

MARCH 2021

# Trump-Era Policies Toward Chinese STEM Talent: A Need for Better Balance

Evan Burke



---

# **Trump-Era Policies Toward Chinese STEM Talent: A Need for Better Balance**

Evan Burke

---

For your convenience, this document contains hyperlinked source notes indicated by teal-colored text.

© 2021 Carnegie Endowment for International Peace. All rights reserved.

Carnegie does not take institutional positions on public policy issues; the views represented herein are the authors own and do not necessarily reflect the views of Carnegie, its staff, or its trustees.

No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from the Carnegie Endowment for International Peace. Please direct inquiries to:

Carnegie Endowment for International Peace  
Publications Department  
1779 Massachusetts Avenue NW  
Washington, DC 20036  
P: + 1 202 483 7600  
F: + 1 202 483 1840  
[CarnegieEndowment.org](http://CarnegieEndowment.org)

This publication can be downloaded at no cost at [CarnegieEndowment.org](http://CarnegieEndowment.org).

## + CONTENTS

Summary	1
The China-U.S. STEM Pipeline	2
National Security Policies Affecting the Pipeline	3
Immigration Policies Affecting the Pipeline	7
Pandemic-Related Restrictions on Travel from China	10
Looking Ahead	10
Acknowledgments	14
Notes	15



## Summary

The United States has been the world's leading science and technology power for over seventy years. A critical factor in that success has been the United States' ability to attract some of the world's most talented students and professionals working in science, technology, engineering, and mathematics (STEM) fields. In the last few decades, the People's Republic of China (PRC) has emerged as the largest and arguably most important source of high-level international STEM talent in the United States.

However, the administration of former president Donald Trump implemented a range of policies that are making it more difficult for Chinese nationals with STEM backgrounds to live and work in the United States. These policies can be broadly organized into three categories: national security–related measures intended to counteract Chinese civil-military fusion and illicit technology transfer; visa and immigration policies designed to restrict migration flows for all nationalities but which disproportionately affect Chinese nationals; and travel restrictions developed in response to the ongoing coronavirus pandemic. Some of these measures have a basis in legitimate policy concerns. But cumulatively, they risk unnecessarily harming the U.S. science and technology base by disrupting one of the key pipelines of international talent supplying the U.S. STEM ecosystem. A better balance is needed.

President Joe Biden's inauguration presents an opportunity for U.S. policymakers to reexamine these constraints on Chinese nationals' participation in the STEM sector. This will require a comprehensive understanding of Trump-era policy changes to identify which ones unduly restrict the China-U.S. STEM pipeline. Much has been written on the pipeline itself, and on specific Trump-era policies and their impact on particular technology sectors. But there has not yet been a detailed review of all the major actions taken by the Trump administration across immigration, visa, and export control policy. This working paper provides an introductory road map to these policies, placing them in the context of China's important role as a source of STEM talent.

A broad analysis of the China-U.S. STEM pipeline reveals several key themes. The United States consistently attracts large numbers of highly skilled Chinese students, many of whom remain in the country after graduating and provide substantial contributions to American science and innovation. Many of these highly skilled Chinese nationals, especially at the graduate and PhD levels, are unduly affected by overly broad visa restrictions enacted to counter illicit technology transfer and civil-military fusion perpetrated by the government of China. Chinese visa holders are also disproportionately affected by restrictions on professional pathways such as the H-1B visa, Optional Practical Training (OPT), and green card programs. These significant constraints on Chinese nationals' ability to study and work in the United States, coupled with travel complications due to COVID-19, are

already having a disruptive effect on the China-U.S. STEM pipeline. The Biden administration should move quickly to revisit these policies in order to stabilize talent flows from China.

## The China-U.S. STEM Pipeline

In the past few decades, the United States has seen rapid growth in the number of Chinese nationals coming to study and work in American STEM. A range of indicators suggests that this pipeline of Chinese STEM talent provides substantial benefits to science and innovation in the United States. One such indicator is the large number of highly skilled Chinese STEM PhD candidates that choose to obtain degrees and subsequently pursue careers in the United States. China is currently the United States' largest source of international STEM PhDs. Chinese nationals on temporary visas **have earned** by far the most U.S. science and engineering doctorates of any non-U.S. nationality since 2000, including the most doctorates granted to temporary visa holders in engineering, computer science, and mathematics.

