Time for a New Playbook—A New Legal Regime for Chips Supply Chain in the Age of Artificial Intelligence

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Semiconductors' geopolitical and geo-economic importance has surged. The intensifying U.S.–China confrontation and the rapid permeation of artificial intelligence have made semiconductors even more critical, making them one of the most crucial strategic products. Realizing this, the new Trump administration aims to expedite the ongoing restructuring of the global supply chain of semiconductors. Despite the importance of chips and their unique strategic implication flowing from this, a global legal regime for semiconductors—be it trade or investment—is absent. Some chip-manufacturing countries and their companies have experimented with a loose cooperation network as an initial step. Given the increasing attention to chips and fierce competition in the chip market, an official regime enshrined in a legal structure is in order. A semiconductor-specific plurilateral treaty could offer a more reliable, predictable, and sustainable legal framework for the trade and investment relating to semiconductors. As semiconductors constitute the core components of the future global economy, a stable trade and investment regime, made possible through a prospective treaty, would arguably embody a first step toward exploring future international economic governance.

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Introduction

Pick nearly any item around us—it's hard to find one without a microchip. Household appliances are embedded with chips to enable the Internet of Things (IoT). The COVID-19 pandemic further accelerated the novel and diverse virtual applications, which in turn demand ever more chips at every step. Each state-of-the-art passenger vehicle on the road incorporates more than 1,000 semiconductors.[1] The latest electric vehicles may contain between 3,000 and 3,500 semiconductors.[2] The value of semiconductors installed in vehicles averaged approximately $500 per car in 2020 but is estimated to reach $1,400 per car by 2028.[3] A commercial airliner carries about 200,000 semiconductors, powering its sensors, monitors, and avionics system.[4] Although the total number of semiconductors used to operate the United States' newest Ford-class aircraft carriers is unknown, concerns remain that over 5,000 components are sourced

1. *AI, Auto, Industrial Markets Spurred Rebound in Chip Demand During Second Half of 2023,* Semiconductor Indus. Ass'n (Mar. 18, 2024), https://www.semiconductors.org/ai-auto-industrial-markets-spurred-rebound-in-chip-demand-during-second-half-of-2023/ [https://perma.cc/JJR3-Z9XU]; *see also* Willy Shih, *Why Are Automotive Chips Still in Short Supply?*, Forbes (Nov. 20, 2022), https://www.forbes.com/sites/willyshih/2022/11/20/why-are-automotive-chips-still-in-short-supply/?sh=6c5d44fe782a [https://perma.cc/6D48-SYF8].

2. David Coffin et al., *Building Vehicle Autonomy: Sensors, Semiconductors, Software and U.S. Competitiveness*, U.S. Int'l Trade Comm'n, Off. of Indus. (Working Paper 8, 2019); *How Many Semiconductor Chips Are in a Car? [Infographic],* Polar Semiconductor (Nov. 30, 2023), https://polarsemi.com/blog/blog-semiconductor-chips-in-a-car/ [https://perma.cc/MP6U-E8KW].

3. Stephanie Brinley, *The Semiconductor Shortage is – Mostly – Over for the Auto Industry,* S&P Global (July 12, 2023), https://www.spglobal.com/mobility/en/research-analysis/the-semiconductor-shortage-is-mostly-over-for-the-auto-industry.html [https://perma.cc/SKD9-JBCM].

4. Alex Derber, *Aircraft Sensors Evolve for Greater Performance*, Aviation Week (Oct. 4, 2024), https://aviationweek.com/mro/emerging-technologies/aircraft-sensors-evolve-greater-performance [https://perma.cc/6TU5-A97E].

from China.[5] The rapid rise of the digital economy has made semiconductors one of the most important and strategically valuable commodities in the modern world. Artificial intelligence (AI) is expected to increase further demand for high-quality semiconductors. The development of AI and generative AI applications requires exponentially greater computing power, thereby intensifying the demand for semiconductors.[6] If our future is indeed digital, those who control semiconductor production will wield disproportionate influence over it.

The strategic significance of semiconductors has reached unprecedented levels due to AI's rapid advancement. Unlike conventional applications, AI requires chips that can manage heavy data loads and execute complex algorithms simultaneously, demanding far greater computing power and efficiency. As AI technologies such as machine learning and neural networks become more sophisticated, they place immense pressure on the underlying hardware. This has shifted semiconductors from mere support components to essential engines driving AI innovation and expansion.

Beyond their pivotal role in AI, semiconductors are critical for national security. They power technologies used in defense communications, radar systems, missile guidance, and cybersecurity frameworks. Any disruption in their availability or integrity can pose serious threats to a nation's defense capabilities, leaving sensitive systems vulnerable. Thus, securing a resilient and trusted semiconductor supply is not merely an economic imperative but a matter of overriding national strategic interest.

I. An Overview of the U.S. Chips Industry Regulation

Regulation of the U.S. semiconductor industry has become a key pillar of national economic and security strategy. As semiconductors power everything from consumer electronics to defense systems, the U.S. has prioritized securing its supply chains and maintaining technological leadership. The pandemic exposed critical vulnerabilities, prompting the government to strengthen domestic production and reduce reliance on foreign suppliers. Meanwhile, growing technological rivalry with China has driven Washington to tighten export controls and form strategic alliances. These measures go beyond industrial support by aiming to prevent technological leakage and reinforce supply chain resilience. As a result, U.S. policies are reshaping the global semiconductor landscape, influencing trade, investment, and innovation.

Successive administrations have pursued semiconductor regulations with a shared focus on national security and economic competitiveness. The Biden Administration expanded federal funding, reinforced industry coordination, and deepened partnerships with key allies like Japan, South Korea, and Taiwan. The

5. Eric Tegler, *America's Carriers Rely on Chinese Chips, Our Depleted Munitions Too*, Forbes (Jan. 9, 2024), https://www.forbes.com/sites/erictegler/2024/01/09/americas-carriers-rely-on-chinese-chips-our-depleted-munitions-too/.

6. Ondrej Burkacky et al., *Generative AI: The Next S-curve for the Semiconductor Industry?*, McKinsey & Co. (Mar. 29, 2024), https://www.mckinsey.com/industries/semiconductors/our-insights/generative-ai-the-next-s-curve-for-the-semiconductor-industry [https://perma.cc/DE29-DZ8F].

CHIPS and Science Act[7] marked a turning point by providing historic investment in domestic chip manufacturing while restricting China's access to critical technologies. The Chip 4 Alliance was introduced to foster a secure and self-sufficient supply chain among trusted partners. Despite these efforts, challenges remain, including geopolitical tensions, economic countermeasures, and risks to existing supply networks. As the regulatory framework evolves, its long-term impact on the semiconductor industry and global trade remains under close scrutiny. Under Trump, policy has shifted dramatically: in August 2025, the Trump administration announced plans for 100 percent tariffs on imported chips to force self-sufficiency, leading to higher costs for electronics and household goods but with exemptions for companies building in the U.S. pending (e.g., TSMC expanding to a $165 billion investment in March 2025, though Trump claimed $300 billion in August 2025, which has not been corroborated by TSMC's own disclosures, and Samsung delaying Texas fabs to 2026 due to customer shortages[8]); implementation details remain pending. This protectionist stance, including threats to repeal CHIPS funding as "corporate welfare," contrasts Biden's collaborative subsidies and alliances, potentially causing ally tensions and supply disruptions while aiming to counter China more aggressively. The following table compares the key aspects of Biden's and Trump's approaches to illustrate these shifts:

Administration	Policy Focus	Key Tools	Potential Impacts
Biden	Collaboration and investment for resilience and leadership	Subsidies via CHIPS Act (~$52B in government funding, spurring over $630B in total private-sector investments by July 2025)	Strengthened domestic production, reduced foreign dependence, but risks of retaliation and supply disruptions
Trump	Protectionism and self-sufficiency through enforcement	Tariffs (up to 100% on imports, exemptions for U.S.-building firms), pauses on CHIPS funding, unilateral export bans	Accelerated onshoring, economic nationalism, but potential inefficiencies, ally tensions, and higher costs

A. Biden's Semiconductor Regulation Scheme

The Biden Administration made semiconductor policy a priority to secure supply chains, maintain technological leadership, and counter China's influence. In response to global chip shortages, it focused on strengthening domestic manufacturing and international partnerships. Its approach blended financial incentives, export controls, and multilateral coordination to balance economic and security interests. Unlike previous policies that relied on private investment, the Biden Administration took an active role in shaping the semiconductor landscape through federal funding and diplomacy.

7. CHIPS and Science Act of 2022, Pub. L. No. 117-167, 136 Stat. 1392.

8. Mariella Moon, *Samsung's Texas Chip Plant Is Reportedly Delayed Due To Lack Of Customers*, Yahoo News U.K. (July 4, 2025), https://uk.news.yahoo.com/samsungs-texas-chip-plant-reportedly-140034825.html [https://perma.cc/4ACM-VP6R].

A key aspect of Biden's strategy was reducing reliance on Chinese manufacturing by forming alliances and reinforcing supply chain resilience. The Chip 4 Alliance—composed of the U.S., South Korea, Japan, and Taiwan—plays a central role in coordinating production and supply security. Additionally, the Biden Administration tightened export controls on advanced semiconductor technology to China and increased federal investments in domestic fabrication. While these policies aim to strengthen U.S. competitiveness, they raise concerns about potential retaliation from China and the challenges of reducing dependence on existing production hubs.

In contrast, Trump's administration has pivoted to aggressive enforcement: in early August 2025, Trump announced plans for tariffs of up to around 100 percent on semiconductor imports, with major exemptions for firms that manufacture in, or have committed to build in, the United States,[9] aiming to compel relocation but risking higher consumer prices and diplomatic strains with allies like Taiwan and South Korea. Trump has also escalated export bans (e.g., August 2025 charges against two Chinese nationals for illegal Nvidia shipments to China[10]) and paused CHIPS disbursements in January 2025 via OMB guidance (but promptly enjoined by federal courts; many disbursements resumed while awards underwent review[11]), criticizing them as inefficient, while maintaining Biden's focus on curbing China's access—though with more unilateral actions that could fragment global chains. See the comparison below:

Aspect	Biden Administration	Trump Administration
Domestic Manufacturing	Historic subsidies ($52B initial, expanded to $630B+ with awards like $285M to SRC for digital twins in Jan 2025) and incentives for reshoring	Tariffs (100% on foreign chips) to force relocation; criticizes subsidies as "corporate welfare," pausing some CHIPS disbursements
Export Controls	Tightened controls on advanced tech to China (2022-2023 rules, e.g., licensing for high-performance chips)	Escalated bans (Dec 2024 restrictions on 140+ Chinese firms, full AI chip sales ban); broader "small yard, high fence" approach to unilateral curbs
Alliances	Deepened partnerships (Chip 4 for coordination among U.S., Japan, South Korea, Taiwan)	Pressures allies via tariffs (exemptions for U.S. builders like TSMC/Samsung), but strains relations; potential fragmentation of Chip 4

9. Andrea Shalal et al., *Trump Says US to Levy 100% Tariff on Imported Chips, But Some Firms Exempt*, Reuters (Aug. 7, 2025), https://www.reuters.com/world/china/trump-says-us-levy-100-tariff-imported-chips-some-firms-exempt-2025-08-07/ [https://perma.cc/9H7L-5NVH].

10. Reuters, *Two Chinese Nationals in California Accused of Illegally Shipping Nvidia AI Chips to China*, CNN (Aug. 7, 2025), https://edition.cnn.com/2025/08/07/us/chinese-nationals-arrested-selling-nvidia-chips-hnk, [https://perma.cc/D3Z2-QKNN].

11. Angus Chen et al., *Trump Administration Reverses Course, Lifts Pause on NIH Grand Awards*, STAT News (July 29, 2025), https://www.statnews.com/2025/07/29/trump-administration-omb-blocks-nih-grant-awards/ [https://perma.cc/QCL5-V9DD].

1. Chip 4 Alliance

As semiconductors have taken center stage in global economic-security debates and become a central pillar of U.S.–China confrontations, various suggestions have been floated and steps taken. For instance, the 'Big Four' in chips—the United States, Japan, South Korea and Taiwan—agreed to form the "Chip 4 Alliance"[12] in September 2022 as part of a mission to restructure the global chip supply chain.[13] The alliance aims to create an international 'consultative body' of the four governments together with their key semiconductor manufacturers and suppliers.[14] They want to internalize all parts of the semiconductor business—research and development, design, manufacturing, packaging, sales and consumption—in-house.[15] This chip 'clique' will only reach outside the circle in strictly controlled circumstances. It is therefore a unique plurilateral public-private partnership to usher in cooperation and coordination across all phases of the global semiconductors supply chain. For the past several years, domestic restructuring processes for the four members' respective domestic chips industries have been underway through a wide range of subsidies, support schemes, and regulatory measures. Now the new alliance is expected to offer a forum where these domestic efforts and changes are coordinated and aligned among the four.

The increasing importance of tight coordination in chips among key U.S. allies was further underscored by key diplomatic events such as the U.S.–South Korea summit in April 2023[16] and the U.S.–Japan–South Korea trilateral summit in August 2023.[17] These events viewed high-end semiconductors as an integral component of the U.S.–China hegemonic confrontation and a linchpin of a future AI-driven digital society.[18] To address semiconductor supply chain

12. It is sometimes called by different names, such as Fab 4 Alliance or US-East Asia Semiconductor Supply Chain Resiliency Working Group.

13. *Background Press Briefing on the Vice President's Meetings in Japan,* The White House (Sept. 27, 2022), https://www.whitehouse.gov/briefing-room/press-briefings/2022/09/27/background-press-briefing-on-the-vice-presidents-meetings-in-japan/ [https://perma.cc/3M3N-ESGB].

14. Jonathan Corrado, *Clash or Consensus? The Conflicting Economic and Security Imperatives of Semiconductor Supply-Chain Collaboration in the Indo-Pacific*, J. of Indo-Pac. Affs. 81 (Oct. 2022); *see also* Baek Byung-yeul, *Korea Still Balks at Joining US-led Chip Alliance*, The Korea Times (Aug. 1, 2022), https://www.koreatimes.co.kr/www/tech/2024/05/129_333648.html [https://perma.cc/86HM-HA3T].

15. Brett Fortnam, *U.S.-proposed 'Chips 4 Alliance' could coordinate industrial policy, export controls*, Inside U.S. Trade (Aug. 19, 2022), https://insidetrade.com/daily-news/us-proposed-%E2%80%98chips-4-alliance%E2%80%99-could-coordinate-industrial-policy-export-controls.

16. *Leader's Joint Statement in Commemoration of the 70th Anniversary of the Alliance between the United States of America and the Republic of Korea,* The White House (Apr. 26, 2023), https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/26/leaders-joint-statement-in-commemoration-of-the-70th-anniversary-of-the-alliance-between-the-united-states-of-america-and-the-republic-of-korea/ [https://perma.cc/9MNG-JG4G].

17. The White House, *The Spirit of Camp David: Joint Statement of Japan, the Republic of Korea, and the United States*, (Aug. 18, 2023), https://www.whitehouse.gov/briefing-room/statements-releases/2023/08/18/the-spirit-of-camp-david-joint-statement-of-japan-the-republic-of-korea-and-the-united-states/ [https://perma.cc/9MNG-JG4G].

18. Jonathan Brill, *America's Shaky Semiconductor Supremacy Over China,* Forbes (Dec. 20, 2023), https://www.forbes.com/sites/jonathanbrill/2023/12/20/americas-shaky-semiconductor-supremacy-over-china/?sh=3df2e7fc1aca [https://perma.cc/W2GB-L6PU];

vulnerabilities, the Department of Commerce announced a preliminary agreement with Samsung to create a robust alliance for advanced technologies like AI.[19] On top of such efforts, the U.S. government increased tariffs across strategic sectors, including semiconductors, to counter China's trade practices.[20]

However, the Chip 4 Alliance and repeated references to chips in key diplomatic functions are simply not sufficient. They point in the right direction and bring the four members on board for a new chip supply chain, but they are too hollow and rudimentary to offer a reliable guideline and a predictable course of action for government agencies and chips-related enterprises of the four members. Only a reliable, predictable, and sustainable legal framework for this subject—i.e., a new plurilateral treaty on chips supply chains—will be adequate. It is thus time to adopt a new treaty among the Four, stipulating specific legal norms for various issues relating to chips supply chains. Alliances, consultations, recommendations, and threats are just too vague and unpredictable to operationalize the new supply chain. The ins and outs of the global semiconductor industry have been revealed. The positions of the United States and China are also well known. So are the four members' strengths and weaknesses in the global chip industry, along with their respective contributions to the new supply chain. A testing-the-waters period is now over, and now is the time for concrete action. This can only come through a treaty.

As a new regime for the global chip trade is on the drawing board, coordination and cooperation among the Four have proven to be critical. Consider, for instance, the *CHIPS and Science Act* enacted in August 2022[21] and export control regulations issued by the U.S. Department of Commerce in October 2022 and modified in September 2023,[22] along with all the diplomatic efforts and political capital mobilized by the four in their wake. These examples show the depth and breadth of the required cooperation and coordination among the four participants when it comes to microchips, and the Chip 4 Alliance is the result of the efforts to formalize and systematize such cooperation and coordination, overcoming the prior ad hoc schemes, so that the four can internalize the production of critical chips among themselves through a division of labor and roles.

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see also Graham Allison et al., *The Great Tech Rivalry: China vs the U.S.* (Harv. Kennedy Sch. Belfer Ctr. Paper, 2021), https://www.belfercenter.org/sites/default/files/pantheon_files/GreatTechRivalry_ChinavsUS_211207.pdf [https://perma.cc/TA2P-P6LJ].

19. *Statement from President Joe Biden on CHIPS and Science Act Preliminary Agreement with Samsung,* The White House (Apr. 15, 2024), https://www.whitehouse.gov/briefing-room/statements-releases/2024/04/15/statement-from-president-joe-biden-on-chips-and-science-act-preliminary-agreement-with-samsung/ [https://perma.cc/9MNG-JG4G].

20. *Fact Sheet: President Biden Takes Action to Protect American Workers and Businesses From China's Unfair Trade Practices,* The White House (May 14, 2024), https://www.whitehouse.gov/briefing-room/statements-releases/2024/05/14/fact-sheet-president-biden-takes-action-to-protect-american-workers-and-businesses-from-chinas-unfair-trade-practices/ [https://perma.cc/6UBB-2HHV].

