

# International Students: Poorly Suited Immigration Pathways Stymie Formation of High Growth Businesses

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**Pioneer Institute develops and communicates dynamic ideas that advance prosperity and a vibrant civic life in Massachusetts and beyond.**

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## Executive Summary

This paper examines the impact, characteristics, and entrepreneurial proclivities of foreign-born college graduates in the United States. A significant body of research has found that immigrants are more likely to start businesses than those born in the U.S., and the propensity of international students to concentrate in STEM fields indicates enormous potential for economic contributions and innovation. Yet the static nature of our immigration system, with visa pathways and restrictions that discourage business creation, hamper the nation's ability to take full advantage of the benefits immigrants can provide. In fact, this study finds that the U.S. immigration system likely delays foreign-born graduates from creating incorporated firms by as many as five years. We estimate that the creation of 150,000 incorporated firms and 580,000 jobs were delayed between 2013 and 2021. Without reform, the U.S. will continue to depress high-value firm creation by international students and cease to be the primary destination of global talent.

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## Introduction

University learning has long been a facilitator of the flow of individuals and knowledge across the globe. The number of students choosing to study abroad has grown exponentially in recent years, with an increasing number of students crossing borders in pursuit of knowledge, cultural exchange, and professional growth. According to data from UNESCO, in 1997 1.96 million students sought an education outside their home country; by 2021, that number had tripled.<sup>1</sup>

The United States, with many of the world's most prestigious universities, is a significant draw. During the 1997–2021 period, the number of foreign students studying in the U.S. jumped from 450,000 to over 1.1 million.<sup>2</sup> This rising student population has become a major contributor to the U.S. economy, with direct benefits estimated at \$40.1 billion for the 2022–23 school year. International students also supported over 350,000 jobs — or one job per every three students.<sup>3</sup>

Beyond revenues for schools and local businesses, international students provide their host countries with crucial talent. In fact, the goal of attracting foreign students and offering a student visa is not only to bolster the research capabilities and funding base of the university system, but also to funnel well-educated individuals into the domestic workforce. Yet, as a nation we could do more to retain these students after they graduate by facilitating employment and encouraging them to follow their entrepreneurial instincts.

A wealth of recent research has documented the proclivity of immigrants to start new businesses at rates as high as twice that of those born in the U.S.<sup>4</sup> This penchant has had a profound economic impact, generating trillions of dollars in revenue, creating new innovative products, revitalizing communities, opening new avenues to foreign trade, and producing thousands of new jobs.<sup>5</sup>

While this risk-taking proclivity is true for immigrants generally, international students are uniquely positioned to have the greatest impact. By studying at American universities, often at the master's or doctoral levels, international students gain the kind of advanced skills and technical knowledge in STEM fields that provide them with the greatest chance of creating a truly innovative product. Former international students have gone on to found or co-found multibillion dollar companies such as Zoom, Moderna, Stripe, and Instacart.

Consequently, international students are a source of competition amongst advanced economies. Yet the United States' immigration policy has not fundamentally changed since the early 2000s. Meanwhile, Canada, the United Kingdom, Australia, and other developed countries have made it a priority to entice and retain top global talent through immigration reform. They have slashed red tape and visa approval times for educated immigrants, as well as carved out entrepreneurship-specific immigration lanes.

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generate new and innovative economic activity and growth. Given an aging population and labor shortages, the U.S. needs to take full advantage of this opportunity. Increasing globalization, characterized by unprecedented mobility and interconnectedness, indicates that international student flows will likely increase. Countries that recognize the value of that source of talent and capitalize on it will reap the benefits for years to come.

This paper explores the contours of immigrant students, creating a profile of their demographics, their pathways through the current immigration system to employment and entrepreneurship, the obstacles they face with respect to both, and their immense economic contributions.

## Demographics and Trends

The factors responsible for international demand for U.S. degree programs are multifaceted and complex. While there will always be those who seek out our institutions of higher learning for their quality and prestige, the internal dynamics in countries of origin also play a significant role. These include the number of students prepared for post-secondary education, availability of local university options, and ability to pay.<sup>6</sup> Since higher education supply is inelastic in the short term, the primary source of global student flows are from developing countries with emerging middle classes. When demand cannot be accommodated domestically, students seek out alternative options—primarily in the U.S., U.K., Canada, and Australia.

Demand is also highly dependent on the host country's immigration and student visa policies. A primary goal of international students is to gain access to labor markets, and it's likely that the ease with which this can be achieved is considered when deciding in which country to locate. For this reason, reforms that promote worker mobility and provide greater access to legal employment status after graduation have a significantly positive correlation with matriculation rates for undergraduate and graduate programs.<sup>7</sup>

U.S. policymakers have tried to orient the system towards that incentive structure, especially for international students in science, technology, engineering, and mathematics (STEM)-related fields. Unlike work visas, student visas are not subject to a cap, and built-in work eligibility programs like Curricular Practical Training (CPT) and Optional Practical Training (OPT) allow students to gain experience in their field and enter the labor market without having to transition to a different visa.<sup>8</sup>

Additionally, students from transition economies with newly opened markets often drive growth in U.S. enrollment at the doctorate level because those programs offer financial opportunities in the form of fellowships, research assistantships, and teaching assistantships.<sup>9</sup> However, lower tiers of study may also become attractive as an increasing number of U.S. schools are opening up new scholarship opportunities.<sup>10</sup>

## Broad Trends

When looking at trends in U.S. enrollment overall and by demographic, a few patterns are clear. First, as previously mentioned, enrollments are up significantly across the board over the last three decades. The U.S. has a large pull, drawing nearly one in every six international students. However, as a percentage of the total student population, at 5 percent, the U.S. trails several other countries.<sup>11</sup> In Canada, Australia, and the United Kingdom for example, foreign students make up over 20 percent of all post-secondary students.

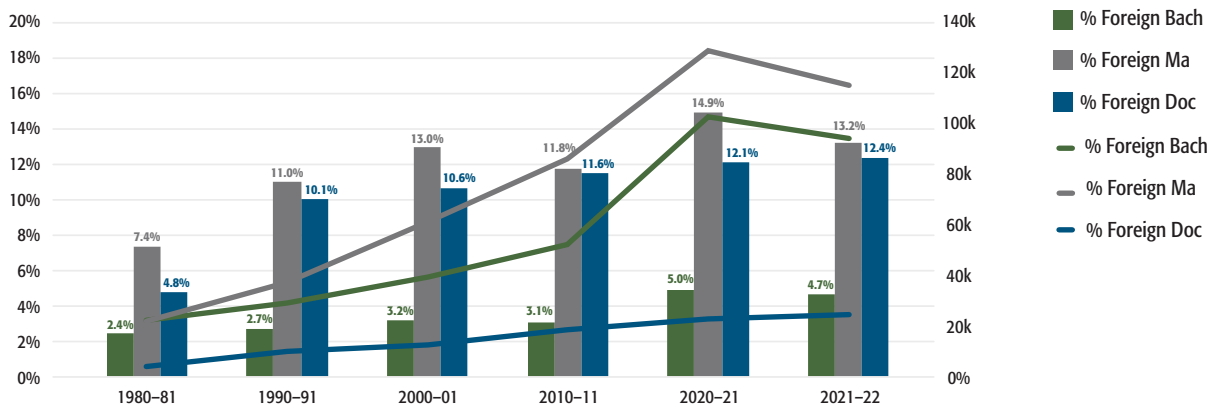
At certain universities, however, international students do account for a significant share of the student body. For example, over half the students at Northeastern and Columbia are international, along with more than a third of those at the University of Southern California and New York University.<sup>12</sup>

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The number of international students as a percentage of the total student population varies considerably with the type and level of degree. A plurality are enrolled in master’s programs. In the 2021–22 school year, as seen in Figure 1, 116,000 international students were conferred a master’s degree, accounting for 13.2 percent of the total degrees conferred at that level.

Conversely, international students made up 4.7 percent of all bachelor’s degrees conferred and 12.4 percent of all doctorates and professional degrees. This concentration in the most advanced degree programs will likely bounce back even higher in the coming years, as numbers for the 2021–22 school year are slightly down from pre-pandemic levels and topline enrollment statistics for 2022–23 point towards a significant increase in enrollment from the previous school year.

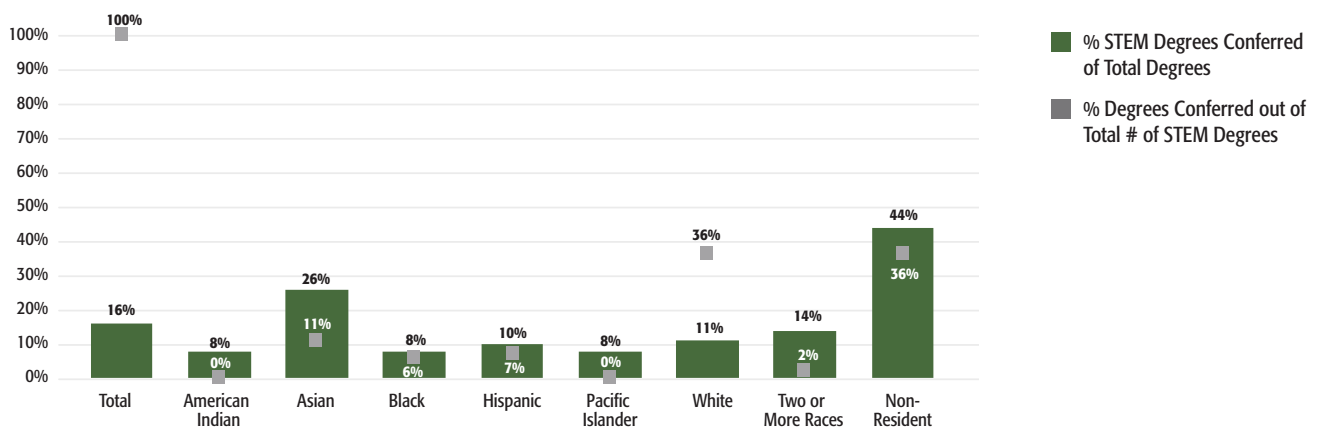
**Figure 1: Total and Share of Total Degrees Conferred to Non-Residents by Academic Level, 1980–2022**



