workers who earned STEM graduate degrees outside the United States are more likely to work for startups than established organizations.

The E-2 Treaty Country Connection. Business ownership rates among foreign temporary resident workers from countries that are *not* eligible for E-2

Treaty Investor visas are lower than one would otherwise expect, based on those individuals' other characteristics. Relatively few options exist for foreign temporary workers to own and manage businesses in the United States. The most accessible, flexible option is the E-2 Treaty investor visa, which links U.S. residency to investment, management, and operation of a U.S. business.¹ However, citizens of many countries—notably including India and China—are not eligible for E-2 visas; the absence of an equally accessible visa alternative for these foreign temporary resident workers appears to be stifling their participation as business owners in the U.S. economy. Nonetheless, despite the positive effect of E-2 Treaty country citizenship on foreign temporary residents' probability of business ownership, among STEM business owners we observe one outlier: over one-third (37%) of foreign temporary resident STEM business owners are from India.

More research is needed to understand which of the visa mechanisms are most frequently utilized by foreign STEM entrepreneurs.

Additional Findings

- While computer science is the most common bachelor's degree field among STEM entrepreneurs, engineering majors tend to have higher STEM entrepreneurship rates.
- Individuals who obtained an advanced degree in computer science, but earned their bachelor's degree in physics, astronomy, mathematics, or statistics, are particularly likely to engage in STEM entrepreneurship.
- The top five countries with the highest shares of foreign-born U.S. STEM entrepreneurs (including

1. The E-2 Treaty Investor visa allows citizens of specific countries with which the United States maintains treaties of commerce and navigation to enter the country to establish a new business, or to purchase and manage an existing business. In fiscal year 2013, about 42 percent of these visas were issued to citizens of Asian countries and 38 percent to Europeans. Japan, Germany, the United Kingdom, Mexico, and Canada were best represented.

new venture joiners) are India (22.6%), followed by China (8.1%), Taiwan (5.2%), Canada (4.6%), and South Korea (4.4%).

- The countries with the highest rates of U.S. STEM business ownership are Vietnam (13.0 percent), Taiwan (11.9 percent), South Korea (10.5 percent), Russia (10.3 percent), Mexico (10.2 percent), Germany (9.7 percent), and India (8.5 percent). (See Figure 2.)

Policy Implications

At present, the United States remains a destination of choice for achievement-oriented foreign nationals seeking greater cultural support for entrepreneurship than their home countries provide. This report suggests several opportunities for policymakers interested in spurring new business creation and startup employment in new ventures focusing in STEM fields.

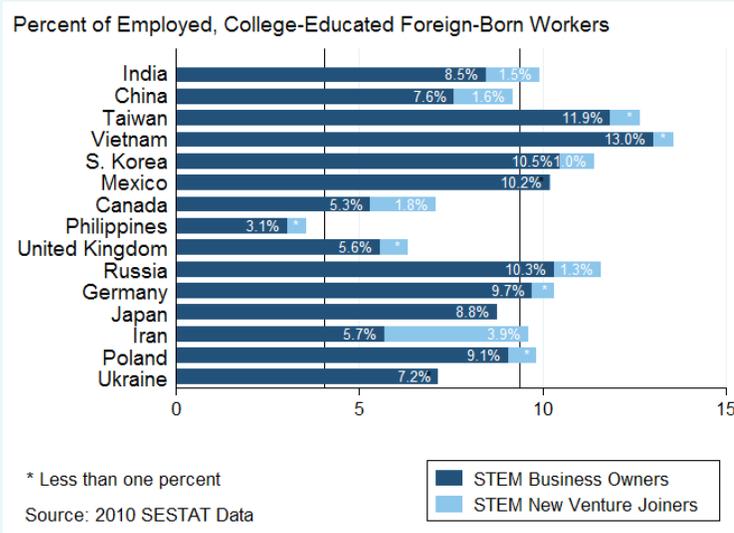
Please note that as of February 2016, the U.S. Department of Homeland Security has issued proposed rules and guidance documents that may update some of the visa categories discussed in the following section and in the report.

