Policy Impact on the U.S. Trade Surplus in Educational Services

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Abstract

Educational services generated $43.8 billion through international student enrollment in 2023-2024, making it one of America's top export sectors. Although tariff policies targeting manufactured goods did not directly impact educational services, the unintended effects of immigration restrictions, visa processing delays, the proposed $100,000 H-1B visa fee, and cuts to federal research funding threaten this trade advantage.

In the 1990s, the European Union and NAFTA created multilateral trade opportunities. The U.S. exported and imported a wide range of goods, but their main advantage was in services like accounting, banking, consulting, education, and legal services. Most imports consisted of clothing, electronics, and food. Despite inefficiencies and selective barriers to trade and foreign countries, globalization of production and markets became a reality.

This paper explains how policies designed to bolster manufacturing unintentionally weaken one of America's most successful exports while offshoring innovation capacity.

Keywords: trade balance, educational services, international students, H-1B visas, research funding, STEM

1. Introduction

The United States maintains a leading position in global services trade, recording a services surplus of $293.3 billion in 2024, compared to a goods deficit of $1,211.7 billion (U.S. Bureau of Economic Analysis, 2025). This services surplus, largely generated by accounting, banking, consulting, educational services, financial services, and legal services, has grown since trade liberalization accelerated in the 1990s with the formation of the European Union single market and the North American Free Trade Agreement (NAFTA) (Evenett, 2024). Educational services alone contributed a $43.8 billion trade surplus to the U.S. economy during the 2023-2024 academic year through international student enrollment (International Trade Administration, 2025). Recent policy changes threaten to undermine this trade advantage due to unintended consequences that policymakers have overlooked (The Washington Post, 2025).

As Figure 1 illustrates, the gap between U.S. exports and imports has widened considerably since the 1990s. After remaining stable throughout the 1980s, the trade deficit in goods has grown over the past thirty years, reaching $1,211.7 billion in 2024 (U.S. Bureau of Economic Analysis, 2025). However, this figure conceals an important offset: the United States maintains a large and growing surplus in services trade that partially balances the goods deficit (Evenett, 2024). Previous research shows that trade in services involves fundamentally different dynamics than trade in goods, with stronger connections to knowledge intensity, human capital, and regulatory environments (Freund & Weinhold, 2002). In 2024, service exports totaled $1,107.8 billion, compared to imports of $814.5 billion, resulting in a $293.3 billion surplus (U.S. Bureau of Economic Analysis, 2025).