Data sourced from the National Center for Education Statistics’ (NCES) Integrated Postsecondary Education Data System<sup>13</sup>

Foreign students are also heavily represented in STEM programs. At the bachelors’ level, over 30 percent of international student graduates are in STEM fields and that proclivity is even more pronounced at the master’s and doctorate levels. As seen in Figure 2, international students study STEM at far higher rates than domestic students of any race at the masters level. Forty-four percent of all non-resident students are in STEM and astoundingly made up 36 percent of all STEM degrees conferred by master’s programs even though they accounted for just 13 percent of total masters students. Similarly, “forty-six percent of doctor’s degrees in a STEM field were conferred to U.S. nonresident students, despite the fact that this group earned only 12 percent of total doctor’s degrees.”<sup>14</sup>

**Figure 2: Masters’ Degrees Conferred by Race and Resident Status, 2021–22**



Data sourced from the National Center for Education Statistics’ (NCES) Integrated Postsecondary Education Data System<sup>15</sup>

Drilling down further, non-resident graduate students are especially concentrated in certain fields within STEM. In 2022, the most recent year for which there is data, the National Center for Science and Engineering Statistics (NCSES) reported that 74 percent of all computer engineering students, 74 percent of computer science students, and 61 percent of all electrical engineering students were foreign-born. In fact, international students made up a majority of students in 16 graduate-level STEM fields, as shown in Table 1.

Motivations for these enrollments are diverse. Incentives for pursuing a master's degree "include the desire to live in a major U.S. city like New York or Los Angeles, the acquisition of skills to better position for employment or doctorate programs, or simply direct access to employment options in those areas where IT-related employment is expanding."<sup>16</sup> Several other higher education institutions outside traditional hotbed areas for immigrants (NYC, Houston, LA, Boston, etc.), also receive a high number of foreign master's students. These universities, like the University of Central Missouri, are likely to draw international talent because they have lower tuition rates and also actively pay foreign recruiters to bring in new students.<sup>17</sup> Some schools pay as much as \$1,600 for each new student recruited.

Foreign-born concentration in STEM master's programs is important because those fields, among others, are where the most impactful and growth-oriented innovation and entrepreneurship are occurring. U.S.-educated immigrants are 10 percent more likely than foreign-educated immigrants to start their own STEM firm.<sup>18</sup> In this way the American university system is not only attractive to entrepreneurship-inclined immigrants, but also helps facilitate entrepreneurship.

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**Table 1: STEM Fields with Significant Concentrations of International Students**

| Field                                       | Percent of International Students | International Students | U.S. Students  |
|---|-----------------------------------|------------------------|----------------|
| Petroleum Engineering                       | 75.1%                             | 701                    | 232            |
| Computer Engineering                        | 74.3%                             | 11,408                 | 3,956          |
| Computer Science                            | 74.2%                             | 39,262                 | 13,662         |
| Industrial and Manufacturing Engineering    | 67.5%                             | 5,842                  | 2,808          |
| Information Technology                      | 67.3%                             | 7,508                  | 3,643          |
| Computer and Information Sciences           | 64.5%                             | 29,774                 | 16,377         |
| Applied Mathematics                         | 64.3%                             | 7,222                  | 4,002          |
| Electrical engineering                      | 61.4%                             | 21,203                 | 13,334         |
| Economics                                   | 61.3%                             | 9,162                  | 5,773          |
| Computer and Information Sciences           | 59.0%                             | 4,496                  | 3,124          |
| Artificial Intelligence                     | 57.1%                             | 3,509                  | 2,633          |
| Statistics                                  | 56.6%                             | 6,307                  | 4,834          |
| Agricultural Engineering                    | 54.7%                             | 558                    | 462            |
| Civil Engineering                           | 53.7%                             | 8,766                  | 7,555          |
| Agricultural Economics                      | 50.8%                             | 458                    | 443            |
| Computational Science                       | 50.7%                             | 1,736                  | 1,688          |
| Materials Science                           | 49.8%                             | 810                    | 815            |
| Engineering Mechanics, Physics, and Science | 49.5%                             | 1,164                  | 1,186          |
| Chemical Engineering                        | 49.3%                             | 4,771                  | 4,879          |
| <b>All Science and Engineering Fields</b>   | <b>40.3%</b>                      | <b>287,928</b>         | <b>426,238</b> |

Data sourced from the National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (2022) Country of Origin

## Country of Origin

The demographic characteristics of foreign-born students in the U.S. have been well documented.<sup>19</sup> The predominant countries of origin for international students studying in the U.S. are overwhelmingly China and India. Both countries have seen rapid growth in the number of students enrolling in U.S. institutions since the 90s, as each country has experienced economic growth and an expanding middle class able to afford an American education.

However, Chinese enrollment has fallen 22 percent since 2019 and looks like it will soon be overtaken by Indian enrollment. U.S. enrollment from other more developed Asian countries, like Japan and South Korea, that have traditionally sent students to the U.S. have also declined in recent years, replaced to some extent by students from economically developing countries like Nigeria and Vietnam and countries that subsidize enrollment in U.S. schools like Saudi Arabia.<sup>20</sup> Others, such as Canada and Brazil, have remained relatively constant.

**Chinese enrollment has fallen 22 percent since 2019.**

**Table 2: Foreign-Born Students, Countries of Origin**

| Place of Origin | 1979/80 | 1999/00 | 2009/10 | 2019/20 | 2022/23 |
|-----------------|---------|---------|---------|---------|---------|
| Canada          | 15,130  | 23,544  | 28,145  | 25,992  | 27,876  |
| Nigeria         | 16,360  | 3,602   | 6,568   | 13,762  | 17,640  |
| India           | 8,760   | 42,337  | 104,897 | 193,124 | 268,923 |
| China           | 1,000   | 54,466  | 127,628 | 372,532 | 289,526 |
| South Korea     | 4,890   | 41,191  | 72,153  | 49,809  | 43,847  |
| Vietnam         | 5,050   | 2,266   | 13,112  | 23,777  | 21,900  |

Data sourced from OpenDoors<sup>21</sup> international students by place of origin data

## Schools of Choice

International student enrollment varies a great deal from school to school. “In the 21st century, foreign enrollment of undergraduate students [have] largely concentrated at public research universities, including large midwestern institutions like the University of Illinois Urbana-Champaign and Purdue University, which are somewhat less selective than top private research universities.”<sup>22</sup> Although other, more prestigious universities like Northeastern have also heavily enrolled international students. The concentration of international students at public research universities reflects not only the size and resources of those schools, but also a reliance on foreign student revenues for colleges and universities struggling to maintain enrollments and funding amid declining domestic enrollments.<sup>23</sup>

This reliance on foreign-paid tuition is not new, but the scale of growth among the non-resident student population is. The introduction of more international students has led to greater resources for universities and increases in U.S.-born enrollments in programs with heavy immigrant concentrations. Yet, the reliance has left certain universities more exposed to demand shocks when relations with international student “exporter” countries have soured.<sup>24</sup>

## Enrollment Declines

The share of all international students coming to the U.S. has been declining in conjunction with a recent plateau in new enrollments. In 2001 the U.S. took in 28 percent of the world’s foreign students; in 2021 that had fallen to 21 percent.<sup>25</sup> Even prior to the pandemic and the temporary implementation of strict immigration policies, growth in enrollment was declining. Between 2015–16 and 2021–22, the number of new enrollees who are foreign students declined every school year. Although there was a resurgence in 2022–23 to near 2015–16 levels, it remains unclear whether this was the result of pent-up demand during the pandemic or the beginning of a new era of sustained enrollment growth.

Declines can partially be explained by two macro trends. First, other advanced economies have put more effort and energy into recruiting foreign talent than the U.S. has, offering more secure

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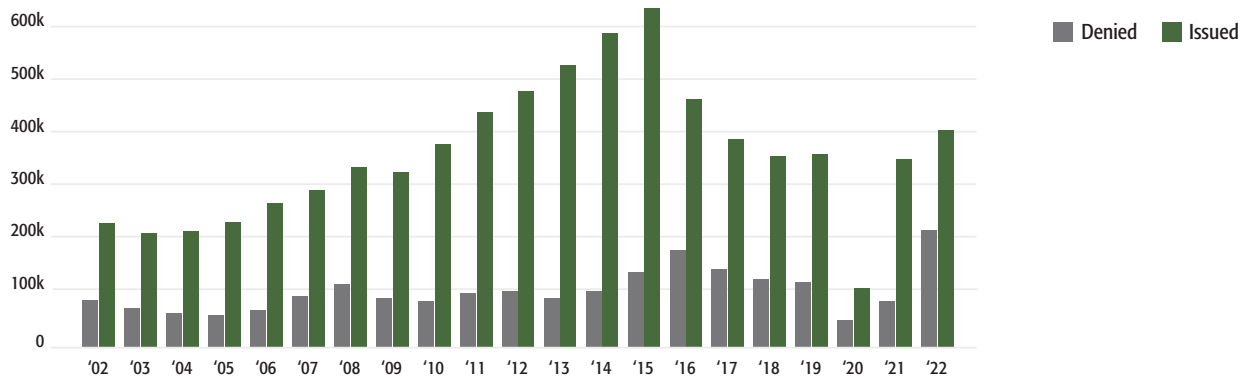


employment opportunities or even guaranteed employment after graduation. Some also offer a fast track to permanent legal status and citizenship. In addition, countries like the U.K., Canada, and Australia offer more efficient processing for visa applications, entrepreneur-specific visas, and national political environments sometimes perceived as being more welcoming to foreigners than the United States.<sup>26</sup>

The other macro trend is only tenuously related to policy. Increased competition, greater domestic capacity at institutions of higher learning, and strict Covid policies led to decreased enrollment among students of Chinese origin.<sup>27</sup> In 2022–23 there were 80,000 fewer Chinese students at U.S. higher education institutions than in 2019–20. This development runs counter to the nearly exponential increases in Chinese enrollment during the 2000's and 2010's. Fortunately, declines were largely counteracted by a surge in students from India.

