

ARTICLE

China and the Paradox of Protectionism?

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The Network Law Review is pleased to present a special issue on “Industrial Policy and Competitiveness,” prepared in collaboration with the International Center for Law & Economics (ICLE). This issue gathers leading scholars to explore a central question: What are the boundaries between competition and industrial policy?

Abstract: The very idea of industrial policy implies that industrial capabilities, and thus comparative advantages, are malleable and can be deliberately created. So perhaps in attempting to deny a competitor our own trade and knowledge, we might unintentionally create incentives for the competitor to improve its own capabilities dramatically. We can call this the paradox of protectionism. I argue that, although there is some evidence for this effect, advantage ultimately remains with countries that are well plugged into the international division of labor, especially at the cutting-edge of technology.

David Ricardo taught us that producers should specialize according to their comparative advantages and then trade with one another. He assumed implicitly that comparative advantages are given: sunny Portugal has the climate for wine while rainy England has the climate for sheep and wool, and those characteristics are hard to change. Adam Smith had never made this assumption. For Smith, the division of labor is importantly about the creation of industrial capabilities. The degree of specialization and the extent of trade help determine what producers focus on and thus what they learn how to do. More extensive specialization and trade is beneficial not because it optimizes a given process of production but because it casts a wide net for new ideas and helps to hone capabilities, thus energizing innovation. Smith opposed what we now call industrial policy not because he believed competitive advantages are given and immutable but because he was skeptical that “statesmen”

had the knowledge and incentives necessary to steer the system of specialization and learning in the most beneficial directions.¹

Although they minimize this last part of Smith’s argument, proponents of industrial policy are generally on board with a strong form of the idea that industrial capabilities are malleable. By creating the right conditions with the right policies, proponents believe, we can stimulate the creation of industrial capabilities – and thus competitiveness – while possibly degrading the capabilities of competitors. Significantly, this typically means weaning target industries off the Ricardian system of specialization and trade. If an industry can simply buy stuff cheaply on the market, the argument goes, it won’t have the incentive to develop its capabilities internally. In practice, this means subsidies for domestic production, often coupled with tariffs or other trade restrictions to raise the price of using the market. It may also mean denying competitors access to key inputs, including knowledge, that they may otherwise have acquired through trade.

Framing the problem this way immediately raises a problem, at least in principle. If we deny our competitors access to the network of specialization and trade, perhaps through export controls and related policies, do we thereby – by our own logic – create for them the very conditions for domestic capability-building that we most wish to deny them? If we refuse to sell our competitors our own superior technology, do we motivate them to develop their own technology in new ways and to greater extents? Call this the paradox of protectionism. It is worth thinking about this paradox in the context of today’s heated industrial conflict in high technology between the US and China, a conflict that very much includes export controls.

It is not a new idea that semiconductors, along with the products and services upstream and downstream from them, are a – or perhaps the – crucial “strategic” technology of the modern era. This was already the battle cry in the 1980s, when the US was feeling pressure from Japanese producers, who, by focusing deeply on the manufacture of dynamic random-access memory (DRAM) chips, had eroded American leadership in semiconductor production. This episode vividly illustrates the limitations of industrial policy for international competition in the ordinary commercial sphere². The Semiconductor Trade Agreement (STA) of 1986 set a price floor for imported Japanese semiconductors, creating a windfall that Japanese firms plowed back into research and development. Informed by the widespread – if largely mistaken – belief that Japanese success had been the result of cooperative research and state planning, the US federal government began funding a consortium called

¹ Smith, Adam. 1776 [1776]. *An Enquiry into the Nature and Causes of the Wealth of Nations*. Oxford: Clarendon Press.

² Langlois, Richard N. and W. Edward Steinmueller. 1999. “The Evolution of Competitive Advantage in the Worldwide Semiconductor Industry, 1947-1996,” in David C. Mowery and Richard R. Nelson, eds., *The Sources of Industrial Leadership*. New York: Cambridge University Press, pp. 19-78.

Sematech to spur research cooperation. Both the STA and Sematech were arguably clear failures. The US returned to leadership in semiconductor production after 1985 because one firm, Intel, made a decision to abandon DRAMs and to focus on what became the signature technology of the millennium, the general-purpose microprocessor, while at the same time renewing its focus on production technology.

The situation today is decidedly different, and the issues go far beyond commercial competition. China is legitimately viewed as a possible military adversary. And the technologies that semiconductors enable, notably artificial intelligence, have military as well as commercial uses. Even those who see civilian industrial policy as a largely fruitless exercise normally recognize that issues of defense reframe the policy question. Chris Miller, author of the much-discussed book *Chip War* (2022), has urged us to think about the problem as a matter of buying insurance against the disruptions, both military and civilian, that would ensue from Chinese advances on Taiwan.³ Yet even here the goals of intervention remain broadly the same: to improve domestic capabilities (possibly including the capabilities of reliable allies) while degrading, or at least slowing the advance of, the capabilities of the adversary.