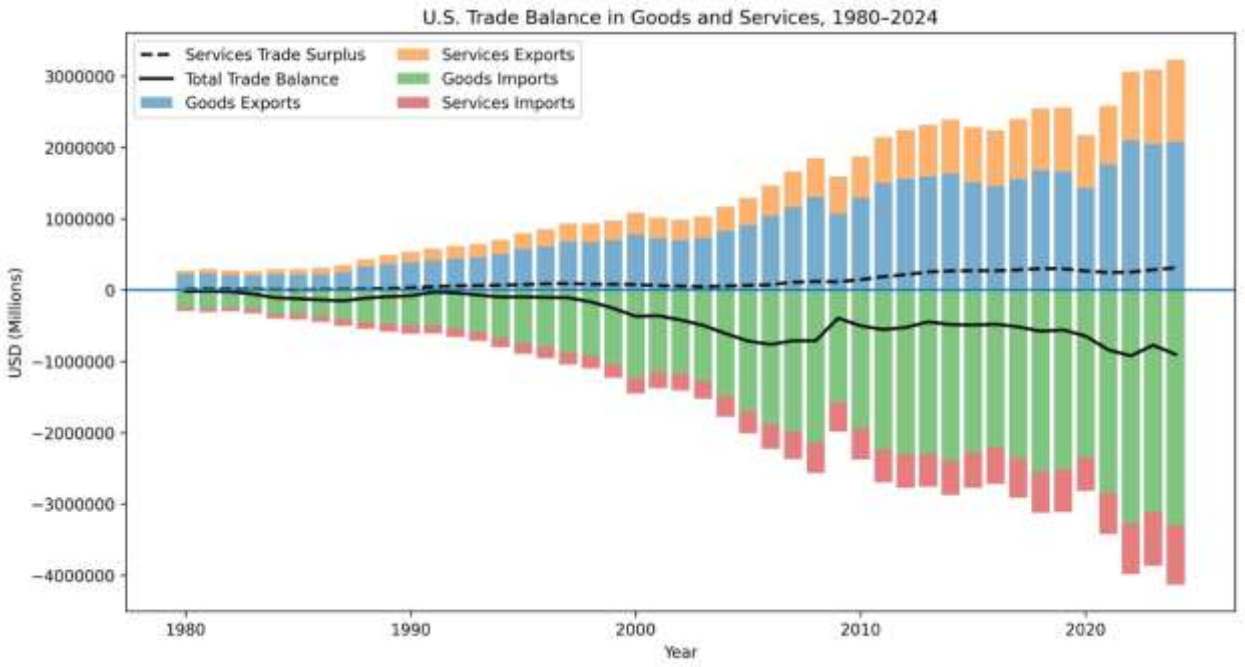

Figure 1. U.S. Trade Balance in Goods and Services, 1980–2024

Note: Bars represent U.S. exports and imports of goods and services. The dashed line indicates the U.S. services trade surplus (exports minus imports), and the solid line indicates the total U.S. trade balance. Values are reported in U.S. dollars (millions).

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and U.S. Census Bureau, U.S. International Trade in Goods and Services, annual data.

The composition of U.S. trade has changed significantly during this period. While manufactured goods, electronics, and consumer products make up the majority of imports, the United States has used its comparative advantage in high-value services to build a trade surplus in services (Center for Strategic and International Studies, 2025). Educational services, classified under "education-related travel exports," were among the top service exports in 2024 (International Trade Administration, 2025).

Multiple rounds of tariffs imposed to address imports of manufactured goods do not account for the interdependence between goods and services in the overall trade balance (Pipe, An-Pham, & Whalen, 2025).

This paper explores how recent immigration and education policies, unrelated to trade policy, threaten to weaken the U.S. services trade surplus, especially the significant contribution from educational services. Restrictions on international students, changes to temporary work visa programs, and federal research funding cuts have combined to diminish a trade services advantage built over decades.

2. Tariff Disruptions

There were concerns about trade abuse, with one country subsidizing production and dumping products at or below cost. Another issue was that companies moved factories offshore to locations with lower labor costs. While tariffs increased export prices, the question remains: will factories return, and if they do, can they find quality, productive workers willing to work at a wage that keeps the product competitive? (Keilman, & Tucker-Smith, 2025)

Highly competitive and automated factories are both expensive and take a long time to reach production capacity and economies of scale. Tariffs increase material costs, cause supply disruptions, and lengthen construction times. Due to previous supply disruptions along with economic and political turmoil, firms have begun shifting production back from offshore (Keilman, & Tucker-Smith, 2025). Because of low unemployment and a shrinking labor force, these new factories will need automation and more female workers.

The time required to complete factories, the availability of needed workers, and the high costs have raised doubts about the impact of tariffs on manufacturing and job creation.

