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INTERNATIONAL STUDENTS AND STEM OPT
BY STUART ANDERSON

EXECUTIVE SUMMARY

Although the legal and economic justifications would be weak or even unlawful, the Trump administration may soon attempt to eliminate via regulation STEM OPT (Optional Practical Training), the primary way the United States allows F-1 international students in science, technology, engineering and math (STEM) fields to work in America after graduation. Today, 81 percent of the full-time graduate students at U.S. universities in electrical engineering and 79 percent in computer science are international students. Preventing talented foreign-born science and engineering students from working in America after graduation would harm the American economy.

The presence in America of international students is crucial for retaining top faculty and keeping programs available for U.S. students. As a candidate, Donald Trump stated: “When foreigners attend our great colleges & want to stay in the U.S., they should not be thrown out of our country.” However, sources indicate the Trump administration is poised to end STEM OPT, which allows international students in STEM fields to work 3 years after graduation – an additional 2 years beyond the 12 months of work authorization allowed under Optional Practical Training for foreign students.

Table 1
Full-time Graduate Students and the Percent of International Students by Field (2015)

Field	Percent of International Students	Number of Full-time Graduate Students – International Students	Number of Full-time Graduate Students – U.S. Students
Electrical Engineering	81 percent	32,736	7,783
Computer Science	79 percent	45,790	12,539

Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, NFAP calculations. U.S. students include lawful permanent residents. Graduate students are in master’s and Ph.D. programs.

The additional 2 years for STEM students has proven vital because it provides international students potentially 3 chances to obtain H-1B status. H-1B visas are generally the only practical way a foreign national can work long term in the U.S. The supply of H-1B visas has been exhausted for 15 consecutive fiscal years, making it necessary for companies often to apply 2 or 3 times before gaining H-1B status for international students they recruit for employment.

STEM OPT was first created by the Bush administration in 2008, in large part to prevent the United States from losing outstanding students unable to obtain H-1B visas. The U.S. government has permitted work authorization for international students post-graduation since 1947. Optional Practical Training provides work authorization for 12

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months. In 2008, the Bush administration extended OPT status an additional 17 months (29 months total) for international students in STEM fields.

In response to litigation, the Obama administration formalized STEM OPT in a March 11, 2016 final rule, following a period of notice and comment, extending the period for international students in STEM fields by 24 months, or 3 years total, if certain conditions were met. It is this additional 2 years the Trump administration may rescind, although it is theoretically possible the 12 months of OPT granted to all international students also could be at risk, since it, too, is subject to regulation and not enshrined in statute.

The legal case for maintaining STEM OPT is strong. "A federal court has already held that the Department of Homeland Security (DHS) had the statutory authority to publish a rule extending OPT to students in STEM fields," according to Stephen Yale-Loehr, a professor of immigration law practice at Cornell Law School. "The court found that DHS had clear legal authority to issue the rule under a general immigration statute authorizing the government to set conditions on what a nonimmigrant can and cannot do while in the United States. The court noted that since at least 1947, the immigration agency has interpreted the immigration laws to allow foreign students to engage in employment for practical training purposes. During all that time, Congress acquiesced to that interpretation."

Among the key findings of the research:

- Representatives of U.S. tech companies say eliminating STEM OPT would compel them to change recruiting practices if they believed gaining approval for an H-1B was unlikely because international students could only stay 12 months in OPT status, rather than the 3 years STEM OPT would allow. Companies say they would plan to recruit, hire and place international students *outside* the United States, since without an H-1B visa these students could not work long term in America.
- Countries with which America competes for talent, such as Canada and Australia, make it comparatively easy for international students to work after graduation. Nations around the world are competing for both international students and high-skilled immigrants.
- Ending STEM OPT could have a negative impact on America's position as a center for innovation, causing companies to shift more employees and resources, including design centers and engineering, outside of America. That would leave fewer opportunities inside the United States for U.S. workers, the opposite of what advocates of ending STEM OPT aim to achieve.

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- The loss of many international students in STEM fields would cause science and engineering programs to shrink or disappear at many U.S. universities. The majority of the students in most U.S. graduate school programs in computer science and electrical engineering are international students.
- The high level of international students plays a role in universities being able to attract and retain faculty, who rely on graduate students to conduct research. "Eliminating STEM OPT would have a chilling effect on international students, causing many to rethink applying to U.S. universities," said Jackie Bangs, assistant director, Division of International Programs, Oregon State University.
- Eliminating STEM OPT would contradict the administration's position in favor of the RAISE Act, which in granting permanent residence under its point system actually gives far more points and a significant advantage to international students who earn a STEM degree from a U.S. university, indicating the administration concedes such students are economically beneficial to the United States.

The opposition to STEM OPT rests on a zero-sum view of the economy, implying that the approximately 45,000 international students who receive STEM OPT status annually are taking jobs from U.S. students. There is no evidence to support this contention, based on economics or the recent performance of students in STEM fields in the U.S. job market.

