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Immigration and High-Impact, High-Tech Entrepreneurship

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EXECUTIVE SUMMARY

Our study shows that the founding teams of about 16 percent of a nationally representative sample of high-impact, high-tech companies – the kind of company that is most critical for long-term economic growth – include at least one immigrant. These immigrant entrepreneurs are deeply-rooted in the U.S.; about 77 percent, for instance, are U.S. citizens. Most are well-educated and have substantial professional experience. Our evidence does not allow us to rule out the possibility that the immigrant entrepreneurs “crowd out” comparable natives, but we incline toward the view that immigrants and natives complement one another. We outline three policy options that might expand the pool of potential high-impact, high-tech immigrant entrepreneurs over the long-term: clearing the green card backlog, easing the pathway from student visa to work visa to green card, and creating a “point system” for a limited number of unsponsored green card applicants.



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Issues in Technology Innovation

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High-Impact, High-Tech Companies: One Key to Strong Economic Performance

Economic growth is an essential objective of the U.S. government, perhaps *the* essential objective. Invariably, when times are hard, voters turn incumbents out of office, as they did in 2010. Challengers know that keeping the campaign focus on the economy will pay dividends. The 1992 Clinton presidential campaign motto — “It’s the economy, stupid” — sums it up.

Governing is harder than campaigning. It may be “stupid” for a challenger to ignore the economy, but the incumbent who is not sure what to do to spur growth does not deserve that label. The American economy is a huge, complex, and rapidly evolving system that is increasingly open to global forces. Changing its trajectory is tricky, and experts disagree about how to do it.

In the short-term, the debate focuses on macroeconomic policy tools, such as interest rates and budget deficits, that may put under-utilized resources, including idled workers, back to work. In the long-term, however, the challenge is to expand the resources that are available and to enhance the creativity and efficiency with which they are used. We need microeconomic policies that stimulate innovation and productivity along with sound macroeconomic policies.

Even in hard times, which demand short-term responses, we should not neglect the long-term challenges. Our research contributes to this agenda by identifying a potential point of leverage for enhancing the economy’s long-term growth prospects. We draw on earlier work (Acs, Parsons, & Tracy 2008) that shows that a small share — just 3-4 percent — of all companies in the U.S. are “high-impact companies” that are responsible for most of the country’s economic growth and job creation.

We also draw on prior work that suggests that high-tech companies are particularly important for long-term growth (Acs *et al.* 2009). The products of these companies help other companies improve their productivity and give consumers new choices. Less than 10 percent of the high-impact companies operate in high-tech sectors. High-impact, high-tech companies therefore comprise less than 1 percent of all the companies in the U.S. If this share could be raised, even a little bit, the economy might benefit a lot.

Immigrants Found a Substantial Proportion of High-Impact, High-Tech Companies

Most of America’s high-impact, high-tech companies are relatively young, and the vast majority are still owned by their founders. Our project seeks to learn more about these entrepreneurs. Although many factors (such as the availability of start-up capital, access to promising markets, etc.) shape the success of each of these businesses, the founder’s skill set and insight certainly play a big part in it.

Our particular question about the founders is where they come from. Many observers of the U.S. high-tech industry believe that immigrant entrepreneurs play a



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Immigrant founders are more than twice as likely as native-born founders to hold a doctorate and are much more likely to hold a masters degree as well.

special role in the industry. Some suggest that immigration policy ought to target potential high-tech entrepreneurs. Such a policy might, in principle, provide the kind of leverage on long-term economic growth that we are looking for.

Research has lagged behind the public dialogue on this subject. Although a number of studies (e.g. Saxenian 1999, Ballou *et al.* 2007, Wadhwa *et al.* 2007) have sought to pin down the share of immigrants among entrepreneurs, none focused on high-impact, high-tech companies on a national basis.

We carried out a telephone survey of a nationally representative sample of such companies. These companies, which were contacted in late 2008, had doubled in size between 2002 and 2006. We followed up the survey by conducting a set of interview-based case studies of companies founded by individual immigrant entrepreneurs, individual native-born entrepreneurs, and mixed teams of immigrant and native-born entrepreneurs.

