November 9, 2026

Submitted via Regulations.gov

Department of Homeland Security U.S. Immigration and Customs Enforcement Regulatory Affairs Unit 500 12th Street SW Washington, DC 20536-5901

Re: Optional Practical Training Fees NPRM DHS Docket No. ICEB-2026-0100 RIN 1653-AB01 91 Fed. Reg. 64566 to 64600 (comments due November 9, 2026) Very high cost to American innovation and economic growth if rule finalized as proposed

Dear Sir or Madam,

We are three immigration experts who have undertaken a detailed consideration over the last two years of over 20 years of administrative data from US Citizenship and Immigration Services (USCIS) and the Student and Exchange Visitor Information System (SEVIS), as well as Census data, to assess the role of international STEM students in the US STEM workforce and in fostering US economic growth.[1]

We are confident the Department's Notice of Proposed Rule Making (NPRM or proposed rule) to impose fees of $70,000 for initial Optional Practical Training (OPT) and $30,000 for any subsequent OPT fails to account for significant potential costs to the nation's innovative capacity and long-term prosperity, especially by ignoring the role of OPT in facilitating international STEM PhDs in the US. Should the Department be interested in discussing our findings and analysis, we stand ready to meet and discuss.

Michael Clemens, an immigration economist, is a Full Professor at the Johns Hopkins University School of Government and Policy, Nonresident Senior Fellow at the Peterson Institute for International Economics, Distinguished Non-Resident Fellow at the Center for Global Development, and Research Fellow at the IZA Institute of Labor Economics and the Rockwool Foundation Berlin (RFBerlin) Center for Research and Analysis of Migration. He is an Associate Editor of the *Journal of Economic Perspectives*, a leading academic journal of the American Economic Association, and his research on the economics of migration has appeared in the *American Economic Review* and other leading journals and received the Royal Economic Society Prize. Over the decade from 2015 to 2025, he

[1]Michael A. Clemens, Jeremy Neufeld, and Amy M. Nice, "Brain Freeze: How International Student Exclusion Will Shape the STEM Workforce and Economic Growth in the United States," IZA Discussion Paper No. 18548 (IZA Institute of Labor Economics, April 2026), originally commissioned by the National Academies of Sciences, Engineering, and Medicine for the "Reimagining STEMM Graduate Education and Postdoctoral Career Development" Summit, October 2025 (attached). The analysis draws on Student and Exchange Visitor Information System records for 2004–2023, obtained from U.S. Immigration and Customs Enforcement under the Freedom of Information Act, U.S. Citizenship and Immigration Services data, and Census data.

ranked in the top 0.6 percent of most-cited economists tracked by Research Papers in Economics (RePEc).

Jeremy Neufeld directs the high-skilled immigration policy work of the Institute for Progress, a nonpartisan think tank focused on innovation policy, including co-publishing the Techno-Industrial Policy Playbook. He has testified as an expert witness before the Joint Economic Committee of Congress and was commissioned as an expert by the National Academies of Sciences, Engineering, and Medicine (NASEM) to study international talent flows for its consensus study report, *International Talent Programs in the Changing Global Environment*.

Amy Nice, a leading thinker on STEM immigration who focuses on using evidence-based research to find practical solutions to immigration policy problems, is a Visiting Fellow at the Hoover Institution at Stanford University, an immigration law and policy fellow at Cornell Law School, and distinguished immigration counsel at the Institute for Progress. She served as Assistant Director for International Science and Technology Workforce at the White House Office of Science and Technology Policy and in the Office of the General Counsel at Department of Homeland Security headquarters. In 2023 Nice received the American Immigration Lawyers Association's Edith Lowenstein Memorial Award for contributions to US immigration law and before working on policy she was in the private practice of immigration law for more than twenty years.

Together, we authored "Brain Freeze: How International Student Exclusion Will Shape the STEM Workforce and Economic Growth in the United States," commissioned by the National Academies of Sciences, Engineering, and Medicine for its 2025 summit on Reimagining STEMM Graduate Education and Postdoctoral Career Development, and summarized in the Peterson Institute Policy Brief "Class Dismissed" (June 2026).[2] That research shows that international education is the primary "front door" through which high-skill STEM immigrants enter the US workforce, that OPT is the principal bridge between US universities and US employment for international STEM graduates, and that policies like drastically reducing OPT would shrink the high-skill STEM workforce and reduce annual GDP by hundreds of billions of dollars within a decade. The Department engaged directly with that analysis in its July 2026 final rule establishing fixed periods of admission, but has not considered its implications for the proposed OPT fees.[3]

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[2]Clemens, Neufeld, and Nice, "Brain Freeze"; Michael A. Clemens, Jeremy Neufeld, and Amy M. Nice, "Class Dismissed: The Effect of International Student Exclusion on the US STEM Workforce and Economic Growth," Policy Brief 26-10 (Washington, DC: Peterson Institute for International Economics, June 2026).

[3]U.S. Department of Homeland Security, "Establishing a Fixed Time Period of Admission and an Extension of Stay Procedure for Nonimmigrant Academic Students, Exchange Visitors, and Representatives of Foreign Information Media," Final Rule, 91 Fed. Reg. 44976, 45088 (July 17, 2026).

FATAL FLAWS IN THE DEPARTMENT'S NPRM

We estimate that DHS's failure to properly account for the costs involved and correctly weigh the risks and benefits of its proposal ignores costs that will rise each year, reaching an annual loss of $165–558 billion by ten years into the future, with a central estimate of $362 billion. Even the low end of that range is more than four times the cumulative total cost of $35.1 billion the Department identifies as the ten-year cost of the rule (and higher than the Department's high end estimate), and our central estimate is more than ten times it.[4] The large difference arises because we account for the role of international STEM graduates in the US STEM workforce and the innovation that drives rising productivity in the US economy, and the Department does not; and because we expect that the fees will indeed reduce OPT participation, including by STEM graduates, and deter international students from enrolling in the first instance, and the DHS impact analysis does not.