21. Cong. Rsch. Serv., Semiconductors and the Semiconductor Industry 1, 10 (2023); Chips and Science Act, Pub. L. No. 117-167, 136 Stat. 1368 (2022).

22. U.S. Dep't of Com., *Preventing the Improper Use of Chips Act Funding*, 88 Fed. Reg. 65600 (Sept. 25, 2023) (to be codified at 15 CFR 231).

The four members are, in fact, not just four. These four economies constitute almost the entire global semiconductor industry, accounting for approximately 82 percent of the global market share, 75 percent of the semiconductor global value chain, and 80 percent of chip design.[23] They collectively hold 77 percent of manufacturing equipment and as much as 99 percent for memory chip capacity.[24] Thus, the alliance is more than just cooperation and coordination: what these four governments determine will shape the global market.

A chip alliance, therefore, is not merely an alliance of a specific item. Rather, it represents an alliance for leadership in the rapidly advancing digital economy and intensifying economic security in the global community. While details of the Chip 4 Alliance remain light and many aspects are yet to be elaborated, it arguably carries significant implications across many areas.

The Chip 4 Alliance remains largely a conceptual framework without a fully formalized structure or binding agreements. While the U.S. has actively pushed for tighter coordination among alliance members to strengthen control over semiconductor supply chains, internal friction has slowed progress. South Korea, for example, remains ambivalent due to its deep economic ties with China, complicating its ability to commit to policies that might provoke Beijing.[25] Japan, on the other hand, has cautiously aligned with U.S. policy, even as Japanese firms express concerns about the impact on their exports.[26] Meanwhile, Taiwan—a crucial player in semiconductor manufacturing—has shown a willingness to support the alliance but remains vulnerable to military and economic pressure from China.[27] Overall, despite shared strategic objectives and its significance, the alliance is still more of a proposal than an actionable entity, lacking the clarity needed for cohesive implementation.

Academic discussions on the Chip 4 Alliance have highlighted its potential as a game-changing initiative but also emphasized the complexity of its implementation. Many researchers note that the alliance reflects a broader shift toward 'techno-nationalism,' where economic and security interests are

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23. *2022 State of the U.S. Semiconductor Industry,* Semiconductor Indus. Ass'n (Nov. 2022), https://www.semiconductors.org/wp-content/uploads/2022/11/SIA_State-of-Industry-Report_Nov-2022.pdf [https://perma.cc/2QHP-Z6C2].

24. Varas, A., Varadarajan, R., Goodrich, J. & Yinug, F., *Strengthening the Global Semiconductor Supply Chain in an Uncertain Era,* BCG x Semiconductor Industry Association (Apr. 2021), https://www.semiconductors.org/wp-content/uploads/2021/05/BCG-x-SIA-Strengthening-the-Global-Semiconductor-Value-Chain-April-2021_1.pdf.

25. Charles Mok, *The Other Half of 'Chip 4': Japan and South Korea's Different Paths to De-risking*, The Diplomat (June 3, 2023), https://thediplomat.com/2024/06/the-other-half-of-chip-4-japan-and-south-koreas-different-paths-to-de-risking/ [https://perma.cc/K6SH-AMX9].

26. Jeremy Mark & Dexter Tiff Roberts, *United States – China Semiconductor Standoff: A Supply Chain Under Stress*, Atlantic Council (Feb. 23, 2023), https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/united-states-china-semiconductor-standoff-a-supply-chain-under-stress/ [https://perma.cc/3A7B-BEPU].

27. Dashveenjit Kaur, *Is There Really a Chip 4 Alliance? Officially, It's Still a Proposal*, Techwire Asia (Jan. 10, 2023), https://techwireasia.com/2023/01/is-there-really-a-chip-4-alliance-officially-its-still-a-proposal/ [https://perma.cc/AH7F-NZE6].

increasingly intertwined. A study argues that Chip 4 is a reaction to China's expanding influence in the semiconductor value chain and a strategic response to maintain technological supremacy in key industries.[28] Another analysis stresses that while the alliance could help the U.S. reclaim its dominance, it could also fracture global supply chains and invite unintended consequences for non-aligned countries.[29] Meanwhile, a report from the Council on Foreign Relations (CFR) underscores that the alliance's success hinges on overcoming internal economic-security dilemmas, particularly for South Korea, whose high dependence on Chinese markets makes its position vulnerable.[30] Thus, while the alliance could foster deeper collaboration and innovation, its current ambiguity and the diverse national interests at play could hinder its long-term stability.

2. *Other Schemes*

Beyond the Chip 4 Alliance, the former Biden Administration launched a series of strategic policies aimed at strengthening the United States' role in the global semiconductor ecosystem. A key initiative in this effort is the *CHIPS and Science Act*, enacted in August 2022, which provides over $52 billion in funding to stimulate domestic semiconductor manufacturing and research.[31] The act seeks to lessen dependence on foreign supply chains by encouraging companies to establish production facilities within U.S. borders. It also supports advancements in semiconductor technology by investing in research and development programs to keep American firms at the forefront of innovation.[32] Additionally, the act introduces financial incentives, tax benefits, and workforce training initiatives to restore domestic chip production capacity and enhance supply chain security. This legislative effort represents a substantial shift toward reshoring key industries and maintaining the U.S.' competitive edge in a rapidly evolving market.

Another crucial aspect of the administration's semiconductor policy is the implementation of rigorous export controls and trade restrictions, particularly targeting China. The U.S. Department of Commerce has imposed multiple regulatory measures limiting access to advanced semiconductor technologies, high-performance computing chips, and specialized

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28. Yongshin Kim & Sungho Rho, *The US-China Chip War, Economy-Security Nexus, and Asia*, 29 J. Chinese Pol. Sci. 433-460 (2024).

29. Seohee Park, *Semiconductors at the Intersection of Geoeconomics, Technonationalism, and Global Value Chains*, 12(8) Soc. Sci. 466-481 (2023).

30. Soyoung Kwon, *Strengthening Strategic Technology Cooperation Between South Korea and the United States*, Council on Foreign Rels. (Nov. 30, 2023), https://www.cfr.org/blog/strengthening-strategic-technology-cooperation-between-south-korea-and-united-states [https://perma.cc/JKW2-ZTND].

31. Emily G. Blevins et al., Cong. Rsch. Serv., R47558, Semiconductors and the CHIPS Act: The Global Context (2023), https://crsreports.congress.gov/product/pdf/R/R47523 [https://perma.cc/ZK5N-DP4T].

32. *Biden-Harris Administration Awards Semiconductor Research Corporation Manufacturing Consortium Corporation $285M for New CHIPS Manufacturing USA Institute for Digital Twins, Headquartered in North Carolina,* Nat'l Inst. of Standards and Tech. (Jan. 3, 2025), https://www.nist.gov/news-events/news/2025/01/biden-harris-administration-awards-semiconductor-research-corporation [https://perma.cc/SGA4-95AM].

manufacturing equipment for Chinese entities.[33] These restrictions, first introduced in October 2022 and expanded in 2023, are designed to impede China's ability to develop high-end semiconductor capabilities, particularly in artificial intelligence and quantum computing.[34] The regulations apply extraterritorially, extending their reach to foreign firms that utilize American-made semiconductor tools and software. In coordination with key allies such as the Netherlands and Japan, the Biden Administration worked to establish a unified approach to restricting technology transfers.[35] These policies reflect Washington's commitment to preventing strategic technologies from falling into the hands of geopolitical competitors while reinforcing the security of its semiconductor industry.

Beyond domestic investments and export controls, the Biden Administration strengthened public-private partnerships to drive semiconductor research and manufacturing innovation. Programs such as the National Semiconductor Technology Center (NSTC) and the Advanced Packaging Manufacturing Program (APMP) have been launched to facilitate collaboration between industry leaders and research institutions.[36] These initiatives aim to accelerate breakthroughs in semiconductor fabrication, design, and packaging while ensuring long-term competitiveness in the global market. By fostering cooperation between the government and private sector, these partnerships seek to mitigate supply chain vulnerabilities and promote technological advancements that align with national security objectives.[37]

These combined regulatory schemes underscore the Biden Administration's broader vision for semiconductor policy—one that emphasizes national security, technological leadership, and economic resilience. By integrating domestic investments, stringent export controls, public–private collaborations, and strategic international partnerships, Washington positioned itself as a dominant force in the semiconductor industry. Despite ongoing geopolitical tensions and economic uncertainties, these measures highlight a determined effort to safeguard U.S. technological sovereignty while shaping the future of the global semiconductor landscape.

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33. Bureau of Indus. & Sec., *Public Information on Export Controls Imposed on Advanced Computing and Semiconductor Manufacturing Items to the People's Republic of China 9PRC) in 2022 and 2023*, U.S. Dep't of Com. (2023), https://www.bis.doc.gov/index.php/about-bis/newsroom/2082 [https://perma.cc/R9Y5-ZTW2].

34. Kirti Gupta et al., *Collateral Damage: The Domestic Impact of U.S. Semiconductor Export Controls,* Ctr. for Strategic and Int'l Stud. (July 9, 2024), https://www.csis.org/analysis/collateral-damage-domestic-impact-us-semiconductor-export-controls [https://perma.cc/45LD-WQYN].

35. *US Targets China's Chip Industry with New Restrictions,* Reuters (Dec. 3, 2024), https://www.reuters.com/technology/us-targets-chinas-chip-industry-with-new-restrictions-2024-12-02/ [https://perma.cc/H9AZ-BNA5].

36. *CHIPS for America Outlines Vision for the National Semiconductor Technology Center,* U.S. Dep't of Com. (Apr. 25, 2023), https://www.commerce.gov/news/press-releases/2023/04/chips-america-outlines-vision-national-semiconductor-technology-center [https://perma.cc/LPR9-KUZM].

37. *2024 State of the U.S. Semiconductor Industry,* Semiconductor Indus. Ass'n (2024), https://www.semiconductors.org/2024-state-of-the-u-s-semiconductor-industry/ [https://perma.cc/WYV7-PG4J].

B. Trump's Semiconductor Regulation Scheme

As the global semiconductor landscape continues to evolve, President Donald Trump has laid out a distinct vision for reshaping the industry. His policies emphasize a dramatic shift from previous U.S. approaches, focusing on economic protectionism and strategic industry realignment. Unlike the *CHIPS and Science Act*, which incentivized domestic manufacturing through subsidies, Trump's plan has compelled semiconductor firms to relocate production to the United States through aggressive tariff policies and restrictive regulatory measures. His stance aligns with broader efforts to decrease reliance on foreign supply chains, particularly those in Taiwan and South Korea, which have long dominated semiconductor manufacturing.

However, this approach has raised concerns among industry leaders and policymakers, who warn that such measures could lead to economic inefficiencies (e.g., 15–20% cost rises[38]), supply chain disruptions, and potential diplomatic conflicts. For instance, under Trump, the CHIPS Act—central to Biden's strategy—has faced significant scrutiny. In January 2025, funding was paused and later lifted in May 2025 amid repeal threats that opponents labeled as "corporate welfare," but investments continued to spur over $630 billion by July 2025, including a proposed 325 million USD federal award to Hemlock Semiconductor first announced in October 2024 and moving toward implementation into 2025.[39] Firms like TSMC also plan to expand U.S. commitments—for example, TSMC announced $165 billion in March 2025, with Trump's unconfirmed claim of $300 billion in August 2025—to qualify for exemptions from 100% import tariffs. This shift marks a move from Biden's subsidy-led growth to Trump's tariff-driven onshoring, delaying projects such as Intel's per August 2025 reports, while projecting $697 billion in AI-driven sales amid ongoing U.S.–China rivalry.[40] Elements like funding have evolved as outlined in the following table:

38. Faizan Farooque, *AMD's U.S.-Made Chips Will Cost More – and Lisa Su Says That's Fine.*, Yahoo Finance (July 29, 2025), https://sg.finance.yahoo.com/news/amds-u-made-chips-cost-150148692.html [https://perma.cc/JUT2-KQM8].

39. *Biden-Harris Administration makes $325 Million Investment to Expand Semiconductor Industry in Michigan, Creating Over 1,000 Manufacturing and Construction Jobs*, Mich. Econ. Dev. Corp. (Oct. 21, 2024), https://www.michiganbusiness.org/press-releases/2024/10/325-million-investment-hemlock-semiconductor/ [https://perma.cc/FE53-QR3K].

40. James Thompson et al., *Trump Unexpectedly Says TSMC 'Spending US$300 Billion in Arizona'*, Focus Taiwan (Aug. 6, 2025), https://focustaiwan.tw/politics/202508060009 [https://perma.cc/99BP-AL8R]; Kitty Wheeler, *Intel's Chip Factory Delays: Global Semiconductor Context*, Technology Magazine (Mar. 4, 2025), https://technologymagazine.com/articles/intels-chip-factory-delays-global-semiconductor-context [https://perma.cc/DQS9-VD8J].

CHIPS Act Element	Biden Administration (2022-2024)	Trump Administration
Funding Awards	$52B for manufacturing and research; e.g., incentives for TSMC and Samsung fabs	Paused funds (January 2025, later lifted[41]) amid repeal threats; total investments reached more than $630B by July 2025[42] with awards like $325M to Hemlock (January 2025)
Public-Private Partnerships	NSTC and APMP for innovation and collaboration	Shifted toward mandates (e.g., domestic sourcing requirements); reduced emphasis on partnerships, favoring tariffs and creating confusion among U.S. allies
Overall Impact	Boosted U.S. competitiveness, AI-driven sales projected at $697B (2025 outlook)	Caused potential delays in disbursements; focused on protectionism over subsidies, raising costs by 15–20%

At the core of Trump's semiconductor policy lies an emphasis on leveraging trade policies to force industry realignment. His administration implemented a series of escalating tariffs on foreign-produced chips, creating a strong disincentive for firms that continue to rely on overseas manufacturing. In addition to tariffs, Trump imposed stringent regulations on foreign investments in U.S. semiconductor firms and expanded restrictions on exports of advanced AI chips to China, though certain low-end exports were eased under an August 2025 truce.[43] These measures reflect a broader shift toward economic nationalism, reinforcing a protectionist framework that prioritizes American semiconductor self-sufficiency. While these policies accelerate the development of domestic chip manufacturing—for example, TSMC's $165 billion investment—they also pose significant risks, particularly in an industry deeply intertwined with global supply chains, with 15–20% cost increases and protests from U.S. allies.

1. First Item: Tariff-Based Protectionism

President Trump implemented an aggressive tariff-based strategy to reshape the semiconductor industry.[44] Unlike the CHIPS and Science Act, which

41. Doug Mills, New Administration Highlights: Freeze on Federal Funds Rescinded, and Trump Signs Law to Ease Path to Deportations, The New York Times (May 24, 2025), https://www.nytimes.com/live/2025/01/29/us/trump-federal-freeze-funding-news [https://perma.cc/A2PN-QCC3].

42. Dylan Butts, Trump's Latest Chip Tariff Declaration Raises More Questions Than Answers, CNBC (Aug. 7, 2025), https://www.cnbc.com/2025/08/07/trump-100-percent-chip-tariff-threat-leaves-more-questions-than-answers.html [https://perma.cc/E8X2-2A8R].

43. David Lawder & Greta R. Fondahn, *US, China Hold New Talks on Tariff Truce, Easing Path for Trump-Xi Meeting*, Reuters (July 29, 2025), https://www.reuters.com/world/china/us-china-hold-new-talks-tariff-truce-easing-path-trump-xi-meeting-2025-07-28/ [https://perma.cc/P73G-SRLV].

44. Richard Lawler, *Trump Says He'll Put Tariffs on Imported Chips 'In the Near Future'*, The Verge (Jan. 28, 2025), https://www.theverge.com/2025/1/27/24353388/trump-tariffs-chips-act-ai-deepseek [https://perma.cc/R2XR-7HMX].

relies on government subsidies to incentivize domestic production, Trump has emphasized punitive tariffs on foreign-made chips to compel manufacturers to relocate to the United States.[45] He has proposed tariff rates of up to 100% on semiconductors imported from Taiwan, South Korea, and other key chip-producing nations.[46] His rationale is that such measures will create strong economic incentives for companies to shift their fabrication facilities to American soil. However, industry experts warn that these tariffs have unintended consequences, such as increased costs for U.S. technology firms and potential retaliation from trade partners—for example, China's rare-earth export curbs.[47,48]

Trump's protectionist stance has been particularly focused on Taiwan's semiconductor industry, which plays a dominant role in the global supply chain. Companies like TSMC manufacture the world's most advanced chips, supplying firms such as Nvidia, AMD, and Apple. The tariff hike on Taiwanese-made chips has forced these companies to either absorb higher costs or seek alternative manufacturing solutions. Some U.S. policymakers argue that this could accelerate efforts to diversify supply chains away from Taiwan, given its geopolitical vulnerability to China.[49] However, critics counter that imposing tariffs on TSMC's products primarily harms U.S. businesses that rely on its high-end fabrication capabilities. Firms have begun transitioning to domestic suppliers, and the price of consumer electronics, AI chips, and cloud computing infrastructure has risen sharply—by 15-20%.[50]

The tariff policy has sparked concerns among U.S. allies, particularly Taiwan and South Korea, whose semiconductor industries will be heavily impacted.[51] The Taiwanese government has emphasized that its semiconductor

45. Charlotte Trueman, *Trump Plans "100 Percent Tax" on Foreign Semiconductors to Incentivize US Manufacturing*, Data Center Dynamics (Jan. 28, 2025), https://www.datacenterdynamics.com/en/news/trump-plans-100-percent-tax-on-foreign-semiconductors-to-incentivize-us-manufacturing/ [https://perma.cc/VP7S-K5SW].

46. Ben Blanchard, *Responding to Trump Tariff Threat, Taiwan Says Chip Business is 'Win-Win'*, Reuters (Jan. 28, 2025), https://www.reuters.com/technology/responding-trump-tariff-threat-taiwan-says-chip-business-is-win-win-2025-01-28/ [https://perma.cc/2KYZ-EFQQ]; Shalal et al., *supra* note 9.

47. Sam Meredith, *China's Rare-Earth Mineral Squeeze Puts Defense Giants in the Crosshairs*, CNBC (June 10, 2025), https://www.cnbc.com/2025/06/10/chinas-rare-earth-squeeze-puts-defense-giants-in-the-crosshairs.html [https://perma.cc/QSX6-TMVL].