Our survey discovered that the founding teams of about 16 percent of the high-impact, high-tech companies in our sample include at least one immigrant entrepreneur, defined as a founder of the company who was born outside of the U.S. This figure is on the low end of the range reported by prior research, but it is still a substantial proportion. Slightly more than half of the companies in our sample were founded by a single individual; the approximately 1300 companies have about 2000 founders. Of these 2000 founders, about 13 percent were born outside of the U.S.

Who Are the Immigrant Entrepreneurs?

The vast majority of the immigrant entrepreneurs in our sample are strongly rooted in the U.S.¹ The average duration of their stay in this country is more than twenty-five years. Only about 25 percent were reported to have been in the U.S. for less than fifteen years. About 77 percent are U.S. citizens. They came to the U.S. from all over the world. Fifty-five countries of origin are represented in the sample.² India tops the list, accounting for about 16 percent of the founders. (See Table 1.)

The immigrant entrepreneurs are well-educated. Roughly 55 percent of them hold a masters degree or doctorate. Immigrant founders are more than twice as likely as native-born founders to hold a doctorate and are much more likely to hold a masters degree as well. One important reason for this difference is that many of the immigrant founders came to the U.S. for graduate education. Two-thirds of them received their highest degree in this country.

Like most successful entrepreneurs, the immigrant entrepreneurs in our sample had significant work experience. More than half of them had been in the U.S. at least ten years before founding their companies. In addition, many are serial entrepreneurs. Although our survey did not ask whether the founders had started a company before, the founders of more than half of the companies in our case studies had done so.

The 13 percent share of immigrant entrepreneurs in our survey sample is roughly

the same as the foreign-born share of the entire U.S. population today. However, considering that the vast majority of the immigrant entrepreneurs in our sample have been in the U.S. for two or more decades and are highly educated, a more appropriate comparison is to the foreign-born share of the U.S. population holding a bachelor's degree or in the science, technology, engineering and mathematics (STEM) workforce in 1990, both of which were about 10 percent. These baseline populations have grown since 1990, which means that the pool of potential high-impact immigrant entrepreneurs has grown as well.

The case studies tell stories that breathe life into these statistics. For instance, one of the immigrant entrepreneurs whom we interviewed is a prolific inventor. He came to the U.S. because he felt unable to pursue the business opportunities opened up by his inventions in his country of origin. He had founded several companies prior to the one in our sample and, at the time of our interview, he was operating what amounted to a personal incubator for several nascent companies based on more recent inventions.

Two other immigrant entrepreneurs in our case study companies are faculty members. One came to the U.S. to get his doctorate, the other as a post-doctoral fellow. Both had lengthy academic research careers before pursuing entrepreneurship, although in both instances, the company in our sample was not the first one that the entrepreneur had started. In both instances as well, the faculty entrepreneur teamed up with a student; one of these students hails from his professor's country of origin, while the other student is native-born.

Do Immigrant Entrepreneurs “Crowd Out” Native-Born Entrepreneurs?

Although entrepreneurs like these are extraordinary individuals, we do not know for sure that the entrepreneurial opportunities that they recognized and their strategies for pursuing them were unique. After all, they came to the U.S. to take advantage of the institutional environment here, to serve in America's great universities in the case of the academics and to access risk capital and risk-taking business partners in the case of the prolific inventor. Perhaps it is the institutional environment that is truly unique and not the entrepreneurs. To put it another way, if these individuals had not come to the U.S. and had not founded high-impact, high-tech companies, perhaps a native-born entrepreneur, drawing on the same institutional environment, would have done so instead.

One way that our research gets at this difficult-to-study issue is by looking at whether companies founded by one or more immigrants are engaged in different lines of business than those founded by natives. Neither the quantitative data from the survey nor the qualitative data from the case studies suggest that this is the case. Nor do we find that immigrant-founded companies are bigger, more likely to engage in research and development, or more likely to hold patents than the native-founded companies in the sample, once we control for other factors. This work suggests that

we cannot rule out the “crowding out” hypothesis.

There is a complication in this analysis, however, which has to do with one of the factors that we are controlling for, the founders’ education. Companies with highly-educated founders *are* different in all of these respects. If we remove the control for education, immigrant-founded companies appear to be different as well, which is not surprising, since we know that immigrant founders tend to be more highly-educated than native-born founders.

