

Chapter 17: Who Controls the Chain

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CHAPTER

17

THE CONTEST

Who Controls the Chain

Since 2018 the United States has used export controls to limit China's access to advanced chips and chipmaking tools, and China has been building its own.

IN PLAIN TERMS

An export control is a rule that requires the government's permission for a sale. The government names an item and a country or a buyer. From then on its own companies must hold a license before they ship that item to that country or buyer. The American government extends some of these rules to goods made abroad with American technology. Few governments can use such a rule to much effect, because it works only when their own firms sell something the buyer cannot get elsewhere. The machines, software and chemicals used to make an advanced chip come from a short list of firms in the United States, the Netherlands, Japan and South Korea. China can copy the simpler machines within a few years. It cannot yet copy the machine that prints the finest circuits, or the chemicals that machine needs. It has also yet to show it can make high-bandwidth memory, the stacked memory beside an AI chip, in volume.

IN SHORT

Japan and the Netherlands have aligned their own export controls with the American rules on chipmaking equipment ². Chinese toolmakers supplied 35 percent of China's own chipmaking equipment market in 2025, up from 10 to 15 percent before 2022 ³³. When the United States licensed sales of Nvidia's H200 chip in February 2026, China restricted them ³⁶.

The most advanced chips come mainly from Taiwan. It held 69 percent of the world's capacity for logic chips below 10 nanometers in 2022, by the count of the Semiconductor Industry Association and Boston Consulting Group ⁹.

The United States is still changing its export controls, and China is still building its response to them.

The shape of the contest

In September 2022 National Security Advisor Jake Sullivan said the United States must keep "as large of a lead as possible" in foundational technologies such as advanced logic and memory chips ¹. The October rules that followed were the first to apply his doctrine of a small yard with a high fence, meaning strict controls on a narrow set of technologies ². Those rules went beyond the old aim of staying two technology nodes ahead of China and tried to push China's capability back below the level it had already reached ³.

² Where the Chips Fall: U.S. Export Controls Under the Biden Administration from 2022 to 2024. Center for Strategic and International Studies · 12 December 2024 [\[A\]](https://www.csis.org/analysis/where-chips-fall-us-export-controls-under-biden-administration-2022-2024) www.csis.org/analysis/where-chips-fall-us-export-controls-under-biden-administration-2022-2024

³³ China's Localization Drive in Semiconductors Gains Impetus from Allied Chip Export Controls. Center for Strategic and International Studies · 24 March 2026 [\[A\]](https://www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls) www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls

³⁶ NVIDIA CORP, Form 10-Q quarterly report for the period ended 2026-07-26 (10-Q). U.S. Securities and Exchange Commission (filing by NVIDIA CORP) · 26 August 2026 [\[A\]](https://www.sec.gov/Archives/edgar/data/1045810/000104581026000075/nvda-20260726.htm) www.sec.gov/Archives/edgar/data/1045810/000104581026000075/nvda-20260726.htm

⁹ Emerging Resilience in the Semiconductor Supply Chain. Boston Consulting Group and Semiconductor Industry Association · May 2024 · p. 14 [\[A\]](https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf#page=14) www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf#page=14

¹ Remarks by National Security Advisor Jake Sullivan at the Special Competitive Studies Project Global Emerging Technologies Summit. The White House · 16 September 2022 [\[A\]](https://www.bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-security-advisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/) [bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-security-advisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/](https://www.bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-security-advisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/)

³ Choking off China's Access to the Future of AI. Center for Strategic and International Studies · 11 October 2022 [\[A\]](https://www.csis.org/analysis/choking-chinas-access-future-ai) www.csis.org/analysis/choking-chinas-access-future-ai

Many license requirements depend on who is buying and why. In October 2018, for example, the Commerce Department put the Chinese chip company Fujian Jinhua Integrated Circuit on its Entity List, so that any US-regulated item needed a license to reach it ⁴. The 2022 rules went further and required a license for any advanced AI chip, and any tool for an advanced fab, bound for China ⁵. Most applications were presumed denied, but equipment for the China fabs of firms headquartered in the United States or allied and partner countries was reviewed case by case ⁵.

Chokepoints and who holds them

SEGMENT	LEADER	SHARE	BASIS
EUV lithography	Netherlands	100.0%	revenue, 2025
Immersion DUV lithography	Netherlands	99.3%	revenue, 2025
Metrology and inspection	United States	71.7%	revenue, 2025
Deposition	United States	60.3%	revenue, 2025
Etch and clean	United States	52.6%	revenue, 2025
Photoresist	Japan	78%	revenue, 2023
Silicon wafers	Japan	53%	revenue, 2023
Leading-edge logic, below 10 nm	Taiwan	69%	capacity, 2022
Foundry, all nodes	Taiwan	81.9%	market share, 2025
HBM	South Korea	82.5%	revenue, 2025: SK hynix 63.2, Samsung 19.3, Micron 17.4
Logic chip design	United States	65%	sales, 2022
Mature logic, 28 nm and above	China	33%	capacity, 2022

No country is self-sufficient, so the United States and China can each use export controls to hurt the other.

⁴ Addition of an Entity to the Entity List. Federal Register (Commerce Department; Industry and Security Bureau) · 30 October 2018 [\[A\] www.federalregister.gov/documents/2018/10/30/2018-23693/addition-of-an-entity-to-the-entity-list](https://www.federalregister.gov/documents/2018/10/30/2018-23693/addition-of-an-entity-to-the-entity-list)

⁵ Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification. Federal Register (Commerce Department; Industry and Security Bureau) · 13 October 2022 [\[A\] www.federalregister.gov/documents/2022/10/13/2022-21658/implementation-of-additional-export-controls-certain-advanced-computing-and-semiconductor](https://www.federalregister.gov/documents/2022/10/13/2022-21658/implementation-of-additional-export-controls-certain-advanced-computing-and-semiconductor)

Advanced packaging is missing from the table because no public source publishes a split of its capacity by country and the Taiwanese chipmaker TSMC will not give one.