DHS makes clear in the NPRM that combating fraud, strengthening the integrity of the immigration system, and protecting U.S. workers are the primary justifications for the proposed fees, and the NPRM repeatedly invokes national security in support of them.[5] These justifications are not inappropriate given the commitment the Department has to, and the interconnectedness between, providing additional mechanisms to exercise agency oversight that allow DHS to vigorously enforce US immigration law, protecting the integrity of the F-1 visa category and OPT, and promptly detecting national security concerns. We are not aware of legitimate and compliant stakeholders, whether individual international students, schools, employers, or their associations, that object to these purposes. But the complex web of national security necessitates the Department do more than restate priorities of oversight, integrity, and prompt detection. For example, as a matter of the nation's security, Congress included as part of the National Defense Authorization Act an instruction to the National Academies of Sciences, Engineering, and Medicine to study international talent programs employed by and in the United States.[6] In response to this statement of work, a 2024 National Academies report concluded, in essence, that the primary if not sole global talent pipeline for the United States is the international students, scholars, and researchers attracted to U.S. university campuses. "The U.S. has a talent program," the National Academies committee chair said, "It's called

[4]U.S. Department of Homeland Security (DHS), "Optional Practical Training Fees," Notice of Proposed Rulemaking, 91 Fed. Reg. 64566, 64579 (October 8, 2026) (estimating ten-year total costs of $275 million to $69.9 billion, with a primary estimate of $35.1 billion, discounted at 3 percent). Our estimates are developed in section (2) below.
[5]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64566; see also 64567, 64569, 64572, and 64575–76 (invoking national security).
[6]William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. L. No. 116-283, § 238, 134 Stat. 3388 (2021); National Academies of Sciences, Engineering, and Medicine, *International Talent Programs in the Changing Global Environment* (Washington, DC: National Academies Press, 2024). The committee chair's remark is quoted in Karen Fischer, "To Remain Scientifically Competitive, the US Must Take a Coordinated National Approach," *Latitudes* (blog), *Chronicle of Higher Education*, September 4, 2024.

graduate school." Likewise, a study prepared for the White House Office of Science and Technology Policy by the IDA Science and Technology Policy Institute (STPI) weighed the economic benefits of foreign STEM talent against the losses from trade secret theft and technology transfer. It found that foreign-born STEM workers contributed $367–409 billion to US GDP in 2019, about 1.7 to 1.9 percent of GDP, and that their estimated net benefit, after accounting for potential losses, is about $200,000 to $700,000 per individual over three years. STPI concluded that the contributions of foreign-born STEM talent "consistently outweigh the potential losses."[7]

Yet, in several critical ways the Department's NPRM fails to account for the vital national security interest of retaining this talent pipeline of international STEM experts,[8] almost all of whom first come to the United States on student visas, and most of whom enter the US workforce through OPT. Of international STEM graduates who stay to work in the United States after graduation, 82 percent do so through OPT.[9] The pipeline matters most at the very top of American science. Of the foreign-born US recipients of the Nobel Prize, Lasker Award, Turing Award, and MIT Technology Review's Innovators Under 35 from 2014 to 2024 whose earliest US activity could be identified, two-thirds first came to the United States as students, most commonly as doctoral students; nearly half of all US recipients of those awards were foreign-born. The Center for Security and Emerging Technology concludes that restricting OPT "could weaken the pathway through which most foreign-born U.S. awardees arrived."[10]

Moreover, the Department does not show that fees of $70,000 to $100,000 per student are needed to accomplish its stated purposes. Instead, DHS explains that it "selected a fee amount for OPT comparable to the fee for H-1B visas."[11] Nor does the Department

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[7]Keith W. Crane, Thomas J. Colvin, Abby R. Goldman, Emily R. Grumbling, and Andrew B. Ware, *Economic Benefits and Losses from Foreign STEM Talent in the United States*, IDA Document D-31855 (Washington, DC: IDA Science and Technology Policy Institute, October 2021), prepared for the White House Office of Science and Technology Policy; IDA Science and Technology Policy Institute, "Weighing the Costs and Benefits of Foreign-Born STEM Talent," Research Summary NS D-33421 (June 2023).

[8]A bipartisan group of 70 national security experts and former officials made these points in a May 2023 letter, reported by *Axios*, urging Congress to act on international scientific and engineering talent because many such workers "will be working in Pentagon-identified critical technology areas."

[9]Clemens, Neufeld, and Nice, "Brain Freeze," sec. IV, table 2 and fig. 3 (63.7 percent of foreign STEM graduates enter the US workforce on OPT, of the 77.8 percent who enter it immediately after graduation); Michael A. Clemens, "Taxes on International Students: Demand and Supply Response for Post-Graduation Foreign Workers on Optional Practical Training," IZA Discussion Paper No. 18933 (IZA Institute of Labor Economics, September 2026), 6.

[10]Adrian Thinnyun, Kelly Beavan, and Zachary Arnold, "How Global Talent Pathways Shape U.S. STEM Award Achievement," data brief (Washington, DC: Center for Security and Emerging Technology, September 2026), 1. Of the 471 award recipients who lived, worked, or studied in the United States, 47 percent were foreign-born; of the 184 foreign-born recipients whose earliest US activity could be identified, two-thirds first came as students.

[11]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64575.

weigh what fees of that size would cost the American economy, American workers, and the nation's security.

That cost is not a matter of serious dispute among economists. On October 28, 2026, the Clark Center for Global Markets at the University of Chicago Booth School of Business asked its US Economic Experts Panel about the proposed fees. Of the 39 panelists who responded, 38 agreed or strongly agreed that the fees would substantially reduce the number of international graduates working in the United States, and none disagreed that the fees would substantially weaken the ability of US universities to attract and retain top foreign students relative to other advanced economies.[12]

The Department's NPRM (1) does not recognize that the fees would sharply reduce OPT participation and international enrollment, including in the STEM fields most important to innovation and growth, (2) does not properly establish the national-level costs of its proposed approach, and (3) ignores the benefits of OPT to American innovation and American workers, including benefits that accrue to Americans who are not party to the fee and cannot be asked to pay it.