The treatment of Indian applications for F-1 visas versus that of Chinese applicants may have depressed total approvals in recent years. According to a new report by the Cato Institute, U.S. consulates in India have been using criteria beyond what is required by law to evaluate Indian applications, including how engaging they are when presenting biographical information during the interview process.<sup>28</sup> This has led applicants from India to have the highest rejection rate of any country of origin and, as seen in Figure 3, has brought the number of overall refusals to record highs.

Figure 3: F-1 Visa Denials and Issuances, FY 2002–2022



Data sourced from the Cato Institute<sup>29</sup> depiction of U.S. Department of State, “Nonimmigrant Visa Statistics,” 2013–2022 (earlier years via Cato FOIA request)

The shift from China to India as our primary source of foreign students has had other noticeable effects on the higher education system. Chinese students are much more likely than their Indian counterparts to enroll in undergraduate programs, are less likely to seek OPT work authorization through their F-1 visa, and less likely to remain in the country for work after graduation. Indian enrollees concentrate more heavily in graduate programs and make up a plurality of OPT participants. Over a third (37 percent) of foreign temporary resident STEM business owners are from India – the highest percentage of any country of origin.<sup>30</sup>

A 2019 survey of more than 500 institutions of higher education also found that the top two listed reasons for the decline in foreign student enrollment were (1) visa issues and (2) global competition. “More specifically, 87 percent of institutions cited visa processes, delays, and denials as their primary answer, while 58 percent said that foreign students were deciding to enroll in other countries’ higher education institutions. In fact, several institutions noted that Canadian institutions and government have increased recruitment efforts in recent years.” While programs like Optional Practical Training are popular among international students, some of the program’s restrictions and requirements made it less attractive than some post-graduation work programs offered by other countries.<sup>31</sup>

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## Pathways

The pathway for entrepreneurial-minded international students is relatively straightforward when first entering the U.S, but becomes increasingly more complicated and restrictive after graduating from their original institution of higher learning.

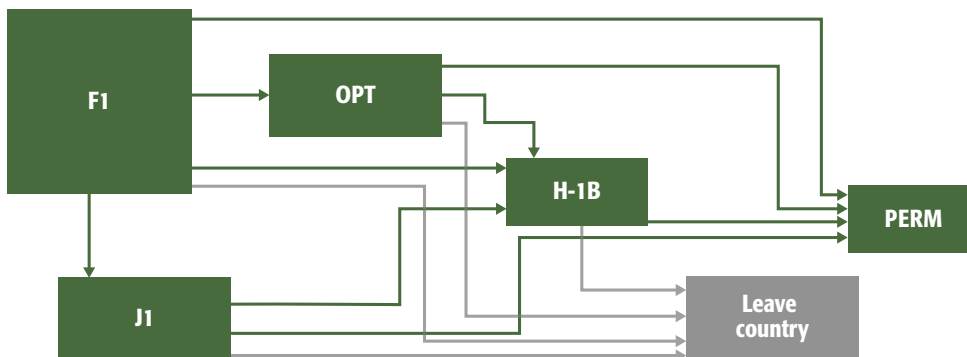
The vast majority of international students enroll in U.S. colleges and universities through F-1 visas, which allow foreign nationals to attend colleges and universities with accredited degree-granting programs. To qualify, a foreign student must be full-time, have the means to pay for school and live in the U.S, and maintain a permanent residence outside the U.S. with no intention of giving it up.

The F-1 visa has long been one of the most popular visas for foreign nationals generally,<sup>32</sup> especially considering that they provide access to some of the world's most accomplished, rigorous, and prestigious institutions of higher education and are not cap-limited like most other avenues of entry into the United States.

The university system has typically been viewed by immigrants as a means to continued residence, through work or even permanent legal status.<sup>33</sup> U.S. immigration policy largely attempts to incentivize and ease this pathway for immigrants, acknowledging it as an ideal means to bring highly skilled workers into the labor force.

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Figure 4: Common Immigrant Pathways



Data sourced from Bound et al. 2022<sup>34</sup>

In recent years regulatory reforms have been made to existing programs, like Optional Practical Training (OPT), to further incentivize this pipeline. Outside of lottery systems like those used to grant H-1B work visas, priority is given to immigrants already residing legally in the United States.

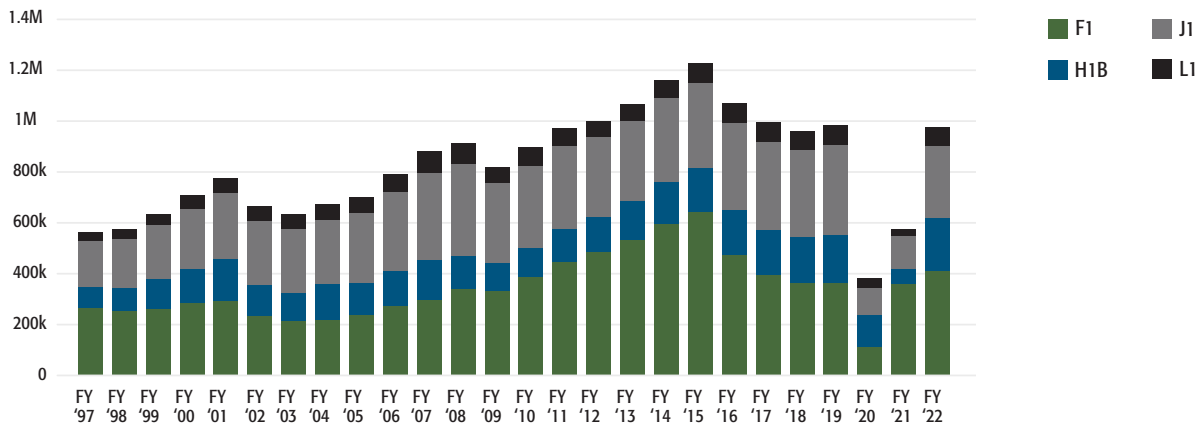
In fact, more than 80 percent of all employment-based green cards are granted to those who already legally reside in the United States.<sup>35</sup> By coming to the U.S. for school, immigrants both benefit from the quality of schooling available compared to their country of origin and by significantly increasing their chances of being approved to stay and work in their chosen field after they graduate.

As seen in Figure 4, there are a few primary pathways for immigrants generally when entering the U.S. as students. First, they attend on an F-1 student visa or a J-1 exchange program visa. Then, after graduation, they either renew their F-1 to continue their studies for a more advanced degree; transition to employment through OPT, which is a program that falls under F-1 visas and is uncapped; transition to employment-based capped visas like the H-1B, O-1, or EB green cards; or leave the country.

H-1B's are the most popular among work visas, but O-1's, which are reserved for those with "extraordinary abilities" in particular fields, also draw as many as 20,000 approvals each year.

J-1's differ from F-1 visas in that they are reserved for scholars, professors, and cultural exchange visitors (like au pairs). Some students, who attend vocational schools or K-12 schools, enter on M-1 visas. However, their numbers are limited.

Figure 5: New Visas Awarded, 1997–2022



Data sourced from the U.S. State Department, Nonimmigrant Visa Statistics

As seen in Figure 5, the approvals for these visas generally align with whether they are capped and with greater trends in enrollments for foreign students.

### Entrepreneur-Specific Paths?

Unlike a number of other advanced economies, the United States does not have a specific visa or green card for entrepreneurs.<sup>36</sup> Some might argue that certain “investor” category non-immigrant visas and green cards like the E-2 or EB-5 fill this role. However, they are best suited to immigrants with already established businesses and funding. The EB-5, for example, requires an immigrant to have invested greater than \$1.8 million in a U.S. business that has at least 10 American workers. The E-2 is less stringent but usually requires at least \$100,000 invested, among other requirements. Without that kind of capital and a clearly established business, many immigrants are not eligible for these visas and often end up outside the U.S. looking in or are funneled to employment-based visas not ideally suited for entrepreneurship.

According to one study,<sup>37</sup> immigrant entrepreneurs without the aforementioned personal wealth who are not already U.S. permanent residents have two main options for creating their own firm. The first is planning the business and creating a product during their time as F-1 students, “using the OPT employment period to launch and build the company, and then transitioning to an employment-based visa such as the O-1 or a self-petitioned green card via the EB-1A or EB-2 National Interest Waiver (NIW) categories.” The second option is to go directly to an employment-based visa like an H-1B through the lottery system, engage in preliminary business planning, and then pursue a green card from one’s employer.<sup>38</sup> There are less often used routes, but the complexity and number of hoops required make them even more difficult to navigate.

These types of immigrant pathways are simply not well designed for entrepreneurs, nor were they intended to be. “The legal fees, uncertainty, and high adjudication standard involved in obtaining an O-1, EB-1A, or EB-2NIW, and employers’ general reluctance to sponsor green cards often deter aspiring entrepreneurs.”<sup>39</sup> Multiple studies<sup>40</sup> by Roach and Skrentny found that immigrant PhDs working in tech startups were underrepresented compared to both their native peers and the number of immigrants expressing a desire to be in a startup. While the foreign PhD’s had a greater risk tolerance and other personality traits suited to entrepreneurship, their early intentions of becoming entrepreneurs often failed to materialize after graduating. The limited capability of the U.S. immigration system to support immigrant entrepreneurs likely plays an important role in this gap between intentions and outcomes among highly educated immigrants.