An analysis by Glassdoor shows that 9 of the 10 highest paying majors 5 years out of college are in STEM. Moreover, there is no correlation between an inability to find work in a STEM field and the presence of foreign nationals in that field in the United States. Nearly three times as many individuals with degrees in the social sciences (11.8 percent), a field in which relatively few H-1B visa holders receive degree, report working involuntarily out of their field as those with degrees in computer and mathematical sciences and engineering, according to the National Science Foundation. The Conference Board reported in August 2017 almost 5 times as many online ads for positions in computer and mathematical science occupations as individuals listed as unemployed in those occupations.

Arguments for ending STEM OPT would only make sense if there were no global economy and the U.S. economy possessed only a fixed number of jobs. However, such an alternative world does not exist. In reality, international students have choices on where to study and work, and U.S. companies possess the option of placing new hires in China, India, Canada or almost anywhere else on the globe. International students are vital to U.S. employers, universities and the American economy. The federal government should facilitate, rather than block, the ability of international students to work in the United States after being educated at U.S. universities.

WHY IS STEM OPT UNDER THREAT?

Allowing international students to remain in the United States after being educated in America should not be controversial. However, the Trump administration may soon propose eliminating STEM OPT, according to sources who have spoken with administration officials. This is the case even though during the election campaign, on August 18, 2015, Donald Trump tweeted his explicit support for policies to keep international students in the United States after graduation. “When foreigners attend our great colleges & want to stay in the U.S., they should not be thrown out of our country,” he tweeted.¹

Observers believe a serious threat exists against the March 2016 final rule to codify in regulation up to 24 months of Optional Practical Training (OPT) for F-1 international students with a (qualifying) science, technology, engineering and math (STEM) degree.² That belief rests on three pieces of evidence.

First, a draft executive order that circulated within the White House in January 2017 specified reforming “practical training programs for foreign students to prevent the disadvantaging of U.S. students in the workforce.”³ While the White House never issued the draft executive order, it represents the sentiments of key advisers or would not have been drafted.⁴

Second, an April 18, 2017, executive order on “Buy American and Hire American” gave a wide mandate to the “Attorney General, the Secretary of Labor, and the Secretary of Homeland Security . . . [to] propose new rules and issue new guidance . . . to protect the interests of United States workers in the administration of our immigration system.”⁵ Anti-immigration critics claim international students on Optional Practical Training harm U.S. workers.

Third, restricting Optional Practical Training would conform to the general anti-immigration tenor and policies of the Trump administration, including the belief from key advisers that fewer people in the workforce, particularly fewer foreigners, would help U.S. workers, as evidenced most recently by administration support of the RAISE Act. It would also fit the pattern of the administration’s actions on DACA (Deferred Action for Childhood Arrivals), the International Entrepreneur rule and employment authorization for H-1B spouses.

¹ Brittney Welch, “UPDATE: Here’s What Clinton, Trump Say About Student Visas to the U.S.,” voanews.com (Voice of America), November 7, 2016.

² 8 CFR Parts 214 and 274a, “Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students,” Department of Homeland Security, Final Rule, March 11, 2016.

³ Available at https://cdn0.vox-cdn.com/uploads/chorus_asset/file/7872567/Protecting_American_Jobs_and_Workers_by_Strengthening_the_Integrity_of_Foreign_Worker_Visa_Programs.0.pdf.

⁴ A bill by Sen. Jeff Sessions (S. 2394) would have eliminated OPT and barred most international students from H-1B visas for 10 years after graduation.

⁵ <https://www.whitehouse.gov/the-press-office/2017/04/18/presidential-executive-order-buy-american-and-hire-american>.

WHAT IS STEM OPT?

Optional Practical Training, or OPT, allows international students in F-1 status to continue their education or training by working in the United States after graduation, a common practice throughout the industrialized world. Canada and Australia have generous policies on post-graduation work for foreign students.⁶ As far back as 1947, the federal government has interpreted the law to allow international students to work in the U.S after they complete their academic programs. “Congress has never repudiated INS or DHS’s interpretation permitting foreign students to engage in post-completion practical training,” according to an August 12, 2015, U.S. District Court opinion.⁷

For many years, Optional Practical Training provided international students with 12 months of work authorization and the freedom to work for a U.S. employer. However, to work long-term in the United States a foreign national generally requires H-1B temporary status, and the supply of H-1B visas has been exhausted for 15 consecutive fiscal years. That means if an international student fails to be approved for an H-1B petition during the first eligible filing period, then the 12-month period of OPT would expire, forcing the student to leave the country. He or she would be unable to work or build a career in America.

In April 2008, in part to address the problem of losing outstanding students unable to obtain H-1B status, the George W. Bush Administration published an interim final rule that allowed F-1 international students with (qualifying) science, technology, engineering and math (STEM) degrees to receive an additional 17 months of OPT, for a total of 29 months in OPT status.