3. Educational Services and International Students

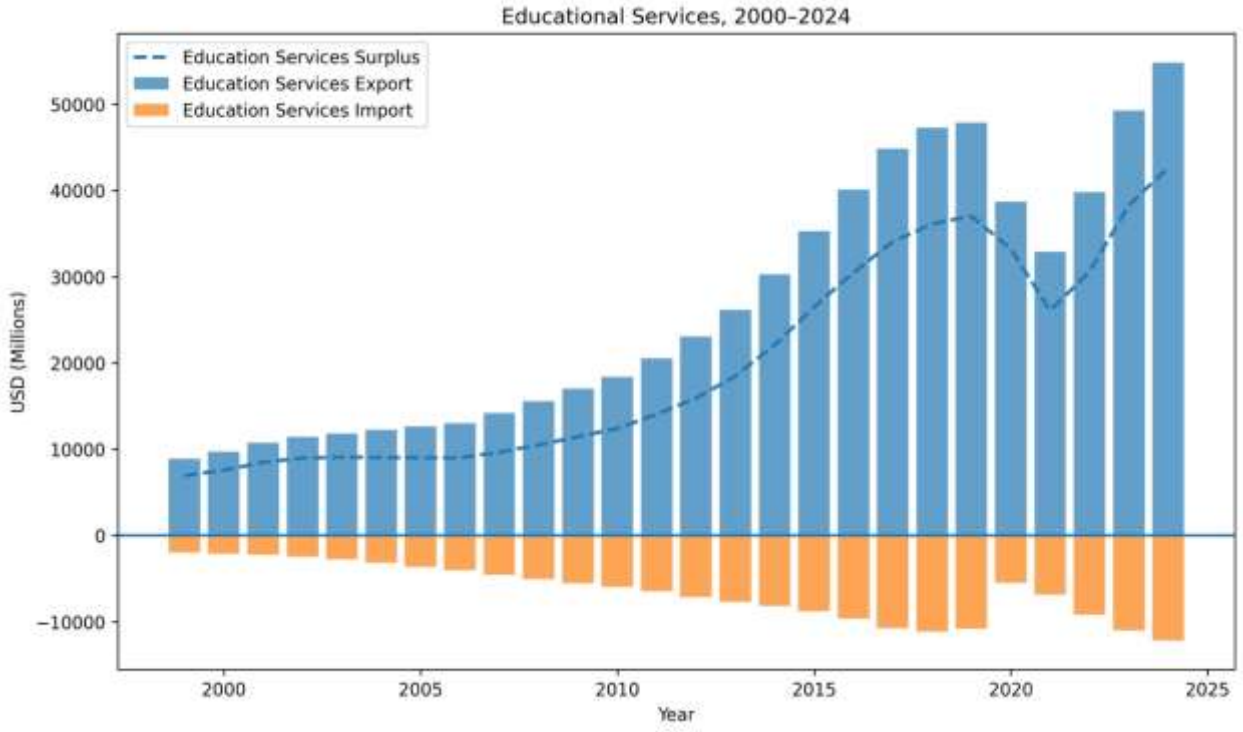

Figure 2. Educational Services, 2000-2024

Note: Bars represent U.S. exports and imports of education-related travel services; the dashed line indicates the trade surplus (exports minus imports). Values are reported in U.S. dollars (millions).

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA), U.S. Trade in Services, Table 2.1, annual data (2000–2024).

As shown in Figure 2, educational services have been one of the United States' most successful export sectors, consistently generating a trade surplus that increased from the early 2000s through 2019, except for the disruption caused by the COVID-19 pandemic to international student mobility (International Trade Administration, 2025). In the 2023-2024 academic year, international student enrollment reached 1,126,690 students, contributing a $43.8 billion education services surplus to the U.S. economy and supporting 378,175 jobs (Association of American Universities, 2025). This makes educational services the tenth-largest export for the United States (Liu, 2025).

However, this strong trade surplus now faces unusual threats from policy changes unrelated to trade goals. Early data showed that international student arrivals in August 2025 declined by 19 percent compared to August 2024 (ABC News, 2025). On August 28, 2025, the Department of Homeland Security proposed a rule to replace the "duration of status" rules for F-1 student and J-1 exchange visitor visas with fixed admission periods limited to four years (Department of Homeland Security, 2025). The proposed rule also shortens the post-completion grace period from sixty to thirty days and eliminates grace periods for students whose extension requests are denied, causing immediate unlawful presence accumulation (Yale, 2025). These changes create significant uncertainty and reduce flexibility for doctoral candidates, whose research often exceeds four years.

3.1 Foreign Students

Higher education services ranked as the United States' tenth-largest export in 2018, with a value similar to automobile exports (Liu, 2025). By the 2023-2024 academic year, international student enrollment reached 1,126,690 (Liu, 2025). Economically, educational services function like a foreign airline purchasing a Boeing 787 aircraft made in the United

States. International students pay to access U.S. higher education, and unlike the Boeing aircraft with imported parts, education creates value that is entirely domestic (Liu, 2025).

Recent U.S. policies that restrict student visas and limit access have impacted both prospective applicants and enrolled international students, disrupting university revenue and vital talent pipelines for faculty and innovation (Liu, 2025). The effects extend beyond just institutional finances**.** International students who complete PhD programs in science and engineering fields have very high retention rates, directly enhancing American technological competitiveness. Previous studies show that foreign graduate students often contribute significantly to U.S. innovation and knowledge spillovers, increasing the economic benefits of higher education services exports (Bound, Khanna, & Morales, 2017). These losses have seriously affected revenue projections and research capacity in graduate programs that depend on this talent pipeline.

Universities face the challenge of managing revenue shortages while also dealing with talent losses in graduate and doctoral programs, where international students make up the majority of enrollees in key STEM fields (Educational Testing Service, 2024). This concentration of talent means that enrollment drops tend to have a bigger impact on research output, innovation, and the future of doctoral programs, especially as federal research funding cuts add to these challenges.