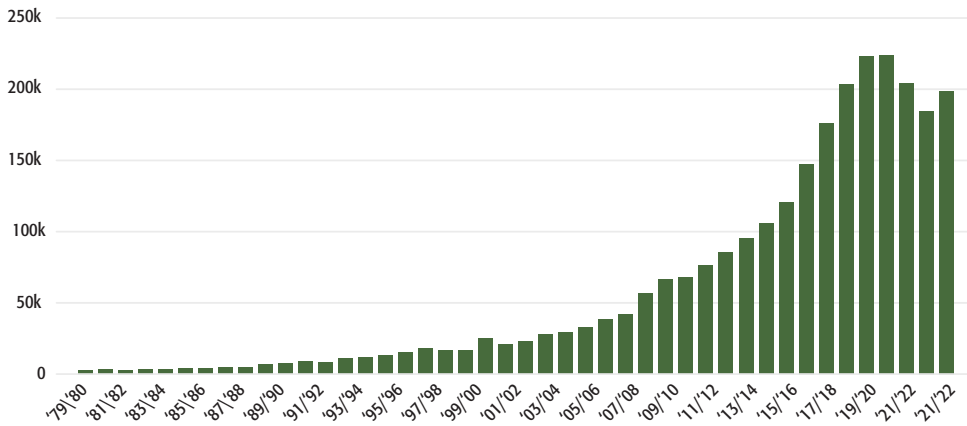
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## Optional Practical Training

The Optional Practical Training (OPT) program allows foreign students to work for at least one year upon graduation from a U.S. college or university and up to a maximum of three years if they graduate in a STEM field. Government regulations dating back to the 1950s allow foreign students to seek temporary work after graduation in some form, but for decades these programs were not widely used, as foreign student populations were relatively small and work authorizations were short in duration.<sup>41</sup>

As the number of international students has exploded in recent years, interest and enrollment in OPT have grown exponentially. As seen in Figure 6, there were fewer than 25,000 F-1 students in OPT during the 1999–2000 school year; in 2021–2022 there were 200,000—an eight-fold increase.

**Figure 6: Optional Practical Training (OPT) Enrollment, 1979–2023**



There were fewer than 25,000 F-1 students in OPT during the 1999–2000 school year; in 2021–2022 there were 200,000—an eight-fold increase.

Data sourced from Open Doors<sup>42</sup>

During that time period, regulations and policy shifted significantly. In its original iteration, the work period for the program was 18 months, then it was shortened to 12 in the 90's. In 2008 the program was amended to include a 17-month extension period for STEM graduates, then in 2016 the extension was lengthened to 24 months.

One study found that the 2008 reform led directly to higher matriculations for “international students in bachelor’s and master’s programs by 18% and 30%, respectively. Additionally, they improved the quality of students, as exemplified by greater scholarship/fellowship funding and matriculation into highly selective universities.”<sup>43</sup>

Time limitations created significant uncertainty for employers who were looking to retain workers longer term and for the international students themselves who were choosing where to locate based on their chances of employment after graduation. At the end of OPT eligibility, there was a risk that the immigrant could fail to be granted an employment-based non-immigrant visa or green card and have to leave the country. In this way, employers were probably much less likely to invest in those workers and the policies made international students less likely to come to the United States for school.

Today, OPT plays a crucial role as an on-ramp to the U.S. labor market. Many, if not most, foreign-born graduates seek H-1B employment sponsorship through their original OPT employers. The STEM extension has incentivized the use of OPT by STEM companies. In 2018, for example, the largest employers of OPT enrollees were Amazon, Intel, Google, and Microsoft.<sup>44</sup>

Over the last few decades, OPT has become increasingly popular, especially as caps for traditional work visas have stagnated even as their applications have grown significantly. Like the visa it falls under, OPT enrollment is uncapped and thus a significant draw, as demand for traditional visas grows along with the probability of being rejected.

Starting a business while on OPT comes with considerable uncertainty. During the first 12 months, an immigrant is able to pursue entrepreneurship freely, as OPT-authorized workers are only limited in their paid or unpaid work by requirements that work be related to their college major/field of study. Many use this time to start building a minimum viable product and seek feedback from potential investors and customers. However, once the year is done, the entrepreneur is no longer able to work for their business unless it is qualified to employ them and secures an H-1B visa. A business is considered qualified if it has raised at least \$200,000 – demonstrating it can pay the entrepreneur at least part-time wages — and has a board of directors with the ability to control the entrepreneur’s employment.<sup>45</sup>

Many promising startups are not far enough along after OPT. The time needed to both gain OPT approval and the necessary business licenses and legitimacy required to qualify for self-sponsorship through their own business can be lengthy. In the U.S. it takes an average of 213–426 days for OPT applications to be processed.<sup>46</sup> That, together with setting up a board of directors, creating a product, soliciting financing and investment, and creating the legal structure of the startup, requires significant planning, forethought, and time. All of this can be difficult for full-time students to juggle before being accepted into OPT and for young entrepreneurs to juggle in the year before their first OPT approval runs out. Visa uncertainty can create even more complications, especially in obtaining funding/investment. So, entrepreneurs must at that juncture seek an alternative means of work authorization.

### H-1Bs

Many students interested in entrepreneurship also apply for employment directly out of college through the H-1B visa. Others attempt to transition to it after exhausting work opportunities through F-1 visas.

H-1B’s are particularly attractive because they are targeted towards educated immigrants, with requirements of a bachelor’s or master’s degree to qualify and a longer eligibility duration than OPT – three years upon initial approval, and an additional three upon an extension.

However, H-1B’s have a hard cap of 65,000, with an additional 20,000 specifically granted to those with graduate degrees. These caps have not changed since the early 2000’s, when they were lowered from a temporary high of 135,000 even as the foreign student population has surged, making competition for those slots more intense and forcing students onto alternative paths. Reductions in the number of slots available have also been found to reduce the number and quality of students desiring to study in the U.S.<sup>47</sup>

Total registrations for FY24 were 780,000, and while 409,000 of those were individuals with multiple registrations, the number illustrates the scale of the issue. In FY23, over 80 percent were rejected through the lottery process before even being adjudicated as full applications.<sup>48</sup>

H-1Bs are also employment-based and require sponsorship by an employer. Spots have become so limited compared to demand in recent years that employers, desperate to use foreign talent in the midst of a worsening labor shortage, have taken to putting forth multiple applications for potential employees despite the considerable expense,<sup>49</sup> a development that has the State Department considering reforms.

Even after obtaining work, full-time employment has mixed effects on future entrepreneurship. By working for a STEM company, an immigrant may accumulate even greater knowledge of where innovation is needed and develop skills to fill those potential needs. However, full-time employment has also generally been shown to decrease the likelihood of entrepreneurship for immigrants, likely as a result of career path dependence and integration.<sup>50</sup>

The 2008 reform [of OPT] led directly to higher matriculations for “international students in bachelor’s and master’s programs by 18% and 30%.

In the U.S. it takes an average of 213–426 days for OPT applications to be processed.

The regulations surrounding H-1Bs are also not ideal for creating a startup. Since H-1Bs are employer sponsored, full-time work is required. Thus, even if the business is created, the entrepreneur cannot engage with his or her business in a managerial way or control day-to-day operations.

One alternative is for international students to try and sponsor themselves through their business, but if the business is still in the early stages of development it may not be sufficiently advanced in terms of financing and governance to even qualify to submit an H-1B petition.<sup>51</sup>

### Other Options

Consequently, an emerging workaround to the current system of employer sponsorship for legal status has sprung up to help immigrant entrepreneurs obtain the necessary employment authorization without waiting for permanent residency.

“Under the American Competitiveness in the Twenty-First Century Act of 2000, Congress made institutions of higher education and non-profit organizations exempt from the H-1B numerical cap.”<sup>52</sup> States have taken advantage of this loophole to retain entrepreneurial immigrants through what have been dubbed Global Entrepreneur in Residence (GEIR) programs at state universities. First created in Massachusetts in 2014, these programs selectively provide employment to immigrants with advanced STEM degrees. Under this arrangement, immigrants work part time for the university as mentors for undergraduates and part time on their entrepreneurial endeavor, providing the certainty of being able to remain in the country as their business and ideas take shape.

Since its adoption in 2014, several other states have realized GEIR’s potential and begun funding similar programs. As of May 2024, New York, Michigan, Washington, and California had implemented some form of GEIR program. Utah and New Jersey have also considered funding.<sup>53</sup>

Even on a small scale these programs have shown promise for nurturing the growth of high-impact STEM companies. While only dozens of immigrants have been accepted to the program in Massachusetts and only \$3 million appropriated, it has generated over \$1 billion in investment for participants and created more than 1,600 new jobs.<sup>54</sup>

However, it is unclear how scalable these programs are and whether they are a long-term solution to a problem best solved by legislative action.

### Tremendous Economic Impact

In the U.S., international students are a valuable resource across three main dimensions: as consumers, as a source of skilled labor with transitions to work visas after graduation, and as innovators and researchers with diverse knowledge bases and skill sets capable of driving dynamic innovation and entrepreneurial ventures.

The impact on local economies is significant. For example, in Massachusetts a recent Association of International Educators (NAFSA)<sup>55</sup> report found that the 80,000 international students who attended institutions of higher learning in the state contributed as much as \$3.6 billion to the economy and supported 35,000 jobs in 2022. Beyond the obvious benefit of providing a critical revenue stream to colleges and universities through tuition, of which international students pay higher rates and subsidize domestic students, they also spend money on housing, food, transportation, and other goods and services. The increase in demand is a boon for local businesses, from grocers to restaurants and retail shops, and creates a ripple effect that leads to new jobs and entrepreneurial ventures that target new consumer interests.

A common critique of increasing international student enrollment is that it will crowd out domestic students from important academic offerings like STEM programs. However, a number of studies have found that the concentration of international students in STEM has actually been shown to increase funding for those programs, ultimately drawing in more domestic students and growing their enrollment instead of crowding them out. One study of undergraduate STEM

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enrollment found that each additional 10 bachelor's degrees awarded to international students across all majors by a college or university lead to an additional 15 bachelor's degrees in STEM majors awarded to U.S. students.<sup>56</sup>

While at school and then after graduation, many international students, who often see the U.S. higher education system as a pathway to future work or even legal permanent residence, provide invaluable labor.<sup>57</sup> This pipeline is ever more important now as the country reels from a tight labor market stemming from an aging population, among other factors. Programs like OPT and visas like the H-1B provide American businesses with hundreds of thousands of talented and highly educated workers, who play an instrumental role in growing the American economy.