On March 11, 2016, following a period of notice and comment, the Department of Homeland Security issued a final rule on STEM OPT.⁸ The new rule came after a lawsuit filed by the Washington Alliance of Technology Workers (WashTech) alleged that the “OPT program exceeds DHS’s statutory authority” and “lacked good cause to waive the notice and comment requirement” when DHS issued the April 2008 rule.⁹ Issuing the regulation satisfied the district court, although WashTech is engaged in additional litigation on OPT.¹⁰

⁶ *State of Immigration*, Business Roundtable, March 2015.

⁷ *Washington Alliance of Technology Workers v. U.S. Department of Homeland Security*, Civil Action No. 14-529, United States District Court for the District of Columbia, August 12, 2015. “For almost 70 years, DHS and its predecessor, the Immigration and Naturalization Service (“INS”), have interpreted the immigration laws to allow students to engage in employment for practical training purposes. See 12 Fed. Reg. 5355, 5357 (Aug. 7, 1947) (“In cases where employment for practical training is required or recommended by the school, the district director may permit the student to engage in such employment for a six-month period subject to extension for not over two additional six-month periods . . .”).”

⁸ 8 CFR Parts 214 and 274a, “Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students,” Department of Homeland Security, Final Rule, March 11, 2016.

⁹ *Washington Alliance of Technology Workers v. U.S. Department of Homeland Security*.

¹⁰ *Ibid.*

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An earlier NFAP Policy Brief¹¹ highlighted the key elements of the March 11, 2016, OPT regulation:

- F-1 students can receive a 24-month extension beyond the initial 12 months if their degree is in a qualifying STEM field.¹²
- Employers must implement a formal training program.¹³
- “To guard against adverse impacts on U.S. workers, the rule requires terms and conditions of a STEM practical training opportunity to be commensurate with those applicable to similarly situated U.S. workers. . . the student will not replace a full- or part-time, temporary or permanent U.S. worker.”¹⁴
- An increase in oversight with site visits, new employer requirements and limiting eligibility based on school accreditation.¹⁵
- Employers using the STEM OPT extension are required to use E-Verify and “report changes in the STEM OPT student’s employment” within 5 business days. The new regulation also adds additional reporting requirements for students, and a greater focus on training and student evaluations.¹⁶

WHY IS STEM OPT IMPORTANT?

Today, approximately 80 percent of the full-time graduate students (master’s and Ph.D.) at U.S. universities in computer science and electrical engineering are international students, which means ending STEM OPT, in effect, asks the vast majority of talented individuals graduating in key tech fields to “self-deport.” Interviews have made it clear that retaining the STEM OPT rule is essential to U.S. companies, universities and the American economy. The additional 24 months in OPT status significantly increases the chances that an international student recruited by a U.S. employer will be able to obtain H-1B status and stay in the United States long-term.

Interviews revealed that ending STEM OPT would cause U.S. tech companies to change recruiting practices. Companies say they would plan to recruit, hire and place international students *outside* the United States, since without an H-1B visa they could not work in America. If international students could only stay 12 months in OPT status, then gaining approval for an H-1B would be unlikely given the supply is exhausted every year. Companies and attorneys note that the 3 years of STEM OPT significantly increases the chances of gaining H-1B status for international students.

¹¹ *Policy Recommendations on Employment-Based Immigration for the New President and Congress*, NFAP Policy Brief, National Foundation for American Policy, January 2017.

¹² 8 CFR Parts 214 and 274a, “Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students,” p. 13041.

¹³ *Ibid.*, p. 13041.

¹⁴ *Ibid.*, p. 13042.

¹⁵ *Ibid.*, p. 13042.

¹⁶ *Ibid.*, p. 13042.

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Ending STEM OPT could have a negative impact on America's place as a center for innovation. "If there is only one year of OPT and the H-1B cap does not increase, then we would recruit an international student off a U.S. campus for an overseas position," said one human resources executive at a prominent tech company who requested anonymity due to the sensitive nature of H.R. policies. "Unfortunately, this would lead to fewer jobs for U.S. workers because it would mean a design center, for example, would be placed in Germany rather than the United States."¹⁷ It is possible if the Trump administration eliminates STEM OPT it would also attempt to end the current one year of OPT for all international students.

Dollars always follow the talent, tech company CEOs have long stated. That means companies will increase the resources spent outside the United States, since that is where many prized recruits would be located. Since the vast majority of graduate students at U.S. universities in key technology fields are international students, such actions could have a significant negative impact on the U.S. economy, innovation and U.S. workers.