- **Equipment.** TechInsights 2025 revenue by parent-company headquarters, from CSET's ETO Supply Chain Explorer ⁶.
- **Materials.** Fuji Keizai's survey by parent-company headquarters, as Japan's Ministry of Economy, Trade and Industry published it in December 2025 ⁷.
- **Memory.** Figures from the market research firm IDC, as SK hynix's US listing prospectus relays them ⁸.
- **Logic capacity.** The Semiconductor Industry Association and Boston Consulting Group's 2022 measurement of logic capacity, below 10 nm for Taiwan and at 28 nm and above for China ⁹.

The US export-control campaign, 2018 to today

In August 2020 the Commerce Department widened its Foreign Direct Product Rule to require a license for any foreign-made item produced with US technology and bound for Huawei ¹⁰. In 2022 its Bureau of Industry and Security (BIS) blocked China's access to the most advanced AI chips and to the tools to make them, and it tightened those rules in 2023 and 2024 ². In August 2025 the government began licensing some sales of Nvidia's H20 chip to China, and in February 2026 small amounts of its H200 ¹¹.

The Export Controls page has the full timeline, with the legal citation for each rule.

⁶ Documentation: Semiconductor Supply Chain Dataset. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](#) eto.tech/dataset-docs/chipexplorer

⁷ METI, Semiconductor and digital industry strategy: future direction (半導体・デジタル産業戦略の今後の方向性), 23 December 2025. Ministry of Economy, Trade and Industry (Japan) · 23 December 2025 · p. 8 [\[A\]](#) www.meti.go.jp/policy/mono_info_service/joho/conference/semicon_digital/0014/handeji14-4.pdf#page=8

⁸ SK hynix Inc., Form 424B4 prospectus for the period ended 2026-07-10 (424(B)(4)). U.S. Securities and Exchange Commission (filing by SK hynix Inc.) · 10 July 2026 [\[A\]](#) www.sec.gov/Archives/edgar/data/0002120882/000119312526299963/d32785d424b4.htm

⁹ Emerging Resilience in the Semiconductor Supply Chain. Boston Consulting Group and Semiconductor Industry Association · May 2024 · p. 14 [\[A\]](#) www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf#page=14

¹⁰ Addition of Huawei Non-U.S. Affiliates to the Entity List, the Removal of Temporary General License, and Amendments to General Prohibition Three (Foreign-Produced Direct Product Rule). Federal Register (Commerce Department; Industry and Security Bureau) · 20 August 2020 [\[A\]](#) www.federalregister.gov/documents/2020/08/20/2020-18213/addition-of-huawei-non-us-affiliates-to-the-entity-list-the-removal-of-temporary-general-license-and

² Where the Chips Fall: U.S. Export Controls Under the Biden Administration from 2022 to 2024. Center for Strategic and International Studies · 12 December 2024 [\[A\]](#) www.csis.org/analysis/where-chips-fall-us-export-controls-under-biden-administration-2022-2024

¹¹ NVIDIA CORP, Form 10-K annual report for the period ended 2026-01-25 (10-K). U.S. Securities and Exchange Commission (filing by NVIDIA CORP) · 25 February 2026 [\[A\]](#) www.sec.gov/Archives/edgar/data/1045810/000104581026000021/nvda-20260125.htm

Eight US actions that shaped chip export controls

- 2019-05-16
Huawei and 68 affiliates added to the Entity List
- 2022-10-07
China-wide controls on AI chips and advanced-fab tools
- 2023-10-17
Performance density added; A800 and H800 captured
- 2024-12-02
24 tool types, HBM controls, 140 entity listings
- 2025-01-13
AI Diffusion rule announced, three country tiers
- 2025-05-13
BIS stops enforcing the AI Diffusion rule
- 2025-08-11
US officials seek 15% of licensed H20 sales
- 2026-01-15
H200 and MI325X move to case-by-case review

Source: Federal Register rules, BIS press releases and Nvidia filings, cited for each entry on the Export Controls timeline

Ways around the controls

Renting out time on a chip does not count as exporting it, so a Singapore data center selling time on an H200 already installed there moves nothing across a border ¹². The AI Diffusion rule of January 2025 required a license for advanced AI chips bound anywhere in the world ¹³. For the data centers it approved, it said that API access to a model, and rented capacity for inference, "are not prohibited" ¹³.

The American rules reach that trade through the firms holding the chips. A license under the 15 January 2026 rule for H200-class chips bound for

¹² 15 CFR 734.13 -- **Export..** Electronic Code of Federal Regulations · 3 June 2016 www.ecfr.gov/current/title-15/subtitle-B/chapter-VII/subchapter-C/part-734/section-734.13

¹³ **Framework for Artificial Intelligence Diffusion.** Federal Register (Commerce Department; Industry and Security Bureau) · 15 January 2025 www.federalregister.gov/documents/2025/01/15/2025-00636/framework-for-artificial-intelligence-diffusion

China or Macau requires the applicant to obtain the recipient's know-your-customer procedures ¹⁴. It must also obtain the recipient's list of customers renting computing power in China and seven other places, among them Russia and Iran ¹⁴. The license also depends on a promise that no algorithm trained on the chips is served to blacklisted or military end users ¹⁴.

The United States has approved large AI chip sales in the Gulf. In November 2025 Commerce authorized G42 of the United Arab Emirates and HUMAIN of Saudi Arabia to buy the equivalent of up to 35,000 Nvidia GB300 chips each under security and reporting conditions ¹⁵. On 10 July 2026 Commerce moved the Emirates into the export-control group that holds close US allies ¹⁶. It named the Emirati government, G42 and eight US-headquartered AI companies as recipients that need no license for controlled AI chips and systems ¹⁶.

Smugglers route chips past the controls through Southeast Asia. Since 14 July 2025 Malaysia has required a permit to export, transship or transit any high-performance US-origin AI chip ¹⁷. On 25 March 2026 the Justice Department announced charges against three people accused of using Thai companies' names to order servers with export-controlled chips for China ¹⁸. The orders included one for \$170 million that was never completed ¹⁸.