48. Tom Porter & Hasan Chowdhury, *Trump's Threat of Taiwan Chip Tariffs Could Give Nvidia a Fresh Headache after DeepSeek*, Business Insider (Jan. 29, 2025), https://www.businessinsider.com/trump-taiwan-chip-tariffs-nvidia-stock-tsmc-deepseek-2025-1 [https://perma.cc/4YNV-PDK4].

49. Aime Williams & Demetri Sevastopulo, *Scot Bessent Pushes Gradual 2.5% Universal US Tariffs Plan*, Financial Times (Jan. 28, 2025), https://www.ft.com/content/7fb420b9-1bd1-4c68-8575-94e99315051c.

50. Amrith Ramkumar et al., *DeepSeek's Breakthrough Pressures Trump to Act on AI*, The Wall Street Journal (Jan. 28, 2025), https://www.wsj.com/politics/policy/china-ai-deepseek-us-washington-response-cac79d6b [https://perma.cc/ZJ4E-BZYA]; Shalal et al., *supra* note 9; Shawn DuBravac & Philip Stoten, *Navigating the Tariff Storm: Electronics Industry Insight Following "Liberation Day"*, Global Electronics Association (Apr. 4, 2025), https://www.electronics.org/blog/navigating-tariff-storm-electronics-industry-insight-following-liberation-day [https://perma.cc/NA46-XRJC].

51. *Explainer: Trump Tariffs on Chips and Drugs Would Hit U.S. Allies in Asia*, Reuters (Jan. 28, 2025), https://www.reuters.com/world/trump-tariffs-chips-drugs-would-hit-us-allies-asia-2025-01-28/ [https://perma.cc/7QPE-SCKR].

sector represents a "win-win" for both the United States and Taiwan, arguing that deep collaboration between American chip designers and Taiwanese manufacturers has benefited both economies.[52] The South Korean government, facing similar pressures, has remained cautious in its response, given its extensive economic ties with both the United States and China.[53] With tariffs enacted, relations have grown strained, and both nations have been forced to reassess their semiconductor trade policies with the United States. Some analysts speculate that such measures could push these countries closer to China, as they seek alternative markets to offset potential losses.[54]

Another concern is the feasibility of rapidly expanding domestic semiconductor manufacturing to offset potential supply disruptions. While the CHIPS Act sought to address this challenge through financial incentives, Trump has dismissed government subsidies as unnecessary, calling them "corporate subsidies."[55] Instead, he argues that high tariffs will naturally drive chipmakers to build fabs in the United States. However, this approach fails to address the practical challenges of scaling up domestic production, particularly given the complexity of semiconductor supply chains. Building advanced fabrication plants takes years and requires substantial expertise, which remains concentrated in countries like Taiwan, South Korea, and Japan. Without a clear transition plan, critics warn that tariffs could create short-term instability in the chip market while failing to achieve long-term self-sufficiency.[56]

Ultimately, the success of Trump's tariff-based semiconductor strategy depends on how companies respond to these economic pressures. If major chipmakers such as TSMC, Samsung, and Intel accelerate plans to build U.S.-based fabs, the policy could strengthen America's position in the global semiconductor industry. However, these tariffs have led to supply bottlenecks, cost increases, and trade tensions, which may cause more disruption than progress. The semiconductor industry relies on global integration, and a sudden shift toward protectionism risks fragmenting supply chains in ways that could undermine U.S. technological leadership. This strategy is forcing a realignment of the semiconductor ecosystem while simultaneously burdening American consumers.[57]

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52. The Mishal Husain Show, *Trump Looking at Tariffs on Semiconductors, Drugs, Steel*, Bloomberg (Jan. 27, 2025), https://www.bloomberg.com/news/videos/2025-01-27/trump-looking-at-tariffs-on-semiconductors-drugs-steel-video [https://perma.cc/C8HB-CLR9].

53. David Shepardson & David Lawder, *Trump Commerce Nominee Says Canada, Mexico can Avoid Tariffs, Vows Stronger China Tech Curbs*, Reuters (Jan. 29, 2025), https://www.reuters.com/world/us/trump-commerce-chief-pick-lutnick-says-he-prefers-across-the-board-tariffs-by-2025-01-29/ [https://perma.cc/3J4H-PVFF].

54. Chris Miller, *How the Chip War Could Turn Under Trump*, Financial Times (Dec. 6, 2024), https://www.ft.com/content/44084570-19a1-4049-8306-46a38648a0a4 [https://perma.cc/F2VL-PX84].

55. Paul Kiernan, *Some Fear Factory Boom Could Suffer Under Trump*, The Wall Street Journal (Nov. 2, 2024), https://www.wsj.com/economy/trump-manufacturing-policy-inflation-reduction-act-98a2a40e [https://perma.cc/8ZY3-AFP3].

56. Miller, *supra* note 54.

57. Kwan Wei Kevin Tan, *Trump's Defense Policy Pick Once Said TSMC Can't End Up in Chinese Hands if China Takes Taiwan*, Business Insider (Dec. 26, 2024), https://www.businessinsider.com/trump-defense-pick-us-destroy-tsmc-if-china-takes-taiwan-2024-12 [https://perma.cc/MY64-UA67].

2. Second Item: Strategic Industry Realignment

Beyond tariffs, Trump's second-term semiconductor strategy extends to broader efforts to realign the industry through regulatory pressure and trade restrictions.[58] He has repeatedly criticized the CHIPS and Science Act, arguing that its $52 billion in subsidies for semiconductor manufacturers is an inefficient use of government funds.[59] Instead, Trump has explored procurement preferences requiring companies to onshore their chip production as a condition for access to the U.S. market. This shift from financial incentives to direct industry mandates represents a significant departure from prior semiconductor policy. Now fully implemented, this framework is fundamentally altering the way companies operate within the American semiconductor ecosystem.

One of the key elements of Trump's industry realignment plan is a requirement for U.S. technology firms to source a majority of their chips domestically.[60] While this policy aims to strengthen national security and reduce reliance on foreign fabs, it creates significant logistical challenges. The United States lacks the fully integrated supply chain needed to produce advanced chips at scale, meaning companies would face high costs and production delays. Semiconductor fabrication depends on specialized materials, photolithography equipment, and advanced packaging technology—most of which remain sourced from foreign suppliers. By imposing strict onshoring requirements without first establishing a robust domestic supply chain, the policy risks creating a gap between demand and production capacity.[61]

Another aspect of Trump's semiconductor realignment involves new restrictions on AI chip exports, particularly to China.[62] The Biden administration had imposed strict controls on the sale of advanced AI semiconductors to Chinese firms, but Trump went further. He initially banned all U.S. chipmakers from selling high-performance AI chips to China, arguing that such sales directly benefit Beijing's military and surveillance industries[63], although his administration later allowed companies like Nvidia and AMD to sell select AI

58. Christine Mui, *What that Powerful New Chinese AI App Means for Washington*, Politico (Jan. 27, 2025), https://www.politico.com/news/2025/01/27/deepseek-freakout-us-ai-policy-00200820 [https://perma.cc/PP24-B6T6].

59. Bill Alpert et al., *Trump Funding Freeze Sows Chaos as Democrats Vow to Challenge It in Court*, Barron's (Jan. 29, 2025), https://www.barrons.com/articles/trump-freezes-spending-democrats-challenge-court-ae8f48f6, [https://perma.cc/TT7Z-NGDT].

60. Maria Curi & Ina Fried, *Trump's Cash Freeze Leaves Tech, AI Projects in Limbo*, Axios (Jan. 29, 2025), https://www.axios.com/2025/01/29/trump-federal-grants-freeze-tech-research-ai [https://perma.cc/HLF4-XLUK].

61. *Chip War Ramps Up with New US Semiconductor Restrictions on China*, The Guardian (Dec. 2, 2024), https://www.theguardian.com/us-news/2024/dec/03/joe-biden-china-microchip-export-restrictions-law-changes [https://perma.cc/TZ2S-YFNV].

62. John Foley, *Supercomputers: The New Superpower Status Symbol*, Financial Times (Jan. 25, 2025), https://www.ft.com/content/651339b1-bb08-4710-8fe5-7a68452ee3b1 [https://perma.cc/R7QQ-4CES].

63. Stephanie Lai et al., *Trump Renews Universal Tariff Threat to 'Protect Our Country'*, Bloomberg (Jan. 28, 2025), https://www.bloomberg.com/news/articles/2025-01-27/trump-vows-near-future-tariffs-calls-deepseek-progress-good [https://perma.cc/VY2Z-CVWY].

chips to China again.[64] This move represented a major escalation of existing policies and initially provoked retaliatory measures from China. However, following trade talks on July 29, 2025, with a 90-day extension under discussion as of August 2025 and a deadline of August 12, 2025, the two sides reached a temporary tariff truce, easing certain restrictions on low-end chip-software exports. These adjustments potentially reduce the technological divide while maintaining curbs on high-end AI technologies.[65] Nevertheless, U.S. companies such as Nvidia and AMD, which derive significant revenue from China, still face major financial setbacks under unpredictable restrictions.

In addition to AI chip restrictions, Trump has implemented tighter foreign-investment regulations to prevent Chinese firms from acquiring U.S. semiconductor technology.[66] While he introduced some of these measures during his first term, his second-term agenda prioritizes even stronger scrutiny of foreign technology investments and acquisitions. The Committee on Foreign Investment in the United States (CFIUS), which reviews foreign purchases of American companies, now plays a more active role in blocking Chinese involvement in the semiconductor industry. This approach aligns with Trump's broader goal of ensuring that cutting-edge American technology remains out of the hands of strategic competitors.

As the semiconductor landscape continues to evolve, Trump's proposals highlight a fundamental debate over the best approach to securing America's position in the industry. While some view his strategy as a necessary corrective to decades of offshoring and supply-chain vulnerabilities, others warn that it introduces new economic inefficiencies and diplomatic frictions. These measures are transforming the semiconductor industry but could also produce unintended economic consequences, depending on how they are implemented and how the industry adapts.[67]

II. U.S. Chips Regulation as a Counterweight to China's Economic Coercion

Based on the above discussion of the U.S. semiconductor regulation under both the Biden and Trump administrations, this section examines how that issue has evolved within the broader context of U.S.–China confrontation. Semiconductors are at the center of the G-2 standoff, and tensions over the sector have steadily intensified as both countries tighten their control over it.

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64. Brooke Becher & Ellen Glover, *Did Trump's Reversal on the Ai Chip Ban in China Just Torpedo U.S. AI Supremacy?*, BuiltIn (Sept. 17, 2025), https://builtin.com/articles/trump-lifts-ai-chip-ban-china-nvidia [https://perma.cc/8KPE-MEXN]

65. David Lawder et al., *US-China Tariff Truce Holds for Now but US Says Trump Has Final Say,* Reuters (July 30, 2025), https://www.reuters.com/world/china/us-china-tariff-truce-holds-now-us-says-trump-has-final-say-2025-07-29/ [https://perma.cc/UD2L-77Q7].

66. Karen Hao, *OpenAI Goes MAGA*, The Atlantic (Jan. 23, 2025), https://www.theatlantic.com/technology/archive/2025/01/openai-stargate-maga/681421/ [https://perma.cc/GU8L-88PT].

67. Kiernan, *supra* note 55; Patrick Seitz, *Nvidia Stock Falls After Trump Essentially Blocks China AI Chip Sales*, Investor's Business Daily (Apr. 16, 2025), https://www.investors.com/news/technology/nvidia-stock-falls-trump-curbs-china-ai-chip-sales/ [https://perma.cc/S3ED-W9HL].

A. The Strategic Importance of Semiconductors in the U.S.–China Rivalry

As memory chips become the most coveted items of the digital economy, both the United States and China are determined to consolidate and complete their respective domestic semiconductor industries.[68] They aim to establish self-reliant domestic manufacturing systems and build networks with reliable foreign partners. It is no wonder that chips have become a hot-button issue in the U.S.–China hegemonic struggle.[69]

Thus, the geopolitical drive underlying the Chip 4 Alliance is barely concealed: it aims to constrain China in the semiconductor sector and undermine Beijing's digital ambitions. If the four governments and their manufacturers join forces in pursuit of Washington's objectives, China will likely face a serious barrier to its chip industry, which could, in turn, affect its long-term plan for socialism based on digital supremacy.[70] As such, China has been carefully watching the alliance's developments and their possible consequences.[71]

For example, Beijing has been persuading and warning South Korea—possibly the weakest link among the four in its view—not to participate in the alliance. U.S. resolve has pushed South Korea toward joining it despite possible Chinese retaliation, as seen in the Terminal High Altitude Area Defense (THAAD) case. South Korea's deployment of the U.S.-made THAAD antimissile system in late 2016 became a serious bilateral controversy between South Korea and China. In retaliation, China imposed unilateral economic sanctions against Korea on many fronts, the consequences of which Korean industries and businesses still feel. It remains one of the thorny issues between the two neighbors in Northeast Asia. Many in South Korea worry that the Chip 4 Alliance, once in full swing, may cause significant damage to China, prompting China to target Seoul with new sanctions.

Among the four participants in the alliance, the United States and Japan have eagerly explored various domestic measures to curb China's advances in chips. Export controls issued by the U.S. Department of Commerce in August 2022 imposed a new licensing requirement, starting October 2022, for the export of certain high-performance chips to China. Various advanced computing and semiconductor manufacturing items now require a license for export to China.[72] As licenses are difficult to obtain in the current geopolitical

68. Chad P. Bown, *How the United States Marched the Semiconductor Industry into Its Trade War with China*, 24 E. Asian Econ. Rev. 349, 374-78 (Special Issue, 2020); Yongshin Kim & Sungho Rho, *The US-China Chip War, Economy-Security Nexus, and Asia*, 29 J. Chinese Pol. Sci. 433, 434, 442, 444, 450, 452 (2024).

69. Cong. Rsch. Serv., *supra* note 21.

70. Anu Bradford, *Digital Empires: The Global Battle to Regulate Technology* 190-92 (Oxford Univ. Press 2023); Manal Hamdani & Ismail Belfencha, *Strategic Implications of the US-China Semiconductor Rivalry*, 2 Discover Glob. Soc'y 67 (2024).

71. Gregory C. Allen, *China's New Strategy for Waging the Microchip Tech War*, Ctr. For Strategic & Int'l Stud. (May 3, 2023), https://www.csis.org/analysis/chinas-new-strategy-waging-microchip-tech-war [https://perma.cc/8SG2-UCWZ]; Maria Papageorgiou et al., *China as a Threat and Balancing Behavior in the Realm of Emerging Technologies,* Chinese Pol. Sci. Rev. (2024).

72. *The United States Announces Export Controls to Restrict China's Ability to Purchase and Manufacture High-End Chips*, 117 Am. J. Int'l L. 117(1), 144–45 (2023); Sujai Shivakumar et al., *Balancing the Ledger: Export Controls on U.S. Chip Technology to China*, Ctr. For Strategic &

landscape, this severely restricts sales of high-performance chips and equipment critical for AI and supercomputing processes, mainly manufactured by NVIDIA and AMD—both U.S. chipmakers—and thus far sold to Chinese companies. Notably, the same regulation also applies to foreign chipmakers as long as they use American tools and software in the design and manufacturing process. Because U.S. technology or equipment is almost always used at some point during chip manufacturing, the new regulation is expected to bring many key chipmakers from Japan, South Korea, and Taiwan under the umbrella of the new U.S. export controls. For its part, Japan adopted export controls against China in March 2023. As a dominant player in parts and equipment for the semiconductor industry, Japan's export controls further damage China's fledgling chip industry. These unilateral restrictions do not stand alone but are implemented in tandem with the alliance. It is little wonder that China's concerns over the alliance have increased and intensified.

B. U.S.-led Semiconductor Export Controls and Technology Restrictions

Since October 7, 2022, the Department of Commerce's Bureau of Industry and Security (BIS) announced a series of revisions to export controls stemming from the U.S. CHIPS and Science Act, foreclosing China's ability to acquire high-end semiconductor chips, technology, manufacturing equipment, and know-how.[73] The main rules include: (1) the Advanced Computing/Supercomputing Interim Final Rule (AC/S/IFR)[74], which designates China as a country of concern related to chip development; (2) the semiconductor manufacturing equipment (SME) rule involving licensing agreements; and (3) the expansion of the Entity List, tantamount to a blacklist of technology exports.[75] On March 31, 2023, the Department of Commerce announced national security guardrails preventing recipients of CHIPS Act funds from building or expanding semiconductor facilities in China for 10 years.[76] In addition, on August 9, 2023, President Biden signed an executive order restricting outbound investment in

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Int'l Stud. (Feb. 21, 2024), https://www.csis.org/analysis/balancing-ledger-export-controls-us-chip-technology-china [https://perma.cc/J45M-QAGD].

73. U.S. Mission China, *Commerce Implements New Export Controls on Advanced Computing and Semiconductor Manufacturing Items to the People's Republic of China,* U.S. Embassy & Consulates in China (Oct. 7, 2022), https://china.usembassy-china.org.cn/commerce-implements-new-export-controls-on-advanced-computing-and-semiconductor-manufacturing-items-to-the-peoples-republic-of-china-prc/ [https://perma.cc/TSS7-5MPZ].

74. Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification, 87 Fed. Reg. 62,186 (Oct. 13, 2022).

75. *Public Information on Export Controls Imposed on Advanced Computing and Semiconductor Manufacturing Items to the People's Republic of China (PRC) in 2022 and 2023*, U.S. Dep't of Com., Bureau of Indus. and Sec., https://www.bis.doc.gov/index.php/about-bis/newsroom/2082 [https://perma.cc/YU4P-HK6D] (last visited Dec. 27, 2025); Emily Benson, *Updated October 7 Semiconductor Export Controls*, Ctr. for Strategic & Int'l Stud. (Oct. 18, 2023), https://www.csis.org/analysis/updated-october-7-semiconductor-export-controls [https://perma.cc/PY7R-RB5J].