### Entrepreneurship

However, the greatest contribution of international students comes in the form of entrepreneurship and innovation, both within their own firms and in established enterprises. With a concentration of high-achieving students in advanced STEM fields, international students are often ideally situated to leverage their degrees into high-impact, scalable businesses in lucrative industries thanks to their knowledge, skill sets, cultural backgrounds and perspective.

Combined with the proclivity of immigrants to start businesses at twice the rate of the U.S.-born, international students are responsible for nearly a quarter of all current billion-dollar private startups in the United States.<sup>58</sup> Those 143 “unicorn” companies have left quite a mark on the economy, creating over 860 jobs each and more than \$591 billion in value.<sup>59</sup> Twenty-five of those entrepreneurs were educated at Massachusetts colleges or universities and can bring serious economic growth to states with well-established institutions of higher education.

A more comprehensive economic value of international students can also be derived not just from business creation but also from patenting. Like other immigrant entrepreneurs,<sup>60</sup> international students patent at rates greater than the U.S. born, in large part because of their high educational attainment. For example, for every percentage point increase in the share of immigrant college graduates, there is a corresponding 9–18 percent increase in the number of patents created.<sup>61</sup> Similarly, for every 1,000 international Ph.D. students who attend school in the U.S. in a year, there is an estimated \$210 billion added to the expected value of patents.<sup>62</sup> Further, immigrant students and U.S.-educated visa holders are 22–28 percent more likely to publish academic books and papers frequently or start firms with 10 or more employees.<sup>63</sup>

Multiple additional studies have corroborated these findings.<sup>64</sup> One in particular found that OPT-enrolled immigrants have a staggering impact on human capital, innovation and the labor market. For every 10 additional OPT participants in a statistical area, there are five additional patents in that area. OPT participation also had a positive effect on U.S.-born college educated workers' earnings through “better diffusion of ideas, knowledge spillovers, and agglomeration effects.”<sup>65</sup>

Immigrant shares of all patents have increased significantly in recent years. In 1975, immigrants accounted for only 9 percent of all patents; they now account for more than 30 percent. And while immigrants only make up 16 percent of total inventors, they are responsible for 30 percent of aggregate innovation since 1976 – nearly double their expected contribution.<sup>66</sup>

### Retention of International Students

Additional research<sup>67</sup> into venture capital-backed international student startups further expands on how well states are at retaining entrepreneurial international students. The impact of venture capital-backed firms was felt the most in states and areas that have high-level universities and access to capital. Three of the states with the highest retention of venture capital-backed entrepreneurs educated in-state were California, New York, and Massachusetts. Out of all venture capital-backed entrepreneurs, 40 percent of U.S.-born founders started their companies in the same state in which they received their post-secondary education. The number was 41 percent for

**Each additional 10 bachelor's degrees awarded to international students across all majors by a college or university lead to an additional 15 bachelor's degrees in STEM majors awarded to U.S. students.<sup>56</sup>**

**International students are responsible for nearly a quarter of all current billion-dollar private startups in the United States.**

immigrant founders who attended graduate school and 35 percent for immigrant founders who obtained an undergraduate degree.

In the 47 states deemed “non-hub,” 34 percent of founders were educated in the same state in which they started their company. “This number [was] even higher in venture [capital] hubs, (35% for New York, 45% for California, and 59% for Massachusetts).” “The evidence suggests that the concentration of founders educated in the same state in which they start firms is common across all states, although this concentration is especially high in venture hubs.” Many of the top firms that generate venture-backed immigrant entrepreneur startups are IT companies, especially those that are among the nation’s top H-1B sponsors.<sup>68</sup>

Rates also vary by country of origin for international student retention. For example, the five-year stay rate for doctorates is higher for countries like India (86 percent) and China (84 percent) than for many European and other East Asian countries. Similarly, “10-year stay rates were highest among students from China and India (85 percent), with students from South Korea, Europe, and the Americas less likely to stay.”<sup>69</sup>

These findings indicate that states can create economic growth by luring international students and that government policies that affect the flow of foreign students into the United States also likely affect the flow of entrepreneurial talent into the country.<sup>70</sup>

## The Effect of Immigration Restrictions on Entrepreneurship

As detailed above, the current structure of the immigration system is poorly suited to entrepreneurship. While there are workarounds, in general, international students seeking to start their own ventures are often unable to obtain visas and are forced to leave the country or get channeled into highly restrictive employer-sponsored work authorizations. Without reform or the creation of an entrepreneur-specific visa, this reality is unlikely to change.

The following section seeks to answer two primary questions: To what extent is entrepreneurship prevented or delayed for international students after graduation? And what is the estimated effect on the United States economy? To answer these questions, we analyze yearly survey data (2013–2021) from the National Science Foundation called the National Survey of College Graduates (NSCG). The analyses include fixed effects for survey year and employer location.

### Delay in Entrepreneurship

To isolate the effect of immigration restrictions on entrepreneurship, we group survey respondents by years out from graduation; less than six years out, six to ten years out, and greater than ten years out. This allows us to control for the time it takes to develop a new business venture. Older individuals (35–45 years old) are typically more likely to start a successful firm than their younger counterparts because it takes time and trial and error to start a business.<sup>71</sup> Comparing U.S.- and foreign-born college graduates who have similar post-graduation experience allows us to isolate the impacts of onerous visa restrictions, both foreign- and U.S.-born college graduates have little business and labor market experience in their first years after graduation. At the same time, foreign-born college graduates are subject to visa-induced labor market constraints in their first several years after graduation, while U.S.-born college graduates are not. Thus, if we see that immigrant college graduates are only more entrepreneurial than U.S.-born graduates after several years have passed since graduation, it is very likely that visa-induced restrictions are leading to delays in college-educated immigrant entrepreneurship.

Consistent with previous literature, the side-by-side comparison of U.S.- and foreign-born graduates for all individuals in the survey showed that international students are more likely to found firms than their native counterparts. This is especially true of incorporated firms, which foreign-born graduates are 24 percent more likely to found than the U.S. born. This is consequential,

**While immigrants only make up 16 percent of total inventors, they are responsible for 30 percent of aggregate innovation since 1976.**

**Foreign-born graduates are 24 percent more likely to found [an incorporated business] than the U.S. born.**

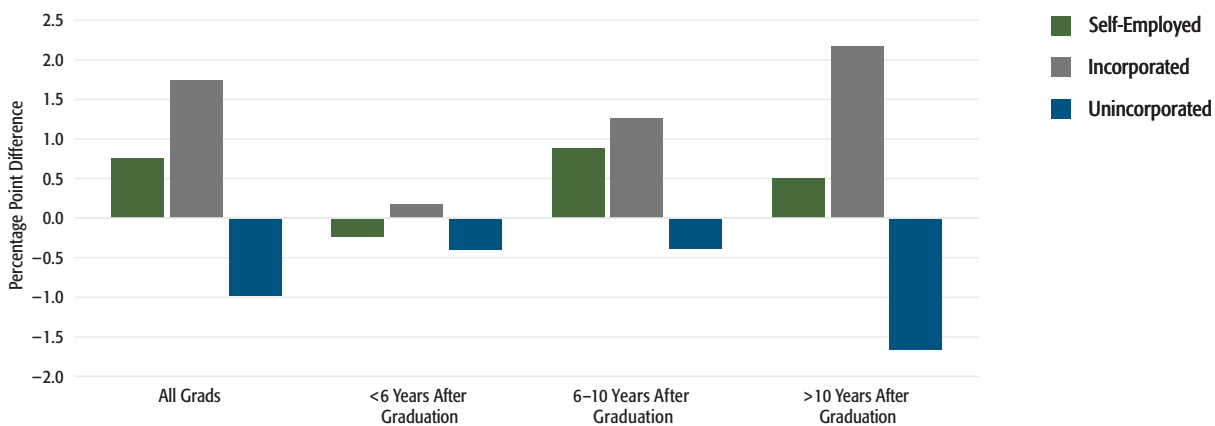


as incorporated firms are the most likely to scale and see high-impact growth.

Unincorporated firms are the exception, with foreign-born college graduates roughly 16 percent less likely than the U.S. born to start those businesses. This could be the result of high opportunity cost. Employment in STEM fields is stable and lucrative for most foreign-born graduates, and unincorporated firms are difficult to grow and scale up. Thus, engaging in entrepreneurship with relatively lower growth prospects may be less attractive to foreign-born college graduates, who are often locked into positions as high-earning employees because of visa restrictions that prohibit self-employment in the first several years after graduation.

Also as predicted, these propensities are variable when breaking down the data by years since graduation. As seen in Figure 7, differences in rates of entrepreneurship are very similar in the years immediately following graduation for international students and those born in the U.S., but diverge over time. The rate at which all individuals engage in entrepreneurship grows as time passes after graduation. In particular the U.S.- and foreign-born are equally likely to start an incorporated business in the first five years after graduation. However, as time passes after graduation, the foreign-born become more and more likely to own an incorporated entrepreneurial venture than their native peers and less and less likely to own an unincorporated, low-growth firm.

**Figure 7: Likelihood of Entrepreneurship for Immigrants Relative to the U.S.-Born, Years Out from Graduation**



Data sourced from National Survey of College Graduates (NSCC),<sup>72</sup> analysis by authors

The clear explanation for this phenomenon is that foreign-born graduates are generally more entrepreneurial than the U.S.-born, but have diminished numbers of ventures in the years immediately following graduation because most immigrant pathways make firm creation difficult. Our estimates suggest college-educated immigrant entrepreneurship is delayed by at least five years after graduation. The large increase in immigrant entrepreneurship relative to U.S.-born entrepreneurship following these initial five years stem from immigrant college grads' increased proclivity to engage in entrepreneurship, a proclivity these immigrants are unable to act on initially after graduation because of visa restrictions. Once granted permanent residency or citizenship, immigrants have more freedom to pursue business creation. They might also be more likely to obtain funding and be attractive to banks and angel investors, as their ability to remain in the country long term becomes more certain, thus reducing the risk in lending to them.