Addressing High-Skilled

Immigrant Underemployment. The slowing rate of immigrant participation in STEM entrepreneurship may be in part attributed to lower stay rates among innovative foreign-born workers. For example, the higher rates of dissatisfaction among highly skilled immigrant workers trained abroad along with substantially higher unemployment rates, suggests there is room for improvement in matching immigrant STEM workers to jobs that make full use of their skills and abilities. More research is also needed to understand how skills, innate ability, and aspirations may differ across individuals in this group, and whether dissatisfied individuals may be trading off job satisfaction for social or family-related reasons.

Creating Post-Graduation Pathways to STEM Entrepreneurship. While the higher rate of STEM entrepreneurship among immigrants who earned their highest degrees in the United States, might

Figure 2. Foreign-Born Workers' Rates of Participation in STEM Entrepreneurship, by Country-of-Origin



Note: The countries-of-origin are ranked from top to bottom based on each country's total share of STEM business owners. The first vertical line, at about 4.1%, represents the rate of STEM business ownership among native U.S. citizens, excluding those raised in Puerto Rico or U.S. territories. The second vertical line, at about 9.4%, represents the total rate of STEM entrepreneurship (including new venture joiners) for this same group.

Source: *Imported Entrepreneurs: Foreign-Born Scientists and Engineers in U.S. STEM Fields Entrepreneurship*, by Margaret E. Blume-Kohout. U.S. Small Business Administration, Office of Advocacy, 2016. Author's calculations from 2010 SESTAT data.

suggest the need to increase foreign student enrollment in STEM fields at U.S. universities, other research suggests this approach may have unintended negative consequences for U.S.-born undergraduate and graduate students. This report's empirical results instead suggest that a better solution would be to expand pathways for foreign temporary resident students who earn advanced degrees in the U.S. to extend their stay after graduation, contingent on an offer of employment related to their U.S.-earned degree, regardless of employer sector.

Supporting STEM Mentorship and New Venture Joiners. Massachusetts's Global Entrepreneur-in-Residence (GEIR) program provides a solution within current legislative and regulatory confines. The GEIR program provides aspiring foreign entrepreneurs access to academic (uncapped) H-1B visas along with mentoring and training.

At the same time, since STEM entrepreneurship strongly increases with years of experience since highest degree, requiring graduates to start their

business immediately after graduation or else leave the country may be counterproductive, decreasing the probability of economically productive and satisfying outcomes. Among adult immigrants who earned their highest degree in the U.S., the peak age range for starting a new STEM venture was between 35 and 40. Employment in industry and especially with startup ventures may provide important on-the-job training and human capital that encourage foreign-born workers eventually to pursue entrepreneurship themselves.

Expanding H-1B and F1/OPT Visa Programs.

The report's empirical results support more generous expansion of H-1B temporary skilled worker visas and/or F-1 Optional Practical Training (OPT) eligibility. Among immigrants who came to the U.S. for higher education and earned their highest degrees here, this research found that whether their highest degree was earned in a STEM field was irrelevant to their probability of engaging in STEM entrepreneurship. Based on this evidence, the author recommends that foreign students who graduate from a U.S. master's or doctoral program and receive an employment offer in a H-1B eligible STEM occupation should be eligible for the F-1 OPT educational/training visa extension.

Missouri's Exemplary Entrepreneurship Program. Expanding the F-1 OPT program might also permit further entrepreneurial engagement by recent graduates, as self-employment is permitted. Along these lines, Luppino et al. note that the University of Missouri-Kansas City's Entrepreneurship Scholars program does not restrict participation on the basis of field of study or prior educational attainment, thus providing greater opportunities for entrepreneurial graduates to engage in mentored startups.² Such mentored engagement might also help to reduce the career dissatisfaction many foreign temporary residents expressed regarding their independent efforts as STEM entrepreneurs.

Creating a New STEM Workforce Visa.