(1) Proposed rule understates or ignores risks concerning reduction in STEM enrollment and participation, especially for PhDs

This part of our comment challenges the Department's estimate of zero effect on STEM enrollment and participation and is relevant to the following specific sections of the NPRM: Establishing the Optional Practical Training Fees (section IV.C); Baseline and Population (section VII.A.3); Costs, including Opportunity Costs and Other Unquantified Impacts (section VII.A.5).

DHS concedes in the NPRM that it "cannot confidently predict the extent of any reduction in participation due to these new requirements,"[13] but we are confident that the analysis it does offer severely underestimates reductions in OPT participation among STEM graduates. In the Department's "high participation scenario," schools pay the fee for every student who would otherwise have participated in OPT, and participation does not change at all. In its "low participation scenario," schools stop recommending OPT for graduates who are ineligible for the STEM OPT extension, but continue to pay $100,000 for every STEM graduate. The Department's primary estimate is the average of the two. In no scenario does the Department expect the fees to cause *any* decline in OPT participation by STEM graduates. Its only justification is that $100,000 for up to three years of OPT is a better value per year than $70,000 for one year, so that schools "may

[12]Kent A. Clark Center for Global Markets, "Optional Practical Training," US Economic Experts Panel survey (Chicago: University of Chicago Booth School of Business, October 28, 2026). Thirty-nine of the panel's 44 members responded.
[13]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64582.

be more willing to pay" for STEM graduates.[14] The Department likewise acknowledges that schools "could also experience declines in F-1 nonimmigrant student enrollment if prospective students are deterred by the new fee requirements," but its analysis never considers any such decline taking place in addition to its scenarios on participation.[15]

The facts on OPT participation and international enrollment say otherwise. One of us, in Clemens (2026) estimates the key behavioral responses that determine the effect of an OPT fee. It provides one of the first quasi-experimental estimates of international students' price elasticity of demand for US degrees, new estimates of the net margin US universities earn on international students, and a plausible range for employers' elasticity of demand for OPT workers drawn from prior research and from the response to the $100,000 H-1B fee.[16] What that means is that Clemens (2026) estimates the effect on enrollment and participation no matter who actually bears the burden of the fee: schools, employers, or students themselves.

The proposed rule places the fee on schools. Universities would not realistically pay a fee larger than the net margin they earn on an international student over the entire course of study; otherwise they would lose money on every international student who enrolled, graduated, and worked on OPT. At the universities international students actually attend, that margin is about $23,000 per year for a bachelor's student and about $14,000 per year for a master's student.[17] A fee of $70,000 to $100,000 is several times the margin a typical master's program earns on an international student over the entire degree. As a result, a fee paid by universities would cut OPT starts among bachelor's and master's graduates by 64 percent at $70,000 and 79 percent at $100,000. Among master's graduates, the declines are 82 percent at $70,000 and 99 percent at $100,000.[18] These estimates are conservative, because universities would realistically begin to withhold OPT recommendations before the fee exhausted their entire margin.

The Department explains that schools can pass the burden of the fee on to students or employers but this too would lead to significant declines. If students bear a $100,000 fee, OPT starts would fall by at least 23 percent among bachelor's graduates and 42 percent among master's graduates, a lower bound on the magnitude of the decline.[19] If employers

[14]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64582–83.
[15]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64588.
[16]Clemens, "Taxes on International Students," 2–3, 31 (attached). The price elasticity of demand is estimated by instrumental variables, extending the method of Michel Beine, Giovanni Peri, and Morgan Raux, "International College Students' Impact on the US Skilled Labor Supply," *Journal of Public Economics* 223 (2023): 104917. The employer demand elasticities range from −4, based on prior simulation estimates, to −16, implied by employers' response to the $100,000 H-1B fee.
[17]Clemens, "Taxes on International Students," 21, table 4, and 29n23 ($22,969 per student-year at the bachelor's level and $13,735 at the master's level, in 2024 dollars).
[18]Clemens, "Taxes on International Students," 23, table 5, panel (b).
[19]Clemens, "Taxes on International Students," 16, table 2, panel (b), and 30, table 7. Because a graduate weighs the fee against the value of OPT alone, not the whole degree, these declines are lower bounds.

bear it, OPT hiring would fall by about 84 percent at the midpoint of the plausible range of employer demand elasticities.[20] This range is validated by recent historical experience. DHS data shows a decline in H-1B demand by 91% in the 245 days after the $100,000 fee on new H-1B petitions took effect in September 2025, in which employers filed 1,212 initial petitions for H-1B workers outside the United States, compared with 13,823 in the same period a year earlier.[21]

The decline in OPT opportunities would in turn deter international students from enrolling in the first instance. Past extensions of STEM OPT raised international bachelor's enrollment by about 18 percent and master's enrollment by about 30 percent, while the 2003 cut in the H-1B cap lowered foreign enrollment by 10 percent.[22] Using these estimates, a $100,000 fee paid by universities would reduce international enrollment by 6–12 percent at the bachelor's level and 35–58 percent at the master's level, costing US universities $2.5–4.2 billion per year in net revenue. Under any incidence of the fee, US universities would lose on the order of $0.5–4.3 billion per year.[23]

Survey evidence points the same way. Between August 14 and October 5, 2026, the Institute for Progress surveyed 734 current and former international students in F-1 status.[24] Under current rules, 80 percent of respondents with STEM OPT-eligible majors said they were likely to try to stay in the United States after graduation. Under a $70,000 fee for initial OPT and a $30,000 fee for the STEM extension, that share of STEM students fell to 15 percent when the fee could be paid by the student, school, or employer, and to 48 percent when it could be paid only by the school. Among the 238 PhD students in F-1 status with STEM OPT-eligible majors, a group Clemens (2026) does not cover, the share likely to try to stay fell from 80 percent to 13 percent, and 66 percent said they would not have enrolled in a US program had the proposed fees been in place. Looking back, 70 percent of STEM OPT-eligible respondents said they would not have enrolled in a US