76. *Com. Dep't Outlines Proposed National Security Guardrails for CHIPS for America Incentives Program,* U.S. Dep't of Com. (Mar. 21, 2023), https://www.commerce.gov/news/press-releases/2023/03/commerce-department-outlines-proposed-national-security-guardrails [https://perma.cc/CYZ3-ACW5].

the semiconductor, quantum information, and AI sectors in foreign "countries of concern," which explicitly includes China.[77] The United States has also advanced domestic semiconductor-manufacturing incentives under the CHIPS and Science Act of 2022, which provides roughly $52.7 billion to strengthen U.S. chip production and research.[78] On top of that, the Biden administration leveraged and refined the Foreign Direct Product Rule (FDPR) to extend jurisdiction over third-country shipments to stop exports of semiconductor manufacturing equipment from foreign countries to Chinese chipmakers,[79] but speculation remains about possible exceptions for shipments from Japan, the Netherlands, and South Korea.[80]

On June 30, 2023, after negotiations with the United States, the Netherlands implemented export controls on ASML's most advanced extreme ultraviolet (EUV) lithography tools, affecting China's ability to produce nanometer nodes and develop AI technology. In a related development, on June 20, 2023, the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy disclosed strategies to assess economic security risks related to such export controls.[81] Since semiconductors are inherently dual-use items, EU member states can adopt similar measures to those of the U.S. under the EU's dual-use export control regulation.[82] Recently, the European Commission proposed new initiatives to strengthen economic

77. Shivakumar et al., *supra* note 72; Paul Haenle, *How Biden's New Outbound Investment Executive Order Will Impact U.S.–China Relations,* Carnegie Endowment for International Peace (Aug. 15, 2023), https://carnegieendowment.org/posts/2023/08/how-bidens-new-outbound-investment-executive-order-will-impact-us-china-relations?lang=en [https://perma.cc/8A58-JZ94].

78. *Fact Sheet: President Biden Takes Action to Protect American Workers and Businesses from China's Unfair Trade Practices,* The White House (May 14, 2024); *CHIPS and Science Act Fact Sheet,* U.S. Dep't of Com. (Aug. 9, 2022), https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2024/08/09/fact-sheet-two-years-after-the-chips-and-science-act-biden-%E2%81%A0harris-administration-celebrates-historic-achievements-in-bringing-semiconductor-supply-chains-home-creating-jobs-supporting-inn/ [https://perma.cc/WUH7-5GB8].

79. *U.S. Floats Tougher Trade Rules to Rein in China Chip Industry* (July 16, 2024), Bloomberg https://www.bloomberg.com/news/articles/2024-07-17/us-considers-tougher-trade-rules-against-companies-in-chip-crackdown-on-china; *Chip Stocks Drop on Frats US to Toughen China Rules,* BBC (July 18, 2024), https://www.bbc.com/news/articles/c7241wmknm3o [https://perma.cc/X96C-F3NN]; *U.S. Is Reportedly Weighing Further Limits on China's Access to AI Chip Tech,* CNBC (June 11, 2024), https://www.cnbc.com/2024/06/12/us-reportedly-weighing-more-limits-on-chinas-access-to-ai-chip-tech.html [https://perma.cc/VX3P-C5W4].

80. *Exclusive: New U.S. Rule on Foreign Chip Equipment Exports to China to Exempt Some Allies,* Reuters (July 31, 2024), https://www.reuters.com/technology/new-us-rule-foreign-chip-equipment-exports-china-exempt-some-allies-sources-say-2024-07-31/ [https://perma.cc/B2JR-HQWJ].

81. *An EU Approach to Enhance Economic Security,* European Commission (June 20, 2023), https://ec.europa.eu/commission/presscorner/detail/en/IP_23_3358 [https://perma.cc/2UYP-EHJN].

82. Tobias Gehrke & Julian Ringhof, *The Power of Control: Howe the EU Can Shape the New Era of Strategic Export Restrictions*, Eur. Council on Foreign Relations (May 17, 2023), https://ecfr.eu/publication/the-power-of-control-how-the-eu-can-shape-the-new-era-of-strategic-export-restrictions/ [https://perma.cc/2W5P-K8ME]; Sibylle Bauer & Mark Bromley, *The Dual-Use Export Control Policy Review: Balancing Security, Trade and Academic Freedom,* EU Non-Proliferation Consortium (Mar. 2016), https://www.sipri.org/sites/default/files/EUNPC_no-48.pdf [https://perma.cc/FVZ8-ZGS9].

security, including export controls and controlling outbound screening controls, which have faced backlash from chip vendors in Europe.[83] Yet, the Netherlands' export controls are limited to a small number of products and do not list China as a country of concern; they did not replicate the extraterritorial application of U.S. controls, leaving potential avenues—such as the use of overseas subsidiaries—that could be harder to police under the current scope.[84] Because the EU decision-making process requires all 27 member states to approve authority to impose export controls on semiconductor technologies, further progress is likely to be cumbersome.[85]

On July 23, 2023, Japan's Ministry of Economy, Trade, and Industry implemented targeted restrictions requiring government licenses for exports of chipmaking tools, and SME—where Japan holds a leading position in several critical segments—are expected to deter Chinese chipmaking.[86] These restrictions focus on 23 types of advanced semiconductor manufacturing equipment, align with U.S. controls, and are justified by Article 1 of Japan's Foreign Exchange and Foreign Trade Law.[87] However, unlike the U.S. regime, Japan's measures have a narrower scope. While BIS operates under an "Entity List" of specific foreign companies and other entities, Japan designated only 23 types of technology that require an export license, and did not explicitly designate China as a "country of concern."[88] The Trump administration built on this. In late 2024, it added more than 100 Chinese entities to the U.S. Entity List. In July 2025, it partially eased certain controls by permitting limited sales of

83. European Commission, *Commission Proposes New Initiatives to Strengthen Economic Security,* European Commission (Jan. 24, 2024), https://ec.europa.eu/commission/presscorner/detail/en/ip_24_363 [https://perma.cc/ERY5-5BAA]; Tobias Mann, *Chip Lobby Group SEMI to EU: Export Restrictions Should Only Be Used in Self-Defense,* The Register (Mar. 6, 2024), https://www.theregister.com/2024/03/06/chip_semi_eu/ [https://perma.cc/XC4S-FAKA].

84. Shivakumar et al., *supra* note 72; Gregory C. Allen & Emily Benson, *Clues to the U.S.-Dutch-Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight*, Ctr. Strategic & Int'l Stud. (Mar. 1, 2023), https://www.csis.org/analysis/clues-us-dutch-japanese-semiconductor-export-controls-deal-are-hiding-plain-sight, [https://perma.cc/KE88-WBEJ].

85. Raquel Jorge Ricart, *Policy Orientations on EU-China Relations in Semiconductors: An Outlook on Bilateral and Multilateral Agendas*, Elcano Royal Inst. (Dec. 27, 2023), https://www.realinstitutoelcano.org/en/analyses/policy-orientations-on-eu-china-relations-in-semiconductors-an-outlook-on-bilateral-and-multilateral-agendas/ [https://perma.cc/2UYN-ZRMG].

86. Gregory C. Allen, *CSIS Translation: Updated Japanese Export Controls on High-Performance Semiconductor Manufacturing Equipment,* Ctr. for Strategic & Int'l Studies (July 19, 2023), https://www.csis.org/analysis/csis-translation-updated-japanese-export-controls-high-performance-semiconductor [https://perma.cc/HY23-NFBM]; Scott Foster, *Japan Enacts Chip Export Controls at US Behest*, Asia Times (July 25, 2023), https://asiatimes.com/2023/07/japan-enacts-chip-export-controls-at-us-behest/ [https://perma.cc/Y9T5-63JU].

87. Heigo Sato, *Coordinating Japan-US Export Controls Amid Growing China Security Risk*, Int'l Info. Network Analysis (Oct. 18, 2022), https://www.spf.org/iina/en/articles/sato_01.html; Nakagawa Hiroshige et al., *Japan Tightens Export Regulations on Advanced Semiconductor Manufacturing Equipment*, Econ. Sec. & Int'l Trade Legal Update (May 17, 2023), https://www.amt-law.com/asset/pdf/bulletins5_pdf/230517.pdf [https://perma.cc/8G99-R5Q5].

88. Hideki Tomoshige, *Key Differences Remain Between U.S. and Japanese Advanced Semiconductor Export Controls on China*, CSIS (May 25, 2023), https://www.csis.org/blogs/perspectives-innovation/key-differences-remain-between-us-and-japanese-advanced-semiconductor#:~:text=Legally%2C%20METI%20can%20make%20a,the%20exporter%20follows%20the%20agreement [https://perma.cc/P9BG-A6YW]; Shivakumar et al., *supra* note 72.

downgraded AI chips to China under a reported 15% revenue-share arrangement. In August 2025, it brought charges against two Chinese nationals for illegally shipping Nvidia AI chips to China—steps intended to maintain the U.S. AI lead while discouraging China's self-reliance, though risking escalation as Beijing pushes toward 5 nm-class chip production (the extent of that capability remains contested). The evolution from Biden-era to Trump-era controls is summarized in the table below.

Date	Measure	Target (Focus on China)	Impact
Oct 2022 (Biden)	Initial export controls on advanced computing/ semiconductor items	High-end chips/ tech for AI/ supercomputing	Virtual ban on sales to Chinese entities; extraterritorial application
2023 Expansions (Biden)	Licensing for SME; Entity List growth; outbound investment restrictions	Quantum/AI sectors; "countries of concern" such as China	Impeded China's capabilities; allies (Netherlands/ Japan) aligned with restrictions
Dec 2024 – Aug 2025 (Trump)	New restrictions on 140+ firms; FDPR expansions; rare-earth retaliation counters	Broader chip equipment/AI chips; retaliatory rare-earth curbs from China	Intensified rivalry; China advances (e.g., 5nm chips); "warning shots" at Nvidia; U.S. "small yard, high fence" widened

While curbing China's semiconductor industry on the one hand, the four members on the other hand provide massive support to their domestic chipmakers. Under the CHIPS and Science Act, the U.S. government will provide $52–53 billion in direct incentives for chipmakers in America, within a broader ~$280 billion package that also funds other science and technology initiatives.[89] Foreign companies are incentivized to move their production facilities to the United States to claim these subsidies. In June 2022, Japan unveiled its plan to expand its semiconductor manufacturing capability. Consider, for example, Taiwan Semiconductor Manufacturing Company's (TSMC) decision to build fabs in Phoenix, Arizona, and Kumamoto, Japan.[90] Another Taiwanese

89. Brian Bushard, *CHIPS Act Passes: House Approves $280 Billion Bill to Boost Microchip Production and Counter China*, Forbes (July 28, 2022), https://www.forbes.com/sites/brianbushard/2022/07/28/chips-act-passes-house-approves-280-billion-bill-to-boost-microchip-production-and-counter-china/ [https://perma.cc/55SE-686Y]; *Senate Approves $280 Billion Bill to Boost U.S. Chip Making*, The Wall Street Journal (July 27, 2022), https://www.wsj.com/articles/senate-approves-280-billion-bill-to-boost-u-s-science-chip-production-11658942295 [https://perma.cc/C2S5-BMYN].

90. *How TSMC's chip plant is shaking up Japan*, Financial Times (Sept. 26, 2023), https://www.ft.com/content/09f0ae79-8935-4070-ab52-dc828b770dce; *see also TSMC to Build Second Japan Chip Factory, Raising Investment to $20 Billion*, Reuters (Feb. 6, 2024), https://www.reuters.com/technology/tsmc-build-second-japan-chip-factory-raising-investment-20-bln-2024-02-06/ [https://perma.cc/BRR2-NS4H].

semiconductor contract manufacturer, Powerchip Semiconductor Manufacturing Corporation (PSMC), planned to establish a plant in Miyagi, investing $2.6 billion with Japan's investment firm SBI Holdings, though the deal was terminated in September 2024.[91] Additional AI-related memory chip manufacturing projects by Micron in Hiroshima have been delayed until 2027.[92] Samsung is building its new fabs in Taylor, Texas, although completion has been delayed to 2026.[93] SK Hynix is establishing its advanced semiconductor facility in West Lafayette, Indiana (approved in May 2025).[94] One may wonder whether these chipmakers would have relocated their fabs and chosen these locations if economic efficiency had been the main consideration. One could instead speculate about heavy geopolitical calculation. In turn, South Korea announced plans to establish a new semiconductor industrial complex near Yongin by investing $230 billion over the next 20 years.[95] On top of that, in May 2024, the Korean government announced another project to form a mega-cluster for semiconductor production in Gyeonggi province, with around $470 billion in private investment over the next two decades.[96] The four

91. Charles Mok, *The Other Half of "Chip 4": Japan and South Korea's Different Paths to De-Risking*, The Diplomat (June 3, 2024), https://thediplomat.com/2024/06/the-other-half-of-chip-4-japan-and-south-koreas-different-paths-to-de-risking/ [https://perma.cc/5BC2-AUHJ]; Monica Chen et al., *SBI Terminates Semiconductor Plant Partnership with Taiwan's PSMC*, DigiTimes Asia (Sept. 28, 2024), https://www.digitimes.com/news/a20240928PD200/psmc-plant-partnership-government-taiwan.html [https://perma.cc/6EW2-GAYG].

92. *Micron Taps Taiwan and Japan to Make Advanced AI Memory Chip*, Nikkei Asia (Nov. 6, 2023), https://asia.nikkei.com/Business/Tech/Semiconductors/Micron-taps-Taiwan-and-Japan-to-make-advanced-AI-memory-chips [https://perma.cc/L8A3-6DRG]; Jen-Chieh Chiang et al., *Micron Reportedly Plans to Produce Advanced DRAM in Japan by the End of 2027*, DigiTimes Asia (May 28, 2024), https://www.digitimes.com/news/a20240528PD215/micron-japan-dram-production-2027.html [https://perma.cc/QW2H-8APX].

93. *Governor Abbott Announces New $17 Billion Samsung Manufacturing Facility in Taylor,* Office of the Texas Governor (Nov. 23, 2021), https://gov.texas.gov/news/post/governor-abbott-announces-new-17-billion-samsung-manufacturing-facility-in-taylor [https://perma.cc/8TDA-MUMF]; Amy Fan et al., *Samsung Delays HBM4 Rollout to 2026 Due To Yield Challenges, All While SK Hynix Strengthens Lead in AI Memory*, DigiTimes Asia (July 24, 2025), https://www.digitimes.com/news/a20250724PD223/samsung-hbm4-production-2026-sk-hynix.html [https://perma.cc/7Q3B-YNSQ].

94. Mackenzie Hawkins et al., *SK Hynix Favors Indiana Over Arizona for $15 Billion Chip Site*, Bloomberg (Feb. 2, 2024), https://www.bloomberg.com/news/articles/2024-02-02/south-korea-s-sk-hynix-favors-indiana-over-arizona-for-15-billion-chip-site [https://perma.cc/96K5-HTC6]; *see also* Yoolim Lee et al., *SK Hynix Plans to Spend $4 Billion on First U.S. Chip Plant*, Bloomberg (Apr. 4, 2024), https://www.bloomberg.com/news/articles/2024-04-03/sk-hynix-plans-to-spend-4-billion-on-first-us-chip-plant [https://perma.cc/9WAG-DFME]; Shin-Young Park et al., *Trump's Chip Tariff Threat Stirs Jitters; Impact on Samsung, SK Hynix Limited Given MFN Status*, Korea Economic Daily (Aug. 7, 2025), https://www.kedglobal.com/business-politics/newsView/ked202508070011 [https://perma.cc/G9EC-7NPX].

95. Heekyong Yang et al., *Samsung Electronics to Invest $230 Billion Through 2042 in South Korea Chipmaking Base*, Reuters (Mar. 15, 2023), https://www.reuters.com/technology/samsung-electronics-invest-230-bln-through-2042-south-korea-chipmaking-base-2023-03-15/ [https://perma.cc/6XXS-A93L].

96. Martin Chorzempa, *The U.S. and Korean CHIPS Acts are Spurring Investment but at a High Cost*, Peterson Inst. For Int'l Econ. (June 10, 2024), https://www.piie.com/blogs/realtime-economics/2024/us-and-korean-chips-acts-are-spurring-investment-high-cost [https://perma.cc/3VRM-KR4T]; Eun-Soo Jin, *Korea on Track to Become No.2 Chipmaker by 2032*, Korea JoongAng Daily (May 9, 2024), https://koreajoongangdaily.joins.com/news/2024-05-09/business/industry/Korea-on-track-to-become-No-2-chipmaker-by-2032/2043373 [https://perma.cc/B3Y6-XY6N].

participants in the alliance support their companies within their jurisdictions and relocate them within the alliance network. Considering the long-term enhancement of competitive edge in this highly competitive market, such collective efforts will make China edgy and defensive.

In short, to solidify their strategic upper hand, the four members of the alliance are making various efforts—both sticks and carrots—and cooperating with their domestic and foreign chip manufacturers. At the end of the day, the alliance appears poised to establish a semiconductor manufacturing network that excludes China and Chinese companies, at least for the critical segment of the semiconductor business.

Given this, the alliance—once in full operation—may serve as a counterweight to China's economic coercion, which is increasingly gaining attention in Japan, South Korea, and Taiwan. The topic also prompted a joint declaration at the G7 meeting held in Hiroshima, Japan, in May 2023, in which the G7 states promised collective action if necessary.[97] Because the three participants are particularly vulnerable to coercive measures from Beijing, the Chip 4 Alliance may offer a meaningful counterweight. China's recent request that South Korea fill the production gap created by the ousting of the U.S. firm Micron Technology shows this potential.[98] The U.S. has urged South Korea not to fill any production gap if Micron were restricted in China, although concerns persist that Beijing could pressure Korean firms to do so. To counter economic coercion, mere rhetoric is insufficient. A practical arrangement should be available. The Chip 4 Alliance may offer such an option to prevent, blunt, or cease possible coercive measures across diverse economic sectors. In this regard, it is a meaningful development that the United States, Japan, and South Korea have explicitly vowed to "confront and overcome economic coercion" at their trilateral summit held at Camp David in August 2023.[99]

C. China's Countermeasures and Growing Global Pressure

China has repeatedly used economic coercion against its trading partners in response to geopolitical disputes, often targeting the semiconductor sector given its strategic importance.[100] These tactics illustrate China's pattern of coercion, pressuring allies and eroding unified responses. One notable example is China's response to the Netherlands and Japan's alignment with the U.S. on export control measures restricting advanced semiconductor equipment.[101] China applied diplomatic pressure, with Chinese officials making di-

97. *G7 Hiroshima Leaders' Communiqué,* The White House (May 20, 2023).

98. Jiyoung Sohn et al., *China's New Chip Ban on Micron Puts South Korea in a Delicate Spot*, The Wall Street Journal (May 22, 2023), https://www.wsj.com/articles/chinas-new-chip-ban-on-micron-puts-south-korea-in-a-delicate-spot-21ce5259 [https://perma.cc/7PXC-S4LN].

99. *The Spirit of Camp David: Joint Statement of Japan, the Republic of Korea, and the United States*, U.S. Embassy & Consulate in the Republic of Korea (Aug. 19, 2023).