Technology companies without overseas offices would have trouble growing without the talent. Katherine Huber, vice president of human resources at SDLC Partners, a Pittsburgh-based technology company with about \$45 million in annual revenue, said that if STEM OPT was ended and the company were unable to hire foreign-born STEM graduate students, then the ramifications for the company would be serious. "Without the new workers, not only would we have difficulty growing but also difficulty in sustaining our current level of work," said Huber.¹⁸

Like other companies in Pittsburgh and around the country, SDLC Partners participates in efforts to increase the supply of U.S. students entering STEM but still finds that in area universities the vast majority of the graduate students are international students. Such students need OPT, STEM OPT and then an approved H-1B petition to work in the United States. "We've found the pool of people with these technical skills is very limited," she said.¹⁹ (As discussed, about 80 percent of the full-time graduate students in key fields at U.S. universities are foreign nationals.)

Without STEM OPT, one can also expect a negative impact on the flow of international students to the United States. "Universities would be devastated if STEM OPT were eliminated, leaving only one chance at the H-1B lottery," said Rodney Malpert, a partner at the Fragomen law firm. "We've never had that combination of a low-probability H-1B lottery combined with a twelve month maximum for OPT."²⁰

¹⁷ Interview with human resources executive, technology company, August 18, 2017.

¹⁸ Interview with Katherine Huber, August 31, 2017.

¹⁹ Ibid.

²⁰ Email interview, Rodney Malpert, August 23, 2017.

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“Eliminating STEM OPT would have a chilling effect on international students, causing many to rethink applying to U.S. universities,” said Jackie Bangs, assistant director, Division of International Programs, Oregon State University. “The freedom to explore career opportunities is crucial. It would be disastrous if STEM OPT or OPT itself were eliminated.” Bangs says foreign students already believe the climate in the U.S. has turned hostile. International student applications at Oregon State are down and reducing opportunities to work after graduation would confirm student suspicions that America is not the place for them.²¹

At Oregon State University, similar to the national statistics, more than 80 percent of full-time graduate students in computer science and electrical engineering are international students. Bangs points out fewer international students would mean fewer course offerings in technical fields for U.S. students and would make it much more difficult to attract top faculty, who rely on graduate students to conduct research.²²

NUMBERS ON STEM OPT – THE MYTH OF A FIXED NUMBER OF JOBS

Despite the importance of the issue, the number of F-1 students who have received STEM OPT is not large. As of June 29, 2017, approximately 33,000 F-1 students received STEM OPT in FY 2017. In FY 2016 and FY 2015, the numbers were 45,184 and 28,093.²³

**Table 2
F-1 STEM OPT Students**

FY 2017	33,055*
FY 2016	45,184
FY 2015	28,083
FY 2014	21,977
FY 2013	19,115
FY 2012	16,624

Source: U.S. Citizenship and Immigration Services;
*as of June 29, 2017.

Some argue that any job an international student fills on STEM OPT, which can last for 2 years beyond the initial 1 year of OPT, is a job a U.S. student could have filled. However, this assumes a fixed number of jobs, which is not the case within the tech sector or the U.S. economy. “In general, zero-sum thinking . . . is probably the source of most errors in economic understanding, such as a preference for tariffs or immigration restrictions,” notes Paul H.

²¹ Interview with Jackie Bangs, August 24, 2017. Educators consider Optional Practical Training an extension of the educational experience for students beyond the classroom (i.e., “practical training”), allowing international students to put into practice what they have learned. Therefore, it follows, limiting or eliminating that practical experience would make an education in the U.S. less rewarding for international students.

²² Ibid.

²³ U.S. Citizenship and Immigration Services.

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Rubin, a former Reagan administration official and the Dobbs Professor of Economics at Emory University. “If we economists could teach people that the world is not zero sum, we would perform a great service.”²⁴

In practice, company human resources executives say that the demand for tech and science talent is so great that when they find both a qualified U.S. applicant and another that is a foreign national they would offer jobs to both individuals.²⁵ In fact, some companies have specific protocols in place to justify the hiring of foreign nationals due to the added expense and process.

OPT itself lasts only one year. The F-1 student on OPT receives work authorization for a year and can work anywhere that conforms with the rules of the program, which would include many employers. As of June 29, 2017, approximately 113,000 F-1 students received OPT in FY 2017. In FY 2016 and FY 2015 the numbers were 154,120 and 132,163. (Based on the data released by USCIS, these numbers do not include individuals on STEM OPT.)²⁶

WEAK ARGUMENTS FOR REPEALING STEM OPT RULE

To rescind the STEM OPT regulation, the Trump administration would need to argue successfully that 1) the regulation is illegal, meaning that the Department of Homeland Security either does not possess the legal authority to provide work authorization for F-1 international students or the rule itself was promulgated in an unlawful fashion; or 2) STEM OPT represents an economic catastrophe for America, leading to one for one replacement of U.S. workers throughout the economy by international students on STEM OPT and that allowing individuals with degrees in science, technology, engineering or math fields to remain an additional two years leads to damaging consequences for the U.S. economy. This second argument would be ironic and contradictory for the administration to make, since the president endorsed the RAISE Act in a White House ceremony and the bill specifically favors granting permanent residence to international students with a STEM degree from a U.S. university.²⁷

A STRONG CASE THAT THE STEM OPT RULE IS LEGAL

Immigration attorneys note that in issuing a final rule, after notice and comment, on March 11, 2016, following the WashTech lawsuit, the Department of Homeland Security met the requirements of the Administrative Procedure Act.²⁸ History and the approximately 70 to 80 pages in the Federal Register published to explain and justify the rule make it legally dubious for DHS to declare the rule unlawful less than two years later.