[20]Clemens, "Taxes on International Students," 26, table 6, and 30, table 7 (labor-cost basis, at the midpoint elasticity of −10).
[21]Clemens, "Taxes on International Students," 26, citing U.S. Department of Homeland Security, "Fee Elasticity Analysis for the U.S. Citizenship and Immigration Services Fee for Certain H-1B Petitions Notice of Proposed Rulemaking," technical appendix to "Fee for Certain H-1B Petitions," Notice of Proposed Rulemaking, 91 Fed. Reg. 54817 (August 25, 2026), Docket No. USCIS-2026-0298-0003, table A.7.
[22]Catalina Amuedo-Dorantes, Kevin Y. Shih, and Huanan Xu, "The Implications of Optional Practical Training Reforms on International Student Enrollments and Quality," *Economic Inquiry* 61, no. 2 (2023): 253–81; Catalina Amuedo-Dorantes, Delia Furtado, and Huanan Xu, "OPT Policy Changes and Foreign Born STEM Talent in the U.S.," *Labour Economics* 61 (2019): 101752; Kevin Shih, "Labor Market Openness, H-1B Visa Policy, and the Scale of International Student Enrollment in the United States," *Economic Inquiry* 54, no. 1 (2016): 121–38. See Clemens, "Taxes on International Students," 28–29.
[23]Clemens, "Taxes on International Students," 29–31 and table 7. Losses are in net margin (tuition less the marginal cost of educating each student), in 2024 dollars, at FY2023 enrollment.
[24]Institute for Progress, "International Student Survey on OPT and Experiential Learning" (Washington, DC: Institute for Progress, October 6, 2026) (attached). Figures for PhD students with STEM OPT-eligible majors are the authors' tabulation of the survey responses.

program had the proposed fees been in place, including 38 percent who said they definitely would not have. The survey was distributed through professional science societies and campus student groups so it is not necessarily a random sample, meaning we treat it as corroborating evidence instead of replacing the estimates above. But neither source is consistent with the Department's assumption of no change in STEM OPT.

Leading economists agree. Since 2011, the Kent A. Clark Center for Global Markets at the University of Chicago Booth School of Business has regularly surveyed a standing US Economic Experts Panel to show the extent to which economists agree or disagree on important public policy questions. Its panelists are senior faculty at the nation's leading research universities, including Harvard, MIT, Stanford, Princeton, Yale, Columbia, Berkeley, Northwestern, and Chicago, chosen to represent the major fields of economics and to include economists of all political stripes.

On October 28, 2026, the Clark Center asked the panel directly about the proposed payment requirement.[25] Of the 39 panelists who responded, a group that includes five Nobel laureates in economics—Daron Acemoglu, Abhijit Banerjee, Oliver Hart, Eric Maskin, and Richard Thaler—38 agreed or strongly agreed, including all five laureates, that it would substantially reduce the number of international graduates working in the United States, and one disagreed. Thirty-seven agreed or strongly agreed that it would substantially weaken the ability of US universities to attract and retain top foreign students; two were uncertain, and none disagreed. Twenty-six agreed or strongly agreed that it would reduce OPT hiring by small firms and start-ups substantially more than OPT hiring by large firms; the remaining 13 were uncertain, and none disagreed. Panelists' comments track the mechanisms described above. As Aaron Edlin of the University of California, Berkeley, put it: "Universities are already strapped for money. They won't come up with this money for [the] current number of students." Fiona Scott Morton of Yale University added: "The 'fee' is as large as the expected salary so I expect it will block all hiring for all sizes of employers."

The same view is shared well beyond the panel. More than 600 economists, including Nobel laureates, have signed a joint letter to Secretary Mullin opposing the proposed fees, which was submitted as a comment. The signers describe themselves as "a broad cross-section of professional economists, with a range of academic specializations and political views," some of whom "have served in administrations of both parties." They include Glenn Hubbard, who chaired the Council of Economic Advisers under President George W. Bush, and Jason Furman, who chaired it under President Barack Obama. The letter warns that "imposing immense new fees on foreign-born graduates of US institutions seeking to work in the US after graduation is likely to be a drag on the American economy by depressing the enrollment and retention of some of the world's top

[25]University of Chicago Clark Center, “Optional Practical Training.”

students, researchers, and workers," and that "the average American will be worse off as a result."

We conclude that it is inevitable that if the OPT fee rule is finalized as proposed there will be a precipitous and sustained reduction in OPT participation and international enrollment, including among STEM graduates. The Department must better account for these declines, engage with actual quantitative evidence like Clemens (2026), survey evidence, and evidence of expert opinion.

(2) Proposed Rule Fails to Account for National Interests in STEM Workforce and Economic Prosperity

This part of our comment challenges the Department's cost calculation and is relevant to the following specific sections of the NPRM: Summary and accounting statement (section VII.A.1); Costs, including Total Costs of the Proposed Rule (section VII.A.5); Benefits (section VII.A.6).

The proposed rule *ignores* altogether the costs to the *nation*.

A. There is no consideration of the role of impacted F-1 students in the US STEM workforce.

In order to understand the role of individuals who first come to the United States as F-1 visa holders in degree-granting programs, we studied data from both USCIS and SEVIS. We reviewed 20 years of administrative data obtained through a Freedom of Information Act (FOIA) request, and completed extensive data cleaning and analysis.[26] We then summarized the "front door" pipeline for international STEM talent coming to the United States, which as the National Academies noted is primarily through the nation's graduate schools.

[26]Student and Exchange Visitor Information System records, 2004–2023, obtained from U.S. Immigration and Customs Enforcement under the Freedom of Information Act. Data cleaning and methods are described in Clemens, Neufeld, and Nice, “Brain Freeze,” sec. IV.