100. Blevins et al., *supra* note 31.

101. Jeremy Mark & Dexter Tiff Roberts, *U.S.– China Semiconductor Standoff: A Supply Chain Under Stress*, Atlantic Council (Feb. 23, 2023), https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/united-states-china-semiconductor-standoff-a-supply-chain-under-stress/ [https://perma.cc/H4Q4-JQZU].

rect statements warning both countries against supporting these controls. In Japan's case, Chinese Foreign Minister Qin Gang explicitly reminded Japan of its past grievances when the U.S. restricted its semiconductor industry in the 1980s, hinting that supporting such actions against China would have negative consequences. The Netherlands, which plays a critical role in the supply chain through its company ASML, faced similar warnings, as Chinese officials implied that there would be retaliation if the Netherlands continued to comply with U.S. policies.

This pressure strategy has also extended to South Korea, where China has used its significant economic leverage to influence policy decisions.[102] China's deep trade ties with South Korean semiconductor giants like Samsung and SK Hynix—which operate substantial facilities in China—have made it difficult for Seoul to navigate between aligning with the U.S. export controls and maintaining a stable economic relationship with Beijing. Additionally, China has reportedly threatened these companies with countermeasures, further complicating their position and underscoring Beijing's intent to undermine any cohesive semiconductor control strategy among U.S. allies.

China's economic pressure extends to Europe as well. The European Union has faced growing concerns about China's influence over its semiconductor supply chains. In response to the EU's discussions on implementing more stringent controls on technology exports to China, Beijing warned that it would disrupt critical supply chains that European companies depend on.[103] This has led to hesitation within the EU, as policymakers try to balance strategic autonomy with economic dependence.

In Taiwan, China has employed coercive tactics to undermine Taiwan's semiconductor dominance. The Taiwanese semiconductor industry, which is a global leader in chip manufacturing, has been under continuous threat from Chinese attempts to lure away skilled talent and engage in industrial espionage.[104] Moreover, political pressures have increased, as Taiwan's strategic position makes it vulnerable to Beijing's broader geopolitical maneuvers aimed at controlling advanced technology supply chains.

III. Legal Issues Haunting the Global Community

The global semiconductor industry now faces unprecedented legal challenges as governments increasingly impose unilateral measures that strain the foundations of international trade and investment law. The rapid shift toward economic security-driven policies, including export controls, investment restrictions, and state subsidies, has created a complex legal landscape where

102. Andrew Yeo & Kristin Vekasi, *Can the United States, South Korea, and Japan Boost Resilience to Economic Coercion?*, Brookings (July 7, 2023), https://www.brookings.edu/articles/can-the-united-states-south-korea-and-japan-boost-resilience-to-economic-coercion/ [https://perma.cc/NQ84-DTUD].

103. Sarah Kreps & Paul Timmers, *Bringing Economics Back into EU and U.S. Chips Policy*, Brookings (Dec. 20, 2022), https://www.brookings.edu/articles/bringing-economics-back-into-the-politics-of-the-eu-and-u-s-chips-acts-china-semiconductor-competition/ [https://perma.cc/43NT-HM5B]

104. Blevins et al., *supra* note 31.

existing rules struggle to accommodate new geopolitical realities. Traditional trade agreements, designed to promote market liberalization and non-discrimination, are now being tested against policies that prioritize national security and strategic autonomy over free trade principles. As states expand their regulatory reach over semiconductor supply chains, the global community is struggling to find a legal consensus on how to reconcile security-driven restrictions with international economic obligations. In the absence of a semiconductor-specific multilateral legal framework, security-motivated measures are increasingly contested, revealing structural weaknesses in existing rules.[105]

On August 11–12, 2025, the U.S. government unveiled an unprecedented agreement allowing the export of certain AI chips (e.g., the H20 and other next-generation models with reduced performance) to China on the condition that 15% of sales revenue from Nvidia and AMD be paid to the government. This development brings to the forefront new legal questions about the boundary between the public-interest goals of export controls and revenue generation, as well as the agreement's relationship to the U.S. Constitution's prohibition on export taxes.

The key legal issues arising from this shift are structural in nature, as they involve deep-seated conflicts between national security imperatives and treaty-based commitments to free trade and investment protection. Governments increasingly invoke national security exceptions under WTO agreements and investment treaties; while panels in *Russia–Transit* (2019) and the *US–Steel/Aluminum* (2022) disputes articulated reviewable limits, their application remains uneven, and outcomes are often suspended by appeals "into the void."[106,107] This ambiguity has allowed several major economies to impose unilateral semiconductor-related restrictions without facing immediate legal repercussions, creating a fragmented regulatory environment that disrupts global supply chains. At the same time, the paralysis of the WTO Appellate Body—and only partial substitution via the MPIA among willing members—has left affected states with limited remedies. Without a concerted effort to modernize international legal frameworks, the semiconductor industry may become a primary battleground for economic conflict, further complicating global efforts to maintain a stable and predictable trade order.[108]

A. Emerging Structural Legal Problems

The evolving semiconductor trade landscape has exposed fundamental weaknesses in the global legal framework, revealing fractures that extend

105. *Semiconductors,* OECD (2023), https://www.oecd.org/en/topics/sub-issues/semiconductors.html [https://perma.cc/8ZKH-J6YM] (last visited Dec. 28, 2025); U.N. Conf. on Trade and Dev., *World Investment Report 2022* (June 9, 2022).

106. Chad P. Bown & Douglas A. Irwin, *The Gatt's Starting Point: Tariff Levels Circa 1947* (World Bank Pol'y Rsch, Working Paper No. 7649, 2016).

107. Panel Report, *Russia—Measures Concerning Traffic in Transit*, WTO Doc. WT/DS512/R (adopted Apr. 5, 2019) [hereinafter *Russia–Transit*]; Panel Report, *United States—Certain Measures on Steel and Aluminum Products*, WTO Doc. WT/DS544/R (adopted Dec. 9, 2022) [hereinafter *US–Steel/Aluminum*].

108. John H. Jackson, *The WTO Dispute Settlement Understanding—Misunderstandings on the Nature of Legal Obligation*, 91 Am. J. of Int'l L. 60, 60-64 (1997).

beyond individual policy decisions. At the heart of these challenges is a growing misalignment between long-established international trade and investment agreements and the unilateral measures adopted by key states.[109] As economic security concerns increasingly override traditional free trade principles, governments have leveraged national security exceptions to justify extensive restrictions on exports, technology transfers, and foreign investments. While these measures are often framed as necessary responses to geopolitical risks, their broad and inconsistent application has raised concerns about systemic legal uncertainty. This legal turbulence is not limited to individual disputes but signals a deeper structural shift in the international legal order, where security imperatives threaten to erode the predictability and stability of economic governance.

Compounding these challenges is the weakening of dispute resolution mechanisms that once served as the backbone of the global trade and investment system. The increasing reliance on national security exceptions has rendered judicial oversight ineffective in many cases, as states invoke these provisions to shield themselves from legal accountability. This trend is exacerbated by the paralysis of the WTO dispute settlement system and ongoing ISDS reform debates since 2017, which have introduced uncertainty around the forum and standards applicable to security-sensitive investments.[110] As a result, the legal instruments designed to mediate economic conflicts are increasingly unable to function as intended, leaving businesses and governments with little recourse in navigating trade disputes. Without structural reform, these developments could accelerate the fragmentation of international trade law, forcing states to seek alternative, ad hoc arrangements that prioritize strategic considerations over legal coherence.

1. Violation of Existing Treaties

Recent shifts in U.S. semiconductor policy significantly challenge the integrity of existing trade and investment treaties. Designed to curb China's access to critical chip technology, these measures have imposed unilateral restrictions on exports, foreign investments, and technology-sharing arrangements.[111] While framed as necessary national security responses, they raise potential inconsistencies with commitments enshrined in trade agreements that emphasize non-discrimination, market access, and fair competition.[112] The exclusionary nature of these policies raises concerns about their compliance with fundamental principles of international economic law, as they selectively disadvantage specific nations and industries. As a result, the global trade

109. Li Long et al, *Analysis of the Structure and Robustness of the Global Semiconductor Trade Network*, PLOS One, (Jan. 9, 2025).

110. Jackson, *supra* note 108.

111. *WTO Report Shows Increase in Trade Restriction Against Backdrop of Unilateral Policies*, World Trade Org. (Dec. 11, 2024), https://www.wto.org/english/news_e/news24_e/trdev_11dec24_e.htm [https://perma.cc/XA65-XP7D].

112. U.N. Conf. on Trade and Dev., *World Investment Report 2023* (July 5, 2023).

regime faces mounting strain, with affected states increasingly contesting these restrictions as unlawful trade barriers.[113]

Beyond trade agreements, recent U.S. chip measures also raise questions about long-standing investment protections in various bilateral and multilateral treaties. Foreign investors in semiconductor manufacturing and related sectors now face heightened uncertainty, as restrictions on capital flows and cross-border technology partnerships could violate core provisions of investment treaties. Many of these agreements contain fair and equitable treatment (FET) provisions, safeguards against expropriation, and access to investor-state dispute settlement (ISDS) mechanisms; critics argue these safeguards are being curtailed by evolving security-driven policies.[114] This shift signals a departure from the investment liberalization principles that have underpinned global economic relations for decades, raising concerns about the broader implications for foreign direct investment (FDI). As semiconductor supply chains grow increasingly politicized, investors may find themselves subject to erratic regulatory shifts that challenge legal predictability. At the same time, Taiwan added Huawei and SMIC to its export control list on June 15, 2025, and on July 9, 2025, China announced reciprocal export controls targeting eight Taiwanese companies, with such tit-for-tat measures heightening both supply chain risks and legal uncertainty.[115]

The legal uncertainty generated by these violations extends beyond individual economic actors, threatening the credibility of the international trade and investment system as a whole. While the use of national security justifications for trade restrictions has historical precedent, its expansion in the semiconductor sector risks normalizing the practice as a means of economic statecraft. If left unchecked, this trend could weaken confidence in the enforceability of trade and investment treaties, encouraging other states to adopt similar unilateral measures. In such a scenario, retaliatory actions and escalating trade disputes may become more frequent, further fragmenting the global economic order. Addressing these concerns will require a multilateral approach that reestablishes legal certainty while accommodating legitimate security concerns.

a. Trade Agreements

The recent U.S. semiconductor trade restrictions are alleged to contravene several fundamental trade agreements in multiple disputes, particularly those under the World Trade Organization (WTO) framework, though final

113. Yong-Shik Lee, *Three Wrongs Do Not Make a Right: The Conundrum of the U.S. Steel and Aluminum Tariffs, Retaliatory Tariffs, and the WTO*, 18 World Trade Rev. 481 (2019); *The U.S. Announces Export Controls to Restrict China's Ability to Purchase and Manufacture High-End Chips*, 117 Am. J. Int'l L. 117(1), 144–50 (2023).

114. Robert Howse, *The World Trade Organization 20 Years On: Global Governance by Judiciary*, 27 Eur. J. of Int'l L. 9, 9-77 (2016).

115. Ben Blanchard, *Taiwan Adds China's Huawei and SMIC to Export Control List*, Reuters (June 15, 2025), https://www.reuters.com/world/china/taiwan-adds-chinas-huawei-smic-export-control-list-2025-06-15/ [https://perma.cc/WT98-9BKS]; Joe Cash, *China Places Export Controls on Eight Taiwanese Firms Citing Dual-use Tech Concerns*, Reuters (July 9, 2025), https://www.reuters.com/markets/emerging/china-places-export-controls-eight-taiwanese-firms-citing-dual-use-tech-concerns-2025-07-09/ [https://perma.cc/X8VD-APSA].

adjudication has been stalled by the Appellate Body impasse. The most-favored-nation (MFN) principle under GATT Article I[116] mandates that trade advantages granted to one WTO member must be extended to all others. However, export controls and technology-sharing restrictions may result in de facto discrimination against certain countries, particularly China, in direct contradiction to this obligation—whether such measures breach MFN turns on the security exception analysis currently in dispute. Additionally, the General Agreement on Trade in Services (GATS) Article XVI[117] which prohibits market access restrictions in committed sectors, could be implicated where a WTO member has scheduled market-access commitments, depending on whether the licensing requirements and investment bans targeting Chinese semiconductor firms amount to prohibited limitations.[118] These measures not only disrupt established supply chains but also create a fragmented global trading environment where geopolitical considerations dictate trade policy more than legally binding commitments.

Moreover, several free trade agreements (FTAs) are being jeopardized by these restrictions, as they impose new barriers that raise compatibility questions under FTAs that commit parties to non-discrimination and market access. Many FTAs contain provisions guaranteeing national treatment, requiring that foreign goods and services receive treatment no less favorable than domestic counterparts. However, restrictions that limit semiconductor-related exports and investments may effectively prioritize U.S. and allied firms, potentially creating de facto discrimination against companies from non-allied nations.[119] Agreements such as the USMCA (United States–Mexico–Canada Agreement)[120] and the KORUS (Korea–U.S.) FTA[121] emphasize open and predictable market conditions, yet recent semiconductor policies have prompted concerns about this stability by introducing unilateral security-based trade measures.[122] Such inconsistencies raise serious concerns about the enforceability of trade rules, as governments increasingly circumvent treaty obligations under the guise of economic security.

The broader impact of these violations extends beyond individual agreements, threatening the structural integrity of the global trade system. The increasing reliance on national security exceptions—particularly under GATT Article XXI—to justify trade restrictions sets a dangerous precedent that may be exploited by other states to justify protectionist measures. While WTO dispute settlement mechanisms have historically provided a forum to address

116. Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 187, Annex IA.

117. Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1869 U.N.T.S. 183, Annex 1B.

118. Office of the U.S. Trade Representative, *2023 Report to Congress on China's WTO Compliance* (2024).

119. U.S. Int'l Trade Comm'n, *Economic Impact of Trade Agreements Implemented Under Trade Authorities Procedures, 2021 Report* (2021).

120. *U.S.–Mexico–Canada Agreement*, Nov. 30, 2018, as revised Dec. 10, 2019 (entered into force July 1, 2020).

121. *U.S.–Korea Free Trade Agreement*, June 30, 2007 (entered into force Mar. 15, 2012).

122. Mark E. Manyin & Liana Wong, Cong. Rsch. Serv. IF1073, U.S.-South Korea FTA and Bilateral Trade Relations (2024).

such issues, their effectiveness has been significantly weakened due to the Appellate Body's paralysis. Consequently, affected states have limited recourse to challenge trade restrictions, accelerating the erosion of multilateral trade norms.[123] If this trajectory continues, it risks normalizing unilateral trade actions, and ultimately dismantling the legal predictability that has underpinned global commerce for decades.

b. Investment Agreements

The increasing intervention of governments in the semiconductor sector has created potential conflicts with international investment agreements, particularly those protecting foreign direct investment (FDI). Many bilateral investment treaties (BITs) and multilateral agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)[124] and various investment chapters in free trade agreements (FTAs), guarantee protections such as fair and equitable treatment (FET), national treatment, and protection against expropriation. However, U.S. export controls, investment restrictions, and outbound screening measures targeting China have created an environment of legal uncertainty, discouraging foreign investors from participating in semiconductor-related ventures.[125] By conditioning state support on domestic production and restricting capital movement into specific jurisdictions, these measures may differentially impact foreign firms and could be alleged to be inconsistent with established investment protections.[126]

Additionally, the use of national security justifications to sidestep investment treaty obligations has raised concerns about due process and investor rights. Many investment agreements contain expropriation clauses that require compensation when a state's actions result in a substantial deprivation of an investor's assets. Yet recent U.S. policies restrict certain transactions and expansions involving targeted foreign firms, prompting claims of inadequate legal recourse.[127] The CHIPS and Science Act and related executive orders impose guardrails on CHIPS-funding recipients (e.g., expansion and technology clawbacks), limiting their ability to operate freely in semiconductor markets. Such measures could trigger investment disputes under the investor-state dispute settlement (ISDS) mechanisms, as affected companies seek compensation for regulatory actions alleged to violate treaty commitments.[128] However, the

123. *Commerce Strengthens Export Controls to Restrict China's Capability to Produce Advanced Semiconductors for Military Applications,* Bureau of Indus. & Sec. (Dec. 2, 2024), https://www.bis.gov/press-release/commerce-strengthens-export-controls-restrict-chinas-capability-produce-advanced-semiconductors-military [https://perma.cc/J8J3-GHD6].

124. *Comprehensive and Progressive Agreement for Trans-Pacific Partnership,* Mar. 8, 2018 (entered into force Dec. 30, 2018) (hereinafter "CPTT").

125. Joachim Karl, *National Security Exceptions in International Investment Agreements*, UNCTAD, https://cil.nus.edu.sg/wp-content/uploads/2011/06/Session-2-Joachim-Karl-National-Security-Exceptions-in-International-Investment-Agreements.pdf [https://perma.cc/34RK-22QZ].

126. Sebastian Mantilla Blanco & Alexander Phel, *National Security Exceptions in International Trade and Investment Agreements: Justiciability and Standards of Review* 1-73 (2020).

127. Bureau of Indus. & Sec., *supra* note 123.

128. Gregory C. Allen, *The True Impact of Allied Export Controls on the U.S. and Chinese Semiconductor Manufacturing Equipment Industries*, Ctr. for Strategic and Int'l Stud. (Nov. 26, 2024), https://www.csis.org/analysis/true-impact-allied-export-controls-us-and-chinese-semiconductor-manufacturing-equipment [https://perma.cc/2B2H-4YPP].

ongoing reform negotiations on ISDS since 2017 have introduced uncertainty regarding the future architecture and remedies, leaving many investors with less clarity about available legal remedies.

The broader implication of these measures and disputes is the erosion of investor confidence in the semiconductor industry, leading to potential capital flight and supply chain realignment. Traditionally, investment agreements have provided a stable and predictable legal framework for cross-border investments, encouraging long-term commitments from private actors. However, as governments introduce new barriers under the pretext of economic security, the risk of regulatory fragmentation and retaliatory measures grows.[129] This shift could undermine global investment flows, forcing companies to restructure their operations in compliance with evolving, security-based trade policies. Without legal certainty, the semiconductor industry may face heightened volatility, further destabilizing an already fragile supply chain.