Some advocates of immigration reform have suggested awarding permanent residence conditional on remaining engaged in the STEM workforce, in an occupation related to one's field of degree, for

2. Luppino, Anthony, John Norton, and Malika Simmons. 2012. *Reforming Immigration Law to Allow More Foreign Student Entrepreneurs to Launch Job-Creating Ventures in the United States*. Kansas City, MO: Ewing Marion Kauffman Foundation.

several years after graduation from a U.S. graduate program.³

Creating a New Startup Visa. Legislative initiatives in recent years have aimed toward a true "startup visa" that would allow foreign-born entrepreneurs to achieve permanent residence upon satisfying specified conditions during an initial conditional residence period similar to the EB-5. One approach would be to require applicants to demonstrate they have attracted substantial U.S. investment in their business, such as from a U.S.-based venture capital firm, angel investor, or government agency.⁴ Then, by the end of the two-year initial conditional residence period, the venture must demonstrate that it has created new jobs, and either achieved high revenue growth or attracted subsequent rounds of investment.

Expanding the E-2 Investor Visa to More Countries and to STEM Startups. The clear advantage of this pathway for attracting STEM-based, high-tech entrepreneurship to the U.S. is in its use of an intermediate benchmark—in this case, venture funding—while research and development, regulatory clearances, and similar steps are still underway. One drawback of the current E-2 visa is the requirement that the applicant be capable of a substantial up front financial investment, which may be infeasible for younger entrepreneurs or high-tech and R&D-based businesses. Expanding opportunities for permanent residence—or, at least, unlimited renewal of temporary resident status—conditional on benchmark successes, and opening eligibility to citizens of India and other countries not eligible for the E-2 visa, seem likely to increase U.S. STEM entrepreneurship overall.

Winning the International Competition for STEM Graduates. As mentioned before, the visa-degree gap may put the U.S. at a disadvantage vis-à-vis other advanced countries. Citizens of nations like Canada and Australia that combine a highly educated labor force with strong cultural support for entrepreneurship are already unlikely to immigrate

3. Gilgannon, Stuart D.P. 2013. "The land of opportunity: why more must be done to encourage immigrant entrepreneurship in the United States." *Duquesne Business Law Journal* no. 15 (1):1-26. Kauffman Foundation. 2015. Immigrant entrepreneurs: a path to U.S. economic growth. *Entrepreneurship Policy Digest*. Kansas City, MO: Ewing Marion Kauffman Foundation.

4. Gilgannon, 2013.

to the U.S. to start entrepreneurial ventures. In addition, these countries increasingly are implementing policies designed to attract and retain highly skilled innovative and entrepreneurial foreign workers. With such a large gap between the number of foreign students graduating from U.S. universities and the number of employment-based visas available to highly skilled graduates, along with evidence of underemployment and related job dissatisfaction among foreign-educated immigrants, the U.S. risks driving trained, innovative, and entrepreneurial talent offshore.

Scope and Methodology

Data used in this report come from two components from the National Science Foundation's 2010 Scientists and Engineers Statistical Data System (SESTAT); the National Survey of College Graduates (NSCG) and the Survey of Doctorate Recipients (SDR). The recent SESTAT surveys contain information on U.S. workers with at least a bachelor's degree, and also includes information on foreign-born workers' current immigrant status, education achievement, country of origin, and demographic variables. Other data sources include information from the Global Entrepreneurship Monitor (GEM), Adult Population Survey, and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

The definition of STEM entrepreneurship used in this study includes business owners, unincorporated self-employed supervising one or more employees, and joiners of new startup ventures. Medical professionals not engaged in research are not included in this definition. Descriptive statistics are used to compare rates of STEM employment and degree achievement among U.S.- and foreign-born workers. Multivariate logistic regression models are used to predict entrepreneurial outcomes and to measure job satisfaction among foreign workers.

This report was peer reviewed consistent with Advocacy's data quality guidelines. More information on this process can be obtained by contacting the director of economic research by email at advocacy@sba.gov or by phone at (202) 205-6533.

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Related Research

The author of the current report also completed a brief supplemental study examining whether SESTAT contains enough data to analyze the participation of U.S. racial and ethnic minorities in STEM fields. This study is entitled *Feasibility of Analyzing Minority STEM Entrepreneurship Using the National Science Foundation's SESTAT Survey*. It was produced under contract number SBAHQ-14-Q-0034.

The author also wrote a report for the Office of Advocacy on a related aspect of STEM entrepreneurship in 2014, *Understanding the Gender Gap in STEM Fields Entrepreneurship*. The report is available on Advocacy's website at www.sba.gov/advocacy/understanding-gender-gap-stem-fields-entrepreneurship.