The 'Front Door' Pipeline: Principal channels for transition from F-1 student visas to long term (>6 years) STEM workforce and PhD-level work in the United States

	All		STEM		PhD	
	Num.	%	Num.	%	Num.	%
Graduates (F-1), average per year 2018–2022	225,752		103,836		22,687	
Short term (OPT)						
F-1 to OPT	121,962	54.0	66,097	63.7	15,255	67.2
F-1 but no OPT	103,790	46.0	37,739	36.3	7,432	32.8
Medium term (nonimmigrant work visas)						
OPT to H-1B	35,479	15.4	23,919	33.4	5,987	27.8
OPT to 'other' (O-1, E-3, H-1B1, TN)	2,523	1.1	864	0.8	679	3
F-1 to H-1B without OPT	19,866	8.8	14,127	13.6	2,461	10.8
F-1 to 'other' without OPT	1,204	0.5	488	0.5	327	1.4
Long term (permanent residency, extended H-1B)						
H-1B to EB-1, EB-2, EB-3	22,709	10.1	15,611	15.0	3,466	15.3
'Other' visa to EB-1, EB-2, EB-3	181	0.1	66	0.1	49	0.2
Extended H-1B (>6 years)	19,372	8.6	13,316	12.8	2,957	13

'All' graduates are all completions of bachelor's, master's, or doctoral degrees in all fields of study by F-1 visa holders in a given year. 'STEM' graduates are all completions at all degree levels by F-1 visa holders in DHS-designated STEM fields only. 'PhD' means all completions of doctoral degrees by F-1 visa holders in all fields, not just STEM. In the table, "%" means percentage of the original F-1 graduation cohort in the first row that eventually makes each transition. Numbers are averages over the years 2018–2022. "Other" nonimmigrant work visas are O-1, E-3, H-1B1, and TN. The source is full-universe administrative data from SEVIS 2004–2023, obtained by request from DHS under the Freedom of Information Act.

As is evident from the administrative data, a notable portion of the nation's STEM workforce first enters the United States as international students at the nation's research universities, and OPT is the critical bridge between student status and the first rung of that pipeline. Of international students earning STEM degrees, 77.8 percent enter the US workforce immediately upon graduation through the front door: 63.7 percent on OPT, 13.6 percent by changing status directly from F-1 to H-1B without OPT, and 0.5 percent by changing to another nonimmigrant work visa without OPT.[27] In other words, of STEM graduates who stay to work, 82 percent do so through OPT. OPT is also the main route to longer-term retention: 34.2 percent of all foreign STEM graduates move from OPT to an H-1B or other work visa, compared with 14.1 percent who reach such a visa without OPT. And 74 percent of foreign STEM graduates who remain in the United States long term do so through this front door pathway of OPT, H-1B, and employment-based green cards.

This proves to be a major contributor to the American STEM workforce writ large. Indeed, foreign-born workers who earned their degrees in the United States make up 19 percent of America's high-skill STEM workforce, 28 percent of STEM workers with master's degrees, and 35 percent of STEM workers with doctorates.[28]

B. The cost calculation for the proposed OPT fees is inaccurate.

The economic research literature collectively suggests that a substantial reduction in the supply of foreign talent to the US workforce will have large, negative, and lasting effects on productivity and economic growth in the United States. We can approximate the magnitude of those effects using the productivity effects estimated by Peri et al.,[29] who estimate the elasticity of annual growth in Total Factor Productivity (TFP) to the share of the workforce comprising high-skill foreign STEM workers. They estimate an increase of 0.27–0.54 percentage points in annual TFP growth caused by each percentage point increase in high-skill immigrant STEM workers as a fraction of the overall labor force. Because the 8 million high-skill STEM workers in the US economy represent 4.7 percent of the US labor force, each reduction in the stock of high-skill STEM workers translates directly into a reduction in TFP growth.

We apply this model to two scenarios for the decline in foreign-born STEM graduates entering the US workforce each year under the proposed fees, drawn from the low and

[27]Clemens, Neufeld, and Nice, "Brain Freeze," sec. IV, table 2 and fig. 3. The 74 percent figure compares retention through these pathways with total retention of foreign STEM graduates eight years after graduation, estimated from the National Survey of College Graduates.
[28]Clemens, Neufeld, and Nice, "Brain Freeze," sec. V, table 3.
[29]Giovanni Peri, Kevin Shih, and Chad Sparber, "STEM Workers, H-1B Visas, and Productivity in US Cities," *Journal of Labor Economics* 33, no. S1 (2015): S225–55.

high ends of Clemens (2026).[30] The low scenario uses Clemens's estimates for a fee borne by students, the case in which both enrollment and OPT participation fall least, at the smaller of the two enrollment elasticities he considers; the high scenario uses his estimates for a fee borne by employers, at the larger elasticity. In each, we combine the decline in enrollment with the resulting decline in retention among those who still enroll, assuming, as in our earlier work, that half of the lost transitions from OPT to a work visa still happen another way; in the high scenario, for example, enrollment falls 31 percent, and because 34.2 of the 48.3 percent of foreign STEM graduates who reach a work visa do so through OPT, an 84 percent drop in OPT starts cuts retention among enrollees by $0.84 \times (34.2/48.3) \times 0.5$, or about 30 percent, so that $1 - 0.69 \times 0.70$, or 52 percent, fewer graduates enter the US workforce. In each scenario we use the midpoint of the range of TFP elasticities estimated by Peri et al. Lost productivity growth accumulates over time: over a ten-year period, a reduction of 0.1 percentage points in annual TFP growth causes GDP at the end of that decade to be about 1 percent smaller.

These estimates are designed to be very conservative with numerous choices that tend to understate the total cost of the rule: we assume half of graduates who lose OPT still reach a work visa another way; we use student-incidence declines in OPT participation that are lower bounds, and employer-incidence declines from a demand curve that never falls to zero, which likely understates how many employers would stop hiring OPT workers altogether; we ignore any compounding with the fee the Department has separately proposed on H-1B petitions, which about half of OPT STEM workers go on to obtain; we set aside the survey evidence, which implies larger declines; and we measure the loss only at the ten-year mark, though it keeps growing after that.