2. *Unclear Parameters of National Security Exceptions*

The increasingly broad invocation of national security exceptions in the semiconductor sector has created significant legal ambiguity, obscuring the boundary between legitimate security concerns and protectionism. GATT Article XXI and similar provisions in bilateral and multilateral trade agreements allow such measures; panel reports (e.g., *Russia–Transit*) recognize reviewability yet afford substantial deference, inviting divergent applications. This vagueness has become particularly pronounced as the U.S. and other major economies impose sweeping restrictions on semiconductor exports and technology transfers, often without precise legal definitions of what constitutes a national security threat.[130] The problem is further compounded by the absence of a standardized review mechanism, leaving room for unilateral measures that lack objective scrutiny. As economic and technological competition intensifies, the risk of misusing security exceptions to justify trade distortions is becoming a pressing concern for the international community.

One of the primary challenges stems from the fact that economic security is increasingly conflated with national security, expanding the scope of exceptions beyond their original intent. While security exceptions were historically reserved for scenarios involving military conflicts or critical national defense, recent justifications have encompassed economic dependencies, intellectual property risks, and supply chain vulnerabilities.[131] This shift has led to growing disputes at the WTO and other trade forums, as affected states challenge restrictions that appear to be trade-motivated rather than security-driven.

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129. Matthew Schleich & Thibault Denamiel, *Why US Semiconductor Export Controls Backfire*, The Diplomat (May 23, 2024), https://thediplomat.com/2024/05/why-us-semiconductor-export-controls-backfire/ [https://perma.cc/V733-GH8Z].

130. Mona Pinchis-Paulsen et al., *The National Security Exception at the WTO: Should It Just Be a Matter of When Members Can Avail of It? What About How?*, 23 World Trade Rev. 271, 272, 286 (2024).

131. Kartikeya Garg, *The National Security Exception in International Trade and Cybersecurity*, 2 Commonwealth Cyber J. 110, 111 (2024).

The *Russia–Transit* dispute at the WTO highlighted this issue, as the panel acknowledged that states retain broad discretion in defining their essential security interests but failed to establish clear limits on how far such claims can be stretched.[132] Without greater clarity, governments may continue to invoke security exceptions as a blanket justification, setting a dangerous precedent that erodes confidence in international economic law.

The growing reliance on national security exceptions also risks escalating geopolitical tensions and trade disputes, as rival states impose countermeasures in response to perceived economic coercion. The lack of a coherent international framework for adjudicating security-related trade restrictions has left businesses uncertain about the stability of cross-border supply chains and investment flows. Semiconductor companies operating in multiple jurisdictions must now navigate an increasingly fragmented regulatory environment, where security policies shift based on political considerations rather than legal consistency. If left unchecked, this trend could undermine multilateral trade institutions and accelerate the transition toward regionalized economic blocs, further complicating efforts to maintain a stable and predictable legal order in global semiconductor trade.

3. *Suspended Dispute Settlement Proceedings*

Paralysis of WTO appeals and ongoing uncertainty from ISDS reform have exacerbated the uncertainty around semiconductor-related disputes. The WTO Appellate Body (AB), once a central pillar of global trade dispute resolution, remains inoperative due to the continued U.S. blockade on new judicial appointments. As a result, cases involving semiconductor-related trade restrictions cannot proceed beyond the initial panel stage, leaving disputes unresolved and allowing unilateral measures to persist unchallenged. Meanwhile, within free trade agreements (FTAs), dispute resolution remains largely underutilized, as affected states often refrain from challenging security-related restrictions due to political sensitivities. This has created a vacuum in legal oversight, enabling major economies to circumvent their trade obligations under the pretext of economic security. Without a functioning adjudicatory body, the fragmentation of trade law is likely to accelerate, forcing countries to pursue bilateral or regional alternatives that may lack the same level of legal predictability.

In the realm of investment dispute settlement, the situation is similarly precarious. While investor-state dispute settlement (ISDS) mechanisms remain formally available under many bilateral investment treaties (BITs) and investment chapters in FTAs, ongoing reform work since 2017 has created uncertainty regarding applicable procedures and forums.[133] Many governments have sought to limit the authority of ISDS tribunals, arguing that they unduly constrain states' ability to regulate in the public interest, particularly in strategic sectors like semiconductors. The result is that affected investors

132. Allen, *supra* note 128.

133. *Working Group III: Investor-State Dispute Settlement Reform*, United Nations, https://uncitral.un.org/en/working_groups/3/investor-state [https://perma.cc/3DCX-NAXE] (last visited Dec. 28, 2025).

face legal uncertainty, as previously guaranteed protections—such as compensation for expropriation and fair treatment—are increasingly subject to political discretion.[134] Without a reliable avenue for investors to challenge government-imposed restrictions, foreign direct investment (FDI) flows in the semiconductor industry may decline, further destabilizing global supply chains.

The broader consequence of suspended dispute settlement proceedings is the erosion of trust in the multilateral legal system, potentially encouraging more states to adopt retaliatory measures rather than seek legal remedies. The absence of enforcement mechanisms has already led some governments to explore alternative trade governance structures, such as the Indo-Pacific Economic Framework (IPEF) and regional semiconductor alliances that bypass traditional WTO rules. While the IPEF was originally launched during the Biden administration, its focus on supply chain restructuring—rooted in the U.S. approach to economic security and strategic competition with China—is expected to be substantively retained under the Trump administration. This continuity shows that, even with progress limited primarily to the supply chain pillar in formal negotiations, the IPEF's substance remains relevant to current debates on trade governance. At the same time, it reflects a broader shift toward selective, security-oriented trade arrangements that could reshape the global economic order outside the traditional multilateral framework. If left unchecked, this trend could result in a legal vacuum, where economic coercion and unilateralism replace established legal norms.[135] Ultimately, the semiconductor industry, as a critical node in global trade, may become the proving ground for a new era of geopolitically driven economic governance, further weakening the role of international dispute resolution bodies.

B. Need for a New Legal Framework for the Global Semiconductor Trade

The rapid transformation of the semiconductor industry, driven by geopolitical tensions and economic security concerns, necessitates a comprehensive legal framework capable of addressing the mounting challenges posed by unilateral restrictions and regulatory fragmentation. The existing trade and investment agreements, rooted in the principles of market liberalization and non-discrimination, struggle to provide clear disciplines for national security-driven interventions in semiconductor trade. As governments impose export controls, investment screening mechanisms, and industrial policy measures, the absence of a coherent legal structure has left businesses and investors

134. Crina Baltag & Cristen Bauer, *An Update on the ISDS Reform: The 27th Session of the UNCITRAL Working Group III Investor-State Dispute Settlement Reform*, Kluwer Arb. Blog (May 2. 2019), https://arbitrationblog.kluwerarbitration.com/2019/05/02/an-update-on-the-isds-reform-the-37th-session-of-the-uncitral-working-group-iii-investor-state-dispute-settlement-reform/ [https://perma.cc/P639-QG8C].

135. Marianne Schneider-Petsinger, *Reforming the World Trade Org.: Prospects for Transatlantic Cooperation and the Global Trade System* 13–14 (Chatham House Research Paper, 2020).

vulnerable to unpredictable regulatory shifts.[136] Without a new international framework tailored to the semiconductor sector, the industry will continue to face legal uncertainties that disrupt global supply chains and hinder technological collaboration.

A well-defined semiconductor trade and investment regime should balance economic security imperatives with legal predictability, ensuring that national security exceptions are not abused to justify disguised protectionism. The international legal community must explore a structured dispute resolution mechanism capable of adjudicating semiconductor-related conflicts, filling the WTO Appellate Body void and addressing uncertainties arising from the ongoing ISDS reform. Given the growing overlap between economic and security considerations, a new legal framework must provide clear procedural safeguards to prevent arbitrary restrictions on technology transfers, FDI, and cross-border R&D collaborations.[137] Without these safeguards, semiconductor-producing nations risk engaging in regulatory tit-for-tat measures, further fragmenting the global market and increasing the likelihood of economic retaliation.

The need for a sector-specific legal architecture is evident in the current push for regional semiconductor alliances, such as the Chip 4 Alliance, which lack formalized legal commitments and remain vulnerable to political shifts. A legally binding multilateral semiconductor treaty could harmonize regulatory standards, establish clear investment protections, and define acceptable security measures, thereby reducing uncertainty for governments and industry players alike.[138] A sector-specific treaty is not without precedent. As a comparative model, the Council of Europe's 'Framework Convention on Artificial Intelligence' was adopted on May 17, 2024, and opened for signature on September 5, 2024 (with signatories including the United States, the European Union, and the United Kingdom), providing a precedent for the design of sector-specific international norms aligned with the principles of human rights, democracy, and the rule of law.[139] This framework should integrate safeguards against forced technology transfers, ensure reciprocity in semiconductor trade relations, and prevent the misuse of state subsidies that distort market competition. Without such a framework, the semiconductor industry will remain at the mercy of ad hoc policymaking, leading to a fragmented, unpredictable, and less resilient global supply chain.

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136. Demetri Sevastopulo, *'We've Impeded China': Departing Official Defends US Export Controls*, Financial Times (Jan. 20, 2025), https://www.ft.com/content/8ba7df25-1d91-46f9-a1f7-6814343c7884 [https://perma.cc/9CNX-WEGJ].

137. Dieter Ernst, *Semiconductor Supply Chain Regulation in the Service of Geopolitics: Implementation Hurdles and Collateral Damage*, Ctr. for Int'l Governance Innovation (Feb. 14, 2022), https://www.cigionline.org/articles/semiconductor-supply-chain-regulation-in-the-service-of-geopolitics-implementation-hurdles-and-collateral-damage/ [https://perma.cc/LKY9-C56V].

138. Toby Sterling et al., *Dutch to Restrict Semiconductor Tech Exports to China, Joining US Effort*, Reuters (Mar. 9, 2023), https://www.reuters.com/technology/dutch-responds-us-china-policy-with-plan-curb-semiconductor-tech-exports-2023-03-08/ [https://perma.cc/NN5Y-87DK].

139. Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law Adopted by the Committee of Ministers, Council of Eur. Treaty Series (Sept. 5, 2024), https://rm.coe.int/1680afae3c [https://perma.cc/AV2S-KVDS].

IV. Exploring a Prospective Chips Treaty to Achieve the Objective

Beyond its basic objectives, the Chip 4 Alliance is still light on detail. Thus, it seems rather premature to predict specific outcomes and consequences from the alliance at this stage. That said, given its geopolitical and economic importance, it is critical that the alliance be designed, elaborated, and implemented in a way that ensures its objectives can be achieved amid the current global turmoil. For the successful operation of the alliance, the following issues need to be carefully reviewed and contemplated as it proceeds.

A. Ensuring Compatibility with the Existing Legal Framework

First, the alliance should be designed to avoid unnecessary legal conflicts arising from existing trade and investment agreements. As an "alliance" rather than a formal treaty, the four-way arrangement represents a network among like-minded participants seeking strategic coordination in geopolitics, economics, and national security—and thus implicates trade and investment. To date, the Chip 4 Alliance remains largely aspirational, with coordination meetings held only at working and senior-official levels and no legally binding commitments yet negotiated. This alignment necessarily implicates trade and investment law. Accordingly, any measures taken under the alliance must avoid breaching trade and investment provisions—especially those anchored on non-discrimination and minimal regulation if at all possible.

Similarly, for chip companies, this whole plan presents a catch-22 situation. Once their governments join, companies must comply with multiple layers of regulation from participating member governments—some imposed collectively, others individually. In restructuring the global supply chains, chipmakers are often encouraged—if not compelled—to coordinate certain business activities with counterparts. This degree of consultation exposes the Achilles' heel of global corporations: the complex web of competition rules and antitrust sanctions across jurisdictions. Members of the Chip 4 Alliance might downplay their competition rules, but non-participating governments—such as the European Union, China, or others—may take a different view when they feel disadvantaged by a new supply chain.

Given these legal implications, the projects undertaken within the alliance should be explicitly framed as national security measures. Stipulations in the implementing instruments and statements by relevant officials of the participants referring to national security considerations may help pave the way for the possible invocation of national security exceptions. Successful invocation of national security exceptions in various trade and investment agreements can resolve otherwise existing violations of those agreements. However, recent jurisprudence indicates that mere reference to national security is insufficient without a reasoned and evidence-based connection to the claimed security interest. In *Russia–Transit*, the WTO panel found that while members have discretion in defining essential security interests, they must demonstrate that the measures were taken in good faith and that they met the treaty's enumerated

security conditions.[140] Elaborate reasoning with sufficient evidence is required. For chips, this is doable with proper prior planning.

B. Preserving Competition in the Market

Second, the alliance should not turn into a production-management and price-control scheme. Geopolitical objectives aside, the Chip 4 Alliance raises a critical and complicated question that may further challenge the already struggling global economic regime: Can countries control production and manage trade for a product defined by innovation and competition? Most notably, the alliance might have the capacity to manage production volume and adjust the price of key semiconductors. Given the highly volatile nature of DRAM and NAND flash chip prices in the global market, and the alternating cycles of shortage and oversupply, an alliance of the four key players could become a decisive player in setting both output and price worldwide. As the market currently stands, if the four act in concert the global market would likely follow. If that is the case, the alliance risks becoming a digital-age equivalent of the Organization of the Petroleum Exporting Countries (OPEC), exercising collective influence over volume and prices.[141] This transformation should be avoided as much as possible, and participants should exercise extra care not to be drawn into such circumstances. Otherwise, the whole rationale for the alliance may crumble.

Semiconductors are metaphorically called the 'rice' and 'oil' of future industry.[142] Indeed, the four-way alliance might lead to the creation of a new consultation and decision-making body for this digital 'oil' industry. As much as semiconductors are critical for a wide range of goods and services, control over them can be translated into comparable controlling power for all these goods and services. The possible economic and business impacts from the new alliance need to be examined carefully once more details are available. This is an important task for the success of the prospective alliance.

The competition involving high-bandwidth memory (HBM) chips, which have become a key component for AI graphics processing units, is growing

140. Panel Report, *supra* note 107.

141. The OPEC, created as a permanent intergovernmental organization in conformity with the Resolutions of the Conference of the Representatives of the Governments of Iran, Iraq, Kuwait, Saudi Arabia and Venezuela, held in Baghdad from September 10 to 14, 1960, coordinates and unifies the petroleum policies of its Member Countries and ensures the stabilization of prices in international oil markets in order to secure (i) a steady income to the producing countries; (ii) an efficient, economic and regular supply of petroleum to consuming nations; and (iii) a fair return on their capital to those investing in the petroleum industry (Articles 1 and 2 of the OPEC Statute); Sorin M.S. Krammer, *Chip War: The Fight for the World's Most Critical Technology*, 55 J. of Int'l Bus. Pol'y 541, 541-545 (2023) (book review).

142. Jae-hyuk Park, *How 'Rice of Industry' Has Changed*, Korea Times (Feb. 27, 2018), https://www.koreatimes.co.kr/www/tech/2024/04/129_244503.html [https://perma.cc/NKV5-3Q3S]; The Yomiuri Shimbun, *Semiconductor Strategy Must Be Reconfigured as a National Project*, Japan News (June 8, 2021), https://japannews.yomiuri.co.jp/editorial/yomiuri-editorial/20210608-54307/, [https://perma.cc/3J3J-CQ86]; Madeline Coggins, *Are Semiconductor Chips the New Oil?*, Fox Bus. (Jan. 19, 2023), https://www.foxbusiness.com/economy/are-semiconductor-chips-the-new-oil [https://perma.cc/7HXB-8M47].

fiercer.[143] As generative AI services are growing rapidly, there is a dramatic surge in demand for HBM chips, which enable the processing of larger datasets. U.S.-based Nvidia, the biggest buyer of advanced HBM chips, has qualified Samsung Electronics' HBM for use in its processors, while Samsung seeks to outpace its crosstown rival SK Hynix. On the other hand, SK Hynix is collaborating with TSMC (pursuant to an April 2024 MOU)[144] to optimize HBM and advanced packaging for next-generation parts, including HBM4.[145] In December 2024, the U.S. Commerce Department expanded export controls to cover certain HBM commodities and related items under the advanced-computing FDPR,[146] restricting China's access to advanced HBM and some semiconductor-manufacturing equipment, with limited license exceptions—while separate, earlier authorizations allowed Samsung and SK Hynix to continue supplying equipment to their China fabs under defined conditions.[147] Amidst restrictions, China's Huawei is offering AI accelerator chips as an alternative to Nvidia and AMD, seeking to bolster self-sufficiency in advanced semiconductor technology.[148]

C. Guarding Against New Multinational SOEs

Third, the alliance should not lead to the creation of a new breed of *de facto* state-owned enterprises (SOEs), as the term is used in the legal texts of various treaties and international agreements.[149] To the extent that participating

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143. Kim Jaewon et al., *AI Memory Emerges as New Battleground for SK Hynix, Samsung, and Others*, Nikkei Asia (May 10, 2024), https://asia.nikkei.com/Business/Business-Spotlight/AI-memory-emerges-as-new-battleground-for-SK-Hynix-Samsung-and-others [https://perma.cc/3NSZ-ZTGN].

144. *SK hynix Partners with TSMC to Strengthen HBM Technological Leadership,* SK Hynix Newsroom (Apr. 19, 2024), https://news.skhynix.com/sk-hynix-partners-with-tsmc-to-strengthen-hbm-technological-leadership [https://perma.cc/YWQ9-AP9R].

145. Jeong-Soo Hwang, *HBM Chip War Intensifies as SK Hynix Hunts for Samsung Talent*, Korea Econ. Daily (July 8, 2024), https://www.kedglobal.com/korean-chipmakers/newsView/ked202407080016 [https://perma.cc/G63N-U8AJ].

146. *Commerce Strengthens Export Controls to Restrict China's Capability to Produce Advanced Semiconductors for Military Applications,* Bureau of Indus. & Sec., (Dec. 2, 2024), https://www.bis.gov/press-release/commerce-strengthens-export-controls-restrict-chinas-capability-produce-advanced-semiconductors-military [https://perma.cc/J8J3-GHD6].

147. Mackenzie Hawkins, *US Weighs Restrictions on China's Access to AI Memory Chips*, Bloomberg (Aug. 1, 2024), https://www.bloomberg.com/news/articles/2024-07-31/us-weighs-new-restrictions-on-china-s-access-to-ai-memory-chips [https://perma.cc/M6V7-N2L5]; Sujai Shivakumar et al., *The Limits of Chip Export Controls in Meeting the China Challenge*, Ctr. for Strategic and Int'l Stud. (Apr. 14, 2025), https://www.csis.org/analysis/limits-chip-export-controls-meeting-china-challenge [https://perma.cc/LND4-7WGW].