3.2 Federal Research Funding

The overall value of federally funded research and development increased steadily from the 1960s through the early 2020s, establishing the foundation for American scientific and technological leadership (Association of American Universities, 2025). Federal research funding supported faculty, graduate students, and research programs that resulted in breakthroughs across science, engineering, and medicine (Association of American Universities, 2025). This investment was crucial for attracting international talent: three-quarters of international STEM PhD graduates who earned degrees at U.S. universities between 2000 and 2015 remained in the United States as of 2017 (Center for Security and Emerging Technology, 2023). These high retention rates connect federal research funding, which supports doctoral and postdoctoral programs, to the international talent pipeline that sustains American innovation capacity. Prior research emphasizes that consistent public research funding is a vital mechanism through which countries attract, train, and keep scientific talent, thereby shaping long-term innovation ability and global competitiveness (Stephan, 2012).

Research funding covers direct research costs and provides facilities and administrative cost recovery. This funding supports infrastructure, maintains research facilities, and funds graduate student stipends and tuition remission (Association of American Universities, 2025). Current and future graduate students, primarily international students in STEM fields, face uncertain funding prospects as universities deal with revenue shortages from multiple sources (Mims, 2025).

3.3 H-1B Visa Restrictions

The H-1B visa program was established in 1990 with the goal of providing a pathway for temporary workers holding a bachelor's degree and specific skills. The visa was valid for an initial three-year period and could be renewed, with a maximum duration of six years. As demand increased, a lottery system was introduced, with a regular cap of 65,000 visas plus an additional 20,000 visas for master's degree holders with exceptional skills. Visas issued to nonprofits and educational institutions were exempt from the lottery (Roush, 2025). Current fees are divided into two parts: $215 to register for the lottery and $780 for the sponsorship petition. In any given year, H-1B visa approvals can reach up to 400,000, which includes renewals, cap-exempt approvals (85,000), and petitions from non-profits, including educational institutions (Im, 2025).

The 2025 approval data include new employment approvals from the lottery, educational service approvals, and continuations or renewals. By company, the top ten H-1B visa holders were Amazon (14,667), Tata Consulting (5,586), Microsoft (5,586), Meta (5,123), Apple (4,202), Google (4,186), Cognizant Technology Solutions (3,681), Deloitte Consulting (3,180), JPMorgan Chase (2,440), and Walmart (2,390) (Torry, Enttenheim, & Pipe, 2025). The majority of the approvals for individuals in the U.S. were renewals, students (applicants in the lottery), those on OPT visas (applicants in the lottery), or in educational services employment (8% of the approvals). Most of the approved individuals were educated in the US, had an average age under thirty-five, and were male (Torry, Ettenheim, & Pipe, 2025). Given the educational status of the approvals, most of the H-1B visa holders were or are included in the educational services trade surplus.

The proposed changes to the program include several components, with the most notable being that each visa application must include a $100,000 application fee (White House, 2025). The current understanding is that this fee

applies to new applicants in both the lottery pool and the nonprofit pool, but not to renewals. The fee is expected to limit applications to the most talented prospects. Currently, the lottery does not consider quality and tends to create a lemons market among winners, which explains why some lottery winners fail to secure a completed employer petition. Additionally, considering the payback period, the estimated breakeven salary is $225,000 over three years and $111,000 over six years. The average salary for new H-1B hires is approximately $100,000 (Collins, Krolik, & Gebeloff, 2025).

The shrinking prospects of entering the lottery have two major long-term effects. First, fewer chances of qualifying will lead to a decline in the number of international students pursuing a US-based higher education degree. Second, only employers who see a clear return on investment will be willing to pay the fee. This fee will exclude start-ups and organizations that are exempt from the lottery, such as nonprofits, government labs, and educational institutions. An even longer-term impact is that a smaller talent pool may encourage companies to establish R&D centers outside the US as talented international students look elsewhere (Jeyaretnam, 2025).

Previous empirical research shows that restrictions on high-skilled visas reduce innovation output and a company's patenting activities, especially in science and engineering fields crucial for long-term competitiveness (Kerr & Lincoln, 2010).