²⁴ Paul H. Rubin, “A Zero-Sum Error,” Economics21.org, August 13, 2017.

²⁵ This sentiment was expressed by several executives interviewed.

²⁶ U.S. Citizenship and Immigration Services.

²⁷ To gain permanent residence under a point-based system, section 5 of the revised RAISE Act grants a significant advantage to international students in STEM fields over other applicants by granting 8 points for a U.S. “master’s degree in STEM” and 13 points for a “doctorate degree in STEM.”

²⁸ 8 CFR Parts 214 and 274a, “Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students.”

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"It is difficult to imagine how the government could take the position that the law *requires* DHS to terminate OPT," according to Eileen Lohmann, who closely tracked the STEM OPT litigation as an associate at the immigration law firm BAL. "The Department of Justice successfully argued in federal court that the program was lawful and supported by the statute and legislative history. It is not uncommon for a subsequent administration to interpret a statute differently, but to argue that there was no basis for the prior legal position? The government's credibility before the courts would take a serious hit."²⁹

"In 2016 DHS legally expanded OPT to include an additional STEM extension, and the agency properly followed the notice and comment requirements of the Administrative Procedure Act to expand OPT for STEM students," states Stephen Yale-Loehr, a professor of immigration law practice at Cornell Law School. "A federal court dismissed a challenge to the DHS's STEM OPT extension rule, providing further assurance of its legality. Thus, the current administration cannot argue that the existing rule was promulgated illegally."³⁰

Yale-Loehr points to the court's decision in explaining why a legal turnabout would be dubious. "A federal court has already held that the Department of Homeland Security had the statutory authority to publish a rule extending OPT to students in STEM fields," he explains. "In *Washington Alliance of Technology Workers v. U.S. Department of Homeland Security*, 156 F. Supp. 3d 123 (D.D.C. 2015), the court rejected the plaintiff's argument that DHS exceeded its statutory authority by issuing the original STEM OPT rule. The court found that DHS had clear legal authority to issue the rule under a general immigration statute authorizing the government to set conditions on what a nonimmigrant can and cannot do while in the United States. The court noted that since at least 1947, the immigration agency has interpreted the immigration laws to allow foreign students to engage in employment for practical training purposes. During all that time, Congress acquiesced to that interpretation. In my view, the court was correct."³¹

He and other attorneys note the language in the court's opinion on this issue (156 F. Supp. 3d at 138):

Congress has delegated substantial authority to DHS to issue immigration regulations. This delegation includes broad powers to enforce the INA and a narrower directive to issue rules governing nonimmigrants. See 8 U.S.C. § 1103(a)(1) ("The Secretary of Homeland Security shall be charged with the administration and enforcement of [the INA] and all other laws relating to the immigration and naturalization of aliens"); *id.* § 1103(a)(3) ("[The Secretary of Homeland Security] shall establish such regulations; prescribe such forms of bond, reports, entries, and other papers; issue such instructions; and perform such other acts as he deems necessary for carrying out his authority under the provisions of [the INA]."); *id.* § 1184(a)(1) ("The admission to the United States of any alien as a nonimmigrant shall be for such time and under such

²⁹ Analysis provided by BAL.

³⁰ Email interview, Stephen Yale-Loehr, September 13, 2017.

³¹ *Ibid.*

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conditions as the Attorney General may by regulations prescribe, including when he deems necessary the giving of a bond with sufficient surety in such sum and containing such conditions as the Attorney General shall prescribe, to insure that at the expiration of such time or upon failure [**29] to maintain the status under which he was admitted, . . . such alien will depart from the United States.")³²

The 2008 Rule was promulgated as an exercise of this delegated authority. The subject matter of the 2008 Rule falls squarely within the ambit of § 1184(a)(1), and the Rule invokes that statute in listing its sources of authority."³³

In addition, the court ruled:

[S]everal pieces of evidence indicate that Congress understood F-1 to permit at least some period of employment. For example, as discussed in Section II supra, in 1990, Congress implemented a pilot program that allowed F-1 students to work up to 20 hours per week in a job unrelated to their field of study. See Immigration Act of 1990 § 221. And F-1 nonimmigrants are explicitly exempted from several wage taxes. See 26 U.S.C. §§ 3121(b)(19), 3306(c)(19); 42 U.S.C. § 410(a)(19). These statutory provisions lend credence to defendant's [i.e., DHS'] argument that the clause in F-1 — "solely for the purpose of pursuing such a course of study" — does not foreclose employment.³⁴