Which of these variables is the right one to focus on? That is a matter of interpretation. Most of the immigrant entrepreneurs were educated in the U.S. If one believes that their academic success, which anticipates their later entrepreneurial success, was due to their innate talent, or to their training before they came here, then one should privilege immigration over education in the analysis. This interpretation assumes that equally gifted native-born students would *not* have been available to take the immigrant entrepreneurs’ places in school, and thus there was no “crowding out.” On the other hand, if it was their U.S. education that was critical to the immigrants’ success as entrepreneurs, native-born substitutes might have done equally well, whether or not these hypothetical substitutes were as gifted as the immigrants *before* they got their education.

One difference that holds up even when we control for education is that immigrant-founded companies are more likely to report that they have a strategic relationship with a company in another country than their native-founded counterparts. Our interviews indicate that these relationships sometimes involve inputs, such as product development services, and sometimes outputs, such as sales to foreign customers. The interviews also suggest that the foreign partner is usually in the immigrant entrepreneur’s country of origin. Presumably such a relationship would not have been created by our hypothetical native-born substitute.

How should we interpret this finding? On the one hand, it may be the case that the strategic relationships that immigrant-founded companies maintain with their foreign partners were essential to their success and possibly even their survival. If this is so, any alternative strategy that might have been pursued by our hypothetical native-born substitute would have been inferior. On the other hand, perhaps these relationships were matters of choice without a material impact on the company. In that case, the hypothesis that the immigrant entrepreneurs are “crowding out” native-born entrepreneurs, once again, cannot be ruled out. Unfortunately, our data do not provide a definitive answer. More research is needed.

We found one more interesting difference in our study that has to do with the composition of founding teams. (Slightly less than half of the companies in the sample were founded by teams, rather than individuals.) Immigrant founders were more likely than their white, native-born counterparts to team up with other “outsiders,” not just other immigrants, but also female and U.S. minority entrepreneurs. Perhaps the availability of immigrant entrepreneurs as teammates creates entrepreneurial opportunities for members of these under-represented groups that would not have been created in their absence.

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Policy Options for Fostering High-Impact, High-Tech Immigrant Entrepreneurship

While our study permits a range of interpretations, we incline toward the view that immigrant entrepreneurs complement, rather than “crowd out,” native-born entrepreneurs. This position finds support in other studies (e.g. Hunt 2010, No & Walsh 2010, Ortega & Peri 2009) that focus on scientific publications and patenting as well as high-tech entrepreneurship. While only a small fraction of immigrants pursues entrepreneurship, much less succeeds at high-impact, high-tech entrepreneurship, the economic leverage of this activity is such that we believe it ought to be considered by immigration policy-makers.

The objective of this aspect of immigration policy should be to expand the pool of potential high-impact, high-tech entrepreneurs, rather than to seek to identify promising individuals. Entrepreneurship is by its nature a high-risk venture, fraught with failure, even for the most well-endowed aspirants. If our conjecture that immigrant entrepreneurs are complements to, rather than substitutes for, native-born entrepreneurs is correct, more tries by immigrant entrepreneurs will produce more successes. So, the policy goal should be to encourage as many tries as possible, not to “pick winners.”

Option 1: Clear the Employment-Based Green Card Backlog

The most important fact that policy-makers need to bear in mind is the long lag between immigration and impact. Both higher education and extensive work experience contribute to entrepreneurial success, and both take time to acquire. The entrepreneurs in our sample reflect the flow of immigrants two or more decades ago, rather than in the last few years.

One way to expand the pool of potential immigrant entrepreneurs in the short- to medium-term is to reduce the constraints on educated and experienced workers who are already in the process of immigrating to the U.S. Jasso *et al.* (2010) estimate that about a half-million applicants were waiting for employment-based green cards (EB-1, EB-2, and EB-3 categories) in 2006, an eight to ten year backlog. Until an applicant reaches the final stage of the process, she must remain an employee of her sponsor. Uncertainty about the length of the wait and the outcome of the process, along with the need for an employer sponsor, surely frustrate the entrepreneurial ambitions of some applicants.

