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Attracting (and Keeping) the Best and the Brightest

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Foreign students and entrepreneurs helped make the United States an innovation powerhouse. With more countries competing for talent, Congress must create a system that attracts highly skilled immigrants.

A DISCUSSION OF

The Next 75 Years of Science Policy

For the first time in a decade, the US Congress is actively debating legislative approaches to solidify the country's global leadership in science and technology. While several different bills have been proposed, all approaches attempt to build on the foundational legacy of Vannevar Bush's 1945 agenda, *Science, the Endless Frontier*, by infusing billions of dollars into US science funding institutions.

There is no question that the American science enterprise needs significant investment. US federal research and development investment as a percentage of gross domestic product has been on a downward slope since the 1970s. But funding is only part of the puzzle.

The reason some countries stay at the cutting edge of science and emerging technologies is a complex question, but one crucial factor is the sheer number of smart, talented people they attract from all around the world. Our country's scientific leadership has been strengthened by a massive influx of global talent over the last century. As the United States seeks to fortify its position in the world, policymakers need to do better by the immigrant scientists who helped the country achieve its preeminent status—and the immigrants who are yet to come. Grudgingly accepting the world's best and brightest students, scientists, and entrepreneurs is no longer enough; the United States needs to be actively recruiting them. And legislators need to give them a clear legal path to work here.

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It's relatively easy for national governments to build the physical infrastructure for science, including expansive new scientific laboratories and the funding for elaborate experiments. But the world's smart and dedicated scientists are inherently scarce, so their choice of where to live and work is critical. Seventy-six years ago when Bush wrote his report, the United States' main international scientific competitors were in Europe. Winston Churchill's military assistant secretary, Ian Jacob, is said to have remarked that the Allies won World War II "because our German scientists were better than their German scientists." Bush recognized that strength: "The government should take an active role in promoting the international flow of scientific information."

Over the years Bush's proposal was realized via the one-way flow of smart, skilled scientists to the United States. Jacob's snarky remark about German émigrés foreshadowed immigrants becoming a pillar of US innovation policy. Today, while immigrants make up 18% of the US workforce, they have won 39% of the country's Nobel Prizes in science, comprise over 40% of STEM PhD graduates and 28% of the science and engineering faculty in US universities, and produce 28% of the nation's high-quality patents. Immigrants have founded more than 50% of the billion dollar startup companies in the United States.

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This informal system benefits not only the universities themselves—which have come to rely on the higher overseas tuition rates as well as foreign graduate students and postdoctoral labor in their labs—but also their local economies. In a 2021 paper, the economists Natee Amornsiripanitch, Paul A. Gompers, George Hu, and Kaushik Vasudevan found that 1 in 5 entrepreneurs who start venture-backed companies in the United States are immigrants—and 79% of them had come for college. This study found that 40% of these immigrant founders started their companies in the same state where they attended school.

We can clearly see the benefits of skilled immigration in cities such as Pittsburgh, which have transformed their declining steel economies to those driven primarily by research and development (R&D) as well as entrepreneurship in the fields of artificial intelligence and the life sciences. International students make up approximately 50% of the Carnegie Mellon University students seeking to launch a startup company in Pittsburgh.

Despite the labyrinthine and politically charged characteristics of the US immigration system, some international students have been quite successful. “The story of Pittsburgh’s revitalization lies not only in bringing young people to learn at our world-class institutions,” Pittsburgh Mayor Bill Peduto commented last year, “but in encouraging young minds to invest in Pittsburgh and call it home. The economic benefit of international students on our regional economy is undeniable. In our region, one job is created for every two international students enrolled in our colleges and universities. Supporting international students is critical to the well-being of Pittsburgh.”

While the current arrangement has brought obvious benefits to the United States, it was based on an implicit promise to immigrant students and scientists that hard work and the courage to think boldly would be rewarded. The pursuit of excellence and innovation, regardless of a person’s country of origin, would be encouraged for the benefit of all. It is a compelling promise, and the country’s apparent ability to deliver rewarding careers to generations of scientists created an innovation ecosystem where attracting and retaining global talent is now more crucial to R&D institutions than having the latest supercomputers and semiconductors.