The vast majority of these Chinese PhD graduates from U.S. institutions have historically chosen to stay and work in the country after receiving their diplomas. According to the National Science Foundation and the National Science Board, the ten-year stay rate of Chinese science and engineering doctorates from 2006 to 2008 was 90 percent; the five-year stay rate of Chinese doctorates from 2011 to 2013 was 83 percent. **Both metrics** far exceed global averages. **From 2000 to 2017**, annual intention-to-stay rates never dropped below 80 percent for new Chinese PhD graduates in computer science, biological and biomedical sciences, engineering, mathematics, health sciences, or physical sciences.

The pipeline of Chinese STEM talent coming to the United States is not limited to doctoral students and PhD holders. China is also one of **the largest sources** for international students earning master's degrees in STEM fields in the United States, and the overall largest source of foreign STEM students in the nation—at 162,000 in 2018. While not all these students remain in the United States after graduation, many contribute to important academic research initiatives during their education, and thousands are hired by U.S. firms each year.

This steady influx of Chinese talent carries benefits for American science and innovation in multiple industries. In particular, it supplements domestic labor shortages in **certain emerging fields** such as artificial intelligence (AI). **Research** from Georgetown University's Center for Strategic and Emerging Technologies indicates that most of the U.S. AI workforce was born abroad, and that China is one of the most common countries of origin for these international employees and students.

By offsetting labor shortages in key fields like AI, Chinese STEM talent helps incentivize American multinational companies (MNCs) in those fields to keep research and development (R&D) operations here. [Research has shown](#) that U.S. MNCs move R&D offshore when they cannot obtain enough highly skilled international talent domestically. This results in a loss of high-skilled jobs for the U.S. economy. Notably, China has in recent years become an [increasingly popular destination](#) for U.S. MNCs offshoring R&D operations, in large part due to China's wealth of highly skilled STEM labor. However, by supplying tens of thousands of highly skilled employees to the U.S. workforce each year, the China-U.S. STEM pipeline reduces U.S. MNCs' primary incentive to offshore skilled labor to China in the first place, allowing the United States to retain more of its domestic R&D base.

Finally, Chinese STEM students studying in the United States at the undergraduate, graduate, and PhD levels also represent a sizable source of income for U.S. universities. In total, an estimated [363,000](#) Chinese studied in the United States in 2018, which accounted for an estimated [\\$15 billion](#) in tuition revenue, according to the Institute of International Education. [Nearly half](#) of those students studied in one of the STEM disciplines.

## National Security Policies Affecting the Pipeline

The steady pipeline of Chinese talent into the United States brings considerable benefits, but it also carries some risk. The Chinese government's repeated attempts to steal American research, technology, and intellectual property represent a national security threat to the United States. Some of this illicit technology transfer has been perpetrated from within China itself through remote cyber operations or coercive joint ventures with American firms. But China has also used [talent recruitment programs](#) and [PLA-affiliated researchers](#) to conduct physical espionage within the United States. These efforts prompted a series of new policies and proposals under the Trump administration that were designed to restrict certain Chinese nationals' access to the American science and technology ecosystem.

### Restrictions on Highly Skilled Chinese Nationals with Ties to Civil-Military Fusion

Most prominent of these measures is a [presidential proclamation](#) from May 2020 suspending visas for Chinese graduate students and researchers with current or past ties to entities in China that support or implement civil-military fusion. The proclamation applies to any Chinese national studying in the United States at the graduate level who currently is or has previously been "employed by, studied at, or conducted research at or on behalf of an entity in the PRC that implements or supports the PRC's 'military-civil fusion strategy.'" The order further defines "military-civil fusion strategy" as

“actions by or at the behest of the PRC to acquire and divert foreign technologies . . . to incorporate into and advance the PRC’s military capabilities.”

