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Testimony Before the U.S. - China Economic and Security Review Commission

Dominance by Design:
China Shock 2.0 and the Supply Chain Chokepoints Eroding U.S. Security

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Silverado Policy Accelerator, Inc. is a non-profit, bipartisan geopolitical think tank. We welcome the opportunity to provide this written testimony to the U.S. – China Economic and Security Review Commission, focused on how the United States should counter China's leveraging of its dominance in sectors like foundational semiconductors through price suppression and supply chain coercion. Silverado has published extensive research and writing on the topic of semiconductor supply chains, including reports on China's chipmaking sector and associated trade flows and global market dynamics.[1]

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[1] Silverado's semiconductor publications and data dashboards can be found at www.silverado.org. They include: Paige Graham and Andrew David, *China's Semiconductor Manufacturing Equipment Import Analysis: Spring 2025* ("2025 SME Analysis"), available at https://silverado.org/reports-and-publications/china-semiconductor-manufacturing-equipment-import-analysis-spring-2025/; Paige Graham and Andrew David, *Understanding Recent Trends in Global Semiconductor Trade* (Oct. 2024) available at https://silverado.org/reports-and-publications/understanding-recent-trends-in-global-semiconductor-trade/; Andrew David and Sarah Stewart, *China Semiconductor Manufacturing Equipment (SME) Import Analysis* ("2024 SME Analysis) (Sept. 2024), available at https://silverado.org/reports-and-publications/china-semiconductor-manufacturing-equipment-import-analysis-midyear-2024-update/; Andrew David, Haley Ryan, Mihir Torsekar, Yumi Gambrill, Sarah Stewart, *Foundational Fabs* ("Foundational Fabs")(Oct. 2023), available at https://silverado.org/reports-and-publications/report-foundational-fabs-chinas-use-of-non-market-policies/. Silverado also submitted comments to the Office of the U.S. Trade Representative (USTR) in its call for input on Proposed Modifications and Machinery Exclusion Process in 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 [Docket Number USTR–2024–0007] (June 2024), available at https://silverado.org/reports-and-publications/silverado-comments-to-ustr-on-section-301-tariffs/. Silverado also submitted comments and testimony to USTR on its initiation of a new Section 301 Investigation on China's Targeting of the Semiconductor Industry for Dominance, February and March 2025, available at https://silverado.org/reports-and-publications/silverado-comments-on-ustr-initiation-of-section-301-investigation/, and https://silverado.org/reports-and-publications/written-testimony-ustr-initiation-section-301-investigation/. Silverado also submitted comments to the Department of Commerce on its Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Semiconductors and Semiconductor Manufacturing Equipment [BIS-2025-0021-0001][X-RIN0694-XC121] (May 7, 2025).

EXECUTIVE SUMMARY

A primary threat to U.S. national and economic security is U.S. reliance on foreign-made semiconductors, including foundational (also known as "mature" or "legacy") chips from China.[2] Semiconductors are the technological backbone of the U.S. economy with nearly every industry dependent on semiconductor technologies.[3] While the U.S. leads in semiconductor design and is a leader in advanced semiconductor production, China has taken the lead in global production of foundational semiconductors at 28nm or larger, which are largely unregulated in terms of U.S. or allied country export controls and yet are produced to be "fit for purpose" and are essential to nearly every application that also includes an advanced chip.

Ceding the foundational chips market to China means that U.S. military readiness is undermined, critical supply chains are unsecured with a dangerous geographic concentration in the hands of a foreign nation of concern,[4] key sectors that rely on foundational chips from automotive to defense will lack the resiliency they need, and the United States loses leverage to take necessary policy measures to counter China, such as through imposition of export controls on advanced chips. This is key as access to the most advanced AI chips is likely to determine the geopolitical trajectory of our modern era. China knows this and has taken action at all levels of government to promote independence of its own chip industry while also working to ensure the leadership the U.S. holds in advanced chips is hard to sustain.

China's unchecked non-market policies are accelerating ballooning foundational chip overcapacity that is untethered to actual global demand, and this is resulting in depressed prices and loss of market share in the global markets to the detriment of U.S. producers. China's semiconductor sector has varying degrees of state-sponsored control along companies on the value chain, pitting private U.S. companies against government competitors. This is textbook CCP maneuvering, i.e., to gain dominance in a critical supply

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[2] *See Foundational Fabs* at 13. (Explaining that foundational semiconductors are expected to account for 76 percent of foundry production capacity in 2024 and 70 percent of global industry capacity during 2023-2027.) *See also Strengthening the Global Semiconductor Supply Chain in an Uncertain Era* at 39-43, Boston Consulting Group and Semiconductor Industry Association (Apr. 2021), available at https://www.semiconductors.org/wp-content/uploads/2021/05/BCG-x-SIA-Strengthening-the-Global-Semiconductor-Value-Chain-April-2021_1.pdf; Antton Haramboure et. al, *Vulnerabilities in the Semiconductor Supply Chain* at 15 – 17, OECD (May 2023), available at https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/06/vulnerabilities-in-the-semiconductor-supply-chain_f4de7491/6bed616f-en.pdf.

[3] *E.g., Assessment of the Status of the Microelectronics Industrial Base in the United States*, 2-11, 28-29, 34, 45, 58, 74 101-102, Dep't of Comm. (Dec. 2023) ("Microelectronics Survey").

[4] *E.g.,* Bureau of Indus. & Sec., *Public Report on the Use of Mature-Node Semiconductors*, available at https://www.bis.gov/media/documents/public-report-use-mature-node-semiconductors-december-2024.https://www.bis.gov/media/documents/public-report-use-mature-node-semiconductors-december-2024. For example, according to the Congressional Research Service, the Department of Defense "is heavily reliant on the commercial supply chain, which includes many non-U.S. suppliers, for most of its electronic hardware." Michaela D. Platzer & John F. Sargent, Jr., Cong. Rsch. Serv., No. R44544, *U.S. Semiconductor Manufacturing: Industry Trends, Global Competition, Federal Policy*, at 22-23, (Jun. 27, 2016), available at https://sgp.fas.org/crs/misc/R44544.pdf.https://sgp.fas.org/crs/misc/R44544.pdf. The Hoover Institution reports that foundational chips support "many of our most advanced weapons systems." Hoover Inst., No. 735, *Silicon Triangle: The United States, Taiwan, China, and Global Semiconductor Security*, at 381 (Larry Diamond et al., eds. 2023), available at https://www.hoover.org/research/silicon-triangle-united-states-taiwan-china-and-global-semiconductor-security.2023), available at https://www.hoover.org/research/silicon-triangle-united-states-taiwan-china-and-global-semiconductor-security. Meanwhile, advanced semiconductors are also necessary for U.S. defense systems and advanced artificial intelligence used in military applications that is "expected to revolutionize warfare." Suja Shivakumar & Charles Wessner, *Semiconductors and National Defense: What are the Stakes?,* Ctr. for Stat. and Int'l Stud. (June 8, 2022), available at https://www.csis.org/analysis/semiconductors-and-national-defense-what-are-stakes.(June 8, 2022), available at https://www.csis.org/analysis/semiconductors-and-national-defense-what-are-stakes.

chain by unfairly and illegally selling below competitors' prices and then throttle supply to global customers to create advantageous price volatility and impede efforts by the United States and others to check its behavior. **This is the definition of a national and economic security threat.**

This testimony will focus on four key points relevant to this assessment: (1) the importance of foundational chips to national and economic security; (2) China's non-market policies practices in this sector and corresponding ambitions; (3) information regarding how China's non-market practices are impacting U.S. companies in the global market; and (4) key recommendations the United States should pursue that support building and expanding semiconductor manufacturing capacity, protecting such investments from China's unfair trade practices, and promoting the necessary demand signals for U.S.-made chips.

I. THE IMPORTANCE OF FOUNDATIONAL SEMICONDUCTORS

China's semiconductor industry is growing exponentially, fueled in large part by non-market government policies across the entire semiconductor value chain, from design, to production, to assembly and test.[5] While the Chinese semiconductor industry is not as technologically advanced as the industry in the United States, it is increasingly competitive, particularly in foundational semiconductors.