The House select committee on China cites a median estimate of 140,000 chips smuggled to China in 2024 ¹⁹. A bill in Congress, the Chip Security Act, would require location verification on controlled chips within 180 days of enactment ²⁰. The House Foreign Affairs Committee approved the House version 42-0 on 26 March 2026 ²¹. It has not become law.

14 Revision to License Review Policy for Advanced Computing Commodities. U.S. Government Publishing Office (Federal Register) · 15 January 2026 [A] www.govinfo.gov/content/pkg/FR-2026-01-15/html/2026-00789.htm

15 Statement on UAE and Saudi Chip Exports. U.S. Department of Commerce · November 2025 [A] www.commerce.gov/news/press-releases/2025/11/statement-uae-and-saudi-chip-exports

16 Enhanced Favorable Treatment for the United Arab Emirates Under the Export Administration Regulations. Federal Register (Commerce Department; Industry and Security Bureau) · 14 July 2026 [A] www.federalregister.gov/documents/2026/07/14/2026-14132/enhanced-favorable-treatment-for-the-united-arab-emirates-under-the-export-administration

17 Export, transshipment and transit of high-performance AI chips of US origin now subject to a Strategic Trade Permit. Ministry of Investment, Trade and Industry (MITI), Malaysia · 14 July 2025 [A] www.miti.gov.my/miti/resources/Media%20Release/%5BFINAL%5D_MITI_Press_Stmt_Malaysia_Regulates_Trade_of_US_AI_Chips_2025-07-14.pdf

18 Chinese National and Two U.S. Citizens Charged with Conspiring to Smuggle Artificial Intelligence Technology to China. U.S. Department of Justice · 25 March 2026 [A] www.justice.gov/opa/pr/chinese-national-and-two-us-citizens-charged-conspiring-smuggle-artificial-intelligence

19 Protecting U.S. Tech: China Committee and Bipartisan, Bicameral Leaders Unite to Stop CCP AI Chip Smuggling. U.S. House Select Committee on the Chinese Communist Party · 7 July 2025 [A] chinaselectcommittee.house.gov/media/press-releases/protecting-us-tech-china-committee-and-bipartisan-bicameral-leaders-unite-to-stop-ccp-ai-chip-smuggling

20 S.1705 – Chip Security Act, 119th Congress (2025-2026), bill text. U.S. Congress (Congress.gov, Library of Congress) · 8 May 2025 [A] www.congress.gov/bills/119th-congress/senate-bill/1705/text

21 UNANIMOUS: Bipartisan Huizenga Legislation to Curb AI Chip Smuggling Passes Committee. U.S. House of Representatives (Office of Rep. Bill Huizenga) · 26 March 2026 [A] huizenga.house.gov/news/documentsingle.aspx?DocumentID=404259

Allies: the Netherlands, Japan, Korea and Europe

US tool controls alone would only shift the sales to Dutch and Japanese suppliers, so the campaign depends on those two governments. Both have aligned their own controls on chipmaking equipment with the American rules ².

- **The Netherlands.** The Dutch government began licensing advanced deep-ultraviolet tools on 1 September 2023 and widened the controls in September 2024 ²². On 1 April 2025 it extended them to measurement and inspection tools ²³.
- **Japan.** Japan's controls on advanced manufacturing equipment took effect on 23 July 2023, apply to all destinations and name no country ²⁴.
- **South Korean fabs in China.** BIS revoked the Validated End-User status that let Samsung's and SK hynix's China subsidiaries and Intel Semiconductor (Dalian) receive US equipment without individual licenses, effective 31 December 2025 ²⁵. BIS said it would license those fabs to keep running, but not to expand capacity or upgrade technology ²⁶. SK hynix, which bought the Dalian fab from Intel, received an annual BIS license in December 2025 to ship approved US equipment to its China fabs during 2026 ²⁷.

A BIS rule effective 29 September 2025 extended Entity List restrictions to any company at least 50 percent owned by one or more listed firms ²⁸. On 30 September the Dutch economy minister invoked the Goods Availability Act against Nexperia, a Nijmegen chipmaker that supplies Europe's car industry ²⁹. He cited governance failures that risked moving technology out of Europe ²⁹.

2 Where the Chips Fall: U.S. Export Controls Under the Biden Administration from 2022 to 2024. Center for Strategic and International Studies · 12 December 2024 [\[A\]](https://www.csis.org/analysis/where-chips-fall-us-export-controls-under-biden-administration-2022-2024) www.csis.org/analysis/where-chips-fall-us-export-controls-under-biden-administration-2022-2024

22 The Netherlands expands export control measure for advanced semiconductor manufacturing equipment. Government of the Netherlands · 6 September 2024 [\[A\]](https://www.government.nl/latest/news/2024/09/06/the-netherlands-expands-export-control-measure-advanced-semiconductor-manufacturing-equipment) www.government.nl/latest/news/2024/09/06/the-netherlands-expands-export-control-measure-advanced-semiconductor-manufacturing-equipment

23 Klever: export controls on advanced semiconductor manufacturing equipment to be tightened. Government of the Netherlands · 15 January 2025 [\[A\]](https://www.government.nl/latest/news/2025/01/15/klever-export-controls-on-advanced-semiconductor-manufacturing-equipment-to-be-tightened) www.government.nl/latest/news/2025/01/15/klever-export-controls-on-advanced-semiconductor-manufacturing-equipment-to-be-tightened

24 CSIS Translation: Updated Japanese Export Controls on High-Performance Semiconductor Manufacturing Equipment. Center for Strategic and International Studies · 18 July 2023 [\[A\]](https://www.csis.org/analysis/csis-translation-updated-japanese-export-controls-high-performance-semiconductor) www.csis.org/analysis/csis-translation-updated-japanese-export-controls-high-performance-semiconductor

25 Revocation of Validated End-User Authorizations in the People's Republic of China. Federal Register (Commerce Department; Industry and Security Bureau) · 2 September 2025 [\[A\]](https://www.federalregister.gov/documents/2025/09/02/2025-16735/revocation-of-validated-end-user-authorizations-in-the-peoples-republic-of-china) www.federalregister.gov/documents/2025/09/02/2025-16735/revocation-of-validated-end-user-authorizations-in-the-peoples-republic-of-china