Finally, the court concluded, "In light of Congress' broad delegation of authority to DHS to regulate the duration of a nonimmigrant's stay and Congress' acquiescence in DHS's longstanding reading of F-1, the Court concludes that the agency's interpretation is not unreasonable."³⁵

AN "ECONOMIC" CASE AGAINST THE STEM OPT RULE WOULD BE WEAK

The economic argument against the STEM OPT rule is weak. When publishing the final rule, DHS published almost 70 pages that cited economic research on the benefits of international students with STEM degrees, the increased competition for international students globally, National Science Foundation research that responded to questions from submitted comments about the impact of foreign STEM professionals on U.S. workers, and, among other things, noted that individuals on STEM OPT represent well less than 1 percent of the "U.S. STEM job market."³⁶

From an economic perspective, it would be highly questionable for the Department of Homeland Security to argue that every foreign national who enters the U.S. labor market prevents a U.S. worker from obtaining a job. Nothing in U.S. or world economic history supports such a contention. If that was the case, then it would also be true every time a U.S. student graduated college and entered the job market he or she would prevent fellow Americans from being employed. Simply put, as noted, there is not a fixed number of jobs in the U.S. economy. The U.S. population

³² Washington Alliance of Technology Workers v. U.S. Department of Homeland Security, 156 F. Supp. 3d 123 (D.D.C. 2015), p. 138.

³³ Ibid.

³⁴ Ibid. pp. 139-140.

³⁵ Ibid., p. 145.

³⁶ 8 CFR Parts 214 and 274a, "Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students."

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and the number of workers in the economy have risen significantly over the past several decades, yet in 2017 the U.S. unemployment rate in 2017 has hovered around 4 percent.

It would also be difficult for DHS to argue there are no job openings available for U.S. workers with STEM degrees. The Conference Board reported in August 2017 that there are almost 5 times as many online ads for positions in computer and mathematical science occupations as individuals listed as unemployed in those occupations: 510,000 online ads vs. 110,000 unemployed.³⁷ That is virtually tied with healthcare practitioners for the best “supply/demand rate” of any occupation reported. Online ads typically measure only part of the demand for labor. Moreover, that number does not reflect the many tens of thousands of job openings in management, teaching, and technology that do not fall within the narrow occupational codes for “computer and mathematical science occupations.”

Forbes and Indeed.com have compiled thousands of job openings for positions that pay at least \$60,000 at U.S. technology companies. These include job openings at Amazon (2,406), Oracle (2,332), Microsoft (2,105), Dell (1,867), SAIC (1,524) IBM (1,437) and Apple (1,383).³⁸

It would also be questionable for DHS to base any economic argument against STEM OPT on U.S. labor market impacts without addressing how the demand for labor is global. Companies unable to hire a graduate of a U.S. university in America, due to immigration restrictions, would likely hire the person to work abroad.

“U.S. firms are competing with firms across the world for skilled workers,” said Madeline Zavodny, a professor of economics at the University of North Florida and a former research economist at the Federal Reserve Bank of Atlanta and the Federal Reserve Bank of Dallas. “Workers with skills that are in demand can choose where to work, and businesses can choose where to have them work. Information technology firms expanding operations in Canada instead of the U.S. because of our caps on the number of skilled immigrants are a prime example. And these policies often end up hurting not only workers and businesses but also American consumers via fewer choices or higher prices.”³⁹

U.S. STUDENTS IN STEM FIELDS ARE DOING WELL IN THE JOB MARKET

U.S. students with STEM majors are doing better in the job market and earning higher salaries than students in other fields, undermining arguments that international students are preventing U.S. students from pursuing careers in science and engineering fields. One indicator of the demand for STEM degrees compared to other college majors

³⁷ “Online Job Ads Decreased 157,700 in July,” News Release, The Conference Board, August 2, 2017.

³⁸ <https://www.forbes.com/pictures/efkk45ehjk/the-tech-companies-hiring-the-most-right-now-3/#7a043ee5fdde>.

³⁹ Email interview, Madeline Zavodny, September 8, 2017.

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is an analysis by Glassdoor that shows 9 of the 10 highest paying majors 5 years out of college are in STEM.⁴⁰ “The proliferation of technology-related jobs is due to those skills now being needed at businesses that don't consider themselves traditional tech companies,” according to Andrew Chamberlain, chief economist at Glassdoor.⁴¹

There is no correlation between an inability to find work in a STEM field and the presence of foreign nationals in that field in the United States. Nearly three times as many individuals with degrees in the social sciences (11.8 percent), a field in which relatively few H-1B visa holders receive degrees, report working involuntarily out of their field as those with degrees in computer and mathematical sciences and engineering.⁴² The National Science Foundation reports only 4.1 percent of individuals with a degree in computer and mathematical sciences report working involuntarily out of their field. In engineering, only 4.6 percent report working involuntarily of their field. Not everyone works in their field, and immigration is unlikely to be the cause.⁴³