It is possible that other factors are responsible for some of the trends we observe, yet it seems highly likely that immigration restrictions are the primary cause. International students speak English well and have similar baseline career prospects to U.S.-born graduates. At the master's and doctoral levels, immigrant labor might be in even greater demand because fewer U.S. natives

**Our estimates suggest college-educated immigrant entrepreneurship is delayed by at least five years after graduation.**

enter many of the STEM fields in which immigrants cluster while at school. In other words, we compare immigrant college grads with very similar U.S.-born college grads. The only major difference between these two groups is that immigrant college grads face visa restrictions that limit their ability to engage in entrepreneurship in the first several years after graduation.

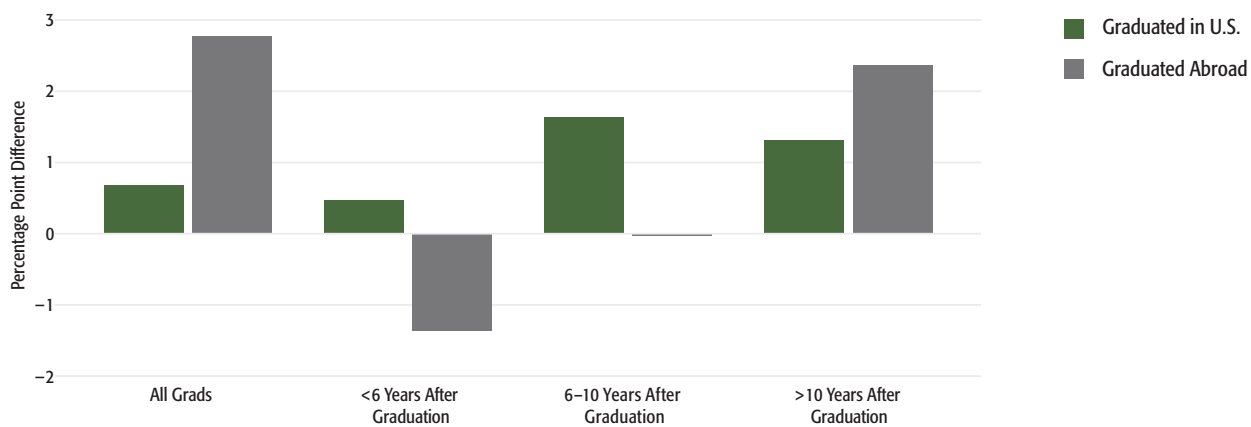
### Foreign Graduates vs. Foreign-Born U.S. Graduates

While the previous section lumped both foreign-born U.S. graduates and immigrants with foreign degrees together, there are some key differences between the two demographics in rates of entrepreneurship.

The primary one is that foreign graduates take longer than foreign students with U.S. degrees to become more entrepreneurial than natives, but once they surpass natives in entrepreneurship they start incorporated businesses at even higher rates than foreign-born students with U.S. degrees. Overall, it takes those with foreign degrees over 10 years after graduation to surpass natives.

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**Figure 8: Likelihood of Incorporated Entrepreneurship for Immigrants Relative to the U.S.-Born by Degree Location, Years Out from Graduation**



Data sourced from National Survey of College Graduates (NSCC),<sup>73</sup> analysis by authors

The delayed entrepreneurship for foreign graduates is likely due in part to the same immigration restrictions faced by international students with U.S. degrees. However, foreign graduates are likely to experience barriers that international students with U.S. degrees will not. For example, they speak English less fluently on average and many foreign degrees and credentials don't translate well to the U.S. These differences may result in hiring discrimination from employers—immigrants with foreign degrees earn 20 percent less than their U.S.-born counterparts—further propelling foreign graduates into entrepreneurship as their prospects for employment are dimmer than international students studying in the U.S. This means their opportunity cost of engaging in entrepreneurship is lower compared to U.S.-born graduates and international students with U.S. degrees.<sup>74</sup>

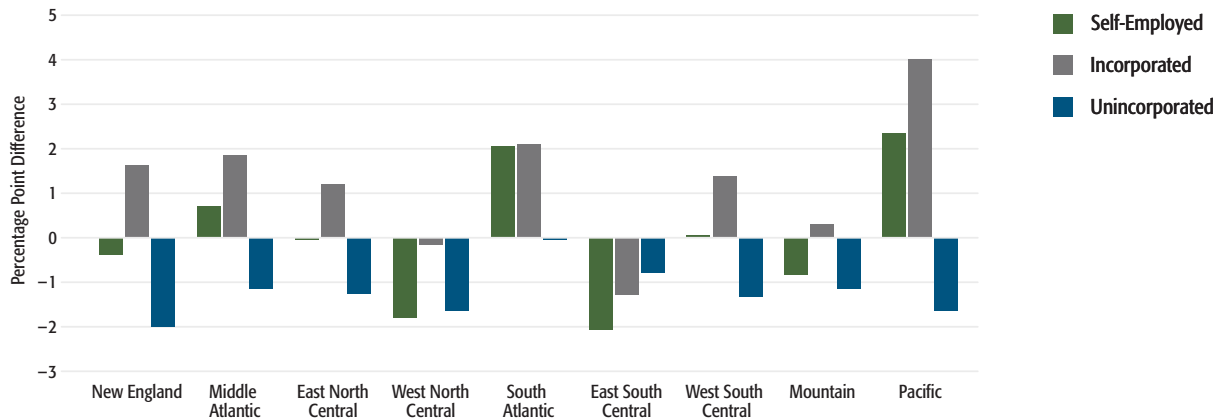
### How Immigration Status Impacts Entrepreneurship by Region

To further build out our analysis, we tested for regional differences in rates of entrepreneurship for international students versus those for the U.S. born. Certain areas of the country have stronger entrepreneurial ecosystems, larger immigrant populations/enclaves, local policies that ease business creation, and access to potential investors and talent that make those locations more attractive to international student entrepreneurship after graduation.<sup>75</sup> This plethora of factors along with the strength of the university systems in those regions are likely determinative of differences across regions.

According to the survey data and Figure 9, entrepreneurship by international students and

foreign-born graduates is not uniform across the country. Regions with well-established entrepreneurial ecosystems, like the West Coast, have much higher rates of entrepreneurship among foreign-born graduates relative to U.S.-born graduates. In that region international students are over 50 percent more likely to own an incorporated firm than are their U.S.-born counterparts.

**Figure 9: Likelihood of Entrepreneurship for Immigrants Relative to the U.S.-Born, by Region**



Data sourced from National Survey of College Graduates (NSCC),<sup>76</sup> analysis by authors

Foreign-born graduates in the Middle Atlantic and South Atlantic regions are highly entrepreneurial relative to U.S.-born graduates compared to the rest of the country. In the Middle Atlantic they are 22 percent more likely than natives to own an incorporated business and 25 percent more likely in the South Atlantic.<sup>77</sup> Somewhat surprisingly, international students in New England were only the fourth most likely compared to their U.S.-born counterparts to own an incorporated business out of the nine regions, despite its reputation for a strong university system.

In two regions, the Mountain and West North Central, foreign-born graduates were not more likely at a statistically significant level to own incorporated businesses than are natives. In the East South Central region (AL, KY, MS, TN), international students were actually less likely than natives to found incorporated firms to a significant degree (15 percent less likely).

In every region, international students and foreign-born graduates were less likely to own unincorporated businesses than their U.S.-born counterparts. However, in two regions, the East South Central and South Atlantic, the difference didn't reach a high level of statistical significance.

### Entrepreneurship by Highest Degree

While immigrant status, years since graduation, and degree location provide some insight into which international students are most likely to engage in entrepreneurship, the type of degrees earned is also highly informative. Rates of entrepreneurship among international students relative to the U.S.-born differ significantly by degree type.

An immigrant with a master's degree is 57 percent more likely to own an incorporated business compared to their U.S.-born peers, 41 percent more likely with a doctorate, 32 percent more likely with a bachelor's degree, and about equally as likely with a professional degree. This points towards an explanation for why those of Indian origin are so well represented in new startups. Indian foreign students are highly concentrated in master's programs in the U.S., a level of education that provides the necessary technical expertise and knowledge required to found a successful firm that stays in business and becomes incorporated.

**International students in New England were only the fourth most likely compared to their U.S.-born counterparts to own an incorporated business out of the nine regions, despite its reputation for a strong university system.**

Our analysis of the NSCG data also found that, except for those with a professional degree, immigrants of all college degree types become less likely to own an unincorporated business as their degree type becomes more advanced. Those with a bachelor's are 5 percent more likely to found an unincorporated firm compared to the U.S.-born, those with a master's are 20 percent less likely, and those with a doctorate are 44 percent less likely.

### Estimated Economic Impact of Delayed Incorporated Firm Creation

From the above analysis, it is clear that international students and graduates with foreign degrees are more likely to start high-impact incorporated firms out of college than their native counterparts, and that proclivity is significantly depressed immediately following graduation. To put the effect of immigration restrictions in context, we made some conservative back-of-the-envelope calculations to quantify what the loss of this delayed entrepreneurship could mean for the economy at large.

We first calculated the difference between the percentage of international students owning an incorporated business within five years of graduation and those owning one after more than five years (5.59 percent) from the 2013–2021 NSCG data. Then we did the same for the U.S. born (3.22 percent) and took the difference between the two (2.3 percent) as a rough estimate of delayed entrepreneurship. This method assumes that since the rate of business ownership is similar for the U.S.-born and foreign-born directly out of college but much higher for the foreign-born several years out, a significant percentage of the difference must be the result of immigration restrictions and not simply a preference for international students to wait longer than natives to start a business.

Considering that 6,352,860 foreign-born individuals graduated from U.S. institutions between 2013 and 2021, that 2.3 percent difference would equate to over 146,000 incorporated firms that would have otherwise been created but were delayed by at least a year. In 2019, the average startup firm had four employees and the annual revenue of an establishment with no employees was \$50,000.<sup>78</sup> A highly conservative estimate would put the economic effect of delayed entrepreneurship at 584,464 jobs and at least \$7.3 billion in revenue between 2013 and 2021.