26 Department of Commerce Closes Export Controls Loophole for Foreign-Owned Semiconductor Fabs in China. U.S. Bureau of Industry and Security · 29 August 2025 [\[A\]](https://www.bis.gov/press-release/department-commerce-closes-export-controls-loophole-foreign-owned-semiconductor-fabs-china) www.bis.gov/press-release/department-commerce-closes-export-controls-loophole-foreign-owned-semiconductor-fabs-china

27 SK hynix Inc., Form 424B4 prospectus for the period ended 2026-07-10 (424(B)(4)). U.S. Securities and Exchange Commission (filing by SK hynix Inc.) · 10 July 2026 [\[A\]](https://www.sec.gov/Archives/edgar/data/2120882/000119312526299963/d32785d424b4.htm) www.sec.gov/Archives/edgar/data/2120882/000119312526299963/d32785d424b4.htm

28 Expansion of End-User Controls To Cover Affiliates of Certain Listed Entities. Federal Register (Commerce Department; Industry and Security Bureau) · 30 September 2025 [\[A\]](https://www.federalregister.gov/documents/2025/09/30/2025-19001/expansion-of-end-user-controls-to-cover-affiliates-of-certain-listed-entities) www.federalregister.gov/documents/2025/09/30/2025-19001/expansion-of-end-user-controls-to-cover-affiliates-of-certain-listed-entities

29 Minister of Economic Affairs invokes Goods Availability Act. Government of the Netherlands · 12 October 2025 [\[A\]](https://www.government.nl/latest/news/2025/10/12/minister-of-economic-affairs-invokes-goods-availability-act) www.government.nl/latest/news/2025/10/12/minister-of-economic-affairs-invokes-goods-availability-act

Both were suspended in November. On 10 November BIS suspended its rule until 9 November 2026 ³⁰. The minister suspended his order on 19 November ³¹. Europe holds a chokepoint in leading-edge lithography, but none in the mature-node chips its car industry uses.

The MATCH Act, a bill introduced on 8 April 2026, would ban sales of immersion deep-ultraviolet scanners to China ³². It would also name five Chinese companies, CXMT, Hua Hong, Huawei, SMIC and YMTC, in statute ³². It would give allies 150 days to match those limits before the United States extends the Foreign Direct Product Rule on its own ³².

China's response

In 2024 China's Ministry of Industry and Information Technology reportedly told Chinese telecom operators to strip foreign chips out of their networks by 2027 ³³.

China has also taken measures against American suppliers. Micron, the American memory maker, failed a review by the Cyberspace Administration of China (CAC) on 21 May 2023 and lost its critical-infrastructure buyers in China ³⁴. In September 2025 the CAC reportedly told firms including ByteDance and Alibaba to cancel Nvidia orders ³⁵. When the United States licensed H200 sales in February 2026, China restricted them, as it had restricted licensed H20 sales ³⁶.

30 One Year Suspension of Expansion of End-User Controls for Affiliates of Certain Listed Entities. Federal Register

(Commerce Department; Industry and Security Bureau) · 12 November 2025 [A]

www.federalregister.gov/documents/2025/11/12/2025-19846/one-year-suspension-of-expansion-of-end-user-controls-for-affiliates-of-certain-listed-entities

31 Update on invoking Goods Availability Act. Government of the Netherlands · 19 November 2025 [A]

www.government.nl/documents/2025/11/19/update-on-invoking-goods-availability-act

32 Risch, Ricketts, Kim Introduce MATCH Act; Level the Global Playing Field for U.S. Tech. U.S. Senate Committee on Foreign Relations · 8 April 2026 [A] www.foreign.senate.gov/press/rep/release/risch-ricketts-kim-introduce-match-act-level-the-global-playing-field-for-us-tech

33 China's Localization Drive in Semiconductors Gains Impetus from Allied Chip Export Controls. Center for Strategic and International Studies · 24 March 2026 [A] www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls

34 Micron Aggression: The Right Response to Beijing's Ban on the U.S. Chipmaker. Center for Strategic and International Studies · 22 June 2023 [A] www.csis.org/analysis/micron-aggression-right-response-beijings-ban-us-chipmaker

35 Beijing blocks Nvidia sales in vote of confidence for Chinese chipmakers, the White House strikes a deal for 10 percent of Intel, and Commerce voids a \$7.4B CHIPS Act grant. Center for Security and Emerging Technology (CSET) · 18 September 2025 [A] cset.georgetown.edu/newsletter/september-18-2025/

36 NVIDIA CORP, Form 10-Q quarterly report for the period ended 2026-07-26 (10-Q). U.S. Securities and Exchange Commission (filing by NVIDIA CORP) · 26 August 2026 [A] www.sec.gov/Archives/edgar/data/1045810/000104581026000075/nvda-20260726.htm

China's Ministry of Commerce (MOFCOM) has also restricted exports of minerals.

- **3 December 2024.** MOFCOM banned exports of gallium, germanium, antimony and superhard materials to the United States, one day after the American chip rules ³⁷.
- **4 April 2025.** It required export licenses for seven medium and heavy rare earths ³⁸.
- **9 October 2025.** It announced licensing, from 1 December 2025, for foreign-made goods containing Chinese rare earths worth 0.1 percent or more of their value ³⁹. MOFCOM suspended that rule on 7 November 2025 until 10 November 2026 ⁴⁰.
- **9 November 2025.** MOFCOM suspended its ban on exports of gallium, germanium, antimony and superhard materials to the United States until 27 November 2026 ⁴¹. It acted after Donald Trump and Xi Jinping met at the Asia-Pacific summit in October 2025 ⁴².

China repealed none of these controls, and the April licensing rules still apply.

Chinese toolmakers held 10 to 15 percent of their home market before 2022, 25 percent in 2024 and 35 percent in 2025 ³³. They hold about 40 percent of the Chinese market for etch and deposition tools ³³. But in September 2025 the Center for Strategic and International Studies (CSIS) judged that making its own extreme-ultraviolet machines remained firmly out of China's reach despite massive state investment ⁴³.