But there are signs that this promise is no longer enough, and that the informal structures that bring international talent to the United States need to be formalized. Just a decade ago, the economist William R. Kerr documented that between 2000 and 2010 more international inventors immigrated to the United States than to the rest of the world combined. But this population of global scientists and technical practitioners now has other, more welcoming

places to go. The economists Michael Roach and John Skrentny found that immigration barriers are a significant deterrent against PhD graduates' ability to realize their startup career interests, compelling them to either leave the country or work at larger US firms where visa pathways are more well-established. While this undoubtedly suppresses the formation of new businesses, these barriers around visas and immigration are also leading early career scientists and entrepreneurs to pursue their careers in countries with a more liberal stance on immigration.

And now other countries are working more formally to welcome them. Global competition to recruit international scientists and entrepreneurs has already begun. In January of 2020, the United Kingdom implemented the Global Talent visa, an uncapped visa program to provide an expedited pathway to residency for international scientists and engineers who are leaders in their fields. Some countries (including Canada, Australia, and the United Kingdom) have adopted versions of a startup company visa to create a dedicated pathway for international entrepreneurs, while other countries (such as China) have elaborate talent recruitment programs to try and bring back talented students and workers who are living abroad.

In contrast to this global trend, the United States does not have an uncapped visa or a realistic pathway to residency for many international scientists and engineers. In fact, the country's process for awarding visas and green cards is restrictive, unnecessarily convoluted, and highly polarized. It's ironic that at a time when concerns about China's growing technological ambition are so central, the US response has been to shut the door on China's brightest pupils and send them home.

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For many foreign graduate students, the most viable path to staying in the United States legally is often a temporary H-1B visa, which gives workers little leverage over their workplace conditions or their wages because they cannot leave their employer without having to also leave the country. Further, the H-1B is a lottery program, which means talented PhD students with highly paid job offers in hand can easily lose out to applicants with more modest entry-level information technology jobs because the former weren't lucky enough to have their name drawn from the (virtual) hat.

For immigrants, starting a business in the United States after graduating is even more difficult. Because the United States does not have a statutory startup company visa category, trying to use traditional pathways such as the H-1B visa is effectively impossible as an entrepreneur because of the requirement that the visa holder be an "employee" and thus

fireable. Other pathways for highly skilled immigrants, including the O-1, EB-1, and EB-2 visas, rely on a strong record of prior accomplishments and are not a good fit for entrepreneurs whose potential accomplishments lie in the future. Some of these visas also suffer from decades-long backlogs due to arbitrary annual caps established by Congress in 1990.

The US visa system, so necessary for the nation's future success, is hampered by its backward-looking outlook. Entrepreneurs such as Steve Jobs or Paul Allen had little track record of success before founding Apple and Microsoft; if they had been born in another country, it is unlikely that traditional employment-based US immigration pathways would have allowed them to launch their respective firms here. This inability to recognize prospective success is one of the core deficiencies in the US immigration system. The United States wants to attract Nobel Prize-winning scientists as they are actively working on their groundbreaking contributions, not after they've won the prize.

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The Biden administration has made an important change by reestablishing the nascent International Entrepreneur Rule for prospective founders who can secure at least $250,000 in investment from a qualified US investor. The program allows a renewable two-and-a-half-year period for entrepreneurs to try building a business in the United States, with the ultimate goal being permanent residence via a transition to a Green Card.

However, as an executive parole program (meaning the duration of entry is determined by the Department of Homeland Security rather than by Congress), the program's impact will inherently be limited. Future administrations can effectively freeze the program—as the Trump administration did. Many pathways to legal status rely on a degree of certainty for their effectiveness. It's difficult for students or entrepreneurs to plan their lives around moving to the United States, or for investors to contemplate large investments in immigrant entrepreneurs, when the enabling program could be wiped from the code of regulations at any time.

As Congress debates funneling more money into science and research, it should consider partner legislation to bolster the nation's ability to attract and retain international scientific and technical talent. The US Citizenship Act of 2021, proposed by President Biden on his first day in office, featured an ambitious and lofty set of immigration reforms, including exempting US-educated STEM—science, technology, engineering, and mathematics—PhD graduates from Green Card caps; increasing the number of available H-1B visas; creating a "Heartland

visa" to allow cities and counties to sponsor immigrants to support a region's economic development strategy; and providing stability to recipients of Deferred Action for Childhood Arrivals protections. These reforms would help make a serious dent in this problem. But the bill is also unlikely to pass.