Although some of the backlog is the result of processing delays, a more fundamental cause is the legal limit on the number of green cards that can be issued overall and to applicants from any given country each year. This policy ignores the size of a country’s population and the size and composition of its applicant pool. Applicants from large countries such as India and China must wait longer than those from smaller countries. For example, in the EB-2 category, for professionals with advanced degrees, applicants from these two countries had to have applied for green cards by mid-2006 in order to have their applications processed in January 2011. In

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the EB-3 category, professionals with bachelor's degrees and skilled workers, Indian applicants from early 2002 were still being processed. (U.S. Department of State, 2011)

Clearing this backlog would require legislation to lift, at least temporarily, the quotas for employment-based applicants. To prevent the backlog's re-emergence in the future, the flow of presumptive immigrants on temporary visas would need to be better matched to the availability of employment-based green cards. One possibility for accomplishing this goal would be to raise the global total of employment-based green cards, while reforming temporary visa programs. In parallel, policymakers might consider a system of awarding green cards that gives preference on the basis of criteria that are better correlated than country of origin with the potential contributions of prospective immigrants to high-impact entrepreneurship and other economically-valuable activities. In the meantime, the requirement for continued employment with the applicant's sponsor during the green card process might be relaxed.

Option 2: Ease the Pathway from Student Visa to Work Visa to Green Card

A second policy option focuses on simplifying and clarifying the immigration pathway for potential high-impact entrepreneurs. The current policy sends mixed signals to many holders of student and work visas. In principle, most are obligated to leave the U.S. when their visas expire; in practice, many find ways to stay. They extend, shift, adjust, overstay, or simply wait for the rules to change. Uncertainty and confusion takes a toll on them along the way.³

One approach to simplification would be to automatically allow foreign students (or some subset of them) to seek jobs in any field for a limited period of time after completing their degrees.⁴ Those who are successful in doing so and then remain employed might not only maintain their right to stay in the U.S., but also be put on a fast track for permanent admission and be exempted from the requirement to have an employer sponsor. A threshold for income or job quality might be applied to assure that these former students are continuing to progress along a promising career path before they receive their green cards.

This approach differs from the proposal to "staple the green card to the diploma" of foreign students in certain fields. It would provide more assurance that presumptive immigrants acquire work experience as well as education. It would also avoid inducing the enrollment of poor-quality foreign students in U.S. higher education institutions simply to obtain green cards. It differs as well from using temporary work visa programs, such as the H-1B, as a pathway to the green card. Such programs should serve their intended purpose, which is to alleviate temporary labor shortages in high-skill occupations.

Option 3: Create a “Point System” That Allows Potential Entrepreneurs to Get Green Cards

A third and much more challenging option would be to create a “point system” to issue green cards to a limited number of unsponsored applicants who have personal attributes associated with successful high-impact, high-tech entrepreneurship, such as graduate education and managerial experience. Such a system would eliminate the linkage between employment and immigration for its beneficiaries, freeing them to engage immediately in entrepreneurial ventures.

The comprehensive immigration bill considered (but not passed) by the U.S. Senate in 2007 contained a point system. The proposed system would have used three selection factors (educational attainment, employment experience, and language proficiency) that are associated with successful entrepreneurship, and two (knowledge of civics and family relationships) that are not known to be. While such a system might be tailored somewhat by dropping the latter factors, it would be very difficult to target potential entrepreneurs precisely. Entrepreneurship is a rare pursuit, even among those with the requisite background for success, and some relevant personal attributes, such as ambition and risk acceptance, are not measurable.

U.S. immigration law currently allocates up to 10,000 green cards annually to applicants who invest \$1 million and employ ten U.S. workers. Senators Lugar and Kerry offered a bill in 2010 that would have expanded this “EB-5” category by giving green cards to entrepreneurs who could show ready access to substantial venture capital. These approaches are much more tightly targeted than any point system could be, but their scale is likely to be quite small. Less than 1000 immigrants per year received green cards under EB-5 between 2000 and 2009. Less than 3 percent of the high-impact, high-tech companies in our sample ever received any venture capital investment.

Toward a Long-Term High-Impact Entrepreneurship Strategy

Whether the nation pursues one or more of these three options, or an alternative approach to expand high-impact, high-tech immigrant entrepreneurship, such a step should be seen as one component of a broader strategy to expand high-impact entrepreneurship as a whole. Effective policies for education, research, antitrust, and a variety of other elements of the entrepreneurship environment ought to complement a skills-oriented immigration policy. Such a strategy will lay the groundwork for a sustainable, long-term economic revival.