Chinese chipmakers remain behind at the leading edge. SMIC's most advanced process, N+3, reaches the transistor density of TSMC's 6 nm-class process without

37 Ministry of Commerce Notice 2024 No. 46: Notice Concerning Strengthening Controls on Exports of Relevant Dual-Use Items to the United States. Center for Security and Emerging Technology (CSET) · 3 December 2024 [\[A\]](https://cset.georgetown.edu/publication/china-rare-earth-export-ban/)
cset.georgetown.edu/publication/china-rare-earth-export-ban/

38 Announcement No.18 of 2025 of The Ministry of Commerce and The General Administration of Customs of The People's Republic of China Announcing the decision to implement export control on some medium and heavy rare earth related items. Ministry of Commerce of the People's Republic of China · 4 April 2025 [\[A\]](https://english.mofcom.gov.cn/Policies/AnnouncementsOrders/art/2025/art_Odd87cbee7b045bf93fabe6ab2faceee.html)
english.mofcom.gov.cn/Policies/AnnouncementsOrders/art/2025/art_Odd87cbee7b045bf93fabe6ab2faceee.html

39 Ministry of Commerce Notice 2025 No. 61: Announcement of the Decision to Implement Controls on Exports of Rare Earth-Related Items to Foreign Countries (translation). Center for Security and Emerging Technology (CSET) · 9 October 2025 [\[A\]](https://cset.georgetown.edu/wp-content/uploads/t0656_china_rare_earth_controls_2025_61_EN.pdf)
cset.georgetown.edu/wp-content/uploads/t0656_china_rare_earth_controls_2025_61_EN.pdf

40 MOFCOM and GAC Announcement 2025 No. 70, suspending the October 2025 export-control measures, Announcements Nos. 55 to 58, 61 and 62 (商务部、海关总署公告2025年第70号). Ministry of Commerce of the People's Republic of China · 7 November 2025 [\[A\]](https://www.mofcom.gov.cn/zwgk/zcfb/art/2025/art_b1ec77dd3f0d4762952904df7cdaadec.html)
www.mofcom.gov.cn/zwgk/zcfb/art/2025/art_b1ec77dd3f0d4762952904df7cdaadec.html

41 商务部公告2025年第72号 公布调整实施商务部公告2024年第46号的决定. Ministry of Commerce of the People's Republic of China · 9 November 2025 [\[A\]](https://www.mofcom.gov.cn/zwgk/zcfb/art/2025/art_5c68985a6b1a46778e2e8dbff1bb1601.html)
www.mofcom.gov.cn/zwgk/zcfb/art/2025/art_5c68985a6b1a46778e2e8dbff1bb1601.html

42 The U.S.-China Trade Truce Has Not Solved the Gallium Problem. Center for Strategic and International Studies · 11 May 2026 [\[A\]](https://www.csis.org/analysis/us-china-trade-truce-has-not-solved-gallium-problem)
www.csis.org/analysis/us-china-trade-truce-has-not-solved-gallium-problem

33 China's Localization Drive in Semiconductors Gains Impetus from Allied Chip Export Controls. Center for Strategic and International Studies · 24 March 2026 [\[A\]](https://www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls)
www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls

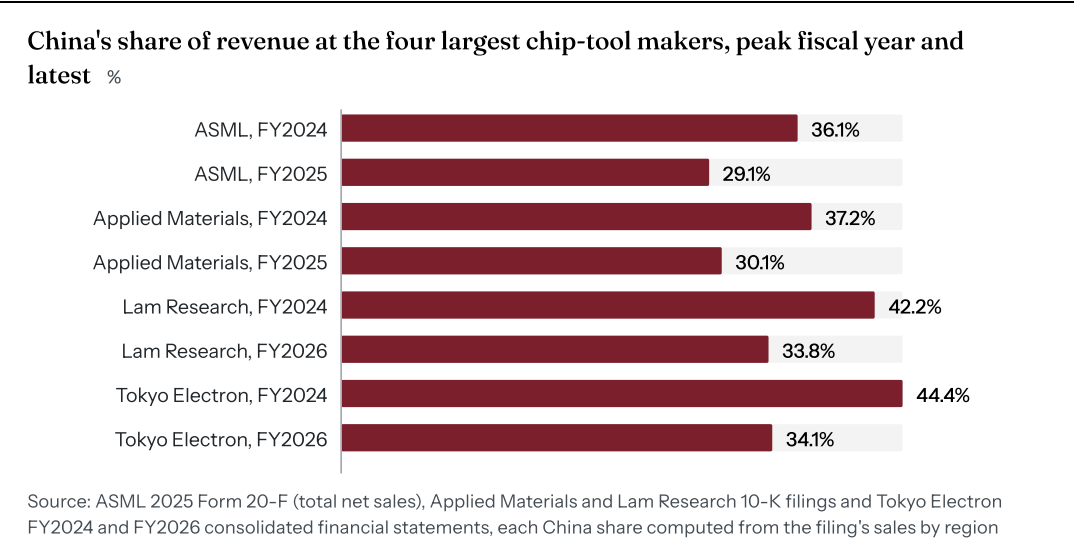
43 Breakthroughs or Boasts? Assessing Recent Chinese Lithography Advancements. Center for Strategic and International Studies · 24 September 2025 [\[A\]](https://www.csis.org/blogs/strategic-technologies-blog/breakthroughs-or-boasts-assessing-recent-chinese-lithography)
www.csis.org/blogs/strategic-technologies-blog/breakthroughs-or-boasts-assessing-recent-chinese-lithography

extreme-ultraviolet scanners ⁴⁴. It prints its tightest layers in several passes on deep-ultraviolet tools ⁴⁴.

In September 2025 the research firm SemiAnalysis conservatively put SMIC's capacity at 7 nm and below at 45,000 wafers a month by the end of 2025 ⁴⁵. It expected 60,000 in 2026 and 80,000 in 2027 ⁴⁵. Those figures count wafers, and how many working chips they give depends on yield, the share of chips on a wafer that work.