148. Shivakumar, *supra* note 147.

149. *See* Jaemin Lee, *The "Indirect Support" Loophole in the New SOE Norms: An Intentional Choice or Inadvertent Mistake?*, 20 Chinese J. Int'l L. 63, 65-67 (2021); CPTPP, *supra* note 124, at art. 17.1.

Article 17.1 of the CPTPP provides:

"State-owned enterprise means an enterprise that is principally engaged in commercial activities in which a Party:

(a) directly owns more than 50 per cent of the share capital;

(b) controls, through ownership interests, the exercise of more than 50 per cent of the voting rights; or

(c) holds the power to appoint a majority of members of the board of directors or any other equivalent management body."

members in the Chip 4 Alliance promise to regulate their respective domestic semiconductor industries in a coordinated way and orient their businesses in a certain direction, the common endeavor may effectively introduce a version of the SOE, operated collectively and managed multinationally. Put bluntly, the four members can lay out, in the long run, which companies do what, who produces parts and materials, how they are sourced, and where chips are distributed and sold. They will also align their R&D, financial support, and incentives.

In essence, these traits potentially indicate government-arranged financial support, ongoing governmental influence, public-private joint business planning, and public mandate fulfillment. This constellation of features is a characteristic of SOEs—a topic that features prominently in recent trade agreements with explicit SOE disciplines, notably the Indo-Pacific Economic Framework (IPEF),[150] the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP, Chapter 17),[151] or the United States-Mexico-Canada Agreement (USMCA, Chapter 22),[152] because of their market distortion and competition stifling effects; related concerns also arise in policy frameworks like the IPEF Supply Chain Agreement, even though IPEF is not a market-access FTA.[153] Although initiated under the Biden administration, the IPEF Supply Chain Agreement entered into force on February 24, 2024 and remains in effect under the current administration; while negotiations on other pillars have slowed, the supply-chain cooperation mechanisms continue to operate and are referenced in the 2025 U.S. Trade Policy Agenda.[154] As of August 12, 2025, at least eight IPEF partners had completed ratification of the Supply Chain Agreement, and parties continue to stand up its cooperative bodies, even as broader trade-pillar negotiations remain slower.[155] It also illustrates how such frameworks can reinforce state influence over industries, thereby linking

150. Conference, Clete Willems & Niels Graham, *TTC, IPEF, and the Road to an Indo-Pacific Trade Deal: A New Model*, Atlantic Council Geoeconomics Ctr. (Sept. 27, 2022), https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/ttc-ipef-and-the-road-to-an-indo-pacific-trade-deal-a-new-model/ [https://perma.cc/ZE8M-B9WV].

151. Weihuan Zhou, *Rethinking the (CP)TPP as a Model for Regulation of Chinese State-Owned Enterprises*, 24 J. Int'l Econ. L. 572 (2021); Intan Murnira Ramli et al., *The Interplay of IPEF Between RCEP and CPTPP: An ASEAN Viewpoint*, *in* Asian Yearbook of International Economic Law 135, 137-138 (Marc Bungenberg et al., eds., 2023).

152. M. Angeles Villarreal, Cong. Rsch. Serv., The U.S.-Mexico-Canada Agreement (USMCA) (2023), https://sgp.fas.org/crs/row/R44981.pdf [https://perma.cc/PSA9-WHGF].

153. Emily Benson, et al., *Securing Semiconductor Supply Chains in the Indo-Pacific Economic Framework for Prosperity*, Ctr. for Strategic & Int'l Stud. (May 30, 2023), https://www.csis.org/analysis/securing-semiconductor-supply-chains-indo-pacific-economic-framework-prosperity; Jinyuan Li, *The Impact of the Indo-Pacific Economic Framework on China and Its Response*, 7 Pac. Int'l J. 192 (2024); OECD, *Quantifying the Role of State Enterprises in Industrial Subsidies*, OECD Trade Pol'y Papers No. 282 (2024).

154. U.S. Dep't State, *Indo-Pacific Economic Framework for Prosperity Agreement Relating to Supply Chain Resilience*, (Nov. 14, 2023), https://www.state.gov/ipef-supply_chain-agreement [https://perma.cc/KLN2-7HAU].

155. Australian Gov't, Dep't of Foreign Affs. & Trade, *Indo-Pacific Economic Framework*, https://www.dfat.gov.au/trade/organisations/wto-g20-oecd-apec/indo-pacific-economic-framework [https://perma.cc/UK6G-2N99]; Kristy Hsu, *The IPEF Supply Chain Agreement on De-risking Supply Chain Disruptions and Implications on Non-Members – A Taiwan Perspective*, Taiwan WTO&TRA Ctr. 76 (Mar. 24, 2025) https://web.wtocenter.org.tw/downFiles/18203/411778/00K9pFyh0FT6jkr9qwiqoYfltTFhKoaAGQ00000EBdzMDnSzTgP

directly to concerns about the emergence of new forms of SOEs. In this respect, it should be noted that not only those directly 'owned' by governments but also those under the 'direction' or 'control' of a government can qualify as SOEs. Economists and policymakers frequently warn that enterprises subject to government direction or control can reduce efficiency and distort competition, which sap economic efficiency and hamper market competition.[156] Such state direction and industrial subsidies have been central to U.S. trade actions toward China since the 2018 Section 301 investigation and in subsequent reviews.[157]

Yet if key decisions of the semiconductor businesses of the four members are made at the request (if not at the direction) of respective government agencies—which seems to be the essence of the current supply chain restructuring scheme—those businesses are presumably set to be a new breed of SOEs in the digital age. What's more, if their business decisions are coordinated and orchestrated by the pool of governments—whether an alliance, network or any other title—they are virtually under the 'collective' control of the participating governments. One could call them 'multinational' SOEs, distinct from 'national' SOEs that have been the target of emerging regulation in the past decade.

Granted, the Chinese chip industry has received a massive amount of financial support from both central and local governments.[158] Beijing launched the National IC Industry Investment Fund ('Big Fund') in 2014 (≈¥138.7 billion, about $19 billion) and a second phase in 2019 (≈¥204 billion, about $27 billion); in May 2024 it established a third phase capitalized at ¥344 billion (about $47.5 billion).[159] With a variety of support schemes, quite a few Chinese chip companies can be called SOEs.[160] In a sense, endeavors like the Chip 4 Alliance risk creating a behemoth to fight a behemoth. One side may win against the other—then wither because of stifled innovation and competition. The concerns over SOEs and the wisdom of curbing their emergence present an equally important lesson for the future chip alliance if it wants to establish its roots and grow. It is thus ironic that a new scheme for the global

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8ULcd8HXZy92lgRf6s3SpF0Lnovjrah8wc00000ZFnJ00000A%3D%3D [https://perma.cc/AN74-YSTB].

156. Ines Willemyns, *Disciplines on State-Owned Enterprises in International Economic Law: Are We Moving in the Right Direction?*, 19 J. Int'l Econ. L 657, 663 (2016); OECD, *State-Owned Enterprises as Global Competitors: A Challenge or an Opportunity?* (Dec. 8, 2016), https://www.oecd.org/en/publications/state-owned-enterprises-as-global-competitors_9789264262096-en.html [https://perma.cc/4JY2-MB23].

157. Off. of U.S. Trade Representative, Exec. Off. of the President, *Four-Year Review of Actions Taken in The Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation* (May 14, 2024).

158. OECD, *Measuring Distortions in International Markets: The Semiconductor Value Chain*, OECD Trade Pol'y Papers No. 234, 48 (2019), http://dx.doi.org/10.1787/8fe4491d-en [https://perma.cc/ZT73-3UDC].

159. *China Sets Up Third Fund with US $47.5 Billion to Boost Semiconductor Sector*, Reuters (May 27, 2024), https://www.reuters.com/technology/china-sets-up-475-bln-state-fund-boost-semiconductor-industry-2024-05-27/ [https://perma.cc/JT3H-6TNF].

160. John VerWey, *Chinese Semiconductor Industrial Policy: Prospects for Future Success*, 2019 J. Int'l Com. & Econ. 1, 7 (2019); Angela Huyue Zhang, *High Wire: How China Regulates Big Tech and Governs Its Economy* (New York, 2024; online edn, Oxford Academic, Apr. 18, 2024).

semiconductor industry could create a new type of SOE, operating at a multinational level, deviating from the general trend of stringent regulation in modern trade and investment agreements.[161]

The governments of the United States, Japan, Taiwan, and South Korea are all offering massive incentives and intervening in the operation and businesses of semiconductor companies as if they were national corporations. Major governments are offering sizable support packages. In the United States, the CHIPS and Science Act provides $39 billion in manufacturing incentives alongside a 25% investment tax credit under Internal Revenue Code §48D (the previously proposed 'FABS Act' did not pass).[162] Japan has committed substantial subsidies, including up to ¥732 billion (≈$4.95 billion) for TSMC's second Kumamoto fab and total approved support of roughly ¥590 billion (≈$3.9 billion) for Rapidus.[163] South Korea expanded its semiconductor support package to $23.25 billion in April 2025.[164] In Taiwan, beyond the Angstrom Semiconductor Initiative to drive long-term R&D, the government enacted tax credits of 25% for qualifying R&D and 5% for advanced-process equipment purchases, and approved an NT$300 billion (≈$9.3 billion) Chip-based Industrial Innovation Program for 2024–2033.[165] By mid-2025, the U.S. government announced CHIPS incentives of up to $8.5 billion for Intel (finalized November 26, 2024), $6.6 billion for TSMC (finalized November 15, 2024), and up to $6.4 billion for Samsung (finalized December 20, 2024) to build and expand U.S. fabs, including capacity relevant to AI-related chips.[166]

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161. Przemyslaw Kowalski et al., *State-Owned Enterprises: Trade Effects and Policy Implications*, OECD Trade Policy Papers No. 147, 42 (2013).

162. CHIPS and Science Act of 2022, *supra* note 7; Advanced Manufacturing Investment Credit Rules Under Section 48D and 50, 89 Fed Reg. 84732 (Oct. 23, 2024).

163. Charlotte Trueman, *Japanese Government Grants Further Subsidies to TSMC for Second Chip Fab*, SDXCENTRAL (Feb. 26, 2024), https://www.sdxcentral.com/news/japanese-government-grants-further-subsidies-to-tsmc-for-second-chip-fab/, https://perma.cc/C9HA-SF8H; Japan's industry ministry approval of Rapidus subsidies was also reported, *see* Yuki Hagiwara, *Japan Approves Extra ¥590 Billion in Aid to Chip Startup*, JAPAN TIMES (Apr. 2, 2024), https://www.japantimes.co.jp/business/2024/04/02/companies/japan-rapidus-more-subsidy/ [https://perma.cc/M344-34UY].

164. *South Korea Unveils $23.25 Billion Support Package for Chips amid U.S. Tariff Uncertainty*, REUTERS (Apr. 14, 2025), https://www.reuters.com/technology/south-korea-unveils-23-billion-support-package-chips-amid-us-tariff-uncertainty-2025-04-14/ [https://perma.cc/VA54-6584].

165. Raj Varadarajan et al., *Emerging Resilience in the Semiconductor Supply Chain 31*, BOS. CONSULTING GRP. & SEMICONDUCTOR INDUS. ASS'N (2024); NAT'L SCI. & TECH. COUNCIL & DEP'T OF ENG'G & TECHS., *Angstrom Semiconductor Initiative – Advanced Semiconductor and Quantum Technology Program* (Apr. 25, 2024), https://www.nstc.gov.tw/eng/en/detail/20403e86-b932-45ef-9c2c-79c02e05a74c, https://perma.cc/GW7Q-ZY5U; Executive Yuan, R.O.C. (Taiwan), *Amendments to the Statute for Industrial Innovation* (Nov. 23, 2022), https://english.ey.gov.tw/News3/9E5540D592A5FECD/50cba142-eb28-4e2a-abe6-a0afcf04c6ad [https://perma.cc/5ZFG-TN52].

166. David Sacks & Seaton Huang, *Onshoring Semiconductor Production: National Security Versus Economic Efficiency*, COUNCIL ON FOREIGN RELS. (Apr. 17, 2024), https://www.cfr.org/article/onshoring-semiconductor-production-national-security-versus-economic-efficiency [https://perma.cc/MPT3-VVGZ]; *Biden-Harris Administration Announces Preliminary Terms with Intel to Support Investment in U.S. Semiconductor Technology Leadership and Create Tens of Thousands of Jobs,* U.S. DEP'T OF COMMERCE (Mar. 20, 2024), https://www.commerce.gov/news/press-releases/2024/03/biden-harris-administration-announces-preliminary-terms-intel-support [https://perma.cc/VJ3C-79YD].

The United States has invoked national-security rationales in defending contested trade measures at the WTO (for example, the Section 232 steel and aluminum tariffs) and has attached national-security 'guardrails' to certain CHIPS incentives; however, such invocations do not automatically supersede WTO obligations—indeed, 2022 panel reports found those tariffs inconsistent with GATT commitments, with the United States appealing into the current Appellate Body void.[167] Japan has taken steps to support fab construction, subsidize joint ventures, and back up a consortium with various grants.[168] As for the consortium, Rapidus Corporation was founded in 2022 by the Japanese government and eight domestic companies. It is collaborating with IBM and imec on 2-nanometer process R&D in Hokkaido, with mass production targeted as early as 2027.[169] The Korean government is taking a more direct role by expanding its support package to $23.25 billion in April 2025 and advancing a multi-decade plan for the world's biggest chipmaking center near Seoul (centered on Yongin), a significant boon to Samsung Electronics and SK Hynix Inc.[170] Meanwhile, although the government acted as an early venture investor, Taiwan's National Development Fund's stake in TSMC has steadily declined to 6.38% as of February 28, 2025.[171]

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167. John Edwards, *Chips, Subsidies, Security, and Great Power Competition*, Lowy Inst. (May 28, 2023), https://www.lowyinstitute.org/publications/chips-subsidies-security-great-power-competition [https://perma.cc/98MJ-JARJ]; Panel Report, *supra* note 107.

168. *Japan to Subsidize TSMC's Kumamoto Plant by up to $3.5bn*, Nikkei Asia (June 17, 2022), https://asia.nikkei.com/Business/Tech/Semiconductors/Japan-to-subsidize-TSMC-s-Kumamoto-plant-by-up-to-3.5bn#:~:text=TOKYO%20%2D%2D%20Japan's%20Ministry%20of,by%20Taiwan%20Semiconductor%20Manufacturing%20Co [https://perma.cc/78UF-DGAG;] Yoshiaki Nohara, *In Boost for Chip Ambitions, Japan Inks $1.3 Billion in Subsidies for Micro Plant*, Bloomberg (Oct. 2, 2023), https://www.bloomberg.com/news/articles/2023-10-03/japan-inks-1-3-billion-in-subsidies-for-micron-hiroshima-plant [https://perma.cc/X369-49DT].

169. Sheila Chiang, *Japan Approves Additional $3.9 Billion in Subsidies for Chip Firm Rapidus to Meet Semiconductor Goals*, CNBC (Apr. 2, 2024), https://www.cnbc.com/2024/04/02/japan-approves-3point9-billion-in-subsidies-to-domestic-chip-maker-rapidus-.html [https://perma.cc/4QMB-FUC6]; *Japan Approves $3.9 Billion in Subsidies for Chipmaker Rapidus*, Reuters (Apr. 2, 2024), https://www.reuters.com/technology/japan-approves-39-billion-subsidies-chipmaker-rapidus-2024-04-02/ [https://perma.cc/FNM8-D3R3].

170. *South Korea Sets Aside Record $19 Billion Chipmaking*, Bloomberg (May 22, 2024), https://www.bloomberg.com/news/articles/2024-05-23/south-korea-sets-aside-record-19-billion-to-boost-chip-industry?sref=ATN0rNv3 [https://perma.cc/Q32Y-PQDG]; *South Korea Lays Out $470 Billion Plan to Build Chipmaking Hub*, Bloomberg (Jan. 14, 2024), https://www.bloomberg.com/news/articles/2024-01-15/south-korea-lays-out-470-billion-plan-to-build-chipmaking-hub [https://perma.cc/6MZA-3R5G]; Reuters, *supra* note 159.

171. Larisa Jacono, *What the U.S. Can Learn from Taiwan's Success in Chip Manufacturing*, Daily Econ. (Mar. 16, 2023), https://www.aier.org/article/what-the-us-can-learn-from-taiwans-success-in-chip-manufacturing/, [https://perma.cc/RE9T-XGLZ]; Stella Robertson, *TSMC and Taiwan's Government: Two Boats on the Same Tide,* Domino Theory (Aug. 26, 2024), https://dominotheory.com/tsmc-and-taiwans-government-two-boats-on-the-same-tide/ [https://perma.cc/T97A-FKCG]; Min-Hua Chiang, *TSMC: The Enduring Silicon Shield of Taiwan's Economy*, Taiwan Insight (May 12, 2025), https://taiwaninsight.org/2025/05/12/tsmc-the-enduring-silicon-shield-of-taiwans-economy/ [https://perma.cc/ZB4F-32XS].

D. Experimenting with a New Legal Template for Economic Security

Global supply chain reformulation has become one of the most pressing topics for the international community.[172] It is an important national agenda for many countries, and various 'legitimate' and/or 'dubious' policy objectives are involved in this process. Given that states will continue to face diverse emergencies in international relations, this new trend of supply chain reformulation is likely to persist for the foreseeable future.

As many supply-chain initiatives are based on the notion that only a few like-minded states are *selected* to participate in, and that their corporations are *permitted* to join an exclusive membership entity, they are arguably discriminatory in principle and selective at their core.[173] Notably, the chip sector is merely one area where countries are attempting to diversify supply chains and use friend-shoring to shift away from countries of concern. If these policies become the norm, the global system could see less competition and less innovation, dominated by a new breed of multinational SOEs. This trait of supply chain reformulation implies that the long-cherished non-discrimination principle in international economic agreements may now be on the verge of being discarded as a matter of policy. The fact that even the governments of key states are proclaiming supply chain reformulation *publicly*[174] suggests that it may amount to an 'official' or 'semi-official' abandonment of the cherished key principle of trade and investment agreements. Notably, the IPEF Supply Chain Agreement entered into force on February 24, 2024, institutionalizing cooperation among participating economies even as broader, more traditional market-access negotiations remain limited.[175]

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172. *Supply Chains are Undergoing a Dramatic Transformation*, Economist (July 13, 2019), https://www.economist.com/special-report/2019/07/11/supply-chains-are-undergoing-a-dramatic-transformation [https://perma.cc/8E8R-YS6R]; *see also* Maria Jesus Saenz et al., *Digital Transformation is Changing Supply Chain Relationships*, Harv. Bus. Rev. (July 7, 2022), https://hbr.org/2022/07/digital-transformation-is-changing-supply-chain-relationships [https://perma.cc/7M39-CPMR].