This broad language leaves considerable room for interpretation, and the U.S. government has offered little clarity. As of fall 2020, the State Department had revoked [about 1,000 visas](#) under the proclamation, but this number could grow. Students do not need to have been tied to any civil-military fusion activity in China to face a ban; they simply need to have attended a university with such ties. Rejecting a Chinese national’s visa not based on an individualized assessment, but rather on the institution with which he or she is affiliated, seems sweeping. Moreover, institutional “support” for military-civil fusion is not clearly defined; it could mean something far less than direct complicity in the illicit acquisition of foreign technologies. China, like other countries, has [active efforts](#) to integrate its universities with its defense sector.

For example, a report from the [Australian Strategic Policy Institute](#) identified well over one hundred Chinese institutions with noteworthy ties to China’s military and intelligence apparatus. [The report](#) also quoted an official PRC document stating that China’s plan to build ninety-eight of its top universities into world-class institutions by 2050 depends on universities integrating into the “civil military fusion system” and “[advancing] the two-way transfer and transformation of military and civilian technological achievements.” Put simply, there are few if any major universities in China that do not support civil-military fusion in some capacity.

If this U.S. policy remains in force and is interpreted broadly, it is entirely possible that new generations of Chinese STEM PhDs and graduate students could be banned from studying and working in the United States because of where they obtained a bachelor’s degree. And given the breadth of institutions potentially covered under the proclamation, a significant portion of the Chinese STEM pipeline to the United States could technically be barred from entry. Even if the U.S. government does not intend to enforce such a broad interpretation of the proclamation, the lack of public clarity could create its own problems.

For example, an [analysis](#) of Chinese sources discussing the proclamation shows considerable uncertainty within China over the proclamation’s scope. This may cause large numbers of graduate students in China to assume they would be denied entry to the United States given their past educational history, creating a chilling effect on STEM talent traveling to America. Likewise, universities could be reluctant to award admission to students if their likelihood of receiving a visa is unknown. Given the demonstrated importance of these individuals to the U.S. STEM ecosystem, this proclamation, as written, risks unnecessarily harming the United States’ own technology and innovation base.

## The Expansion of Deemed Export Requirements

A deemed export is the transfer of information about an export-controlled item to a foreign national. In the eyes of the U.S. government, it is deemed legally equivalent to exporting that item to a foreign country—hence the term. Like regular exports, deemed exports require a license from the U.S. government; these licenses are often used by employers that work with national-security-controlled technologies to hire highly specialized engineers, scientists, researchers, and technicians from a small pool of qualified global talent. In the United States, deemed exports are used **most commonly**, but not exclusively, by employers in the semiconductor and telecommunications industries.

To counteract the threat of illicit technology transfer to China, the Trump administration made two changes to deemed export controls that could significantly impact U.S. firms' ability to hire Chinese nationals to work with sensitive technologies. These changes are particularly noteworthy given that **nearly half** of all approved deemed exports between 2015 and 2019 were for Chinese nationals.

In April 2020 the Department of Commerce **eliminated** the civil end users (CIV) exemption for international employees from China and other countries to whom U.S. exports are controlled for national security reasons. The CIV exemption had absolved companies of the need to obtain a deemed export license for a Chinese employee if that employee was a civilian end user—in other words, if the employee was the final recipient of the export-controlled item and was unaffiliated with the Chinese military. Without a CIV exemption, companies will need to file deemed export applications for all future Chinese employees working with relevant technologies, **which include** but are not limited to integrated circuits, telecommunications systems and equipment, and radar systems.

Separately, the Trump administration **expanded** existing license requirements on all exports, including deemed exports, of items intended for military end use in China, Russia, and Venezuela. Employers must now determine whether the intended recipient of a deemed export is a military end user; unfortunately, the Commerce Department's definition of military end user is somewhat nebulous. **Specifically**, a military end user in the Chinese context is any person or entity directly linked to Chinese military, security, or intelligence services or any person or entity whose actions or functions are intended to support “military end uses,” which in turn encompasses the use of any technology that supports or contributes to China's “development” or “production” of controlled military items.

There is considerable uncertainty among U.S. firms as to whom exactly would qualify as a military end user under this definition. A list of frequently asked questions released by the Department of Commerce **did** little to clarify the rule's broad language. Further complicating compliance for U.S.

industry is the fact that the rule also expands the list of items that require a license for export to military end users. [The rule](#) specifically lists materials processing, electronics, telecommunications, information security, sensors and lasers, and propulsion technology as technologies that now require export licenses.