The importance of foundational semiconductors to China's ambitions to lead in this sector is multifaceted, including that these are semiconductors at 28nm or larger and therefore are largely unregulated in terms of U.S. or allied country export controls.[6] The lack of focus on foundational semiconductors from an export controls perspective, however, is not indicative of the centrality of these items to national security needs for the U.S. and China. In fact, foundational semiconductors are expected to account for 76 percent of global foundry production capacity in 2024 and 70 percent of global industry capacity during 2023-2027.[7] While also termed "mature" or "legacy," they are quite innovative and fit for purposes that range from heat tolerance for defense needs to operational necessity for everyday consumer items. Current U.S. policy is akin to blocking China from producing carbon-fiber materials but allowing it to corner the world's market on aluminum.[8]

Advanced-node chips account for only a small percentage of semiconductor development and production, and foundational semiconductors are needed for nearly every application where a more advanced chip is used, from automotive vehicles to medical devices to missile guidance.[9] This means that even if the United

[5] *See Foundational Fabs* at 10.
[6] *See Semiconductors and the Semiconductor Industry,* Congressional Research Service (April 2023), available at https://www.congress.gov/crs-product/R47508
[7] *See Foundational Fabs* at 10.
[8] *See* D. Alperovitch, *How the right U.S. chip strategy can keep Taiwan free,* Washington Post Opinion (April 24, 2024), available at https://www.washingtonpost.com/opinions/2024/04/29/china-us-computer-chip-strategy-breakout-free-taiwan/.
[9] *See Foundational Fabs* at 9-10. *See also Think Tank Urges US to Get Even Stricter with China Over Chips*, Bloomberg (October 26, 2023); D. Alperovitch and G. Graff*, World on the Brink: How America Can Beat China in the Race for the 21st Century*, (2024). *See* Thomas Alsop*, Production Share of Mature and Advanced Nodes in the Foundry Industry 2021-2024*, Statista (Aug. 15, 2022), available at https://www.statista.com/statistics/1322610/mature-advanced-node-proportions/ (demonstrating that the production of foundational chips accounts for over 75% of the semiconductor industry); Lindsey Allen and Ritika Sinha-Chaudhuri, *Looking Deeper: The Enduring Role of Legacy Semiconductors*, Wilson Center (Dec. 22, 2023), available at https://www.wilsoncenter.org/blog-post/event-summary-looking-deeper-enduring-role-legacy-semiconductors (explaining that 99.5% of the U.S. Department of Defense's "national security, mission-critical, pentagon-style capabilities" depend on foundational chips); *Building Resilient Supply Chains, Revitalizing American Manufacturing,*

States and allied partners continue to lead in the advanced chip nodes, China can weaponize its dominance in foundational chips to impede final production and assembly of goods critical to U.S. national and economic security. Ceding the foundational market to China also means that the CCP has more supply chain leverage to counter any additional U.S. export controls on advanced semiconductor chips and equipment – which are essential to prevent China from modernizing its military ambitions.

China's capture of market power in foundational semiconductors follows the same policy playbook that it deployed long ago to dominate sectors including steel and aluminum. Mainland production capacity for crude steel and primary aluminum now respectively approach and exceed half the global total.[10] This capacity dominance allows China to exert market pricing power, especially during periods of low demand when market-oriented producers respond to market signals by reducing production and thereby cede market share to Chinese producers less subject to budget constraints.[11] Chinese gains in shares of global production capacity were especially pronounced after the Global Financial Crisis. Since that time, China has repeated the process by moving up the value chain to produce advanced technology products at volumes untethered to global demand, including chemicals, lithium-ion batteries, and solar modules.[12] Given China's decades-long execution of this playbook enabled by state support and in defiance of market-based principles, the consequence of failing to act to protect American production capabilities in foundational semiconductors is starkly clear. We must acknowledge China's predatory intent and protect U.S foundational semiconductor production accordingly.

II. CHINA'S NON-MARKET POLICIES AND PRACTICES TO DOMINATE DESIGN AND PRODUCTION OF FOUNDATIONAL SEMICONDUCTORS THREATENS U.S. ECONOMIC AND NATIONAL SECURITY

A. China's Non-Market Practices in the Semiconductor Sector Span the Entire Supply Chain

China's ambitions and non-market government policies in the semiconductor sector are well-documented. Publicly stated market share targets are achieved through expansion of capacity untethered to market conditions. Failure to address China's increasing share of global production capacity for foundational semiconductors stands to cede market power, including on pricing, to China and thereby undermine the viability of investment and production outside the mainland.

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and Fostering Broad Based Growth, The White House (June 2021) at 24-25, ("100-Day Review)" available at: https://bidenwhitehouse.archives.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf?utm_source=sfmc%E2%80%8B&utm_medium=email%E2%80%8B&utm_campaign=20210610_Global_Manufacturing_Economic_Update_June_Members.

[10] *See OECD Steel Outlook 2025*, OECD (May 2025), available at https://www.oecd.org/en/publications/oecd-steel-outlook-2025_28b61a5e-en.html; *see also U.S. Geological Survey Annual Aluminum Report*, available at https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-aluminum.pdf?utm_source=chatgpt.com.

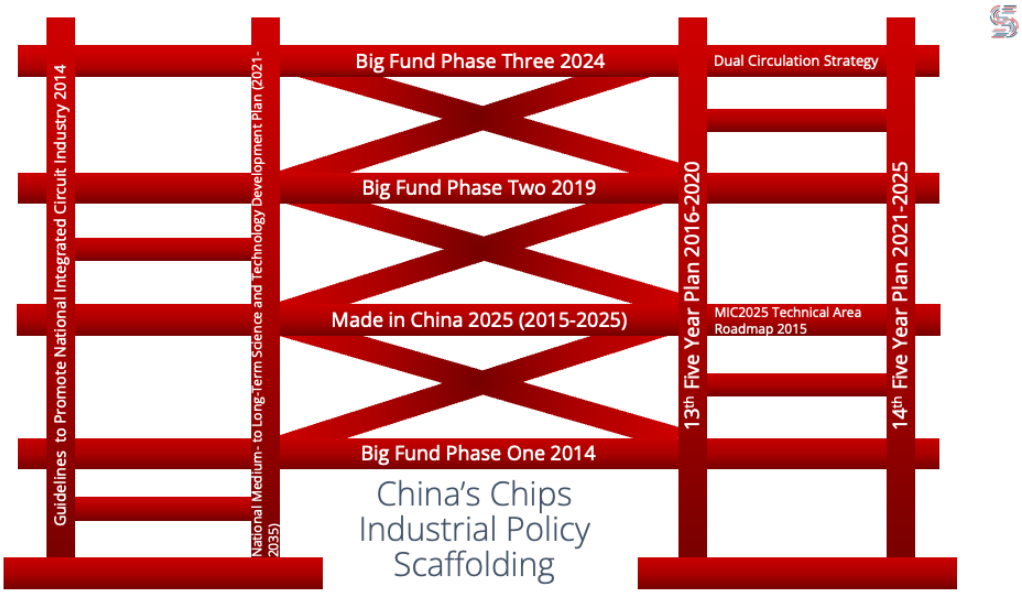
[11] *See e.g. Joint United States – United Kingdom Statement on Addressing Global Steel and Aluminum Excess Capacity*, Office of the U.S. Trade Representative (January 19, 2022), *available at* https://ustr.gov/about-us/policy-offices/press-office/press-releases/2022/january/joint-united-states-united-kingdom-statement-addressing-global-steel-and-aluminum-excess-capacity?utm_.

[12] *See Testimony Before the U.S.-China Economic and Security Review Commission by Jamieson L. Greer* (May 23, 2024), available at https://www.uscc.gov/sites/default/files/2024-05/Jamieson_Greer_Testimony.pdf; *see also Remarks by Under Secretary Jay Shambaugh on Chinese Overcapacity and the Global Economy* (July 10, 2024), available at https://home.treasury.gov/news/press-releases/jy2455?utm_source=chatgpt.com.

China's *Made in China 2025* policy, as an example, stresses the importance of development of this sector with the goal of 70% self-sufficiency by 2025 and increasing to 80% by 2030.[13] China's National Integrated Circuit Guidelines and associated "Big Fund" are intended to help finance Chinese firms, such as through acquisition of foreign intellectual property and state-sponsored support.[14] An illustrative list of Chinese support for its semiconductor industry follows:

- Billions of dollars in subsidies to publicly traded Chinese semiconductor companies (design, foundries, IDMs, and equipment manufacturers); [15]
- Over $50 billion in equity investments in Chinese semiconductors companies in Phase 1 and 2 of the Big Fund, with another $47 billion slated for Phase 3, and approximately $45 billion in equity investments in provincial government funds; [16]
- Government joint venture and direct investments in Chinese semiconductor companies;
- Low priced land;
- Reduced taxes like discounted corporate income tax rates or exemptions; and
- Encouragement of acquisition of essential technologies through foreign acquisitions and technology transfers, including high profile instances where U.S. and allied company IP was illicitly obtained by Chinese entities. [17]

Figure 1: China's Chips Industrial Policy Scaffolding[18]



[13] *Semiconductors: U.S. Industry, Global Competition, and Federal Policy*, Congressional Research Service (October 26, 2020), available at: https://www.congress.gov/crs-product/R46581.
[14] *See Foundational Fabs* at 12.
[15] *See Foundational Fabs* at 12-13.
[16] *See Foundational Fabs* at 12 – 13; Shunsuke Tabeta, *China's Third Semiconductor Big Fund Starts Spending $47 billion War Chest,* Nikkei Asia (January 7, 2025), available at https://asia.nikkei.com/Business/Tech/Semiconductors/China-s-3rd-semiconductor-Big-Fund-starts-spending-47bn-war-chest.
[17] *See Foundational Fabs.* at 13-14.
[18] Maureen Hinman, *Keynote Presentation,* (May 2024), available at https://cdn.sanity.io/files/0wfzc71x/production/0491afb219d9c22b8ecd66340d415013c3ce2d6f.pdf.

Notably, these aforementioned non-market policies are not aimed at one particular segment of the semiconductor value chain, but rather across the board from upstream material and mineral inputs, to design, EDA software, fabrication, semiconductor manufacturing equipment (SME), and assembly, test, and packaging (ATP).