SemiAnalysis also expected Huawei to ship about 805,000 of its Ascend AI chips in 2025, with dies made by both TSMC and SMIC ⁴⁵. It judged that memory would limit China's output of AI chips before logic wafers did ⁴⁵. By its count, a stockpile of roughly 13 million memory stacks was enough for about 1.6 million Ascend 910C packages ⁴⁵. It expected CXMT, China's own memory maker, to make only about 2 million stacks in 2026, enough for 250,000 to 300,000 more ⁴⁵.

Huawei said in September 2025 that its Ascend 950 chips, due in 2026, would carry high-bandwidth memory of its own design ⁴⁶. It gave no figure for how much of that memory it would make ⁴⁶.



44 Is SMIC N+3's Metal Pitch Smaller than Intel 18A's?. SemiAnalysis · 14 June 2026 ^B newsletter.semianalysis.com/p/steel-smic-n3-teardown

45 Huawei Ascend Production Ramp: Die Banks, TSMC Continued Production, HBM is The Bottleneck. SemiAnalysis · 8 September 2025 ^B newsletter.semianalysis.com/p/huawei-ascend-production-ramp

46 Groundbreaking SuperPoD Interconnect: Leading a New Paradigm for AI Infrastructure. Huawei · 18 September 2025 ^A www.huawei.com/en/news/2025/9/hc-xu-keynote-speech

Industrial policy: CHIPS, Rapidus, Big Fund and the rest

The CHIPS and Science Act authorized about \$52.7 billion ³³. By July 2025 Commerce had awarded \$30.9 billion of direct funding to 19 companies for 40 projects, covering a median 14.2 percent of each project's capital cost ⁴⁸. Commerce counted a federal tax credit, the Advanced Manufacturing Investment Credit, when it sized those grants ⁴⁸. Since the One Big Beautiful Bill Act of 2025, the credit covers 35 percent of qualified investment in an advanced chip plant placed in service after 2025, up from 25 percent ⁴⁸.

On 22 August 2025 the government agreed to convert \$5.7 billion of unpaid Intel grants and \$3.2 billion of Secure Enclave defense money into \$8.9 billion of Intel stock, a 9.9 percent stake ⁴⁹.

The United States has also used tariffs to draw chip investment. Under a memorandum signed in January 2026, Taiwanese chip and technology firms are to invest \$250 billion in US semiconductor, energy and AI production ⁵⁰. In the same memorandum the United States agreed to cap some of its national-security tariffs on Taiwanese goods at 15 percent ⁵⁰. On 16 July 2026 TSMC announced another \$100 billion for four more Arizona fabs, bringing its total Arizona investment to \$265 billion ⁵¹.

The European Commission says the EU still depends on other countries for advanced chip manufacturing ⁵². On 3 June 2026 it proposed a Chips Act 2.0, which would add measures to support advanced chip production in the EU ⁵².

33 China's Localization Drive in Semiconductors Gains Impetus from Allied Chip Export Controls. Center for Strategic and International Studies · 24 March 2026 [\[A\]](https://www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls) www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls

48 GAO-26-107882, SEMICONDUCTORS: Information on Projects Funded to Strengthen U.S. Supply Chain. U.S. Government Accountability Office · 11 December 2025 [\[A\]](https://files.gao.gov/reports/GAO-26-107882/index.html) files.gao.gov/reports/GAO-26-107882/index.html

49 Intel and Trump Administration Reach Historic Agreement to Accelerate American Technology and Manufacturing Leadership. Intel · 22 August 2025 [\[A\]](https://www.intel.com/news-events/press-releases/detail/1748/intel-and-trump-administration-reach-historic-agreement-to) www.intel.com/news-events/press-releases/detail/1748/intel-and-trump-administration-reach-historic-agreement-to

50 Implementing Certain Tariff-Related Elements of a Trade and Security Agreement Between the American Institute in Taiwan and the Taipei Economic and Cultural Representative Office in the United States. Federal Register (Commerce Department; International Trade Administration; Trade Representative, Office of United States) · 28 May 2026 [\[A\]](https://www.federalregister.gov/documents/2026/05/28/2026-10571/implementing-certain-tariff-related-elements-of-a-trade-and-security-agreement-between-the-american) www.federalregister.gov/documents/2026/05/28/2026-10571/implementing-certain-tariff-related-elements-of-a-trade-and-security-agreement-between-the-american

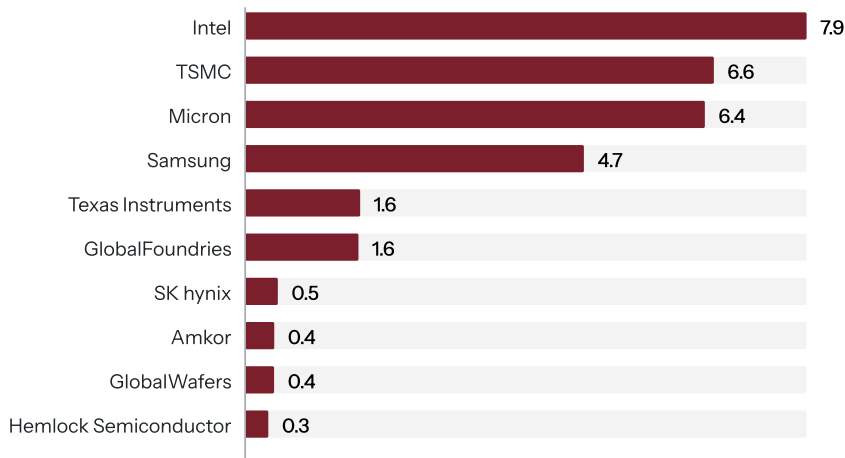
51 TSMC Announces Additional \$100 Billion Investment In Arizona. City of Phoenix · 16 July 2026 [\[A\]](https://www.phoenix.gov/newsroom/ced-news/tsmc-announces-additional--100-billion-investment-in-arizona.html) www.phoenix.gov/newsroom/ced-news/tsmc-announces-additional--100-billion-investment-in-arizona.html

52 Proposal for the Chips Act 2.0. European Commission · 3 June 2026 [\[A\]](https://digital-strategy.ec.europa.eu/en/library/proposal-chips-act-20) digital-strategy.ec.europa.eu/en/library/proposal-chips-act-20

Japan instead backs a homegrown chipmaker, Rapidus. It began prototyping 2 nm gate-all-around transistors at its IIM-1 plant in July 2025 ⁵³. In February 2026 it raised another 267.6 billion yen, about \$1.7 billion, from a government agency and 32 companies, aiming for 2 nm mass production by 2027 ⁵⁴. By June 2026 it had raised 424.95 billion yen in equity, the latest 150 billion yen from a state agency ⁵⁵.