Taken together, these two new regulations significantly complicate the deemed export application process, particularly in cases involving Chinese employees. The elimination of the CIV exemption effectively forces employers to obtain deemed export licenses for all future employees from China who work with national security–controlled items. This is a significant burden. Approvals for deemed export license applications can often take [six to eight months](#), and applications involving national security–controlled items previously covered under the CIV exemption are reviewed [under the presumption of denial](#), decreasing the likelihood of a successful application.

The licensing requirement also expands the number of potential *current* Chinese employees that now require a deemed export license given the broad definition of military end user. Research teams in U.S. industry that employ Chinese nationals [must identify](#) any employees that the U.S. government would designate as military end users and restrict their access to export-controlled technologies until a deemed export license can be obtained. In practice, this could necessitate pulling researchers and engineers off active projects for months at a time. Additionally, deemed export license applications for military end users are also reviewed [under the presumption of denial](#).

At a minimum, the new regulations for deemed exports are [likely to](#) create a very significant compliance burden for relevant U.S. employers, to say nothing of their impact on productivity. [Fortunately](#) for U.S. employers in academia, the fundamental research exclusion of National Security Decision Directive 189 (NSDD-189) exempts most university-based research from export controls, so this burden would be largely borne by private-sector companies. The academic exemption has come under challenge, however. A bipartisan [Senate investigation](#) on Chinese threats to the U.S. research enterprise recommended that the United States “consider updating NSDD-189 and implement additional, limited restrictions on U.S. government fundamental research.” Such an action, if not carefully tailored, could exacerbate disruptions to the U.S. STEM pipeline.

For U.S. firms that are currently affected by these new regulations, the difficulties of hiring Chinese nationals on deemed export licenses are further compounded by the application review process, which became [slower](#) and more restrictive under the Trump administration. Deemed export approvals for Chinese nationals have decreased [significantly](#) in the last two years and, as mentioned above, common wait times for a decision on deemed export applications [have grown](#) from a few weeks to six to eight months. Unfortunately for U.S. employers, the spike in applications likely to be caused by the new Commerce Department rules will further exacerbate this slowdown.

If U.S. employers are unable to obtain deemed export licenses for Chinese talent, there could be significant consequences for certain industries that rely on them, such as semiconductor manufacturing. Because deemed export licenses are often used to hire for highly specialized roles, the number of positions these regulations would affect annually would likely be relatively low (an exact estimate is difficult to find). Yet the scientists, engineers, and technicians that fill many of these positions significantly impact an employer's capacity for innovation. With such a small pool of qualified talent available for these key positions, a firm that loses out on a prospective highly skilled Chinese employee due to the regulatory burden of a deemed export license may be unable to find an equally qualified candidate for the role. Companies that believe certain active Chinese employees could be interpreted as "military end users" may need to stall key R&D operations until a deemed export license can be obtained.

In the long term, employers may adapt and simply choose not to hire individuals from China who require deemed export licenses. Yet because Chinese nationals comprise such a large portion of all deemed export license applications, this could result in a talent shortage for those employers, at least in the short term. Additionally, Chinese nationals shut out from certain roles or industries could choose to seek the same opportunities in other countries (whether China or elsewhere), increasing those countries' innovative capacities at the expense of the United States.

## Immigration Policies Affecting the Pipeline

### The Elimination of Duration of Status

The United States stands to further deprive itself of Chinese STEM talent through immigration and visa policies that impose restrictions on all nationalities but which disproportionately affect Chinese nationals. For example, a [new proposed rule](#) from the Department of Homeland Security (DHS) would impose a four-year limit on visas for nearly all international students and scholars. Currently these individuals, who enter the United States on F, I, and J visas, can remain in the United States for the duration of their period of study or work, also known as "duration of status." Under the proposed rule, F, I, and J visa holders would be required to apply for an extension with the DHS after four years. The DHS justifies the change [in part by reasoning](#) that more frequent vetting of extension applications will allow the department to ensure that international students and researchers are not engaging in activities inconsistent with their status, such as espionage.