Degrees in computer science and electrical engineering have the highest return on investment (ROI) of any degree other than a degree in petroleum engineering, according to the website Launch My Career Colorado, a web-based tool endorsed by the state of Colorado to help students and parents evaluate colleges and potential careers. A degree in computer science at UC-Boulder would bring a return on investment of \$875,930, while a degree in electrical engineering at UC-Denver would yield a return on investment of \$757,462. In comparison, a degree in psychology at UC-Boulder would bring a return on investment of only \$131,154.⁴⁴

CONCLUSION

Making it easier for international students to remain and work in the United States after graduation is good for U.S. workers, companies and universities. “The best thing the U.S. government has done on immigration is OPT to allow international students a chance to stay and work for a time after graduation,” according to Michelle Zatlun, co-founder of Cloudflare, one of 21 recent billion-dollar startup companies with an international student founder. “It allowed me to work with Matthew on the business plan that helped create the company.”⁴⁵

⁴⁰ Nursing was the only exception. Allison Berry, “50 Highest Paying College Majors,” Glassdoor, October 17, 2016.

⁴¹ Marco della Cava, “The Best of the Best U.S. Jobs are Tech, Tech and Tech, Again,” *USA Today*, January 24, 2017. Parts of this section were adapted from *H-1B Visas By The Numbers*, NFAP Policy Brief, National Foundation for American Policy, June 2017.

⁴² *Science and Engineering Indicators 2016*, National Science Foundation, chapter 3, p. 58.

⁴³ *Ibid.*, p. 58.

⁴⁴ Mark J. Perry, “What’s the Value of a College Degree? A New Interactive Website Provides Some Answers and Much Needed Transparency,” *Carpe Diem*, June 23, 2016. Return on investment is “the estimated additional income during the next 20 years earned by a college graduate over and above the earnings of a high school graduate.”

⁴⁵ Stuart Anderson, *Immigrants and Billion Dollar Startups*, NFAP Policy Brief, National Foundation for American Policy, March 2016.

International Students and STEM OPT

“Matthew” is Matthew Prince, CEO of Cloudflare. Michelle and Matthew met as students at Harvard Business School. Today, the company employs hundreds of people. More than 4 million websites are in the Cloudflare network. But the company might never have existed if not for OPT. Michelle used the year of OPT to work out details of the company with Matthew Prince and a third cofounder, Lee Holloway. Michelle later (with some difficulty) obtained H-1B status. “If I hadn’t obtained the visa I would have gone back to Canada and tried to work on Cloudflare from there,” she said. “If that had happened, Cloudflare would not be where it is today.”⁴⁶

Economic research supports policies that make it easier – not more difficult – for international students to work after graduating from U.S. universities. “The United States has the enormous international advantage of being able to attract talent in science, technology, and engineering from all over the world to its most prestigious institutions,” writes University of California, Davis economist Giovanni Peri. “The country is certainly better off by having the whole world as a potential supplier of highly talented individuals rather than only the native-born.”⁴⁷

Peri explains how native-born Americans gain from the entry of high skilled professionals and researchers. “The relatively large positive effect of immigrants on the wages of native-born workers with a college degree or more is driven by the fact that creative, innovative, and complex professions benefit particularly from the complementarities brought by foreign-born scientists, engineers, and other highly skilled workers,” according to Peri. “A team of engineers may have greater productivity than an engineer working in isolation, implying that a foreign-born engineer may increase the productivity of native-born team members . . . Technological and scientific innovation is the acknowledged engine of U.S. economic growth and human talent is the main input in generating this growth.”⁴⁸

Keith Maskus, an economist at the University of Colorado, Aaditya Mattoo, lead economist at the World Bank’s Development Economics Group, and Gnanaraj Chellaraj, a consultant to the World Bank found, “Larger enrollments of international graduate students as a proportion of total graduate students result in a significant increase in patents awarded to both university and non-university institutions as well as increases in total patent applications. This finding points out the importance of scientific contributions made by international graduate students in both settings.”⁴⁹ Their conclusion: “[R]educing foreign students by tighter enforcement of visa restraints could reduce innovative activity significantly” in the United States.⁵⁰

⁴⁶ Ibid.

⁴⁷ Giovanni Peri, *Immigrants, Skills, and Wages: Measuring the Economic Gains from Immigration*, (Washington, DC: Immigration Policy Center, March 2006), p. 7.

⁴⁸ Ibid., p. 6.

⁴⁹ Gnanaraj Chellaraj, Keith E. Maskus, and Aaditya Mattoo, “The Contribution of Skilled Immigration and International Graduate Students to U.S. Innovation,” World Bank Policy Research Working Paper 3588, May 2005, p. 23.

⁵⁰ Ibid., p. 26.