[30]Clemens, "Taxes on International Students," 30, table 7; Clemens, Neufeld, and Nice, "Brain Freeze," sec. IV, fig. 3 (48.3 percent of foreign STEM graduates reach a nonimmigrant work visa, 34.2 percentage points of them through OPT), and sec. V (assumption that half of lost transitions from OPT to a work visa occur another way). In the low scenario, with a fee borne by students and the smaller enrollment elasticity ($\eta = 0.1$), bachelor's and master's results weighted by FY2023 enrollment imply a 4.0 percent decline in enrollment and a 33.3 percent decline in OPT starts, so that retention among enrollees falls $0.333 \times (34.2/48.3) \times 0.5$, or 11.8 percent, and the total decline is $1 - 0.960 \times 0.882$, or 15.3 percent. In the high scenario, with a fee borne by employers and the larger elasticity ($\eta = 0.2$), enrollment falls 31.0 percent and OPT starts fall 84.4 percent, so that retention among enrollees falls 29.9 percent and the total decline is 51.6 percent.

Scenario	Decline in foreign-born STEM graduates entering US workforce annually	Long-run change in stock of US workers with STEM degrees	Change in annual TFP growth	Change in annual GDP after ten years (at today's GDP)
Clemens (2026), low	−15%	−2.9%	−0.054 pp	−$165B
Clemens (2026), high	−52%	−9.6%	−0.184 pp	−$558B
Central (average of low and high)	−33.5%	−6.3%	−0.119 pp	−$362B

Source: Authors' calculations using the model of Clemens, Neufeld, and Nice (2026), applied to the estimates of Clemens (2026), using the midpoint of the TFP elasticities estimated by Peri et al.[31]

These estimates imply that the proposed fees would reduce annual GDP by $165–558 billion within ten years, with a central estimate of $362 billion per year, or about $2,680 per household. In that central case, the high-skill STEM workforce would be about 6.3 percent smaller and annual GDP about 1.2 percent smaller than it otherwise would have been. This is a percent decline in annual GDP, not a percentage-point decline in annual growth of GDP.

The Department suggests that "employers may find alternative workers, and students may pursue other employment or visa options."[32] The evidence does not support the presumption that either would offset the loss. When the 2008 STEM OPT extension greatly expanded the number of US-educated foreign STEM graduates seeking H-1B visas, it did not reduce the number of new H-1B workers arriving from abroad, and the

[31]Clemens, Neufeld, and Nice, "Brain Freeze," sec. VII; Peri, Shih, and Sparber, "STEM Workers." Dollar values apply the percent change in GDP to US GDP of $30.4 trillion, as in "Brain Freeze." Per-household figures follow Violet Buxton-Walsh et al., "DHS's $100k Fee on STEM OPT Would Break High-Skilled Immigration," Institute for Progress, October 2026.
[32]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64588.

rate at which STEM graduates transitioned from F-1 to H-1B status rose rather than fell.[33] That indicates that we cannot presume foreign-trained workers will automatically replace US-educated foreign graduates. Furthermore, a large body of research has found no evidence international students crowd out US students in aggregate. Rather, positive shocks to international enrollment increase native enrollment, in part because tuition paid by international students allows universities to expand programs.[34]

These impact estimates are inherently somewhat uncertain. For that reason, DHS proceeds as if such impacts are zero. This method is inadequate. It fails to meet minimal standards of quality demanded of economic analysis by qualified experts in cost-benefit analysis. In other words, the mere fact that an economic impact is somewhat uncertain does not imply that the best estimate of that impact is zero. The consensus of peer-reviewed economic research on the impacts in question is that they are very large.

We conclude that DHS has grossly underestimated the potential negative impact of the proposed OPT fees on the US economy.

(3) Proposed Rule Ignores OPT's Benefits to American Innovation and American Workers

This part of our comment challenges the Department's treatment of the benefits of OPT, and its assumption that the fee itself bounds the cost of lost OPT participation, and is relevant to the following specific sections of the NPRM: Protecting American Workers (section IV.B); Opportunity Costs (section VII.A.5.b); Benefits (section VII.A.6).

The decline in STEM graduates entering the US workforce that DHS ignores is precisely the category of workers who matter most for American innovation and growth: US STEM workers. The economic research literature contains very extensive evidence—leading to an overwhelming consensus among economists[35]—that high-skill immigration causes large increases in productivity and economic growth in the United States. These effects are largest for immigrants with STEM training. The increase in US city-level productivity caused by inflows of foreign STEM workers from 1990 to 2010 is sufficient in magnitude to explain between 30 and 50 percent of all aggregate productivity growth in the United States during that period.[36] The influx of highly skilled immigrant college graduates to the

[33]Clemens, Neufeld, and Nice, "Brain Freeze," sec. VI, using SEVIS data and U.S. Citizenship and Immigration Services, *Characteristics of H-1B Specialty Occupation Workers*, annual reports to Congress.
[34]Clemens, Neufeld, and Nice, "Brain Freeze," sec. VI; Kevin Shih, "Do International Students Crowd-Out or Cross-Subsidize Americans in Higher Education?," *Journal of Public Economics* 156 (2017): 170–84; John Bound, Breno Braga, Gaurav Khanna, and Sarah Turner, "A Passage to America: University Funding and International Students," *American Economic Journal: Economic Policy* 12, no. 1 (2020): 97–126; Osborne Jackson, "Does Immigration Crowd Natives into or out of Higher Education?," Working Paper No. 15-18 (Federal Reserve Bank of Boston, 2015).
[35]Chelsea Vail, "What Economists Think about Admitting Highly Skilled Immigrants," *Chicago Booth Review*, 2016.
[36]Peri, Shih, and Sparber, "STEM Workers."