However, true totals are likely much higher. First, since our estimates only model the economic effect of a one-year delay, it doesn't incorporate the cumulative effect of several years of delay, which is far more likely for most international students attempting to start a business. Secondly, because the revenue estimates we used are for average businesses without employees, a far cry from what we might expect from high-growth potential STEM startups, the total revenue loss is likely underestimated by orders of magnitude, especially considering that in Massachusetts alone the GEIR program has brought in more than \$1 billion of investment and created 1,600 jobs with only a few dozen entrepreneurs taking part from 2014 to 2023.<sup>79</sup> International students are responsible for over 25 percent of all private billion-dollar companies in the U.S., a single one of which being delayed could double our estimated economic loss.

Our numbers also do not consider international students who were unable to stay in the U.S. after graduation because they were discouraged or unable to come due to visa and immigration restrictions. Nor does it account for the greater percentage of immigrant businesses in STEM. According to one study, using 2010 data, the foreign-born made up 20 percent of all college educated business owners but over 30 percent of college graduates owning STEM firms.<sup>80</sup>

## Discussion

Over the last several decades, employment has become increasingly concentrated in larger established firms, and while new businesses are the primary drivers of employment growth and innovation, their share of the overall number of businesses has declined significantly.<sup>81</sup> The number of entrepreneurs per capita has also declined, indicating that much of new establishment creation is concentrated in the same owners' hands, while truly new independent entrepreneurs are harder to

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come by. According to a 2020 Congressional Budget Office study, the annual rate at which new firms were created decreased from about 10 percent of all businesses in 1982 to about 8 percent in 2018.<sup>82</sup>

Failure rates for entrants are much higher than for established firms, as high as 50 percent in the first five years. Yet, those surviving firms, and even those that don't survive, are essential for economic dynamism, productivity growth, and general improvements in wellbeing. While only 8 percent of all firms are startups, those firms account for 26 percent of aggregate growth from innovation.<sup>83</sup>

These trends, if left to continue unabated, would weaken the American economy and leave significant improvement in our way of life on the table. One estimate found that if rates of entrepreneurship had not declined so much since 1970, the economy today would be 50 percent larger.<sup>84</sup> When we don't invest in facilitating innovation, we miss out on the bounty and prosperity it creates.

"The benefits of past economic growth show up across various dimensions of well-being. Americans at all income levels have access to a greater quality and quantity of food than ever before, have more leisure time, and work fewer hours for higher incomes than at any other point in history. They live in higher quality homes with modern appliances and less overcrowding. Advances in medical technology have helped increase the average life expectancy from 47 years in 1900 to 77 years in 2020."<sup>85</sup> Slower growth threatens Americans' ability to overcome challenges and create a better life for everyone. Thus, it is imperative that policymakers at every level of government strategize about how U.S. laws and regulations can best be optimized to encourage new business formation and innovation.

Immigrants are business creators and a huge part of that picture that offers enormous potential and has often been underutilized. The mere act of being an immigrant is inherently entrepreneurial, and their unique backgrounds allow them to identify opportunities in ways that are not always apparent to the U.S. born.<sup>86</sup> This is true for less educated immigrants, who are foundational to neighborhood revitalization and improving quality of life at the local level through small businesses, as well as for international students and more highly educated immigrants who have the greatest likelihood of starting transformative high-growth firms. As such, they should be a prime focus for reforms, and U.S. policy should orient itself to encourage their entrepreneurship in whatever ways possible.

Encouraging entrepreneurship and creating pathways for international students to stay in the U.S. also have far reaching benefits beyond innovation and business creation. International students are instrumental in staffing many of the country's most productive STEM firms, and are more important than ever during a time of labor shortages that are likely to last for years to come. They also increase the productivity of U.S.-born workers and strengthen our national security. If those same immigrants were not able to come and stay in the U.S., they would go elsewhere and weaken our competitive edge for attracting global talent.

To strengthen this essential pipeline, national and state policy makers should pursue four primary policy objectives:

### 1. Create an entrepreneur-specific immigration lane

One of the most glaring gaps in the U.S. immigration system is the lack of an entrepreneurship-specific visa. Without a dedicated lane, our current immigration system discourages entrepreneurship by funneling talented immigrants through an employment-based system that is highly restrictive and regulated.

The U.S. should follow the example of countries like Canada and the U.K. by establishing a specific immigration lane for entrepreneurs without the significant pre-existing funding requirements of current "investor" category visas.

**While only 8 percent of all firms are startups, those firms account for 26 percent of aggregate growth from innovation.**

## 2. Commit to institutional and regulatory changes that will reverse slides in the number of students admitted on F-1 visas

De facto policies and procedures present in the way the U.S. adjudicates applications for F-1 visas should be further investigated. If they systematically disadvantage those from certain countries of origin, as they appear to, changes should be made to allow a greater number of international students to attend school in the U.S.

Policy makers should also consider streamlining the application process or upgrading current capabilities of the agencies tasked with processing applications in order to make the U.S. competitive with other countries. Our current approval process takes four times longer than in other developed countries and provides a significant incentive for students to locate elsewhere.<sup>87</sup>

Federal policymakers should also aim to promote certainty and stability within the immigration framework. Perceptions of anti-immigrant sentiment, visa complexity, and frequently changing rules can create a significant disincentive to locate here.

## 3. Expand Optional Practical Training

Optional Practical Training is one of the U.S.'s most effective programs at integrating international students into the labor force and economy. Policy makers could expand and better utilize OPT by:

- Allowing non-STEM graduates to extend their OPT for an additional two years
- Removing employer sponsorship requirements for entrepreneurship-inclined students (require some level of business planning, with an evaluation after one year to determine continued approval)
- Allowing foreign graduates to work in industries outside their field of study
- Streamlining the I-765 form issuance process used for OPT so applicants can receive authorization within three months

Several notable immigrant entrepreneurs started their businesses while on OPT, including Michelle Zatlyn, co-founder of Cloudflare, and Ashifi Gogo, founder of Sproxil. Both companies are valued at more than \$1 billion.<sup>88</sup> Yet, how many businesses were unable to form because the window for creating a new venture and securing funding is so short while on OPT?

## 4. Expand Global Entrepreneur in Residence programs and increase the cap on H-1B visas

More states should seek to fund GEIR programs, as the Massachusetts experiment has more than proven they can generate strong STEM businesses for comparatively little investment. State universities are well positioned and tooled to provide the ideal setting to foster high-growth innovative firms.

Federal policy makers could further make adjustments that replicate the GEIR program's model by making those who participate in OPT for the full duration of the program (at least one year) eligible for a cap exempt H-1B and by restructuring H-1Bs to offer flexibility for entrepreneurship through a part-time work option. This would allow immigrants to pursue gainful employment and their business idea simultaneously.

**It is imperative that policymakers at every level of government strategize about how U.S. laws and regulations can best be optimized to encourage new business formation and innovation.**

## Endnotes

- 1 Other policy relevant indicators: inbound internationally mobile students by country of origin, 2024. *UNESCO Institute for Statistics*.
- 2 Enrollment Trends, 2023. *Institute of International Education: Open Doors*.
- 3 International Student Economic Value Tool, 2024. *NAFSA*.
- 4 e.g. Enright, A. and Bedi, J., 2022. Immigrant Entrepreneurs and the Barriers They Face: An Academic Literature Review. *Pioneer Institute*; Bedi, J., 2023. Immigrant Entrepreneurship in New England. *Pioneer Institute*; Azoulay, P., Jones, B., Kim, J. and Miranda, J., 2021. Immigration and Entrepreneurship in the United States. *American Economic Review: Insights*, 4(1), pp.71–88.
- 5 e.g., Azoulay, P., Jones, B., Kim, J. and Miranda, J., 2021. Immigration and Entrepreneurship in the United States. *American Economic Review: Insights*, 4(1), pp.71–88; Kerr, Sari Pekkala, and William R. Kerr. 2018. “Immigrant Entrepreneurship in America: Evidence from the Survey of Business Owners 2007 & 2012.” *Research Policy* 49(3); Kahn, Shulamit, Giulia La Mattina, and Megan J. MacGarvie. 2017. ““Misfits,” “Stars,” And Immigrant Entrepreneurship.” *Small Business Economics* 49(3): 533–557.
- 6 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 7 Amuedo-Dorantes, C., Shih, K. and Xu, H. 2022. ‘The implications of optional practical training reforms on international student enrollments and Quality’, *Economic Inquiry*, 61(2), pp. 253–281.
- 8 Rosenzweig Mark. 2006. “Global Wage Differences and International Student Flows.” *Brookings Trade Forum*, pp. 57–86; Bound John, Demirci Murat, Khanna Gaurav, and Turner Sarah. 2014. “Finishing Degrees and Finding Jobs: U.S. Higher Education and the Flow of Foreign IT Workers” *Innovation, Policy and The Economy*
- 9 Bound John, Turner Sarah, and Walsh Patrick. 2009. “Internationalization of U.S. doctorate education.” *In Science and engineering careers in the United States: analysis of markets and employment*, edited by Freeman RB and Goroff DL. Chicago: University of Chicago Press.
- 10 Baer, Julie, and Mirka Martel. “Fall 2023 Snapshot on International Student Enrollment.” Institute of International Education, 2023.
- 11 Dyvik, E.H. 2023. *Countries with Highest Share of International Students*, Statista.
- 12 Palagashvili, Liya, and Jack Salmon. 2022. “Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation.” *SSRN Electronic Journal*
- 13 “Integrated Postsecondary Education Data System.” National Center for Education Statistics, n.d.
- 14 “Integrated Postsecondary Education Data System.” National Center for Education Statistics, n.d.
- 15 “Integrated Postsecondary Education Data System.” National Center for Education Statistics, n.d.
- 16 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 17 Chen Te-Ping, and Korn Melissa. 2015. “American Colleges Pay Agents to Woo Foreigners, Despite Fraud Risk” *Wall Street Journal*.
- 18 Blume-Kahout, M., 2019. Imported entrepreneurs: Foreign-born scientists and engineers in U.S. stem fields entrepreneurship, *Small Business Administration’s Office of Advocacy*.
- 19 Kerr, Sari Pekkala, and William R. Kerr. 2020. “Immigration Policy Levers for Us Innovation and Startups.” *SSRN Electronic Journal*, etc.
- 20 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 21 Institute of International Education, 2023. “International Students by Place of Origin, Selected Years, 1949/50 - 2022/23.” Open Doors Report on International Educational Exchange. Retrieved from <https://opendoorsdata.org/>
- 22 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 23 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 24 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 25 Other policy relevant indicators: inbound internationally mobile students by country of origin, 2024. *UNESCO Institute for Statistics*.
- 26 Palagashvili, Liya, and Jack Salmon. 2022. “Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation.” *SSRN Electronic Journal*; Kerr, Sari Pekkala, and William R. Kerr. 2020. “Immigration Policy Levers for Us Innovation and Startups.” *SSRN Electronic Journal*
- 27 Other policy relevant indicators: inbound internationally mobile students by country of origin, 2024. *UNESCO Institute for Statistics*.
- 28 Bier, D.J., 2023. Unprecedented Student Visa Denials in 2022: 35% Rejected, *Cato Institute*.
- 29 Bier, D.J., 2023. Unprecedented Student Visa Denials in 2022: 35% Rejected, *Cato Institute*.
- 30 Blume-Kahout, M. (2019) *Imported entrepreneurs: Foreign-born scientists and engineers in U.S. stem fields entrepreneurship*, Small Business Administration’s Office of Advocacy.
- 31 Sanger, J. and Baer, J., 2019. Fall 2019 International Student Enrollment Snapshot Survey, *Institute of International Education: Center for Academic Mobility Research and Impact*.
- 32 *Non-Immigrant Visa Statistics*. 2024. U.S. Department of State.
- 33 Kato, T. and Sparber, C. (2010) *Quotas and Quality: The Effect of H-1B Visa Restrictions on the Pool of Prospective Undergraduate Students from Abroad*, Institute for the Study of Labor.
- 34 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. “The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System.” *Journal of Economic Perspectives* 35.1, pp. 1–23.