Policy experts have argued that the regulation [would impose significant costs](#) for F, I, and J visa holders applying for extensions. Notably, the rule is likely to create a substantial backlog of extension of stay (EOS) applications. [The rule itself](#) estimates that hundreds of thousands of visa holders would

need to file EOS applications with U.S. Citizenship and Immigration Services (USCIS) each year, with a peak of 364,000 applications in 2024 and a sustained average of over 300,000 annual applications from 2025 to 2029. [The rule also states](#) that these EOS applications should be filed with USCIS using form I-539; [according to its own data](#), USCIS took an average of five and a half months to process one I-539 form in fiscal year (FY) 2020. That processing time represents a 67 percent increase from FY 2017, suggesting USCIS is already struggling with its volume of I-539 forms.

The hundreds of thousands of new EOS applications filed each year under the proposed rule would likely cause a dramatic increase in wait times for EOS decisions. International students and researchers could be left at risk of violating U.S. immigration law if their visas expire while waiting for their extension applications to process, and thus may be forced to leave the country. Future generations of students and researchers [may take their talents elsewhere](#), having decided that this new regulation, in combination with others already in effect, creates excessive costs for studying in the United States.

The DHS proposal [specifically affects](#) two student groups that are vital sources of talent for U.S. STEM employers: international PhDs and Optional Practical Training (OPT) beneficiaries. Many international PhD candidates in the STEM fields would need to apply for F-1 visa extensions, as doctorate degrees often take longer than four years to complete. OPT allows international students at all levels to stay in the United States on their F-1 visas and work in their major field of study for twelve months upon graduation. A twenty-four-month “[STEM extension](#)” allows STEM international students to work on OPT for up to three years. Under the DHS proposal, all prospective OPT workers would first need to apply for a visa extension. STEM OPT workers would need to file [two applications](#): one for the first year of general OPT and another for the STEM extension.

If international PhD candidates and OPT workers were to be driven away in large numbers due to the proposed rule, it would cause significant harm to innovation in the United States. The critical role of international PhDs in mitigating the shortage of highly skilled American STEM talent has already been discussed above. OPT is also vital to the talent pipeline of many American technology firms and research institutions. Along with the H-1B visa, it is one of the two primary ways international students can obtain work authorization in the United States. However, unlike the H-1B, which involves a competitive and costly application process and is capped at a maximum of 85,000 visas per year, OPT is uncapped and available to anyone in the United States on an F-1 visa.

OPT allows firms to hire international STEM talent without investing the significant resources required to sponsor an H-1B application, which may or may not be successful. It is a key vehicle for recruiting talent in emerging sectors like AI; [84 percent](#) of noncitizen AI PhDs working in the United States have used OPT at some point. While it is particularly useful for smaller firms and [start-ups](#), OPT also allows more established firms to retain international workers who lose out on the

H-1B lottery. Intel estimated [in 2018](#) that it used OPT to hire about 70 percent of the highly skilled graduates it recruited.

While the proposed rule applies to people of all nationalities, eliminating the duration of the status system would have a disproportionately large impact on Chinese students in the United States. China is the largest country of origin for U.S. foreign STEM students and supplies by far the most STEM PhD candidates to American universities. China is also the second-largest country of origin for participants in both OPT and STEM OPT; [nearly 26,000](#) Chinese nationals were hired on STEM OPT alone in 2018.

A huge backlog on EOS applications would also have severe effects on Chinese graduate students studying robotics, aviation, or high-tech manufacturing. [As of 2018](#), these graduate students have been required to reapply for F-1 visas each year, and [are experiencing](#) increased delays in application reviews as a result. A massive additional increase in wait times for application decisions could make the pursuit of a graduate degree in these sensitive research fields extremely difficult for Chinese nationals. Furthermore, the espionage concerns voiced by the DHS in its justification of the proposal have a clear association with the presence of Chinese nationals in the U.S. university system, suggesting that Chinese students applying for visa extensions could face a higher degree of scrutiny than students of other nationalities.