Table 1. Immigrant Founders of High-Impact, High-Tech Companies by Country of Origin					
Country	Number	Percent	Country	Number	Percent
India	40	16.2	Greece	2	0.8
UK	25	10.2	Haiti	2	0.8
Canada	15	6.1	Iraq	2	0.8
Japan	15	6.1	Jamaica	2	0.8
Germany	13	5.3	Philippines	2	0.8
China	8	3.2	Serbia	2	0.8
Cuba	8	3.2	Sweden	2	0.8
Iran	7	2.8	Hong Kong	2	0.8
Russia	7	2.8	West Indies	2	0.8
France	6	2.4	Argentina	1	0.4
Mexico	5	2.0	Burma	1	0.4
Netherlands	5	2.0	Chile	1	0.4
Taiwan	5	2.0	Colombia	1	0.4
Vietnam	5	2.0	Croatia	1	0.4
Australia	4	1.6	Denmark	1	0.4
Belgium	4	1.6	El Salvador	1	0.4
Ireland	4	1.6	Ghana	1	0.4
Korea	4	1.6	Guyana	1	0.4
Pakistan	4	1.6	Israel	1	0.4
Ukraine	4	1.6	Nicaragua	1	0.4
Austria	3	1.2	Nigeria	1	0.4
Brazil	3	1.2	Panama	1	0.4
Italy	3	1.2	Peru	1	0.4
Lebanon	3	1.2	Poland	1	0.4
Romania	3	1.2	Spain	1	0.4
South Africa	3	1.2	Tanzania	1	0.4
Switzerland	3	1.2	Turkey	1	0.4
			Uruguay	1	0.4

References

- Acs, Z.J., *et al.* (2009). "The knowledge spillover theory of entrepreneurship," *Small Business Economics* 32, 15-30.
- Acs, Z.J., Parsons, W., & Tracy, S. (2008). *High impact firms: Gazelles revisited*. Washington: U.S. Small Business Administration.
- Ballou, J., *et al.* (2007). *Kauffman firm survey: Baseline methodology report*. Princeton: Mathematica Research.
- Hunt, J. (2010). "Skilled immigrants' contribution to innovation and entrepreneurship in the United States," Pp. 257-272 in *Open for Business: Migrant Entrepreneurship in OECD Countries*. Paris: OECD.
- Jasso, G. *et al.* (2010). "How many highly skilled foreign-born are waiting in line for U.S. legal permanent residence?" *International Migration Review* 44:477-498.
- No, Y., & Walsh, J.P. (2010). "The importance of foreign-born talent for U.S. innovation," *Nature Biotechnology* 28:289-291.
- Ortega, F., & Peri, G. (2009). *The Causes and Effects of International Migrations: Evidence From OECD Countries 1980-2005*. National Bureau of Economic Research Working Paper 14833. Cambridge: NBER.
- Saxenian, A. (1999). *Silicon Valley's New Immigrant Entrepreneurs*. San Francisco, CA: Public Policy Institute of California.
- U.S. Department of State. (2011). *Visa Bulletin*. January.
- Wadhwa, V., *et al.* (2007). *America's new immigrant entrepreneurs*. Durham: Duke University School of Engineering.

Further reading:

- Acs, Z.J., Audretsch, D.B., & Strom, R.J. (2009). *Entrepreneurship, growth, and public policy*. New York: Cambridge University Press.
- Hart, D.M. (2003). *The emergence of entrepreneurship policy*. New York: Cambridge University Press.

Hart, D.M. & Acs, Z.J. (2011). High-technology immigrant entrepreneurship in the U.S. *Economic Development Quarterly*.

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Endnotes

¹ Indeed, the deep roots of these entrepreneurs justify our use of the term “immigrants” in this paper, rather than “foreign-born.” Legally, a person does not “immigrate” to the United States until she obtains a green card.

² Hong Kong and Taiwan are counted in the text and in the table as “countries of origin.”

³ The federally-funded New Immigrant Survey finds that “the process of applying for an LPR visa is sufficiently arduous that approximately 22.4 percent of adjustee employment principals became depressed as a result...” (Jasso et al. 2010).

⁴ Some student visa holders are eligible to stay for an additional year after graduation if they are employed in “optional practical training” (OPT) directly related to their field of study. OPT was recently extended to 29 months for graduates in STEM fields.