3.4 Optional Practical Training (OPT) as Temporary Buffer

Optional Practical Training (OPT), which allows F-1 international students to work in the United States after earning their degrees, may initially help reduce enrollment declines (Peterson Institute for International Economics, 2025). OPT participation more than doubled from 154,522 in 2007 to 418,781 in 2024, with STEM OPT extensions increasing by 54 percent year-over-year in 2024 (Congressional Research Service, 2025). About 72 percent of international graduate students use OPT authorization, making it the largest pathway for university-educated immigrants to stay in the U.S. after graduation, vastly surpassing the 85,000 new H-1B visas available each year (Peterson Institute for International Economics, 2025). However, this protection is only temporary; if OPT graduates cannot transition to long-term work authorization due to high H-1B costs, the value of U.S. education diminishes (Husain, 2025). Evidence shows that labor-market openness and high-skilled visa policies influence international student enrollment decisions, linking immigration policy to educational service exports (Shih, 2016).

Furthermore, government officials have indicated their intention to phase out the OPT program entirely (Peterson Institute for International Economics, 2025). If OPT were eliminated or significantly restricted, the trade surplus in educational services would drop immediately as the primary method for attracting and keeping international graduates disappears (Brookings Institution, 2025). Given the current situation, OPT might initially help offset the shortage of international students and the decline in the educational services surplus.

4. Policy Implications and Future Outlook

This analysis identifies three primary mechanisms by which non-trade policies impact U.S. trade results in educational services. First, restrictions on student visas and immigration processing decrease international student inflows, directly lowering education-related service exports. Second, limitations on post-graduation work authorization, especially through changes to OPT and H-1B pathways, reduce the expected benefits of U.S. higher education, weakening demand for U.S. degrees. Third, cuts in federal research funding weaken doctoral programs that attract international talent, eroding a long-standing competitive edge in high-value services. These mechanisms show how policies targeting goods trade and domestic labor markets can unintentionally harm a vital part of the U.S. services trade surplus.

The educational services trade surplus, which earns $43.8 billion annually and supports 378,175 American jobs, was not directly affected by tariffs on manufactured goods (Association of American Universities, 2025). However, other policy measures threaten this trade advantage through mechanisms that policymakers addressing goods trade deficits did not anticipate (Brookings Institution, 2025). Visa restrictions, changes in visa duration status, cuts in federal research funding, proposed adjustments to H-1B visas, and the potential elimination of OPT visas sent negative signals to current and prospective international students. The decline in foreign students directly impacts the educational services trade surplus.

The decline in foreign students signifies a loss of talent. International students make up the majority of PhD candidates in critical STEM fields: 81 percent in petroleum engineering, 79 percent in computer science, and 72 percent across graduate STEM programs (Educational Testing Service, 2024). As international student enrollment drops, universities face shrinking doctoral cohorts in the very disciplines that drive technological innovation (ABC News, 2025). About 77 percent of international STEM PhD graduates who earned degrees between 2000 and 2015 remained in the United

States (Association of American Universities, 2025). When deterrents discourage international doctoral applicants, universities lose not only current research capacity but also future leadership in innovation, creating "a human capital crisis" (National Science Foundation, 2025).

The proposed H-1B visa fee undermines the economic viability of startups, nonprofits, government labs, and educational institutions, creating harmful incentives: companies might set up R&D centers outside the United States where talented international graduates increasingly seek careers, offshoring the very innovation capacity that tariffs intended to bring back (Collins, Krolik, & Gebeloff, 2025). Global competitors quickly exploit American missteps. China launched its K-visa on October 1, 2025, just weeks after the U.S. imposed the H-1B visa fee, specifically targeting young STEM talent with easier pathways (TRT World, 2025). Germany, the UK, Canada, and South Korea also announced initiatives to attract talent displaced by U.S. restrictions (Bruegel, 2025). China now accounts for 21 percent of the world's most highly cited researchers compared to the U.S. at 36 percent, with the gap shrinking as international students return home after earning U.S. degrees (Bruegel, 2025).

The decline in the educational services surplus affects GDP. Prior studies show that an increase in international student enrollment positively influences the growth rate of US GDP. The growth of the educational services surplus has a small positive effect on GDP. However, a decrease in international students and the decline in the educational services surplus have a much larger negative impact on GDP (Kim, Han, & Lopez, 2025).

Policies aimed at strengthening American manufacturing inadvertently undermine one of America's most successful exports while offshoring future innovation capacity (Brookings Institution, 2025).

Authors' contributions

All authors read, approved the final manuscript and contributed equally to the study.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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The Publication Ethics Committee of Sciedu Press.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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