Figure 2: Semiconductor Supply Chain

i. Upstream Inputs - Critical Minerals and Materials

China is using its non-market practices and industrial policy playbooks to dominate the critical minerals needed as inputs into the semiconductor manufacturing process, from gallium and germanium to rare earths. In many cases, China has cornered the global market for the processing and refining of these minerals and has been weaponizing this leverage against the U.S. as new export controls on semiconductors and tariffs on Chinese products have been announced.[19]

China also accounts for a sizeable share of critical materials such as silicon wafers, photoresists, lead frames, and substrates, holding 18 percent of global revenue (tied with South Korea). Taiwanese firms account for the largest share at 28 percent of global revenue, with Japanese firms (12 percent), and U.S. firms (9 percent).[20]

ii. Design

The U.S. still leads in design of semiconductors, accounting for 51 percent of industry revenue in 2022, while Korea (13 percent), the EU (10 percent), Japan (9 percent), and Taiwan (8 percent) follow.[21] China accounted for 6 to 8 percent of semiconductor design revenue in 2022, depending on the estimate.[22]

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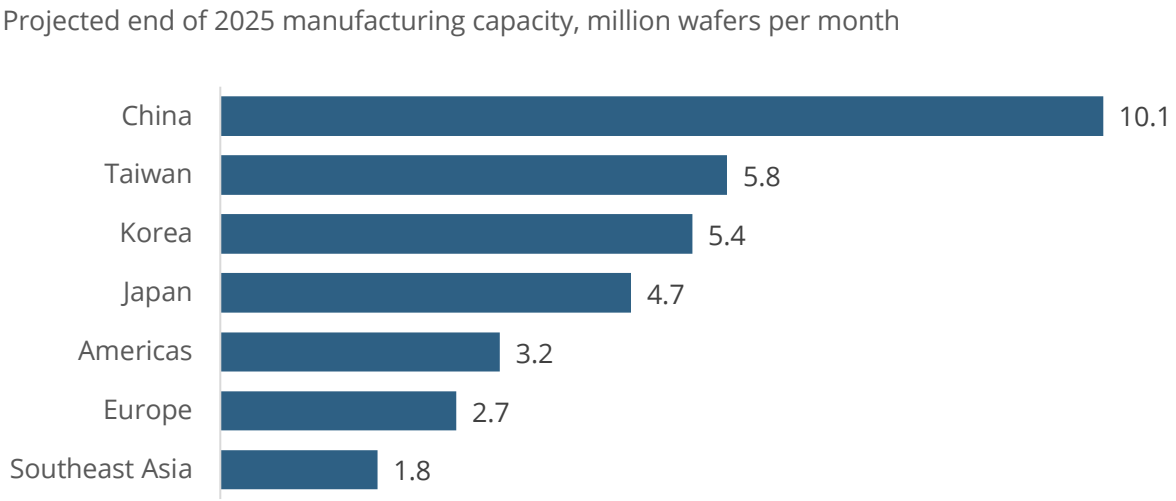
[19] *See, infra,* Figure 7.
[20] The data are by firm headquarters location. Varadarajan et al, *Emerging Resilience In The Semiconductor Supply Chain*, May 2024, https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf.
[21] The data are by firm headquarters location. Varadarajan et al, *Emerging Resilience In The Semiconductor Supply Chain*, at 11, (May 2024), https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf.
[22] Varadarajan et al, *Emerging Resilience In The Semiconductor Supply Chain*, (May 2024), available at https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf; *See Foundational* Fabs at 16.

China's desire to localize its semiconductor industry and acquisition of foreign firms, however, are driving factors owing to its rapid growth in design since 2015, (736 firms in 2015 compared to 3,243 in 2022).[23] Chinese firms are also trying to make inroads into the electronic design automation (EDA) software and IP core markets where they are largely reliant on foreign firms.[24] While some Chinese firms have developed EDA software for foundational semiconductors, adoption is lagging, leading China to promote the adoption of open-source IP, such as the RISC-V architecture.[25]

iii. Fabrication

China is projected to account for 30 percent of global semiconductor fabrication capacity at the end of 2025, followed by Taiwan (17 percent), Korea (16 percent), Japan (14 percent), the Americas (9 percent), Europe and the Middle East (8 percent), and Southeast Asia (5 percent).[26] Not only does China account for the most global fab production capacity, it accounts for an even larger share of foundational semiconductor production. In 2023, China already accounted for more than 30 percent of global foundational production capacity, depending on the estimate.[27]

Figure 3: Global Semiconductor Manufacturing Capacity[28]



[23] *See Foundational Fabs* at 15.
[24] *See Foundational Fabs* at 25.
[25] *See Foundational Fabs* at 16, 25.
[26] SEMI, *Global Semiconductor Fab Capacity Projected to Expand 6% in 2024 and 7% in 2025, SEMI Reports,* (June 18, 2024), available at https://www.semi.org/en/news-media-press-releases/semi-press-releases/global-semiconductor-fab-capacity-projected-to-expand-6%25-in-2024-and-7%25-in-2025-semi-reports?utm_medium=ppc&utm_source=google&utm_campaign=Brand.
[27] Jessie Chen*, SMIC Earnings Signal Potential Price War in Mature-Node Chip Market,* DigiTimes (February 14, 2025), available at https://www.digitimes.com/news/a20250213VL205/smic-earnings-price-competition-market-capacity.html.
[28] SEMI, *Global Semiconductor Fab Capacity Projected to Expand 6% in 2024 and 7% in 2025, SEMI Reports*, (June 18, 2024), available at https://www.semi.org/en/news-media-press-releases/semi-press-releases/global-semiconductor-fab-capacity-projected-to-expand-6%25-in-2024-and-7%25-in-2025-semi-reports?utm_medium=ppc&utm_source=google&utm_campaign=Brand.

What is even more concerning, however, is how much planned capacity Chinese firms are adding and plan to add. China imported a record amount of semiconductor manufacturing equipment (SME) in 2024, Chinese firms produced a record amount of such equipment, and the country spent more on SME in 2024 than any other country. Further, China is projected to be the largest spender on such equipment in 2025 and 2026 and to install three times as much capacity during 2024-2027 as any other country.[29] By 2027, China alone will account for 32% of global semiconductor production capacity.[30]

Chinese firms are also making major investments in compound semiconductors, which have a range of potential applications, from consumer electronics to medical devices. These technologies are known for their efficient use of power, higher switching frequencies, and high resistance to heat make them valued components of products such as renewable energy equipment and electric vehicles. They are also used in defense applications.[31]

Chinese firms have quickly gained market share in the compound semiconductor market. For example, Chinese firm Innoscience's share of the power gallium nitride (GaN) compound semiconductor market reached 31 percent in 2023, up from less than 15 percent in 2021.[32] Similarly, as recently as 2022, U.S. firms dominated the silicon carbide (SiC) substrate market, with Wolfspeed supplying 53 percent of the market and Coherent supplying 19 percent of the market.[33] Wolfspeed remained the largest supplier in 2024, though its market share fell to 34 percent, while Chinese firms TanKeBlue and SICC each supplied 17 percent of the market.[34]

The market share gains of Chinese firms are driven by low pricing. One industry representative noted that 2 years ago, Wolfspeed's 6-inch SiC wafers cost $1,500 per piece, and currently China is offering them for as low as $500.[35] In its comments to USTR on the 301 Investigation of China's Acts, Policies, and Practices Related to Targeting of the Semiconductor Industry for Dominance, Wolfspeed stated that it is facing pressure from customers to match the low prices of Chinese producers.[36]