### Changes to the H-1B Program

Changes to the H-1B program under the Trump administration are also restricting Chinese nationals' ability to work in American STEM fields. Trump's [Buy American, Hire American](#) executive order mandated that H-1B applications face heightened scrutiny and has likely caused a rapid increase in H-1B denial rates. [Twenty-nine percent](#) of all H-1B applications in the second quarter of FY 2020 were denied, up significantly from a 10 percent rejection rate in FY 2016.<sup>1</sup>

Higher denial rates could result in fewer employers willing to hire highly skilled international workers in the first place.<sup>2</sup> The Georgia Institute of Technology, for example, reported a [“huge shift downward”](#) in the number of companies willing to hire its students on H-1B visas in 2019, ostensibly due to employers' uncertainty about the success of H-1B sponsorships. This has implications for all international students and workers in the United States, but it disproportionately affects Chinese and Indian nationals because they make up [the large majority](#) of H-1B applications.<sup>3</sup>

### Extreme Delays in Green Card Applications

Chinese nationals able to secure H-1B visas can stay and work in the United States for several years but must subsequently apply for lawful permanent resident (LPR) status to remain in the United

States indefinitely. To secure LPR status, a nonimmigrant in the United States must obtain an employment-based immigrant visa, better known as a green card. Only 140,000 green cards can be distributed in a given year; these are divided into five major categories. As dictated by the U.S. Immigration and Nationality Act, the number of green cards that can be given to any single nationality is capped: no country of origin can account for more than 7 percent of the green cards in any category.

The number of annual applicants from China and India far exceeds this cap. This has led to enormous wait times on application reviews and approvals for Chinese and Indian nationals. For example, the average time a Chinese national must wait for a decision on an EB-2 visa—the category of green card **most commonly** granted to foreign STEM PhDs seeking lawful permanent residence—is currently projected to be **eighteen years**.

A **study** from the National Bureau of Economic Research indicates that this backlog is associated with a steady reduction in the stay rates of Chinese PhDs who have applied for permanent residency. Specifically, stay rates of Chinese PhDs decreased 2.4 percent for each year of delay on a green card application decision. Furthermore, these PhDs are almost all returning to China. Without reform to the green card distribution process, application wait times will continue to rise, and the United States will continue to bleed critical Chinese STEM talent directly back to its strategic adversary.

## Pandemic-Related Restrictions on Travel from China

In January 2020 then president Donald Trump issued an **executive order** barring travelers who had been inside China within the last fourteen days from entry to the United States. The order significantly complicates travel for Chinese students, researchers, and employees traveling between the United States and China. They must now factor in the costs of a fourteen-day quarantine in a foreign country when deciding to travel to the United States or return temporarily to China. The travel ban itself may not be enough to affect decisions to come to the United States, but when considered together with the various other policies and regulations that are creating a more restrictive environment for Chinese students and researchers, it may for some be the last straw that compels them to seek opportunities elsewhere.<sup>4</sup>

## Looking Ahead

Despite some risks, there are clear data suggesting that the United States benefits from the overall pipeline of talented Chinese nationals who choose to pursue academic and professional opportunities

in U.S. STEM fields. Yet the cumulative effect of Trump-era U.S. policies may be jeopardizing the benefits of highly skilled Chinese STEM labor by creating a more difficult environment in which Chinese nationals may enter, study, work, and remain in the United States for an extended period.

It is not yet possible to quantify the disruptive effect of these policies on U.S. industry and academia, but early warning signs have already emerged. Recently released State Department data show that F-1 visas issued to Chinese nationals decreased **99 percent** in the last year. A significant portion of that drop is attributable to the coronavirus pandemic, but 99 percent still exceeds the average decrease in F-1 visa distribution of **88 percent** for all nationalities. Furthermore, preliminary Common App data **show** an 18 percent decline in Chinese undergraduate applications from a year ago, even though overall international applications were up 9 percent. Indicators like these are worth watching moving forward; sustained dips in intention-to-stay rates for Chinese PhDs; total Chinese OPT approvals; and total F-1, H-1B, and J-1 visas issued to Chinese nonimmigrants could be indicative of a broad sentiment among Chinese nationals that studying and working in the United States is no longer the best option for them.