Sections of the bill with bipartisan appeal, however, could be combined with other reforms to create a national competitiveness bill for talent development. From a scientific talent perspective, the most promising starting place would be to expedite the Green Card exemption for STEM PhD students that was featured in the Biden proposal. Under the status quo, promising PhD graduates can be kept waiting for years (or forced to leave the country) as they wait in line for a Green Card along with all other candidates. During this period, it's difficult or impossible for them to launch a new business, switch employers without filing copious paperwork, or work with the federal government in a variety of research or security capacities. The exemption would let them instantly apply for a Green Card upon graduation, without impacting other applicants. Importantly, this would provide a tangible and stable pathway to permanent residency that students could envision and aim for from the outset of their studies.

This approach should be paired with a statutory startup visa so that talented international entrepreneurs have a pathway to launch technology and science startups in the United States. As discussed above, a simple way to do this would be to solidify the International Entrepreneur Rule in legislation so that future presidents cannot simply freeze the program on a whim. This legislation would provide certainty to students who are considering coming to the United States with the goal of eventually launching a business, as well as for investors as they attempt to recruit talented researchers and entrepreneurs from around the world.

The combination of these two reforms, of course, will not fix all that ails the US talent system. There is a great need to nurture US-born talent to enter the technology and sciences workforce as well. Thus any changes to immigration legislation should be bundled with increased funding for domestic STEM training. A large demand-side boost in science funding envisioned by Congress will be most effective when paired with a supply-side increase in the number of scientists available to work on these difficult problems.

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Senate Majority Leader Charles Schumer and the Chairwoman of the House Committee on Science, Space, and Technology, Eddie Bernice Johnson, are long-standing champions of

immigration reform. Senator Schumer—who led the Border Security, Economic Opportunity, and Immigration Modernization Act of 2013 that provided two statutory pathways for international entrepreneurs—also emphasized the importance of pairing National Science Foundation funding proposals with immigration reform before he introduced the Endless Frontier Act. Chairwoman Johnson championed legislation in the last Congress to provide Green Cards to US-educated STEM PhD graduates.

The success of the US scientific enterprise—and its ability to create jobs—relies heavily on the contribution of scientists who came to the United States from around the world and work alongside the domestic STEM workforce. This can be clearly seen in the examples set by dynamic US immigrants: Katalin Karikó came to the United States from Hungary and performed the foundational research that led to mRNA vaccines for COVID-19; Ibrahim AlHusseini moved to the United States as a student and founded FullCycle, an investment company working to reverse the effects of climate change; and Sethuraman Panchanathan, who helped Arizona State University become a major research university before he was unanimously confirmed by the US Senate to lead the National Science Foundation in 2020.

Despite protectionist rhetoric over the past decade, there has never been any doubt that the success of the US innovation engine rests on its ability to attract global talent. As aerospace expert and former Under Secretary of the Army Norm Augustine said in April 2021 testimony to Congress, “It is vitally important that more of America’s youth be motivated and qualified to pursue careers in science and engineering; yet, without continuing to attract talent from around the world there is little chance that America can remain competitive.”

To “put America in a position to outgrow, out-innovate, and out-compete” other countries, as Senator Todd Young put it in reintroducing the Endless Frontier Act, the United States must redouble its efforts toward fostering an open and global scientific community. This means formalizing the country’s relationship with foreign scholars. The United States needs to attract promising students and highly skilled workers and support their drive and ambition—not only when they’re celebrated but also when they’re at the beginning of their careers. Policymakers must recognize that the nation’s ability to draw talented and ambitious immigrants from around the world enriches US scholarship, US culture, and US industry. This acknowledgment of value needs to be enshrined in legislation that cannot be repealed with every new presidency.

The key to being a global leader in science and technology over the next 75 years is recognizing who helped make the United States powerful in the first place. As legislators seek to dramatically expand the nation’s scientific enterprise, US leaders should be sure to put up a “Now Hiring” sign in the window.

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