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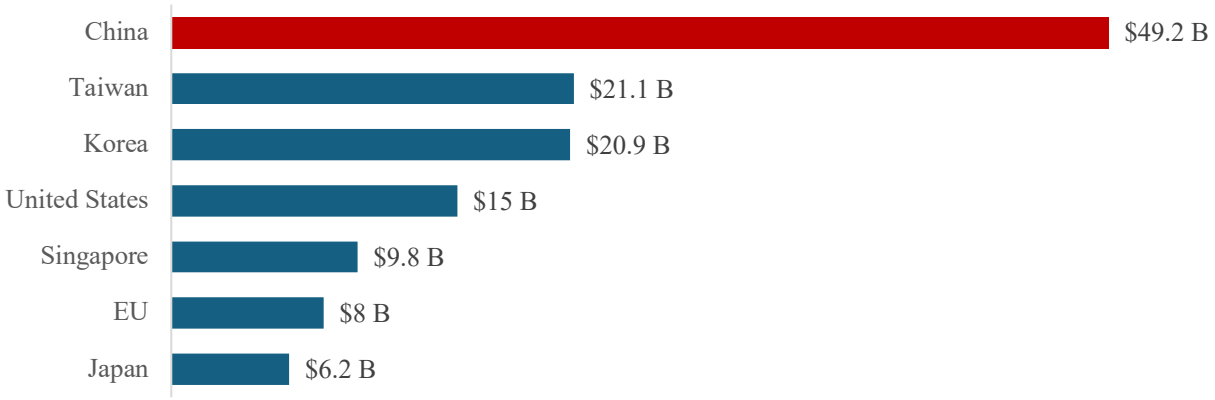
[29] In 2023, China accounted for 22% of 200mm global production capacity, and in 2022, China accounted for 22% of 300mm fab production capacity. See *Foundational Fabs* at 4. *See 2024 SME Analysis* at 12. Semiconductor Industry Association, *What is a 300mm Wafer* available at https://www.semiconductors.org/semiconductors-101/frequently-asked-questions/; *See 2025 SME Analysis* at 7, 8, 10, 23.
[30] *See 2024 SME Analysis* at 13.
[31] *See Foundational Fabs* at 20.
[32] *Power GaN: Harnessing New Horizons*, Yole Group (April 11, 2024), available at https://www.yolegroup.com/strategy-insights/power-gan-harnessing-new-horizons/; *Power GaN 2022*, Yole Group (2022), available at https://medias.yolegroup.com/uploads/2022/06/Power-GaN-2022-Product-Brochure-.pdf; *See Foundational Fabs* at 20.
[33] *Foundational Fabs* at 20.
[34] *Wolfspeed Reportedly to File Bankruptcy in Weeks as China's Aggressive Pricing, Weak Demand Bite*, Trendforce (May 21, 2025), available at https://www.trendforce.com/news/2025/05/21/news-wolfspeed-reportedly-to-file-bankruptcy-in-weeks-as-chinas-aggressive-pricing-weak-demand-bite/.
[35] *China's Low-Cost SiC and Mature Chips Ignite Global Semiconductor Price War,* Trendforce (April, 16, 2025), available at https://www.trendforce.com/news/news/2025/02/27/news-chinas-low-cost-sic-and-mature-chips-ignite-global-semiconductor-price-war/
[36] Werner, *Re: Request for Public Comments: China's Acts, Policies, and Practices Related to Targeting of the Semiconductor Industry for Dominance,* (February 5, 2025), available at https://comments.ustr.gov/s/commentdetails?rid=RKDDYKT2YM

iv. Semiconductor Manufacturing Equipment (SME)

U.S. firms are the leading producers of SME, accounting for 47 percent of industry revenues in 2022, with Japan accounting for 26 percent and the EU for 18 percent.[37] Chinese firms are rapidly increasing SME production, with the SME revenue of 19 publicly traded Chinese firms tracked by Silverado reaching $9.1 billion in 2024, up from $3.2 billion in 2021.[38]

China's SME sector, however, is not as technologically advanced as the United States and China remains dependent on imports of SME. In fact, China is the largest importer of SME in the world, importing twice as much equipment as Taiwan, the second largest importer.[39] Export controls would stop the flow of SME and inhibit China's ability to maintain or upgrade current equipment. Notably, SME requires frequent maintenance, which would be restricted by export controls on SME parts, components, and technology. In addition, while China has arguably imported significant quantities of SME already, new controls would delay China from maintaining new capacity. These restrictions are vitally important as China is projected to have the highest SME spending of any country in 2025 and 2026.[40]

Figure 4: Leading Global Importers of SME, 2024



[37] The data are by firm headquarters location. Varadarajan et al, *Emerging Resilience In The Semiconductor Supply Chain*, (May 2024), available at https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf. These data, however, may overstate the role of the United States in producing SME. While global SME revenues were $108 billion in 2022, U.S. industry production in the North American Industrial Classification System (NAICS) code for semiconductor machinery manufacturing totaled only $13.8 billion in 2022. U.S. production is the establishment's reported "sales, value of shipments, or revenue." U.S. Census Bureau, *2022 Economic Census*, NAICS 333242 (semiconductor machinery manufacturing), available at https://data.census.gov; *Global Semiconductor Equipment Billings Slip to $106.3 Billion in 2023, SEMI Reports*, SEMI (April 10, 2024), available at https://www.semi.org/en/news-media-press-releases/semi-press-releases/global-semiconductor-equipment-billings-slip-to-%24106.3-billion-in-2023-semi-reports. While some SME is classified elsewhere in the NAICS, these data indicate that U.S. SME production supplies a lower share of global production than would be indicated by firm revenue.
[38] *2025 SME Analysis* at 23.
[39] *2025 SME Analysis* at 5.
[40] *See 2025 SME Analysis* at 8.

v. Assembly, Test, and Packaging (ATP)

China has the most ATP capacity (30 percent), by location of ATP facility, followed by Taiwan (28 percent) and Southeast Asia (around 20 percent). The United States only accounts for 3 percent of ATP production capacity.[41]

B. China's Non-Market Practices Create Overcapacity

Overcapacity in Chinese foundational semiconductor production is not different than historical state-created overcapacity in industries ranging from steel to aluminum and more recently to electric vehicles. China's National Development and Reform Commission has itself acknowledged industrial overcapacity as recently as 2024 and stated the need to reduce the problem.[42] As defined by the U.S. Department of the Treasury, overcapacity "{i}s not just production in excess of domestic demand, it is production capacity untethered from global demand."[43] Net addition of capacity during global market downturns, as Chinese steel producers undertook in the years following the Global Financial Crisis, or untethered to current or estimated future global demand as is now the case for electric vehicles, is fundamentally non-market conduct that private firms subject to hard budget constraints cannot undertake. China's stated policy objective is not profitability, but rather to accrue market power and thereby capture market share. Targets related to market share capture are explicitly stated, including for semiconductors, in planning documents such as *Made in China 2025*. Zero-sum capture of market share either in China or globally, as has been achieved in many industries that are prioritized in China's industrial plans, leaves no commercial space for market-oriented producers and exposes consumers to long-run predatory pricing and export restriction policies of the Chinese Communist Party.

Chinese expansions in foundational chip design and production capacity are creating overcapacity that is likely to far outstrip anticipated demand.[44] With this type of market positioning, China is already manipulating prices and controlling the supply chain for foundational chips and even downstream products. Over time, expanded design and production of foundational semiconductors in China will likely displace U.S. production, eliminate U.S. jobs, depress prices and thereby investment incentives, undermine CHIPs Act incentives, and create an over-reliance on Chinese semiconductors.[45] China's

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[41] ATP capacity data are by the country in which the ATP plant is located. Varadarajan et al, *Emerging Resilience In The Semiconductor Supply Chain*, (May 2024), available at https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf.

[42] *Report on the Implementation of the 2023 Plan for National Economic and Social Development and on the 2024 Draft Plan for National and Economic Social Development*, National Development and Reform Commission (March 5, 2024), available at: https://english.www.gov.cn/news/202403/13/content_WS65f196f2c6d0868f4e8e50dc.html.

[43] *Remarks by Under Secretary Jay Shambaugh on Chinese Overcapacity and the Global Economy* (July 10, 2024), available at https://home.treasury.gov/news/press-releases/jy2455?utm_source=chatgpt.com.

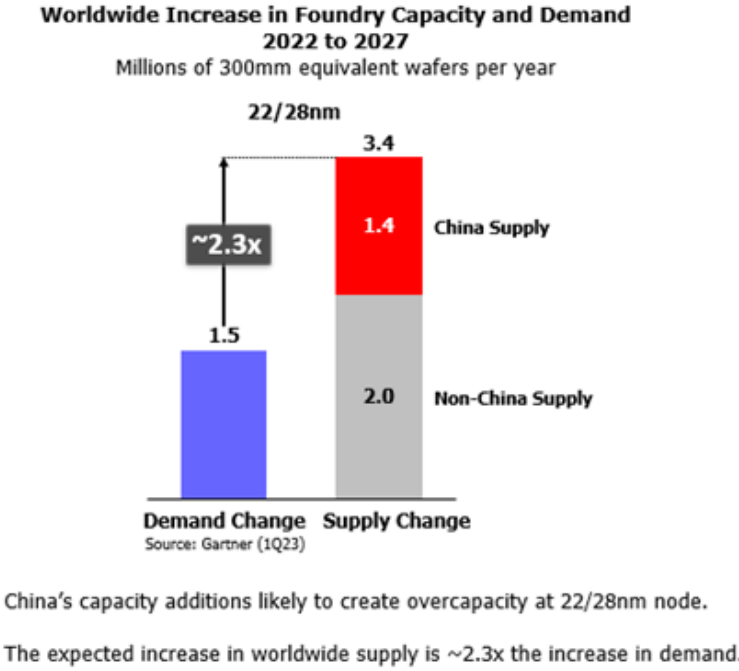
[44] Allen, *supra* note 9 ("The United States has ceded the realm of legacy chips, enabling China to build over capacity and drown US industries."); Sujai Shivakumar, Charles Wessner, and Thomas Howell, *The Strategic Importance of Legacy Chips,* 5-6, Ctr. for Strategic and Int'l Studies (Mar. 3, 2023). Gregory C. Allen and Akhil Thadani, *Mapping the Semiconductor Supply Chain: The Critical Role of the Indo-Pacific Region*, Ctr. for Strategic and Int'l Studies (May 30, 2023), available at https://www.csis.org/analysis/mapping-semiconductor-supply-chain-critical-role-indo-pacific-region

[45] David, *supra* note 5 at 13-14, 28-32 ("Comparatively lower Chinese pricing exists across the semiconductor supply chain, with design firms, foundries, and OSAT firms all offering lower prices for their products/services . . . Non-Chinese firms are also losing market share to Chinese firms."); Jane Lanhee Lee, Josh Horwitz and Alexandra Alper, *Analysis-China's massive older chip tech build up raises U.S. concern*, Reuters (Dec. 13, 2022), available at https://www.reuters.com/technology/chinas-massive-older-chip-tech-build-up-raises-us-concern-2022-12-13/. (China "has a

control over the foundational chip market also provides it with greater leverage to counteract export controls and other measures designed to limit its access to advanced chip technology.