Given this current trajectory, the new Biden administration should consider revisiting Trump-era policies in order to stabilize the China-U.S. STEM pipeline. One area especially worth revisiting would be the range of current and proposed measures that have made it more difficult for highly skilled Chinese talent to obtain an H-1B visa, OPT, or lawful permanent residence. The opportunity to work in the United States is one of the main reasons Chinese nationals choose to come to America in the first place, and restrictions on these opportunities likely deter talent flows from China to America. While a full discussion of possible policy changes is outside the scope of this working paper, the Biden administration could at minimum instruct the DHS to abandon its proposed four-year limit on F, I, and J visas; revisit vetting procedures causing a sharp increase in H-1B denials; and work with Congress to develop new pathways to legal permanent residence for the most highly skilled international talent pools, such as STEM PhDs, that stand to make the greatest contributions to American science and technology.

The Biden administration should also examine how policies enacted to prevent technology transfer could be modified to fulfill legitimate objectives without enacting overly broad restrictions on Chinese participation in American STEM. For instance, the administration should revisit the U.S. proclamation banning visas for Chinese graduate and PhD students who have attended or worked at Chinese institutions that “support” civil-military fusion. At a minimum, the administration should internally direct relevant agencies to (1) more clearly define what the United States views as an unacceptable institutional relationship with the Chinese civil-military fusion apparatus, and (2) more carefully consider what kind of associations an individual must have with an institution linked to civil-military fusion for that individual to be denied a visa. The Biden administration might also

consider publicly signaling some of these clarifications, though this would come with trade-offs. While a lack of transparency on the enforcement of the proclamation makes it more difficult for agents of the Chinese state to subvert its restrictions, more clearly defined criteria would also reduce the risk of an unnecessary chilling effect on Chinese student travel to the United States.

While such policy changes could be helpful in restoring some level of talent flows from China, Chinese participation in U.S. STEM is driven by many factors, not all of which can be directly or easily controlled by the U.S. government. Most obvious of these forces is the coronavirus pandemic. The executive order requiring travelers to quarantine outside China for fourteen days before entering the United States presents one barrier to entry for Chinese students and workers, but a far greater concern for Chinese nationals may be the aggressive spread of the virus in the United States. Skilled STEM workers from China, as well as the rest of the world, may decide in large numbers to avoid travel to the United States out of concern for their personal safety until the threat of COVID-19, the disease caused by the novel coronavirus, can be mitigated. Controlling the spread of the virus is therefore a critical component of any effective strategy to maintain international talent flows from China.

Another factor driving Chinese talent flows is the degree to which U.S. MNCs offshore business operations. [Research has shown](#) that when faced with restrictions on their ability to hire international talent, multinationals have transferred highly skilled jobs out of the United States, with China being one of the most common destinations due to its wealth of highly skilled STEM labor. MNCs clearly value Chinese talent and are likely to be particularly sensitive to disruptions in the China-U.S. STEM pipeline, especially because Chinese nationals form such a significant component of the total pool of highly skilled international STEM talent in the United States. Sustained slowdowns in the availability of highly skilled Chinese employees to work in the U.S. STEM disciplines could therefore be exacerbated by MNCs prompted to offshore operations out of the United States to retain access to that critical pipeline—creating a vicious cycle. This could hurt the United States' status as a top destination for Chinese STEM talent by creating more attractive and lucrative work prospects either in China or in other developed countries with less restrictive immigration and visa regulations. If this pattern occurred at scale, it could induce a long-term U.S. loss of highly skilled Chinese STEM professionals to the rest of the world.

China is also likely to take active measures to retain as much of its domestic talent pool as possible, as President Xi Jinping has [publicly identified](#) talent as the number one resource for China's science and technology development. China's development of a robust STEM ecosystem with high-wage opportunities has made it a far more [attractive destination](#) for Chinese talent. Continued investment from the state into education and basic research should be expected as China strives to achieve technological parity with the United States and to adjust the incentives for its top scientific talent to

pursue opportunities abroad. China may couple investment in its own scientific and technological capabilities with nationalist and anti-American messaging, thus dissuading its citizens from pursuing opportunities in the United States. China is also likely to continue its overseas talent recruitment and economic espionage efforts—threats the U.S. government must be prepared to address while recognizing that sweeping countermeasures limiting most Chinese access to the U.S. STEM ecosystem could harm the United States.