United States during the 1990s caused a 12–21 percent rise in the annual number of high-technology innovations reflected by annual patent applications, which in turn raised US GDP per capita by between 1.4 and 2.4 percent.[37] High-skill workers who entered the United States on student visas have much larger rates of patenting, publishing, earning, and entrepreneurship than otherwise comparable natives.[38] The leading economists who considered all available policy levers to raise productivity in the United States concluded that the single lever with the greatest impact, demonstrated by the most conclusive evidence, is policy to encourage high-skill immigration.[39] A very large and essentially uncontested body of research finds that these positive effects on productivity and growth arise from high-skill STEM immigrants' effects on new business formation, scientific discovery, and the patenting of new economically valuable ideas, including STEM immigrants' positive effects on innovation by natives.[40]

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[37]Jennifer Hunt and Marjolaine Gauthier-Loiselle, "How Much Does Immigration Boost Innovation?," *American Economic Journal: Macroeconomics* 2, no. 2 (2010): 31–56.
[38]Jennifer Hunt, "Which Immigrants Are Most Innovative and Entrepreneurial? Distinctions by Entry Visa," *Journal of Labor Economics* 29, no. 3 (2011): 417–57.
[39]Nicholas Bloom, John Van Reenen, and Heidi Williams, "A Toolkit of Policies to Promote Innovation," *Journal of Economic Perspectives* 33, no. 3 (2019): 163–84.
[40]Economists have found that increases in foreign master's graduates cause more entrepreneurship, including by US natives (Michel Beine, Giovanni Peri, and Morgan Raux, "The Contribution of Foreign Master's Students to US Start-Ups," NBER Working Paper No. 33314, 2024); that foreign STEM PhD students report a greater preference for entrepreneurship than their US-born colleagues (Michael Roach, Henry Sauermann, and John Skrentny, "Are Foreign STEM PhDs More Entrepreneurial? Entrepreneurial Characteristics, Preferences, and Employment Outcomes of Native and Foreign Science and Engineering PhD Students," in *The Roles of Immigrants and Foreign Students in US Science, Innovation, and Entrepreneurship*, ed. Ina Ganguli, Shulamit Kahn, and Megan MacGarvie (Chicago: University of Chicago Press, 2020), 207–28); that historical barriers to skilled immigration reduced US scientific productivity (Petra Moser, Alessandra Voena, and Fabian Waldinger, "German Jewish Émigrés and US Invention," *American Economic Review* 104, no. 10 (2014): 3222–55; Petra Moser, Sahar Parsa, and Shmuel San, "Immigration and Innovation: Lessons from the Quota Acts," working paper, New York University, 2025); that inflows of foreign STEM PhD students raise innovation in US academic departments (Eric T. Stuen, Ahmed Mushfiq Mobarak, and Keith E. Maskus, "Skilled Immigration and Innovation: Evidence from Enrolment Fluctuations in US Doctoral Programmes," *Economic Journal* 122, no. 565 (2012): 1143–76; Patrick Gaulé and Mario Piacentini, "Chinese Graduate Students and US Scientific Productivity," *Review of Economics and Statistics* 95, no. 2 (2013): 698–701); that immigrant inventors make their native colleagues more productive (Shai Bernstein, Rebecca Diamond, Abhisit Jiranaphawiboon, Timothy McQuade, and Beatriz Pousada, "The Contribution of High-Skilled Immigrants to Innovation in the United States," *American Economic Review*); and that more foreign STEM workers raise patenting in US cities (John Winters, "Foreign and Native-Born STEM Graduates and Innovation Intensity in the United States," IZA Discussion Paper No. 8575, 2014), entrepreneurship in US regions (Inara S. Tareque, Jorge Guzman, and Dan Wang, "High-Skilled Immigration Enhances Regional Entrepreneurship," *Proceedings of the National Academy of Sciences* 121, no. 37 (2024): e2402001121), employment of high-skill native workers (Sari Pekkala Kerr, William R. Kerr, and William F. Lincoln, "Skilled Immigration and the Employment Structures of US Firms," *Journal of Labor Economics* 33, no. S1 (2015): S147–86), product innovation (Gaurav Khanna and Munseob Lee, "High-Skill Immigration, Innovation, and Creative Destruction," in Ganguli, Kahn, and MacGarvie, *Roles of Immigrants and Foreign Students*, 73–98), and entrepreneurial success (Stephen G. Dimmock, Jiekun Huang, and Scott J. Weisbenner, "Give Me

A. New evidence quantifies OPT's benefits to American innovation.

The Department notes the 2016 STEM OPT rule because it "include[d] neither a quantified estimate of potential negative impacts to individual U.S. workers nor a quantified estimate of specific benefits to U.S. educational institutions or the overall economy."[41] New research by one of us now provides that estimate.[42] It uses the April 2008 rule that extended OPT for STEM graduates from 12 to 29 months, as well as the 2016 rule that extended it to 36 months, a nationwide supply shock fixed by policy, and measures each city's exposure by its stock of OPT STEM workers before the rule. It links full-universe SEVIS data on every OPT authorization from 2004 to 2022 to the universe of granted US utility patents, to startup formation and financing data from Crunchbase, and to stock-market valuations of patents, across 917 US metropolitan and micropolitan areas. It finds:

- Additional OPT workers cause large increases in innovation and productivity in the average US city. This is observed as increases in patenting, entrepreneurship, and firm value.
- One additional current or former OPT STEM worker in the average US city causes 0.083 additional patents per year.
- Roughly 45 percent of that impact comes from patents that are highly unlikely to have been filed by OPT workers themselves. This spillover is consistent with knowledge spillovers, specialization in inventor teams, and the crowding-in of native high-skill STEM workers, all of which increase knowledge production by others. The paper shows this by comparing the nationalities of OPT workers with the likely ethnic origins of the inventors named on the patents the OPT expansion induced.
- In other words, that effect of 0.083 additional patents per year caused by one additional current or former OPT STEM worker consists of 0.044 additional patents filed by current and former OPT STEM workers themselves plus 0.039 additional patents filed by others, in the average US city. Another way to say this is that each patent filed by a current or former OPT STEM worker brings with it roughly 0.8 to 0.9 additional patents filed by others, a total multiplier of 1.8 to 1.9. Two independent methods in the paper arrive at that multiplier: one compares the city-level effect to OPT workers' own patenting rates (1.88), and the other uses the names of the inventors on the induced patents (1.81). This multiplier effect goes

Your Tired, Your Poor, Your High-Skilled Labor: H-1B Lottery Outcomes and Entrepreneurial Success," *Management Science* 68, no. 9 (2022): 6950–70).

[41]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64573 (quoting U.S. Department of Homeland Security, "Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students With STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students," Final Rule, 81 Fed. Reg. 13040 (March 11, 2016)).