China spends more than the United States. The latest round of its National Integrated Circuit Industry Investment Fund, the Big Fund, reached \$47 billion ⁵⁶. CSIS puts cumulative state funding since 2014 at an estimated \$150 billion and calls the CHIPS Act substantially smaller in scale ³³.

CHIPS Act direct funding awarded, by firm, as of July 2025 \$B



Source: GAO-26-107882, Semiconductors: Information on Projects Funded to Strengthen U.S. Supply Chain

53 Rapidus Achieves Significant Milestone at its State-of-the-Art Foundry with Prototyping of Leading-Edge 2nm GAA Transistors. Rapidus · 18 July 2025 ^[A] www.rapidus.inc/en/news_topics/information/rapidus-achieves-significant-milestone-at-its-state-of-the-art-foundry-with-prototyping-of-leading-edge-2nm-gaa-transistors/

54 Rapidus Secures 267.6 Billion Yen in Funding from Japan Government and Private Sector Companies. Rapidus · 27 February 2026 ^[A] www.rapidus.inc/en/news_topics/information/rapidus-secures-267-6-billion-yen-in-funding-from-japan-government-and-private-sector-companies/

55 Rapidus Completes 150 Billion Yen Funding Round from Japan Government. Rapidus · 5 June 2026 ^[A] www.rapidus.inc/en/news_topics/information/20260605-2/

56 China's Evolving Industrial Policy for AI. RAND Corporation · 26 June 2025 ^[A] www.rand.org/pubs/perspectives/PEA4012-1.html

33 China's Localization Drive in Semiconductors Gains Impetus from Allied Chip Export Controls. Center for Strategic and International Studies · 24 March 2026 ^[A] www.csis.org/analysis/chinas-localization-drive-semiconductors-gains-impetus-allied-chip-export-controls

Taiwan

No policy has reduced the world's reliance on Taiwan. Taiwan's foundries held 81.9 percent of the world's contract chipmaking market in 2025, according to the Taiwan Semiconductor Industry Association's August 2026 report ⁵⁷. TSMC makes its 2 nm chips only in Taiwan ⁵⁸. Taiwan held 69 percent of the world's logic capacity below 10 nm in 2022 ⁹.

Advanced packaging is in Taiwan too. Asked in October 2025 how much CoWoS packaging capacity he would add, TSMC's chairman said only that the company was "working very hard to narrow the gap between the demand and supply" ⁵⁹. He called wafer and packaging capacity both "very tight" ⁵⁹.

The silicon shield argument holds that this concentration deters an attack on Taiwan, because so many countries rely on its chips ⁵⁸. The Stimson Center calls that open to debate, though many Taiwanese believe it ⁵⁸.

With an eye to that shield, Taiwan's rules keep TSMC's newest process at home first, so TSMC's Arizona fabs have run a generation behind its fabs in Taiwan ⁵⁸. The Stimson Center expected 2 nm production in Arizona in 2028 at the earliest ⁵⁸. TSMC said in October 2025 that it was "preparing to upgrade our technologies faster to N2 and more advanced process technologies in Arizona" ⁶⁰. The four Arizona fabs it announced in July 2026 are to run at 2 nm or more advanced ⁵¹.

57 Overview on Taiwan Semiconductor Industry (2026 Edition). Taiwan Semiconductor Industry Association · 7 August 2026 · p. 9 [\[A\]](https://www.tsia.org.tw/api/DownloadOverview?ID=36#page=9) www.tsia.org.tw/api/DownloadOverview?ID=36#page=9

58 Why Taiwan Fears 'America First' Risks Eroding Its 'Silicon Shield'. Stimson Center · 10 October 2025 [\[A\]](https://www.stimson.org/2025/why-taiwan-fears-america-first-risks-eroding-its-silicon-shield/) www.stimson.org/2025/why-taiwan-fears-america-first-risks-eroding-its-silicon-shield/

9 Emerging Resilience in the Semiconductor Supply Chain. Boston Consulting Group and Semiconductor Industry Association · May 2024 · p. 14 [\[A\]](https://www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf#page=14) www.semiconductors.org/wp-content/uploads/2024/05/Report_Emerging-Resilience-in-the-Semiconductor-Supply-Chain.pdf#page=14

59 Q3 2025 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call (Chinese, English) — edited transcript. Refinitiv StreetEvents (transcript of a TSMC earnings call), via TSMC · 16 October 2025 · p. 7 [\[A\]](https://investor.tsmc.com/english/encrypt/files/encrypt_file/reports/2025-10/6860312f04fd291d0f26b46c1234f84e6332717e/TSMC%20Q25%20Transcript.pdf#page=7) investor.tsmc.com/english/encrypt/files/encrypt_file/reports/2025-10/6860312f04fd291d0f26b46c1234f84e6332717e/TSMC%20Q25%20Transcript.pdf#page=7

60 Q3 2025 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call (Chinese, English) — edited transcript. Refinitiv StreetEvents (transcript of a TSMC earnings call), via TSMC · 16 October 2025 · p. 5 [\[A\]](https://investor.tsmc.com/english/encrypt/files/encrypt_file/reports/2025-10/6860312f04fd291d0f26b46c1234f84e6332717e/TSMC%20Q25%20Transcript.pdf#page=5) investor.tsmc.com/english/encrypt/files/encrypt_file/reports/2025-10/6860312f04fd291d0f26b46c1234f84e6332717e/TSMC%20Q25%20Transcript.pdf#page=5