Ultimately, effective policy regarding Chinese participation in U.S. STEM is a balancing act. The United States is right to guard against illicit technology transfer perpetrated by China and to protect the work opportunities of the American labor force. But the United States should also recognize that Chinese nationals form a critical talent pipeline for American STEM employers and are important drivers of scientific and technological innovation in the United States. These priorities are in tension but not totally irreconcilable. The United States can and should pursue a strategy that protects its economic and security interests while keeping its doors open to Chinese STEM talent, the vast majority of which represents no threat to America. Such a strategy would require more moderation and care than the Trump administration showed. The United States is currently undermining its ability to attract critical STEM talent from China, to its own detriment. It falls to the new administration to chart a better path forward.

## Acknowledgments

The author is immensely grateful to Jon Bateman for his extensive feedback and invaluable guidance throughout the writing process; George Perkovich for his comments and suggestions that greatly improved this working paper; and Remco Zwetsloot, who generously shared his expertise and provided critical feedback.

The views expressed in this working paper are those of the author alone and do not necessarily reflect the views of those acknowledged here. Any errors are the author's sole responsibility.

## Notes

1. That figure was projected to rise further with [new policy changes](#) to the H-1B program implemented in October 2020. Under the proposed regulations, which were set aside by a federal court, applicants would only receive H-1B visas for jobs in the same field as their college degrees. This could have significantly reduced the available recruiting pipelines for American STEM employers. For example, electrical engineering is one of the three most common degrees among international workers sponsored for U.S. permanent residence through technical jobs at U.S. AI companies. Yet under the challenged rule, an international employee with an electrical engineering degree would not have been able to obtain an H-1B visa as a software developer.
2. Higher salary requirements would also be a deterrent factor for companies looking to hire on H-1B visas. An [October 2020 rule](#) issued by the Trump administration would have compelled employers to pay H-1B beneficiaries significantly higher wages. These changes were set aside by a federal court for violations of the Administrative Procedure Act in December 2020, then [subsequently reintroduced](#) in January 2021 by the Trump administration with minor changes intended to conform with the Administrative Procedure Act. The regulation, unless discarded by the Biden administration, would increase the required wage for entry-level H-1B employees from the 17th percentile of their profession's distribution to the 35th percentile, and the wage for the highest skilled workers to the 90th percentile from the 67th percentile.
3. Chinese and Indian nationals would also bear the brunt of [a last-minute Trump administration rule](#) that would eliminate the current H-1B lottery process. Under the lottery system, all registrants have an equal chance of being granted permission to file an application for one of the 85,000 annual H-1B slots. The new rule would replace the lottery with a system that would prioritize distribution of H-1B petitions to registrants at higher wage levels. Under the new system, it would become extremely difficult if not impossible to hire for entry-level positions using the H-1B visa. This would significantly impact employment opportunities for foreign students in the United States, the largest group of whom are Chinese. In early February 2021, USCIS announced that it had delayed the effective date of the rule from March 9 to December 31, 2021. Yet the Biden campaign [publicly advocated](#) for a wage-based visa allocation process, so while the new administration may ultimately choose to withdraw the rule, it may also introduce related measures in the future.
4. Separately, Trump signed an [executive order](#) suspending the issuance of new H-1B visas to applicants outside the United States. The move, which was fiercely opposed by American technology companies reliant on H-1B visas for talent recruitment, was [blocked](#) by a federal court and expires at the end of March 2021 in any case. The court decision restores the ability of American companies to hire international workers outside the United States, though in theory it could be appealed. Restoring the ban could have significant implications on the Chinese talent pipeline to the United States: a Chinese national with an expired student or work visa might be forced to return to China, at which point the combined effect of the restored H-1B ban and the current travel ban from China to the United States could deter efforts to reenter the U.S. workforce.



1779 Massachusetts Avenue NW | Washington, DC 20036 | P: + 1 202 483 7600

[CarnegieEndowment.org](https://www.CarnegieEndowment.org)