The threat of overcapacity is not just hypothetical. By way of one example, industry data shown in Figure 5 below reflect that by 2027, supply of chips at the 22 / 28 nm level will exceed demand by 230 percent:

Figure 5: Worldwide Increase in Foundry Capacity and Demand



The overcapacity in the market caused by this expansion would undermine U.S. chip designers and producers and prevent them from obtaining sufficient returns on their investments. If this strategy is successful, the U.S. industry will struggle to compete, and U.S. consumers will no longer have access to a dependable and secure semiconductor supply chain for foundational chips and the downstream products that incorporate them.[46]

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track record of dominating key technologies by flooding the market with cheaper products and wiping out global competition . . . it would give Beijing coercive leverage over every country and industry - military or civilian - that depend on 28 nanometer chips"); Shivakumar, *supra* note 4 at 5-6; *Results from Semiconductor Supply Chain Request for Information*, U.S. Department of Commerce (Jan. 25, 2022), available at https://www.commerce.gov/news/blog/2022/01/results-semiconductor-supply-chain-request-information.

[46] *See, e.g., 100-Day Review*, *supra* note 9 at 39 ("The fact that many fabrication facilities are in China and Taiwan and are owned by entities in these two economies puts the world semiconductor community at great risk from geopolitical actions. Even a minor conflict or embargo could have immediate major disruptions to the United States and long-term implications for U.S. supply chain resilience"); *id.* at 57 (describing how the reliance on foreign produced legacy chips, in particular from China, will impact the U.S. ability to supply sectors that are critical to its national and economic security); Martijn Rasser and Kevin Wolf, *The Right Time for Chip Export Controls*, Lawfare (Dec. 13, 2022), available at https://www.lawfaremedia.org/article/right-time-chip-export-controls. ("China's dominance in [foundational semiconductor production] could create a huge supply chain vulnerability"); Microelectronics Survey, *supra* note 3 at 101 ("[F]orecast PRC overcapacity threatens to make [products relying on legacy chips] financially nonviable in the United Stated and allied economies"); Ken Moriyasu, *U.S. nervous about 'flood' of older-generation chips from China*, Nikkei Asia (Jan. 9, 2024), available at https://asia.nikkei.com/Business/Tech/Semiconductors/U.S.-nervous-about-flood-of-older-generation-chips-from-China.

Additional extensive data on overcapacity in semiconductors is not readily obtainable. Even so, it is essential to acknowledge that China's stated market share targets included in *Made in China 2025*, as first published in 2015 and to be achieved by 2030, imply capture of market share through the same means used in other industries – production in excess of demand that creates a price-suppressed market in which only firms enjoying state support can continue to produce at volume. We should expect this playbook to be repeated in the foundational semiconductors market.

C. China's Non-Market Practices Facilitate Government Ownership of Private Firms

China's non-market practices provide an unfair advantage to Chinese semiconductor firms along the value chain, which puts pressure on U.S. firms to keep up in terms of costs and prices or else lose market share. Of particular note is the significant share of Chinese government ownership of leading Chinese design and fabrication companies. For example, major beneficial owners of China's largest foundry, SMIC, include the State Council and the State-owned Assets Supervision and Administration Commission of the State Council (SASAC). Similarly, major beneficial owners of China's second largest foundry, Hua Hong, include the State-owned Assets Supervision and Administration Commission of Shanghai Municipal Government and the State Council. Two of the major memory companies in China, CXMT and YMTC, are more than 80 percent and more than 90 percent government owned, respectively. Chinese government entities also have extensive ownership in other stages of the value chain, such as design and assembly, test, and packaging.[47]

Such high levels of government ownership mean that U.S. firms are essentially competing for business in global markets with a government, not with another private company. Even where government ownership is not reported or is relatively low, the Chinese government incentives are trade and market distortive and make it difficult to compete for even the most efficient, productive, and innovative companies in the world.

III. THE IMPACT OF CHINA'S NON-MARKET PRACTICES ON THE U.S. AND GLOBAL SEMICONDUCTOR MARKET

Non-market practices plus a predatory motive are predictably leading Chinese firms to build out capacity that is not tied to any documented demand signals and then export their production into markets where they can unfairly compete on price and capture market share. By value, Taiwan, China, and Korea were the top three exporters (excluding re-exports) in 2023 and the first half of 2024. China was also the top exporter by volume over the same period – exporting significantly more than Taiwan likely owing to product mix.[48] As U.S. semiconductors firms compete with Chinese firms in the U.S., China, and other foreign markets, it is concerning that Chinese firms are significant exporters of highly subsidized semiconductors.

While U.S. general imports of semiconductors from China totaled only $2.1 billion in 2024, accounting for only 5 percent of U.S. imports (with imports for consumption from China totaling only $1.5 billion), these data understate U.S. reliance on Chinese semiconductors in two ways.[49] First, China supplied over 15 billion semiconductors to the United States, accounting for 34 percent of the quantity of U.S.

[47] WireScreen database, available at https://www.wirescreen.ai/.
[48] *See Silverado Report: Understanding Recent Trends in Global Semiconductor Trade* at 14.
[49] USITC, DataWeb.

semiconductor imports in 2024. This includes billions of diodes and transistors and 1.6 billion integrated circuits.[50] Second, Chinese semiconductors enter the U.S. market as components of downstream products. While it is difficult to quantity the exact volume of semiconductors that enter the U.S. market in downstream products, semiconductors fabricated by Chinese companies are integrated into the supply chains of multinational firms in sectors ranging from consumer electronics to passenger vehicles and beyond.[51]

A 2024 survey issued by the Department of Commerce's Bureau of Industry and Security (BIS) of U.S. industry use of mature-node semiconductors found that "overall, end users had limited visibility into the origins of chips used in their products" but that they had "sufficient visibility, however, to reveal that the use of chips manufactured in PRC based foundries is pervasive."[52] The survey also highlighted that "chip suppliers indicated that capacity expansion in China is beginning to cause pricing pressure, and that the combination of subsidies for foundries and downstream industries in China, as well as pressure to use PRC-origin content in China, may impact their competitive positions." [53]

End-user visibility aside, foundational semiconductors are recognized as critical for defense applications in which cutting-edge chips are not necessarily required. Foundational semiconductors are required in bulk and over extended service periods for defense purposes, due to their use in systems that have operational lives longer than applications like consumer electronics, where updates to using advanced-node chips are more frequently made.[54]

A. Price Suppression

While comprehensive semiconductor pricing data are not publicly available, there is ample anecdotal evidence that Chinese firms are offering lower prices and gaining market share across the supply chain, with cumulative cost advantages as a result.[55] Nikkei Asia reports that:

> "[a] 'China shock' is coming for the chip industry as the country's aggressive expansion in older semiconductors and niche substrates drives prices down to previously unthinkable levels…. Another imminent concern for the industry is China's expansion in "mature" semiconductor nodes -- typically 28-nanometer and older technologies -- used in everything from phones and home appliances to cars and defense equipment. …The semiconductor industry must brace for the same kind of "China shock" that the solar

[50] The data are general imports by number of semiconductors. USITC, DataWeb.
[51] *See Foundational Fabs* at 30.
[52] *Public Report on the Use of Mature-Node Semiconductors*, Bureau of Industry and Security (December 6, 2024), available at https://www.bis.gov/media/documents/public-report-use-mature-node-semiconductors-december-2024.
[53] *Public Report on the Use of Mature-Node Semiconductors*, Bureau of Industry and Security (December 6, 2024), available at https://www.bis.gov/media/documents/public-report-use-mature-node-semiconductors-december-2024.
[54] *See Microelectronics: Macro Impacts from Competition to Crisis*, Lt Gen Mark Weatherington, USAF (Ret.), (September 2024) at 4, available at: https://www.mitchellaerospacepower.org/app/uploads/2024/09/MI_Forum_56-Microelectronics-FINAL.pdf.
[55] *See Foundational Fabs* at 4, 27-30. This is attributable to factors that include state-sponsored non-market practices as well as customers choosing to localize their supply chain.