Even in the 1980s, the semiconductor business was international. But the progressive division and specialization of industries has created a highly globalized supply chain today. With the notable exception of Intel and Micron, American manufacturers have come to specialize in chip design, contracting with so-called pure-play foundries for the actual manufacturing. The most important of these latter are in Asia, especially Korea and Taiwan. The single most important is the Taiwan Semiconductor Manufacturing Company (TSMC), the world's most efficient producer of semiconductors, which is in many ways the fulcrum of the policy debate. At the same time, however, the US and Japan remain the dominant suppliers of the complex equipment required for semiconductor fabrication. One key piece of equipment is the stage of lithography, the process of drawing circuit designs onto the silicon wafers. By far the most sophisticated producer of lithography equipment is ASML of the Netherlands, whose capabilities were bolstered by investments and advance orders from Intel, TSMC, Samsung, and Micron.⁴ ASML's cutting-edge extreme ultraviolet (EUV) machines might well qualify as the most complex production tools in human history. The autocratic regime in China has also long viewed semiconductors as a strategic technology, and China has now integrated to a significant extent into the existing semiconductor ecosystem, largely by relying on

³ Keynes, Soumaya. 2024. "Who Is Winning the Chip Wars? With Chris Miller," *The Financial Times*, August 26.

⁴ *The Economist*. 2020. "Industrial Light and Magic: How ASML Became Chipmaking's Biggest Monopoly," February 29, p. 10.

foreign-made equipment acquired on the market. In 2024, half of all imports of semiconductor manufacturing equipment went to China.⁵

Starting during the first Trump administration and continuing through the Biden administration, the US has been committed to slowing the development of a chip industry in China while attempting to “reshore” semiconductor production to the US. The CHIPS and Science Act of 2022 offered subsidies, tax credits, and grants for domestic production, provisions that were reinforced by legislation passed in July 2025. Export controls on some semiconductors and semiconductor equipment also went into effect in 2022, and these were reinforced in 2023 and again under the Trump administration in 2025.⁶ The US also exerted diplomatic pressure on the Dutch (i. e., ASML) and other allies to enforce similar export controls on advanced equipment.

Should we fear the paradox of protectionism?

One possible piece of evidence in favor of the paradox is the case of artificial intelligence.

The U.S. had been permitting the export to China of less-than-cutting-edge H20 chips from Nvidia, which some have argued would help promulgate the Nvidia hardware and software standards (or “stack”), even in the face of efforts by Chinese firms and the likes of Intel, Amazon, and Google to develop alternatives, including open-source alternatives.⁷ Characteristically, the Trump administration vacillated about whether to ban the H20 as well, ultimately deciding in the summer to permit licensing, at least so long as Nvidia gives the federal government a 15 percent cut.⁸ But almost immediately, Chinese regulators began discouraging Chinese firms from buying H20 chips and later banned the purchase of essentially all Nvidia chips.⁹

In January 2025, the Chinese AI startup DeepSeek revealed major innovations that reduce dependence on the premium hardware sold by Nvidia. Because American firms could avail themselves of the highest-powered Nvidia chips, they had had little incentive to invent techniques to reduce dependence on chip speed, and these

⁵ Castellano, Robert. 2025c. “Who Really Makes the Chips? The Hidden Geography of Revenue, Manufacturing — and Tariffs,” *The Information Network*, June 29. <https://drrobertcastellano.substack.com/p/who-really-makes-the-chips-the-hidden>.

⁶ Shivakumar, Sujai, Charles Wessner, and Thomas Howell. 2025. “The Limits of Chip Export Controls in Meeting the China Challenge,” *Center for Strategic and International Studies*, April 14. <https://www.csis.org/analysis/limits-chip-export-controls-meeting-china-challenge>.

⁷ Mims, Christopher. 2024. “Why Every Big Tech Company Has Failed to Dethrone Nvidia as King of AI,” *The Wall Street Journal*, August 9.

⁸ Ramkumar, Amrith, and Robbie Whelan. 2025. “Nvidia, AMD to Give U.S. 15% Cut on AI Chip Sales to China,” *The Wall Street Journal*, August 10.

⁹ Wu, Zijing, and Cheng Leng. 2025. “China turns against Nvidia’s AI chip after ‘insulting’ Howard Lutnick remarks,” *The Financial Times*, August 20.

innovations may not have emerged in a less chip-constrained environment¹⁰. Although in principle American firms can now profit from those innovations, Chinese AI engines remain significantly cheaper than American Chatbots, and they are making inroads in the developing world, which has long been a focus of Chinese industrial strategy.¹¹ Although training AI models benefits from fast chips, this is less true of the inference stage (using the models once trained), and this is where Chinese AI firms are excelling.¹²

At the same time, however, training an AI engine requires enormous amounts of computation, and there is great – and cumulative – advantage to having the fastest chips. Moreover, restricting Chinese access to the best chips meant that, in a constrained supply system, American firms could get their hands on chips that would otherwise have been sold to China.¹³

When we look upstream, to the production of semiconductors and the equipment needed to fabricate them, the question becomes even more ambiguous. Unlike export controls on chips, which can be and are routinely evaded through black markets and other mechanisms,¹⁴ sanctions against semiconductor equipment purchases are more easily enforced because of the scale and visibility of the equipment. Cutting-edge ASML lithography equipment is effectively banned from China.