International Students and STEM OPT

Another benefit of international students is the contributions made by their children. A recent National Foundation for American Policy study of student finalists at the 2016 Intel Science Talent Search competition found, “27 of the 40 children – 68 percent – had a parent who came to America as an international student. That means failure to facilitate the ability of international students to remain in America after graduation (through Optional Practical Training and improved visa policies) will deprive America of the potentially substantial contributions of their children.”⁵¹

Based on interviews and research on international students, the legal and economic case for maintaining STEM OPT is strong. It would be in America’s national interest to keep STEM OPT in place.

⁵¹ Stuart Anderson, *The Contributions of the Children of Immigrants to Science in America*, NFAP Policy Brief, National Foundation for American Policy, March 2017.

APPENDIX

Table 3
International Students Who Became Entrepreneurs of Billion Dollar Companies

NAME	UNIVERSITY/DEGREE	COMPANY CO-FOUNDED/FOUNDED	EMPLOYEES	VALUE OF COMPANY
Noubar Afeyan	MIT, Ph.D. Biochemical Engineering	Moderna Therapeutics	326	\$3.0 Billion
Ash Ashutosh	Penn State, M.S. Computer Science	Actifio	350	\$1.1 Billion
Mohit Aron	Rice, Ph.D. Computer Science	Nutanix	864	\$2.0 Billion
Alexander Asseily	Stanford, B.S./M.S. Elec. Engineering	Jawbone	395	\$3.3 Billion
Amr Awadallah	Stanford, Ph.D. Electrical Engineering	Cloudera	1,100	\$4.1 Billion
Jay Caudhry	Univ. of Cincinnati, MBA and M.S. Computer Engineering, Industrial Engineering	Zscaler	600	\$1.1 Billion
John Collison	Harvard	Stripe	380	\$5.0 Billion
Patrick Collison*	MIT	Stripe	(380)	(\$5.0 Billion)
Nicolas Desmarais	Amherst, B.A. Economics & Pol. Science	AppDirect	400	\$1.0 Billion
Borg Hald	Stanford, MBA, Ross School of Business (U. of Michigan), B.B.A.	Medalia	850	\$1.3 Billion
David Hindawi	U.C.-Berkeley, Ph.D. Operations Research	Tanium	300+	\$3.5 Billion
Tomer London	Stanford, M.S. Electrical Engineering	Gusto	300	\$1.1 Billion
Doron Kempel	Harvard, MBA	SimpliVity	750	\$1.0 Billion
Elon Musk	Univ. of Penn., B.A., Economics & Physics, Wharton School (UPENN), B.S. Business	SpaceX	4,000	\$12 Billion
Dheeraj Pandey*	Univ. of Texas, Austin, M.S. Computer Science	Nutanix	(864)	(\$2.0 Billion)
Adam Neumann	CUNY Bernard M Baruch College	WeWork	1,200	\$10 Billion
Dhiraj Rajaram	Wayne State, M.S. Computer Engineering, Univ. of Chicago, MBA	Mu Sigma	3,500	\$1.5 Billion
Daniel Saks*	Harvard, M.A. Finance & Accounting	AppDirect	(400)	(\$1.0 Billion)
Mario Schlosser	Harvard, MBA	Oscar Health Insurance	415	\$1.7 Billion
Eric Setton	Stanford, Ph.D. and M.S. Electrical Engineering	Tango	260	\$1.0 Billion
K.R. Sridhar	University of Illinois at Urbana-Champaign, M.S. Nuclear Engineering, Ph.D. Mechanical Engineering	Bloom Energy	1,200	\$2.9 Billion
Ragy Thomas	NYU, MBA	Sprinklr	325	\$1.2 Billion
Renaud Visage	Cornell, M.S. Engineering	Eventbrite	500	\$1.0 Billion
Michelle Zatlyn	Harvard, MBA	CloudFlare	225	\$1.0 Billion

Source: National Foundation for American Policy, company information, CrunchBase. *Denotes second international student from same company. Values and employees as of January 1, 2016.

ABOUT THE AUTHOR

Stuart Anderson is Executive Director of the National Foundation for American Policy, a non-profit, non-partisan public policy research organization in Arlington, Va. Stuart served as Executive Associate Commissioner for Policy and Planning and Counselor to the Commissioner at the Immigration and Naturalization Service from August 2001 to January 2003. He spent four and a half years on Capitol Hill on the Senate Immigration Subcommittee, first for Senator Spencer Abraham and then as Staff Director of the subcommittee for Senator Sam Brownback. Prior to that, Stuart was Director of Trade and Immigration Studies at the Cato Institute in Washington, D.C., where he produced reports on the military contributions of immigrants and the role of immigrants in high technology. He has an M.A. from Georgetown University and a B.A. in Political Science from Drew University. Stuart has published articles in the *Wall Street Journal*, *New York Times*, *Los Angeles Times*, and other publications. He is the author of the book *Immigration* (Greenwood, 2010).

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