> power industry experienced, according to Charles Shi, a chip analyst with asset management company Needham." [56]

Further, a review of government publications and media reports—as well as pricing data for certain products within China compiled by Silverado—indicates that Chinese companies often sell at significantly lower prices. For example:

- Materials: Chinese firms offer significantly lower prices on silicon carbine (SiC) substrates. One industry representative noted that 2 years ago, Wolfspeed's 6-inch SiC wafers cost $1,500 per piece, and currently China is offering them for as low as $500.[57] Another report indicated that Chinese prices fell to $400 to $450 in the fourth quarter of 2024.[58]

- Foundries: A survey on mature-node semiconductors by the Department of Commerce's Bureau of Industry and Security (BIS) found that among products for which respondents had comparable pricing, 72% were cheaper from PRC-based foundries compared to non-Chinese alternatives. The median price difference was 10% lower.[59]

- Assembly, test, and packaging: Chinese assembly, test, and packaging firms also offer lower prices than their international competitors.[60]

- Semiconductors from Chinese design firms: Chinese semiconductor design firms and integrated device manufacturers often sell prices at significantly lower prices than non-Chinese firms. While published time series data are limited, media reports and Silverado's analysis indicate that there are significant price differences across multiple types of products. Silverado's Foundation Fabs report found that "[a]vailable published price information indicates that Chinese fabless firms and IDMs offered prices that were 20 to more than 30 percent lower than non-Chinese competitors' prices for some products in 2022 and 2023."[61] A review of recent information indicates that lower pricing by Chinese firms continued in 2024 and the first half of 2025. For DRAM, for example, multiple reports consistently indicate the CXMT sells products at below the prices of major international competitors. The estimated margin of underpricing is

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[56] Cheng, Ting-Fang and Lauly Li, *Global Tech Industry Braces for 'China Shock' in Mature Chips*, Nikkei Asia (February 26, 2025), available at https://asia.nikkei.com/Business/Technology/Tech-Asia/Global-tech-industry-braces-for-China-shock-in-mature-chips. "In addition to the price, Marco said he was also taken aback by how rapidly these Chinese suppliers had emerged and by their aggressiveness in grabbing global market share. That rapid rise is a result of China ramping up efforts to build a domestic supply chain in areas not yet targeted by U.S. export curbs, namely compound semiconductors like SiC and less advanced but still vital chips used in a range of applications."

[57] *China's Low-Cost SiC and Mature Chips Ignite Global Semiconductor Price War,* Trendforce (April, 16, 2025), available at https://www.trendforce.com/news/news/2025/02/27/news-chinas-low-cost-sic-and-mature-chips-ignite-global-semiconductor-price-war/

[58] *Silicon Carbide Prices Drop by Nearly 30%*, Trendforce (October 23, 2024), available at https://www.trendforce.com/news/2024/10/23/news-silicon-carbide-prices-drop-by-nearly-30/#:~:text=Industry%20reports%20indicate%20that%20since,term%20oversupply%20in%20the%20market.

[59] *Public Report on the Use of Mature-Node Semiconductors*, Bureau of Industry and Security (December 6, 2024), available at https://www.bis.gov/media/documents/public-report-use-mature-node-semiconductors-december-2024.

[60] *See Foundational Fabs* at 29.

[61] *See Foundational Fabs* at 28.

significant, though it varies by source.[62] Similarly, Chinese MCU suppliers continue to offer lower global prices than their international competitors. In one example in May 2024, a company was offering prices that were 25 percent of the price of its competitors.[63] Silverado's own analysis of pricing in China in May 2025, which examined NOR Flash and MCU pricing by Chinese distributors, found that Chinese firms offered lower prices than non-Chinese competitors on average for comparable products.[64]

B. Loss of Market Share

China captures market share on a zero-sum basis from non-Chinese producers through a combination of price suppression and additional factors including producers choosing to allocate orders to Chinese suppliers to localize supply chains.[65] Undergirding the ability of Chinese producers both to suppress prices and attract orders is China's increasing share of global semiconductor fab production capacity, which significantly increased over the decade ending in 2022. Chinese exports have consequently increased at a faster rate than both global exports and the size of the larger global market. [66] This trend appears set to continue as China increasingly hoards semiconductor manufacturing equipment through world-leading imports.[67]

The U.S. semiconductor manufacturing industry is exposed to these developments in China through multiple channels. U.S. producers export more than half of domestic production, of which nearly 20 percent was exported directly to China in 2021.[68] U.S. production is therefore threatened by imports into the United States, Chinese producers' targeted dominance in their home market pursuant to *Made in China 2025* market share targets of 70% capture by 2025 and 80% capture by 2030, as well as low-price Chinese exports to third-country markets. Over time, adverse impacts to the U.S. industry includes elimination of competitive market segments, higher per unit production costs due to diminished economies of scale, lost revenue, and increasing competition in higher value-add segments of the market as China dominates commodity chip production.[69]

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[62] According to one source, CXMT's prices are 20 to 30 percent lower than the leading producers, while another source indicates that there is an even larger price difference. Chen, *DDR4 Market Set For Price War Between Chinese And Taiwanese Manufacturers After Samsung And SK Hynix Exit,* (May 16, 2025), available at https://www.digitimes.com/news/a20250516PD224/ddr4-dram-micron-samsung-sk-hynix-market.html; Jae-Lim, *China's CXMT Emerges As Silent Threat To Samsung,* Micron (April 14, 2025), available at https://koreajoongangdaily.joins.com/news/2025-04-14/business/industry/Chinas-CXMT-emerges-as-silent-threat-to-Samsung-Micron/2282536; Cheng Ting-Fang and Lauly LI, *China Makes Inroads in Dram Chips in Challenge to Samsung and Micron*, Nikkei Asia (January 15, 2025), available at https://asia.nikkei.com/Business/Technology/Tech-Asia/China-makes-inroads-in-DRAM-chips-in-challenge-to-Samsung-and-Micron.

[63] Liu and Strom, *Taiwanese IC Design Firms Accelerate Exit From Red Ocean Markets*, (March 8, 2024), available at https://www.digitimes.com/news/a20240307PD220/taiwan-ic-design-capacity-expansion-price-competition-china-market.html; Chen and Shen, *Chinese Foundries, IC Design Houses Collaborate To Slash Prices,* (May 9, 2024), available at https://www.digitimes.com/news/a20240508PD222/china-ic-design-mcu-pure-play-foundry.html#:~:text=Chinese%20mature%2Dnode%20foundries%20collaborate,pricing%2C%20according%20to%20industry%20sources.

[64] Analysis of distributor pricing by Silverado Policy Accelerator.

[65] *See Foundational Fabs* at 30.

[66] *See Foundational Fabs* at 31.

[67] *See 2025 SME Analysis passim*.

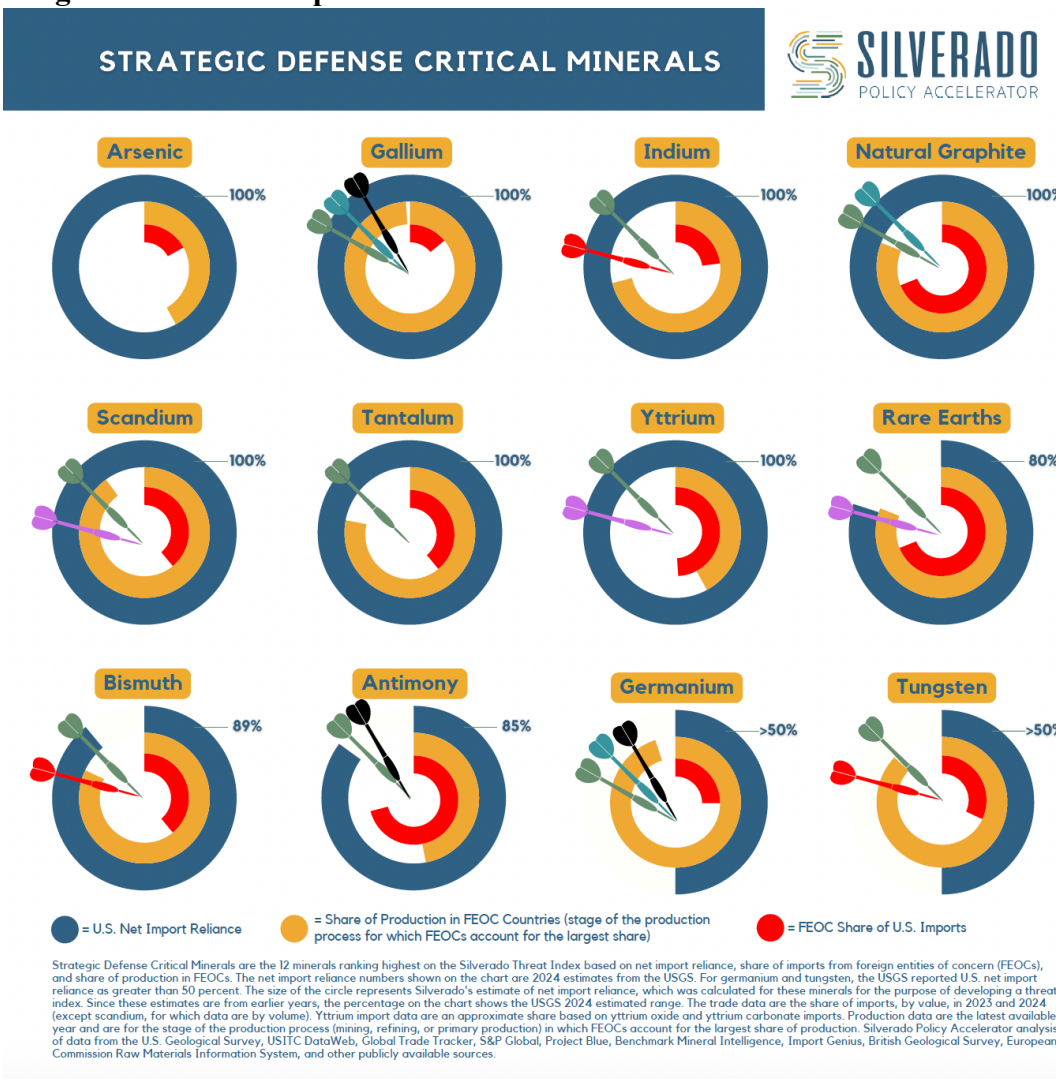
[68] *See Foundational Fabs* at 31.