[42]Michael A. Clemens, "International Students and Innovation Spillovers: Evidence from Restrictions on US-Trained Foreign STEM Workers" (Zenodo, October 2026; publication forthcoming by IZA Institute of Labor Economics) (attached).

beyond the immigrant-native multiplier effect of 1.39 within narrow inventor teams already documented by Bernstein et al. because it also includes spillovers between teams, spillovers between organizations, agglomeration effects within innovation hubs, and the crowding-in of native STEM workers.[43]

- That crowding-in channel is that each additional current or former OPT STEM worker causes employment of 0.68 additional native high-skill STEM workers. This is roughly double the statistically imprecise estimate of about 0.34 additional college-educated native workers within the same firm independently measured by Mahajan et al., because the 0.68 estimate includes spillover effects on all other firms in the same metropolitan area.[44]
- The post-2008 relaxation of restrictions on OPT STEM duration caused a 24 percent rise in the market value of patents filed by publicly traded firms, over $1 billion in additional value created per year in the average city. Roughly half of OPT STEM workers go on to change to a work visa, almost always an H-1B.
- Every 43 additional OPT STEM authorizations caused the founding of one additional startup still operating three years later, and every 108 caused the founding of one additional high-growth, venture-backed technology startup, in the average city.

In other words, almost half of the positive effect of OPT on American patenting comes from inventors other than the OPT workers themselves, through crowding in *more* domestic STEM professionals and *causing* increased knowledge production by American engineers, technologists, and scientists. The proposed fees would run the post-2008 experiment in reverse.

B. The fee is not an upper bound on the cost of lost OPT participation.

The Department does not attempt to quantify the value of OPT participation. Instead, it "uses unpaid baseline OPT fees as a proxy for opportunity costs" and "assumes these opportunity costs are equal to or less than the proposed fee per OPT instance." The Department justifies this assumption as follows: "DHS recognizes that in some instances, the societal benefits associated with OPT participation may have exceeded this amount, but assumes that if the benefit of OPT exceeds the fees, affected parties could collectively cost share to preserve OPT."[45]

This reasoning holds only if the school, the student, and the employer capture all of the benefits of OPT participation. They do not. The evidence above shows that roughly 45

[43]Bernstein et al., "Contribution of High-Skilled Immigrants"; Clemens, "International Students and Innovation Spillovers."
[44]Parag Mahajan, Nicolas Morales, Kevin Y. Shih, Mingyu Chen, and Agostina Brinatti, "The Impact of Immigration on Firms and Workers: Insights from the H-1B Lottery," IZA Discussion Paper No. 16917 (IZA Institute of Labor Economics, April 2024); Clemens, "International Students and Innovation Spillovers."
[45]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64588.

percent of OPT's effect on patenting accrues to inventors other than the OPT worker, including inventors at other firms and in other organizations in the same city, and through native STEM workers drawn into the local labor market. The paper estimates that more than half of that spillover arises between teams and between organizations, outside the contribution to the team that the OPT worker is on directly. The fee therefore cannot serve as an upper bound on the cost of lost OPT participation, and the Department's opportunity-cost estimates are biased downward by construction.

C. The fees would reduce, not protect, employment of American STEM workers.

The Department states that the rule "may provide job opportunities to U.S. workers who would have lost job opportunities to OPT students in the absence of the rule."[46] The evidence says the opposite. Each additional current or former OPT STEM worker causes the employment of 0.68 additional native high-skill STEM workers in the same metropolitan area. A rule that reduces OPT participation would therefore reduce, not increase, employment of American STEM workers. In the paper's preferred specification, no group of native workers sees a statistically significant decline in employment. Kwon, Lee, and Monras (2026), using the 2016 STEM OPT extension and a different research design, likewise find that retaining international graduates raises demand for native high-skill workers.

We conclude that the Department has omitted the largest benefits of OPT from its analysis, and that its central assumption for valuing those benefits is contrary to the evidence.

CONCLUSION

When federal agency policies, like the proposed OPT fees, are of the type and character that they can only be shifted through new public regulations promulgated in compliance with the Administrative Procedure Act, the Department of Homeland Security must not ignore significant, non-speculative costs to America and Americans.

Those costs are not a matter of serious dispute among the experts who study them. Of the 39 members of the Clark Center's US Economic Experts Panel who responded, including five Nobel laureates in economics, 38 agreed that the proposed fees would substantially reduce the number of international graduates working in the United States. More than 600 economists, including Nobel laureates and economists who have served in administrations of both parties, have told the Department that the fees would make "the average American…worse off." And more than 2,000 working scientists at universities, research institutes, teaching hospitals, and companies across the country, including more than 30 Nobel laureates and more than 500 members of the National Academies of

[46]DHS, "Optional Practical Training Fees," 91 Fed. Reg. at 64591.

Sciences, Engineering, and Medicine, have asked the Department to withdraw the proposed fees because the rule "would set back American science."

We look forward to seeing a careful response from DHS, an abandonment of this proposal or a revised, less burdensome approach to protecting the integrity of OPT that accounts for the decline in OPT participation and international enrollment, including among STEM graduates and PhDs, and the opportunity, if you find it appropriate, to discuss the costs and concerns we have studied and summarize here.

We attach to this comment the papers and survey on which our analysis relies, which detail the methods and data sources used:

1. Michael A. Clemens, Jeremy Neufeld, and Amy M. Nice, "Brain Freeze: How International Student Exclusion Will Shape the STEM Workforce and Economic Growth in the United States," IZA Discussion Paper No. 18548 (IZA Institute of Labor Economics, April 2026).
2. Michael A. Clemens, "Taxes on International Students: Demand and Supply Response for Post-Graduation Foreign Workers on Optional Practical Training," IZA Discussion Paper No. 18933 (IZA Institute of Labor Economics, September 2026).
3. Michael A. Clemens, "International students and innovation spillovers: Evidence from restrictions on US-trained foreign STEM workers" (CERN open science repository Zenodo, October 2026, publication forthcoming by IZA Institute of Labor Economics).
4. Institute for Progress, "International Student Survey on OPT and Experiential Learning" (October 6, 2026).

Thank you for the opportunity to participate in the rulemaking process.

Respectfully submitted,

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