173. Indo-Pacific Economic Framework for Prosperity Agreement Relating to Supply Chain Resilience, art. 25, Sept. 7, 2023, 80 Stat. 271, 1 U.S.C. 113. Pursuant to Article 25 of the IPEF Supply Chain Agreement, states can only accede to the Agreement subject to the "consent of the IPEF partners".

"Article 25: Accession

1. Any State or separate customs territory may accede to this Agreement, subject to the consent of the Parties and any terms or conditions that may be decided between the Parties and the State or separate customs territory. The Agreement shall enter into force with respect to an acceding Party 30 days after the date of deposit of its instrument of accession with the Depositary.

2. Notwithstanding paragraph 1, no State or separate customs territory may accede to this Agreement until one year after the date of entry into force of this Agreement or after the date on which this Agreement has entered into force for all States listed in Article 21.1, whichever comes first."

174. The White House, Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth 72 (2021); *see also* Eur. Comm'n, *Updating the 2020 New Industrial Strategy: Building a Stronger Single Market for Europe's Recovery*, at 89-90 (Working Document, May 5, 2021).

175. U.S. Dep't State, Indo-Pacific Economic Framework for Prosperity Agreement Relating to Supply Chain Agreement (entered into force Feb. 24, 2024); *see* Indo-Pacific Economic Framework, *supra* note 173.

That being said, current policy debates still under-theorize legal implications beyond resort to national-security exceptions.[176] WTO panels in *Russia–Transit* (2019) and *US–Steel/Aluminum* (2022) clarified that national-security claims are reviewable and require a reasoned connection to essential security interests—signaling that bare invocations will not suffice.[177] Noting that the supply chain reformulation currently underway has the potential to discard (or significantly dilute) one of the cardinal principles of the existing international economic agreements and indicate a new course of direction for a future governance of the international economic regime, the international community must examine the issue from a more structural point of view based on rigorous legal analyses.

For instance, how to institutionalize the 'dual' supply chains—one for ordinary items and the other for core items subject to new supply chains—seems to be a key task for future discourse.[178] Defining targeted supply chains and core items to include in the targeted supply chains appears to be another pending task. The meaning and scope of national security should also be further refined and updated in this regard. If possible, these issues could be adequately reflected in ongoing WTO reform discussions or other fora that are exploring new templates for regulating international economic activity. Relatedly, China's DS615 complaint against U.S. semiconductor export controls squarely raises MFN and other obligations alongside national-security defenses—underscoring the need for clearer, sector-specific rules.[179] One way or another, global supply chain discourse needs to be brought to the realm of legal debates and scrutiny—not just confined to geopolitical considerations as they exist in the moment—to ensure at least a certain level of predictability.

It may signal a significant departure from existing trade or investment agreements, as it relates to key principles such as the most-favored-nation (MFN) obligation.[180] It is indeed an unfortunate development for multilateralism

176. Olga Hrynkiv & Saskia Lavrijssen, *Not Trading with the Enemy: The Case of Computer Chips*, J. World Trade 64-65 (2024); David Chieng, *Supply Chains, COVID-19 and the GATT Security Exception: Legal Limits of "Pandemic Exceptionalism"*, 39 Austl. Y.B. Int'l L. 13 (2021).

177. *Members Adopt National Security Ruling on Russian Transit Restrictions*, World Trade Org. (Apr. 26, 2019), https://www.wto.org/english/news_e/news19_e/dsb_26apr19_e.htm [https://perma.cc/L5EP-SA78]; Notification of an Appeal by the United States, *United States – Certain Measures on Steel and Aluminum Products,* WTO Doc. WT/DS544/14 (Jan. 30, 2023), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/DS/544-14.pdf&Open=True, [https://perma.cc/5G7M-KM2K].

178. Cameron Cavanagh, *U.S. Economic Restrictions on China: Small Yard, High Fence?*, Geo. Sec. Stud. Rev. (Dec. 26, 2023) [https://perma.cc/N4HV-FESB]; *see also Remarks by National Security Advisor Jake Sullivan on Renewing American Economic Leadership at the Brookings Institution,* The White House (Apr. 27, 2023); Thomas Gehrig & Rune Stenbacka, *Dual Sourcing and Resilient Supply Chains: The Case of Essential Resources*, Atlantic Econ. J. 223 (2023).

179. Request for Consultations by China, *U.S.—Measures on Certain Semiconductors and Other Products, and Related Services and Technologies*, WTO Doc. WT/DS615/1/Rev.1/Add.2 (Dec. 15, 2022), https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds615_e.htm [https://perma.cc/4BUY-WXKU].

180. General Agreement on Tariffs and Trade, art. I, Oct. 30, 1947, 55 U.N.T.S. 187. The MFN obligation of the WTO is stipulated in the GATT as follows:

or perhaps for the rule of law. If, however, this new phenomenon reflects a genuine consensus among states and a new course of action for international economic governance, a more practical approach would be to develop a legal mechanism to 'tame' it.

In that respect, the Chip 4 Alliance could offer a key opportunity to experiment with a new template for regulating trade in strategic sectors. As such, the Chip 4 Alliance is an important endeavor at a critical time in many respects. It concerns the most critical component of the digital economy—semiconductors—and hence touches one of the most sensitive fault lines in the U.S.–China standoff. At the same time, the four participating members are also

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Article I: General Most-Favored-Nation Treatment

1. With respect to customs duties and charges of any kind imposed on or in connection with importation or exportation or imposed on the international transfer of payments for imports or exports, and with respect to the method of levying such duties and charges, and with respect to all rules and formalities in connection with importation and exportation, and with respect to all matters referred to in paragraphs 2 and 4 of Article III,* any advantage, favor, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.

2. The provisions of paragraph 1 of this Article shall not require the elimination of any preferences in respect of import duties or charges which do not exceed the levels provided for in paragraph 4 of this Article and which fall within the following descriptions:

(a) Preferences in force exclusively between two or more of the territories listed in Annex A, subject to the conditions set forth therein;

(b) Preferences in force exclusively between two or more territories which on July 1, 1939, were connected by common sovereignty or relations of protection or suzerainty and which are listed in Annexes B, C and D, subject to the conditions set forth therein;

(c) Preferences in force exclusively between the United States of America and the Republic of Cuba;

(d) Preferences in force exclusively between neighboring countries listed in Annexes E and F.

3. The provisions of paragraph 1 shall not apply to preferences between the countries formerly a part of the Ottoman Empire and detached from it on July 24, 1923, provided such preferences are approved under paragraph 5(1), of Article XXV which shall be applied in this respect in the light of paragraph 1 of Article XXIX.

4. The margin of preference* on any product in respect of which a preference is permitted under paragraph 2 of this Article but is not specifically set forth as a maximum margin of preference in the appropriate Schedule annexed to this Agreement shall not exceed:

(a) in respect of duties or charges on any product described in such Schedule, the difference between the most-favored-nation and preferential rates provided for therein; if no preferential rate is provided for, the preferential rate shall for the purposes of this paragraph be taken to be that in force on April 10, 1947, and, if no most-favored-nation rate is provided for, the margin shall not exceed the difference between the most-favored-nation and preferential rates existing on April 10, 1947;

(b) in respect of duties or charges on any product not described in the appropriate Schedule, the difference between the most-favored-nation and preferential rates existing on April 10, 1947.

In the case of the contracting parties named in Annex G, the date of April 10, 1947, referred to in subparagraph (a) and (b) of this paragraph shall be replaced by the respective dates set forth in that Annex.

This provision of GATT Art I is juxtaposed with Chip 4 Alliance and IPEF, where contracting parties may invite certain states for a new global supply chain while rejecting other states that they cannot trust, thereby creating an exclusive membership entity of like-minded countries. In particular, the accession provision of the IPEF Supply Chain Agreement (*supra* note 173) stipulates discriminatory treatment between Members and non-Members.

among the key players in economic and military security in the Asia-Pacific region. The four-way arrangement, therefore, is likely to have significant long-term implications. It has the potential to serve as a linchpin for global value-chain restructuring, catalyze new trade and investment norms, and shape the contours of economic security. Since October 2022, U.S. export controls—further tightened in October 2023 and December 2024 (including controls on certain HBM items)—have accelerated friend-shoring dynamics that any Chip 4 framework would need to address explicitly.[181] Most importantly, it may work as a scheme to blunt possible economic coercion from China in the region. Once formed and launched, the alliance will play an important role.

Friend-shoring efforts affect those outside the Chip 4 Alliance. As originally articulated by U.S. Treasury Secretary Janet Yellen (April 2022), 'friend-shoring' means re-orienting supply chains toward trusted partners to reduce geopolitical risk.[182] The Chip 4 Alliance is a form of geopolitical turbulence affecting stability and transparency in the semiconductor industry.[183] The United States may face criticism that its selective supply-chain arrangements reflect a form of economic nationalism, thereby complicating efforts to build inclusive multilateral coalitions.[184] Some commentators argue that the Chip 4's exclusivity—and the absence of broad exemptions from U.S. export-control rules (the status of the new FDPR for countries such as Malaysia, Singapore, and Israel)—signals a coercive intent toward China rather than a neutral trade strategy.[185] Other critics contend that an 'anti-China' alliance 'denies other countries' legitimate development' and 'persistently monopolizes the high end of the value chain.'[186] Chinese officials have repeatedly criticized U.S. semiconductor measures as discriminatory and destabilizing to global

181. *Foreign-Produced Direct Product Rule Additions, and Refinements to Controls for Advanced Computing Items*, 89 Fed. Reg. 96790 (Dec. 5, 2024), https://www.federalregister.gov/documents/2024/12/05/2024-28270/foreign-produced-direct-product-rule-additions-and-refinements-to-controls-for-advanced-computing [https://perma.cc/ZWJ2-J5N9]; *Summary of BIS's December 5, 2024, Chip Controls*, ArentFox Schiff (Mar. 17, 2025), https://www.afslaw.com/perspectives/alerts/summary-biss-december-5-2024-chip-controls [https://perma.cc/RBY6-W2Z6]; Shivakumar, *supra* note 147.

182. *Transcript: U.S. Treasury Secretary Janet Yellen on the Next Steps for Russia Sanctions and Friend-Shoring Supply Chains*, Atlantic Council (Apr. 13, 2022), https://www.atlanticcouncil.org/blogs/new-atlanticist/transcript-us-treasury-secretary-janet-yellen-on-the-next-steps-for-russia-sanctions-and-friend-shoring-supply-chains/ [https://perma.cc/2LQV-PACF].

183. Farlina Said & Angeline Tan, *Malaysia's Semiconductor Ecosystem Amid Geopolitical Flux*, Inst. Strategic & Int'l Stud. (ISIS) Maly. (Apr. 2024), https://www.isis.org.my/2024/06/20/malaysias-semiconductor-ecosystem-amid-geopolitical-flux/ [https://perma.cc/FCC6-FDVX].

184. *Competing Great Power Coalitions*, Asan Inst. For Pol'y Stud. (Feb. 27, 2024), https://www.asaninst.org/bbs/board.php?bo_table=s1_1_eng&wr_id=181&sfl=wr_subject%7C%7Cwr_content&stx=AOIP&sop=and [https://perma.cc/A5TB-B8ED]; Charles L. Glaser, *A Flawed Framework: Why the Liberal International Order Concept is Misguided*, 2019 Int'l Sec. 43, 51-87 (2019).

185. Jeff Pao, *Allies Dodging U.S.' Tech War Draft*, China Daily (H.K.) (July 18, 2024), https://www.chinadailyhk.com/hk/article/588482 [https://perma.cc/F339-2RBW]; *Weakness of U.S.' 'Iron Chip Curtain' Exposed*, China Daily (H.K.) (Aug. 1, 2024), https://www.chinadailyhk.com/hk/article/589680, [https://perma.cc/22T4-EJ93].

186. Jeff Pao, *U.S. Wants Allies to Boost Chip Ban Against China*, Asia Times (Mar. 7, 2024), https://asiatimes.com/2024/03/us-wants-allies-to-boost-chip-ban-against-china/ [https://perma.cc/E28K-W95K]; Zhou Xiaoming, *Blame U.S. for Economic Fragmentation*, China-U.S.

supply chains.[187] Given the MFN inquiries raised in the *US-Semiconductors (China) dispute* (DS-615), analysts have offered proposals for how the WTO should address the chip race within existing rules.[188]

At the same time, however, if the alliance emphasizes control and direction of private entities, it risks spiraling down into a managed-trade apparatus for semiconductors, effectively creating multinational SOEs among participants.[189] To the extent that market distortion effects in the chip industry could quickly spill over into other industries using chips, such a development, if it materializes, would have grave long-term consequences. In designing the alliance, careful study and planning are essential to guard against such a risk.

Concluding Thoughts—A Semiconductor Treaty for the AI-Driven Global Community

The restructuring of semiconductor supply chains lies at the core of the economic security debates at the moment. The United States, Japan, South Korea, and Taiwan—the four major players in the global semiconductor industry—have formed a clear consensus on the need and direction for restructuring. They have formed the Chip 4 alliance among themselves for this endeavor. As the alliance evolves, a few more countries may join. That said, as a novel attempt without a reliable precedent to refer to, the alliance and various projects stemming from it arguably deviate from existing norms of international law, be it trade or investment agreements. The growing gap between the alliance and existing legal norms would potentially expose the alliance to legal and political challenges from those opposed to it. As a loose network of coordination and cooperation without clear legal parameters and boundaries, the alliance may stifle innovation and invite agency interventions from the four governments. If unchecked, this would be a recipe for gradual regression. Most importantly, a loose network may fail to satisfy the semiconductor industry's growing demand for certainty and predictability.

One way to overcome the current challenge would be to seek a more reliable, predictable, and sustainable legal framework for the operation of the Chip 4 Alliance. It would be a plurilateral treaty among the four members (possibly a couple more in the future) that legalizes, structures, and systematizes the new semiconductor supply chain.

Focus (June 28, 2024), https://www.chinausfocus.com/finance-economy/blame-us-for-economic-fragmentation [https://perma.cc/FL9Y-E6Y5].

187. *China Urges U.S. to Correct 'Wrongdoings' on AI Chip Curb*, Reuters (May 19, 2025), https://www.reuters.com/world/china/china-urges-us-correct-wrongdoings-chinese-ai-chip-curb-2025-05-19/, [https://perma.cc/ZB3E-6R5E].

188. *See* Request for Consultations by China, *supra* note 179; Victoria Walker, *Subsidizing the Microchip Race: The Expanding Use of National Security Arguments in International Trade*, 57 U. Mich. J.L. Reform 661, 707-16; Jessica Brum, *Technology Transfer and China's WTO Commitment*, 50 Geo. J. Int'l L. 709 (2019).

189. Jaemin Lee, *The U.S. and Its Allies Want to Bring the Entire Chip Supply Chain In-House – and That Could Create an OPEC-Style Cartel for the Digital Age*, Fortune (Mar. 28, 2024), https://finance.yahoo.com/news/u-allies-want-bring-entire-210000820.html [https://perma.cc/GS6K-5AXT].

Trump's announced plans for tariffs of approximately 100% on imported semiconductors, with exemptions for companies manufacturing in—or committing to build in—the United States, together with a brief, litigated pause on federal financial assistance in late January 2025 that also swept in grant programs like CHIPS before being rescinded and enjoined, and stepped-up export-control enforcement evidenced by August 2025 DOJ smuggling charges, maintains the security emphasis but heightens protectionist pressures and uncertainty—further underscoring the case for a plurilateral treaty to stabilize rules amid U.S.–China tensions.[190] As of August 12, 2025, the administration has extended the China tariff truce for 90 days while it finalizes tariff details and has confirmed a 15% revenue-share arrangement tied to export licenses for certain downgraded AI chips to China.

As the Trump administration attempts to shake up the global trade and investment regime, deviating from conventional trade and investment rules, the next couple of years present a window to act. The Trump administration has underscored the strategic importance of semiconductors—a rare continuity with the previous Biden administration—and has signaled a range of measures to accelerate reform of global chip supply chains. This is therefore an opportune moment to move from ad hoc coordination to a narrow, rules-based plurilateral semiconductor treaty.

190. Elizabeth Leavy et al., *As Trump Hits Pause on Certain Federal Financial Assistance Programs, Including for Grants and Loans, What Are Recipients' Rights and Remedies?*, Winston & Strawn LLP, https://www.winston.com/en/blogs-and-podcasts/investigations-enforcement-and-compliance-alerts/as-trump-hits-pause-on-certain-federal-financial-assistance-programs-including-for-grants-and-loans-what-are-recipients-rights-and-remedies [https://perma.cc/5C6J-PNPU]; Shalal et al., *supra* note 9; *South Korea says Samsung, SK Hynix Will Not Be Subject to 100% U.S. Chip Tariffs*, Reuters (Aug. 7, 2025), https://www.reuters.com/world/asia-pacific/south-korea-says-samsung-sk-hynix-will-not-be-subject-100-us-chip-tariffs-2025-08-07/ [https://perma.cc/C9EU-RAJ8]; Trevor Hunnicutt et al., *US, China Extend Tariff Truce by 90 Days, Starving Off Surge in Duties*, Reuters (Aug. 11, 2025), https://www.reuters.com/world/china/trump-signs-order-extending-china-tariff-deadline-90-days-official-says-2025-08-11/ [https://perma.cc/M6WP-FQVX]; *OMB Memorandum: Temporary Pause of Agency Grant, Loan, and Other Financial Assistance Programs*, NAFSA (Jan. 31, 2025), https://www.nafsa.org/regulatory-information/omb-memorandum-temporary-pause-agency-grant-loan-and-other-financial [https://perma.cc/3VYK-B2VW]; Steve Holland et al., *Trump Aid Freeze Stirs Chaos Before it is Blocked in Court*, Reuters (Jan. 28, 2025), https://www.reuters.com/world/trump-orders-pause-all-federal-grants-loans-2025-01-28/ [https://perma.cc/F5JF-65HC]; Amanda Gerut, *Four Accused in Black-Market Scheme to Smuggle Hundreds of Nvidia GPUs to China—While Raking in Millions*, Fortune (Nov. 20, 2025), https://fortune.com/2025/11/20/nvidia-chips-china-smuggle-ai/ [https://perma.cc/NKK3-K6QE].