[69] *See Foundational Fab* at 32.

C. Familiar Playbook

China has already demonstrated its willingness to use non-market practices and industrial policy playbooks to dominate critical markets and then weaponize its dominance to the detriment of the United States. For example, China has cornered the global market for the processing and refining of critical minerals needed as inputs into the semiconductor manufacturing process.[70] As demonstrated below, China has used this leverage over supply chains to restrict and even ban critical minerals and rare earth elements and associated processing technology from the United States.

Figure 7: Chinese Export Controls and Bans on Select Critical Minerals[71]



[70] M. Kahn, D. Kelm, and S. Stewart, *What's Next for China's Critical Minerals Hit List?* Silverado Policy Accelerator Report (Jan. 2025), available at https://cdn.sanity.io/files/0wfzc71x/production/bac1d1b1a77dc52271de3ff0886fdcab036c2884.pdf.

[71] M. Kahn, D. Kelm, and S. Stewart, *What's Next for China's Critical Minerals Hit List?* at 10, Silverado Policy Accelerator Report (Jan. 2025), available at https://cdn.sanity.io/files/0wfzc71x/production/bac1d1b1a77dc52271de3ff0886fdcab036c2884.pdf.

The U.S. Intelligence Community's Annual Threat Assessment published in March 2025 found that:

> China's dominance in the mining and processing of several critical materials is a particular threat, providing it with the ability to restrict quantities and affect global prices. *Beijing has shown a willingness to restrict global access to its mineral resources—sometimes in response to geopolitical disputes—as with its banning of exports to the United States of metals used in semiconductor manufacturing, such as gallium, germanium, and antimony in December 2024 in response to U.S. export controls on advanced semiconductors and chipmaking equipment.*[72]

The report further outlined that "China is using an aggressive, whole-of-government approach, combined with state direction of the private sector, to become a global S&T superpower, surpass the United States, promote self-reliance, and achieve further economic, political, and military gain. Beijing has prioritized technology sectors such as advanced power and energy, AI, biotechnology, quantum information science, and semiconductors, further challenging U.S. efforts to protect critical technologies by tailoring restrictions narrowly to address national security concerns."[73]

IV. RECOMMENDATIONS

The U.S. semiconductor industry is innovative and leads in some key areas of the value chain. New investments are being made to enhance fabrication capacity in the United States by both domestic and foreign companies to meet the demand of the future for advanced and foundational semiconductors.[74] These are critically important steps, but they will not be sufficient to sustain U.S. readiness from a military perspective or U.S. resilience from an economic perspective.

In a doomsday scenario where China invades Taiwan as part of its reunification plan, the U.S. will find itself cut off not just from Chinese chips, but also very likely from Taiwanese chips under China's control. The consequences of this type of geopolitical conflict are that the United States could rapidly find itself without access to key chips needed to deploy or sustain a war effort. Even outside of a military conflict, a global market for foundational chips that is dominated by China threatens economic growth of key sectors like automotive and medical devices that rely on a resilient supply of foundational chips.

There is room for optimism, though, as there are some key moves the United States can make now to slow China's growth in this sector and bolster U.S. resiliency by growing U.S. and allied foundational

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[72] *Annual Threat Assessment of the U.S. Intelligence Community, Office of the Director of National Intelligence ("DNI Threat Assessment")*, at 12-13, (March 2025), available at https://www.dni.gov/files/ODNI/documents/assessments/ATA-2025-Unclassified-Report.pdf.

[73] *DNI Threat Assessment* at 13 (emphasis added). The report also states that "China is accelerating its S&T progress through a range of licit and illicit means, to include investments, intellectual property acquisition and theft, cyber operations, talent recruitment, international collaborations, and sanctions evasion. Some forecasts indicate China's technology sectors will account for as much as 23 percent of its gross domestic product by 2026, more than doubling since 2018. In addition to private funding, the PRC government is investing hundreds of billions of dollars in priority technologies, such as AI, microelectronics, and biotechnologies, in pursuit of its self-reliance goals."

[74] *Comments on Section 232 Investigation,* at 4, Semiconductor Industry Association (May 7, 2025). ("SIA member companies have announced over half-a-trillion dollars (and counting) in private investments to manufacture and develop semiconductors in the U.S., with over 100 projects across 28 states…")

fabrication capacity and demand for U.S.-made chips. This will require a three-pronged, holistic strategy with action by the legislative and executive branches: **Build, Protect, Promote**. At its core, this strategy includes: (1) measures to build and expand semiconductor manufacturing capacity in the United States, (2) protecting the necessary investments and countering China's non-market practices, and (3) promoting the necessary demand signals to reduce reliance on Chinese chips.

The recommendations that follow acknowledge that there are tradeoffs in designing and implementing these policies. It is for this reason that policymakers must look holistically at the suite of options. For example, while extending tax credits to build more foundational chip capacity in the United States may incur some allocation of federal funding or acceptance of revenue foregone, those investments coupled with measures that offset price depression and volatility and promote the export and sale of U.S.-made chips will net a better return on investment than if the build, protect, promote framework is pursued one prong at a time. Moreover, when talking about restrictive policy measures like export controls, these recommendations stress the importance of using both carrots and sticks to incentivize trading partners to adopt measures comparable in effectiveness and scope.

A. Building and Expanding U.S. Foundational Chip Manufacturing

Reducing reliance on Chinese and foreign made semiconductors requires sufficient and cost competitive domestic manufacturing capacity to provide alternative supply. Despite similar costs for process equipment, fabrication plant construction costs in the United States are 37 to 50 percent higher than costs in major chip producing countries like China.[75] The Chips and Science Act was an important advancement to durable, longer-term resilient supply but additional action is needed by Congress to ensure that the investment momentum is sustained by: (1) extending and expanding the Advanced Manufacturing Investment Credit in Section 48D of the Internal Revenue Code; and (2) coordinating across committees to make sure that U.S. tax policy also provides incentives and tax credits to attract other elements of the semiconductor value chain to the United States or to an allied country, including critical minerals extraction and processing. The AMIC should be extended for at least another ten years and should be expanded to include the production of semiconductor-grade polysilicon and compound semiconductor substances, such as silicon carbide and gallium nitride.

The Administration's announcement of a new Investment Accelerator is a complementary approach to facilitate and accelerate large investments in the United States, including in the foundational semiconductor sector.[76]

B. Protecting U.S. Investments, Countering China's Non-Market Practices in the Semiconductor Sector, and Preventing China from Becoming Self-Sufficient

Public or private investments in new or expanded foundational fabrication capacity will be undermined by China's non-market practices if the United States fails to use existing tools and pursue new tools to close legislative gaps.

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[75] *Turning the Tide For Semiconductor Manufacturing in the U.S.*, Semiconductor Industry Association (2020), available at https://www.semiconductors.org/turning-the-tide-for-semiconductor-manufacturing-in-the-u-s ; Pete Singer, *Building Fabs in the U.S. vs Taiwan: Twice as Long, Twice as Much,* Semiconductor Digest (Feb. 18, 2025), available at https://www.semiconductor-digest.com/building-fabs-in-the-u-s-vs-taiwan-twice-as-long-twice-as-much/.
[76] The White House, *Establishing the United States Investment Accelerator* (March 31, 2025) available at https://www.whitehouse.gov/presidential-actions/2025/03/establishing-the-united-states-investment-accelerator/

i. Modernizing the Section 421 China Safeguard

First, Congress should look to pass a modernized version of the China Section 421 Safeguard.[77] Congress enacted this statute in 2000 as part of a package of provisions to address issues stemming from China's accession to the World Trade Organization (WTO). The 421 Safeguard was intended to be a temporary remedy to allow the United States to respond to potential import surges from China during a twelve-year time horizon where China would implement market economy reforms and fulfill other commitments as part of its WTO accession protocol.[78] Unlike its sister Section 201 global safeguard, the 421 was China-specific and invoked where the U.S. found that U.S. imports from China were increasing so rapidly as to cause market disruption and threaten or cause material injury to the domestic industry. The U.S. invoked Section 421 in several cases, but it ultimately expired in 2013 per its original terms, *despite the fact that China did not fulfill its commitments to market reforms*. Since that time, China's non-market policies, especially in the semiconductor industry, have worsened as evinced by its industrial plans and underlying documented state support to Chinese producers.