- 35 Nowrasteh, A., 2023. Only 45 Percent of Employment-Based Green Cards Went to Workers in 2022, *Cato Institute*.
- 36 Kerr, Sari Pekkala, and William R. Kerr. 2020. "Immigration Policy Levers for Us Innovation and Startups." *SSRN Electronic Journal*.
- 37 Kerr, Sari Pekkala, and William R. Kerr. 2020. "Immigration Policy Levers for Us Innovation and Startups." *SSRN Electronic Journal*.
- 38 Blume-Kahout, M. (2019) *Imported entrepreneurs: Foreign-born scientists and engineers in U.S. stem fields entrepreneurship*, Small Business Administration's Office of Advocacy.
- 39 Kerr, Sari Pekkala, and William R. Kerr. 2020. "Immigration Policy Levers for Us Innovation and Startups." *SSRN Electronic Journal*.
- 40 Roach, M., Sauermann, H. and Skrentny, J., 2019. Are foreign stem PhDs more entrepreneurial? entrepreneurial characteristics, preferences and employment outcomes of Native and foreign science & engineering PhD students, *National Bureau of Economic Research*
- 41 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 42 International Students, 2024. *Institute for International Education, Open Doors*.
- 43 Amuedo-Dorantes, C., Shih, K. and Xu, H. 2022. 'The implications of optional practical training reforms on international student enrollments and Quality', *Economic Inquiry*, 61(2), pp. 253–281.
- 44 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 45 Brah, W. (2019) How does the Massachusetts Global Entrepreneur in Residence program work? *Venture Development Center, UMass Boston*
- 46 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 47 Kato, Takao, and Chad Sparber. 2013. "Quotas and Quality: The Effect of H-1B Visa Restrictions on The Pool of Prospective Undergraduate Students from Abroad." *Review of Economics and Statistics* 95(1): 109–126.
- 48 "H-1B Petitions and Denial Rates in FY 2023". 2024. *National Foundation for American Policy*.
- 49 "H1B Petitions and Denial Rates in FY 2021." 2022. *National Foundation for American Policy*.
- 50 Chellaraj Gnanaraj, Maskus Keith, and Mattoo Aaditya. 2008. "The Contribution of International Graduate Students to US Innovation." *Review of International Economics* 16(3): 444–62.
- 51 Brah, W., 2019. How does the Massachusetts Global Entrepreneur in residence program work?, *Venture Development Center, UMass Boston*
- 52 Kerr, Sari Pekkala, and William R. Kerr. 2020. "Immigration Policy Levers for Us Innovation and Startups." *SSRN Electronic Journal*.
- 53 O'Brien, C. 2024. *How more states and cities can retain immigrant entrepreneurs*, Economic Innovation Group
- 54 O'Brien, C. 2024. *How more states and cities can retain immigrant entrepreneurs*, Economic Innovation Group
- 55 *2022 Economic Value Report for MA*. 2024. NAFSA.
- 56 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. "The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System." *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 57 Kato, T. and Sparber, C. (2010) *Quotas and Quality: The Effect of H-1B Visa Restrictions on the Pool of Prospective Undergraduate Students from Abroad*, Institute for the Study of Labor.
- 58 Anderson, Stuart. 2022. "Immigrant Entrepreneurs and U.S. Billion-Dollar Companies." *National Foundation for American Policy*.
- 59 Authors calculations
- 60 Enright, A. and Bedi, J., 2022. Immigrant Entrepreneurs and the Barriers They Face: An Academic Literature Review. *Pioneer Institute*
- 61 Hunt, Jennifer, and Marjolaine Gauthier-Loiselle. 2010. "How Much Does Immigration Boost Innovation?" *American Economic Journal: Macroeconomics*, 2 (2): 31–56.
- 62 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 63 Hunt, Jennifer, and Marjolaine Gauthier-Loiselle. 2010. "How Much Does Immigration Boost Innovation?" *American Economic Journal: Macroeconomics*, 2 (2): 31–56.
- 64 E.g. Chellaraj Gnanaraj, Maskus Keith, and Mattoo Aaditya. 2008. "The Contribution of International Graduate Students to US Innovation." *Review of International Economics* 16(3): 444–62.
- 65 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 66 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 67 Amornsirapanitch, Natee, Paul A. Gompers, George Hu, and Kaushik Vasudevan. 2021. "Getting Schooled: The Role of Universities in Attracting Immigrant Entrepreneurs." *SSRN Electronic Journal*.
- 68 Kerr, Sari Pekkala, and William R. Kerr. 2020. "Immigration Policy Levers for Us Innovation and Startups." *SSRN Electronic Journal*.
- 69 Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner, 2021. "The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System." *Journal of Economic Perspectives* 35.1, pp. 1–23.
- 70 Amornsirapanitch, Natee, Paul A. Gompers, George Hu, and Kaushik Vasudevan. 2021. "Getting Schooled: The Role of Universities in Attracting Immigrant Entrepreneurs." *SSRN Electronic Journal*.
- 71 Azoulay, P. et al. (2021) Research: *The average age of a successful startup founder is 45*, Harvard Business Review
- 72 *National Survey of College Graduates* (2023) National Center for Science and Engineering Statistics.
- 73 *National Survey of College Graduates* (2023) National Center for Science and Engineering Statistics.
- 74 Kane-lee, E.S., McNally, M. and Molina, S. (2024) *Hiring Skilled Immigrants: Recommendations for Massachusetts*, UMass Donahue Institute.



- 75 Bedi, J. and Enright, A., 2024. Open for Business? Entrepreneurship, Regulations, and Immigration in New England and Beyond, *Pioneer Institute*.
- 76 National Survey of College Graduates, 2023. *National Center for Science and Engineering Statistics*.
- 77 Author Note: Percentages are conversions of percentage point increases from regression analysis
- 78 Business Employment Dynamics by age and size of firms, 2024. *U.S. Bureau of Labor Statistics*; Petulla, A., 2024. Small business revenue statistics, *altLINE*.
- 79 O'Brien, C. (2024) *How more states and cities can retain immigrant entrepreneurs*, Economic Innovation Group
- 80 Blume-Kahout, M. 2019. Imported entrepreneurs: Foreign-born scientists and engineers in U.S. stem fields entrepreneurship, *Small Business Administration's Office of Advocacy*
- 81 Goetz, C. and Stinson, M., 2022. Business Dynamics Statistics Trace Evolution of Job Growth, Employment at U.S. Firms Over Four Decades, *Census.gov*.
- 82 Musick, N. (2020) *Federal policies in response to declining entrepreneurship*, Congressional Budget Office
- 83 Yeh, C., 2023. "Why Are Startups Important for the Economy?". *Federal Reserve Bank of Richmond*; Akcigit, U. and Kerr, W., 2010. 'Growth through heterogeneous innovations', *Journal of Political Economy*, 126(4).
- 84 Entrepreneurship and the Decline of American Growth, 2022. *Senate Joint Economic Committee*, Republicans.
- 85 Entrepreneurship and the Decline of American Growth, 2022. *Senate Joint Economic Committee*, Republicans.
- 86 Enright, A. and Bedi, J., 2022. Immigrant Entrepreneurs and the Barriers They Face: An Academic Literature Review. *Pioneer Institute*
- 87 Palagashvili, Liya, and Jack Salmon. 2022. "Reforming Optional Practical Training (OPT) To Enhance Technological Progress and Innovation." *SSRN Electronic Journal*.
- 88 Bier, D.J., 2020. The Facts about Optional Practical Training (OPT) for Foreign Students, *Cato Institute*.

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Pioneer Institute develops and communicates dynamic ideas that advance prosperity and a vibrant civic life in Massachusetts and beyond.

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Success for Pioneer is when the citizens of our state and nation prosper and our society thrives because we enjoy world-class options in education, healthcare, transportation, and economic opportunity, and when our government is limited, accountable, and transparent.

## Values

Pioneer believes that America is at its best when our citizenry is well-educated, committed to liberty, personal responsibility, and free enterprise, and both willing and able to test their beliefs based on facts and the free exchange of ideas.