51 TSMC Announces Additional \$100 Billion Investment In Arizona. City of Phoenix · 16 July 2026 [\[A\]](https://www.phoenix.gov/newsroom/ced-news/tsmc-announces-additional--100-billion-investment-in-arizona.html) www.phoenix.gov/newsroom/ced-news/tsmc-announces-additional--100-billion-investment-in-arizona.html

The Arizona fabs narrow the gap in wafer production, and TSMC has two advanced packaging fabs planned there ⁶¹. But TSMC's work in Taiwan rests on a local supply chain of more than 300 firms, which the Stimson Center judged extremely difficult to copy in the United States ⁵⁸. The US push has raised fears in Taiwan that the shield could weaken ⁵⁸.

Who gains and who pays

- **Taiwan and Korea.** None of these policies will move leading-edge logic, memory stacking or advanced packaging out of Taiwan and Korea before 2030. Reshoring adds capacity elsewhere without taking any away from them.
- **The Netherlands and Japan.** Their toolmakers build the controlled machines, so the two governments gain a say in who gets them. China accounts for a falling share of the firms' sales. At ASML, China's share of net system sales, which leave out service and field options, fell from 41 percent in 2024 to 33 percent in 2025 ⁶². Against total net sales, the measure in the chart, it fell from 36.1 percent to 29.1 percent ⁴⁷. At Tokyo Electron, China's share of sales fell from 44.4 percent in the year to March 2024 to 34.1 percent in the year to March 2026 ⁶³. The company said China's share of its sales dropped to 26.8 percent in the quarter to March 2026 because spending on leading-edge chips grew faster than spending on older ones ⁶⁴.
- **The United States.** Its firms took 65 percent of the world's logic chip sales in 2022 ⁶⁵. The Semiconductor Industry Association, using data from World Semiconductor Trade Statistics, Gartner and Omdia, put US firms' share of all chip sales in 2025 at 53.4 percent, the highest since 1984 ⁶⁶. Commerce expects the CHIPS-funded projects to lift the US share of global leading-edge logic chip manufacturing from 0 percent in 2022 to 20 percent by 2030 ⁴⁸.
- **China.** Mature-node chips, tools below the leading edge, DRAM and NAND are moving to Chinese suppliers. In September 2025 SemiAnalysis expected China, without smuggled memory, to make fewer Ascend chips in 2026 than in 2025 ⁴⁵.

61 Q3 2025 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call (Chinese, English) — edited transcript. Refinitiv StreetEvents (transcript of a TSMC earnings call), via TSMC · 16 October 2025 · p. 13 [A](https://investor.tsmc.com/english/encrypt/files/encrypt_file/reports/2025-10/6860312f04fd291d0f26b46c1234f84e6332717e/TSMC%203Q25%20Transcript.pdf#page=13)

58 Why Taiwan Fears 'America First' Risks Eroding Its 'Silicon Shield'. Stimson Center · 10 October 2025 [A](https://www.stimson.org/2025/why-taiwan-fears-america-first-risks-eroding-its-silicon-shield/)

62 ASML 2025 fourth-quarter and full-year results (investor presentation). ASML · 28 January 2026 · p. 9 [A](https://ourbrand.asml.com/m/3136300aa4999bc1/original/2026_01_28_Presentation-Investor-Relations-Q4-2025.pdf#page=9)

47 ASML HOLDING NV, Form 20-F annual report for the period ended 2025-12-31 (financial statement R71). U.S. Securities and Exchange Commission (filing by ASML HOLDING NV) · 25 February 2026 [A](https://www.sec.gov/Archives/edgar/data/937966/000162828026011378/R71.htm)

63 FY2026 (April 2025-March 2026) Financial Announcement, transcript. Tokyo Electron · 30 April 2026 · p. 27 [A](https://www.tel.com/ir/library/report/pjuomj00000000tf-att/fy26q4transcript-e.pdf#page=27)

64 FY2026 (April 2025-March 2026) Financial Announcement, transcript. Tokyo Electron · 30 April 2026 · p. 5 [A](https://www.tel.com/ir/library/report/pjuomj00000000tf-att/fy26q4transcript-e.pdf#page=5)

65 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [A](https://chipeexplorer.eto.tech/?parentNode=NO&selectedNode=N6)

66 2026 State of the U.S. Semiconductor Industry. Semiconductor Industry Association · 2 July 2026 · p. 7 [A](https://www.semiconductors.org/wp-content/uploads/2026/07/SIA_2026_State-of-the-Semiconductor-Industry.pdf#page=7)

48 GAO-26-107882, SEMICONDUCTORS: Information on Projects Funded to Strengthen U.S. Supply Chain. U.S. Government Accountability Office · 11 December 2025 [A](https://files.gao.gov/reports/GAO-26-107882/index.html)

45 Huawei Ascend Production Ramp: Die Banks, TSMC Continued Production, HBM is The Bottleneck. SemiAnalysis · 8 September 2025 [B](https://newsletter.semianalysis.com/p/huawei-ascend-production-ramp)

FIVE THINGS TO REMEMBER

- An export control works only when a country's firms sell something the buyer cannot get elsewhere.
- US controls also cover some foreign goods made with American technology.
- The controls have kept China below the leading edge. But Chinese toolmakers' share of China's own chipmaking equipment market rose from 10 to 15 percent before 2022 to 35 percent in 2025.
- China's share of ASML's and Tokyo Electron's sales has fallen since 2024.
- Taiwan held 69 percent of the world's logic capacity below 10 nm in 2022, and TSMC makes its 2 nm chips only there.

Made by **Yashvardhan Sharma** with Claude. Corrections and questions: contact@chipsupplychain.org.

UPDATED 20 OCTOBER 2026

A company filings, governments, standards bodies, universities and research institutions; **B** SemiAnalysis, Reuters, the Financial Times and Nikkei Asia.

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