Injurious levels of Chinese imports have continued to batter U.S. industries since 2013. While the U.S. could, and has, used tools other than the 421 Safeguard, there is no tool that is specific to China and to import surges. Congress could consider reviving the 421 Safeguard and encouraging other WTO Members to take similar domestic action given that China benefitted from its sunset without fulfilling the precondition for its expiry. Should Congress pursue a modernized 421 Safeguard, which would be a critical remedial tool to address any surge of Chinese foundational chips in light of China's buildup of capacity, the following updates should be considered:

1. The Department of Commerce or U.S. International Trade Commission should be tasked with monitoring Chinese exports (and mirror U.S. and third country imports) and Chinese firms' production and capacity increases across manufacturing sectors. This should include Chinese exports to the U.S. from third countries. This type of continuous monitoring of not just trade flows but also production and capacity will allow for early-warning signals that can trigger a U.S. response before the injurious surge.
2. The tariff remedy should be expanded to cover exports to the U.S. from third countries where China is making significant investments and using as an export platform.
3. The threshold for proving "threat" of a market disruption should be lowered to ensure that action is able to be meaningfully taken before the injurious surge and can act as a deterrent.
4. Coordination with allies will be key to stemming trade diversion to other markets.
5. The remedy should be expanded to not just include tariffs, but also stricter requirements or even exclusions from certain types of U.S. investment or public procurement.

ii. Export Controls or Preferential Measures on Semiconductor Manufacturing Equipment (SME)

Second, in the case of foundational semiconductors, export controls are only targeted at advanced SME, allowing China to import as much SME as it wants to achieve its foundational fabrication and targeted

[77] Section 421 of the Trade Act of 1974, 19 U.S.C. Section 2451.
[78] *See* CRS, *Chinese Tire Imports: Section 421 Safeguards and the World Trade Organization* (August 24, 2012). The mechanism was agreed to by China and actually was available to all WTO Members.

capacity ambitions. Imposing export controls on only U.S. foundational SME, however, cedes the SME market to Japanese and Dutch SME competitors.

There are several options to consider enhancing existing export control regimes in a way that would help to slow China's capacity growth in foundational semiconductors:

1. The Administration could use its authorities under existing export control laws to impose additional export controls on SME (especially for foundational chipmaking), and any tools, parts, or components that support ongoing maintenance and operation of SME. This would inhibit or at least delay China's ability to expand and maintain its outsized semiconductor production capacity. Every effort should be made to work with SME producing countries like Netherlands and Japan to harmonize these efforts by using incentives such as lower tariffs on their exports of certain goods to the United States; if they are unwilling to join in using carrots, the Administration could consider invoking the foreign direct product rule to block their sale of the subject SME to China.

2. Congress could consider legislation that would explicitly authorize the Department of Commerce to use export controls in extraordinary circumstances to temporarily block exports of U.S. equipment or technology to China, in any sector covered by the *Made in China 2025* plan, where China is importing that equipment/technology to dominate a supply chain node in a way that is or likely would be weaponized to the detriment of the United States. This would expand export controls in narrow instances to items that may not otherwise be controlled as the technology is already widely available but where it may be necessary to impose restrictions in a time-limited manner to slow an adversary's ambitions. This would require cooperation by allies, as outlined in the point above.

3. Last, Congress could consider legislation that would require any SME company that is receiving direct federal funding or taking advantage of a tax credit to prioritize sales to U.S. or allied customers over China or other foreign entities of concern.

iii. Support for Section 232 or Section 301 Actions – Component Tariffs

Third, imports of semiconductors from China are currently relatively modest at under $2 billion;[79] thus, tariffs on imports of wafers alone will be an ineffective remedy to address the unfair and injurious effects of China's non-market policies and practices with respect to foundational semiconductors. Whether under Section 232 of the Trade Act of 1962 or Section 301 of the Trade Act of 1974 (or some other authority yet unidentified), any tariff on semiconductors must therefore capture derivative articles that incorporate foreign made, particularly Chinese made semiconductors. Given the high likelihood of Chinese retaliation, the Administration should also consider imposing semiconductor derivative tariffs on any country susceptible to disruptions by Chinese actions that threaten U.S. national security.[80] The country-of-origin for the semiconductors should be based on the location of semiconductor fabrication.

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[79] *Foreign Trade Import Data*, U.S. Census Breau (retrieved June 5, 2024).

[80] If the United States imposes tariffs only on Chinese made semiconductors, then semiconductor demand is likely to shift predominately to other Asian countries rather than the United States, particularly given the high likelihood that China retaliates with tariffs on U.S. made chips. In which case, the United States continues to be reliant on foreign made chips from a region at risk for influence by, or adverse action from, China.

The tariff should be applied to the value of the semiconductor content of the article, not to the article itself (although the article may be subject to tariffs under other authorities). This will reduce reliance on Chinese and foreign made chips and increase demand for semiconductors not only designed but also fabricated in the United States.[81]

C. Promoting Demand and New Markets for U.S. Semiconductors

Reducing reliance on Chinese and foreign made semiconductors necessitates instituting trade policies that drive demand for U.S. made chips and thereby economies of scale in domestic chip production. An increase in demand for U.S. made chips motivated by U.S. trade policies will accelerate immediate investment and fab construction in the United States while incentivizing domestic manufacturing for future fab expansion and maintenance.

i. Know Your Chip ("KYC") Legislation

One such way to drive demand for U.S. chips is to be able to better identify the full extent to which Chinese foundational chips are incorporated into U.S. imports of downstream products. A December 2024 BIS survey demonstrated that half of those surveyed were unable to determine whether their products contained any chips manufactured by PRC-based foundries.[82]

At present, there are no comprehensive laws or regulations requiring importers to have visibility into where the chips embedded in their products are designed or fabricated. This means that U.S. companies, importers, and even the U.S. government may be directly or indirectly supporting China's efforts to dominate the foundational chip market. It is also alarming that products like lifesaving medical devices or family cars or national defense communications systems may include Chinese designed and fabricated foundational chips. At a minimum, this is aiding China's target to dominate this segment of the market, and at a maximum, these chips could be manipulated or sub-quality. The United States has visibility into supply chains for cotton and seafood[83], but not for this ubiquitous technology.

Congress should therefore consider legislation that would require a phased-in, risk-based approach for U.S. importers to understand the supply chain for any product containing a chip, and to know where that chip is designed and fabricated. This KYC regime would provide significant insight into the extent of Chinese chips in U.S. imports and would facilitate the administrability of regimes such as component tariffs to effectively counter Chinese non-market policies and practices.

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[81] Silverado outlines a detailed proposal for component tariffs in its comments to the Office of the U.S. Trade Representative (USTR) in its call for input on Proposed Modifications and Machinery Exclusion Process in 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 [Docket Number USTR–2024–0007] (June 2024), available at https://silverado.org/reports-and-publications/silverado-comments-to-ustr-on-section-301-tariffs/ and in its comments to the Department of Commerce re its Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Semiconductors and Semiconductor Manufacturing Equipment [BIS-2025-0021-0001][X-RIN0694-XC121] (May 7, 2025).

[82] *See BIS Survey,* available at https://www.bis.gov/press-release/bis-publishes-assessment-use-mature-node-chips.

[83] E.g., Seafood Import Monitoring Program, NOAA, available at https://www.fisheries.noaa.gov/international/international-affairs/seafood-import-monitoring-program ("The Seafood Import Monitoring Program, a risk-based traceability program, requires importers to provide and report key data from the point of harvest to entry into U.S. commerce on 1,100+ unique species. SIMP covers nearly half of all U.S seafood imports.")

ii. Tariff Incentives for U.S.-Chip Content

Driving demand for U.S. semiconductors can also be accomplished by reducing an imported article's value for purposes of tariff valuation by a multiplier of the value of the U.S. semiconductor content. The result is a lower tariff for derivative articles that incorporate a higher value of U.S. chips. The multiplier must be sufficient to increase demand for U.S. chips, which will in turn motivate U.S. chip manufacturers to invest in expanding their U.S. manufacturing capacity to provide a sufficient alternative to foreign made chips. The multiplier can be modified (as necessary) in response to demand signals for foreign or U.S. made semiconductors.

Below is an example of the operation of the U.S. semiconductor content bonus using an illustrative 4x multiplier:

- Total Value of Derivative Article: $100
- Total Value of U.S. Semiconductor Content: $10
- Bonus: $10 x 4(multiplier) = $40
- Tariff Valuation: $100 - $40 = $60

Generally, the assessment of tariffs would be based on the total $100 value of the article. Accordingly, in the above example, a 10 percent tariff rate would result in a $10 tariff. However, the U.S. semiconductor content bonus would reduce the article's value for purposes of tariffs to $60 such that the tariff liability would be $6. The U.S. semiconductor bonus will increase demand for U.S. made chips, providing necessary incentives for semiconductor companies to increase their manufacturing capacity in the United States.

While this type of action is within the purview of the executive branch, Congress should also consider this type of framework in any trade-related or supply chain legislation.

V. CONCLUSION

Thank you for the opportunity to provide these views on how to bolster competitiveness of the U.S. foundational semiconductor industry while countering China's non-market policies and practices. There is still time to avoid dangerous reliance on a single source of concentration and build more resiliency into the foundational semiconductor supply chain.