It is true that China has embarked on a crash program to produce its own semiconductor fabrication equipment to reduce, and in principle to eliminate, dependence on foreign manufacturers. In calendar 2024, Chinese semiconductor-equipment firms grew at an average annual rate of 37 percent, whereas non-Chinese firms grew only 11 percent.¹⁵ Would the same kind of program have developed even in the absence of sanctions?

¹⁰ Zhang, Angela H. 2025. “Will DeepSeek Upend US Tech Dominance?” Project Syndicate, February 5. <https://www.project-syndicate.org/commentary/deepseek-represents-a-challenge-to-us-tech-oligopolies-by-angela-huyue-zhang-2025-02>.

¹¹ Lin, Liza, Josh Chin, and Raffaele Huang. 2025. “China Is Quickly Eroding America’s Lead in the Global AI Race,” The Wall Street Journal, July 1.

¹² Allen, Gregory C. 2025. “DeepSeek, Huawei, Export Controls, and the Future of the U.S.-China AI Race,” Center for Strategic and International Studies, March 7. <https://www.csis.org/analysis/deepseek-huawei-export-controls-and-future-us-china-ai-race>.

¹³ Allen, Gregory C. 2025. “DeepSeek, Huawei, Export Controls, and the Future of the U.S.-China AI Race,” Center for Strategic and International Studies, March 7. <https://www.csis.org/analysis/deepseek-huawei-export-controls-and-future-us-china-ai-race>.

¹⁴ Wu, Zijing, and Eleanor Olcott. 2025. “Nvidia AI Chips Worth \$1bn Smuggled to China after Trump Export Controls,” The Financial Times, July 25.

¹⁵ Castellano, Robert. 2025b. “The Real Cost of Sanctions?” The Information Network, July 23. <https://drrobertcastellano.substack.com/p/the-real-cost-of-sanctions-china>.

In one account, American sanctions and related policy sparked a “Sputnik moment” in China.¹⁶ During the era of easy access to international chips and equipment, Chinese industrial policy had operated under the purview of the state, with all the problems that implies. After the imposition of sanctions, however, a new urgency developed and, most significantly, the giant electronics firm Huawei stepped into the breach. Especially in an environment behind the technological frontier, when the direction of innovation has already been mapped out by others, a large vertically integrated company is often able to marshal and develop innovative capabilities effectively – as Intel did in the U.S. in the 1980s. Huawei subsidiaries commandeered fabs laden with equipment that had been essentially abandoned after sanctions, making intellectual property more available than if foreign technicians had remained to operate the equipment and monitor IP.¹⁷ This enabled those subsidiaries to reverse-engineer foreign equipment and begin producing their own versions in record time.

At the end of the day, however, China remains considerably behind the frontier in chip production, and capabilities at that frontier are arguably improving fast. Chinese fabs have been able to produce chips – notably the Kirin chip that appeared in Huawei phones – at 5 nm, but only at low volumes by using more expensive and less-efficient deep (rather than extreme) ultraviolet techniques and older American and Dutch equipment they already possessed.¹⁸

Could China eventually develop EUV technology or invent around it – the way DeepSeek invented around the bottleneck of fast chips for AI training? One reason to be pessimistic about China’s ability to reach the technological frontier any time soon is that EUV is a genuine bottleneck: economies of scale in lithography research and development are so great that the major semiconductor firms in the west all supported – and invested – in ASML because they knew that a single concerted effort would best produce the technology of the future. In the face of a genuine technological bottleneck that is costly to break in the medium term, sanctions may be effective.

From a larger perspective, the real limits to Chinese ascendance in semiconductors are arguably internal to China itself. It is significant that unlike vertically integrated Japanese optics firms Canon and Nikon, which had dominated an earlier era of lithography, ASML succeeded by tapping into a deep ecosystem of

¹⁶ Wang, Dan. 2021. “China’s Sputnik Moment?” *Foreign Affairs*, July 29.

¹⁷ Castellano, Robert. 2025a. “Huawei, SiCarrier, and the Making of China’s Shadow Semiconductor Equipment Industry,” *The Information Network*, May 27. <https://drrobertcastellano.substack.com/p/huawei-sicarrier-and-the-making-of>.

¹⁸ Liu, Qianer. 2024. “China on Cusp of Next-generation Chip Production Despite US Curbs,” *The Financial Times*, February 6.

components and services from suppliers around the world.¹⁹ China's turn inward to produce more of its "critical technologies" domestically may do more than American industrial policy to cut the country off from the international network of capabilities and ideas that drives rapid technological advance at the frontier.

Carl Benedict Frey²⁰ writes of what he calls the dictator's dilemma: to retain political control of industry, an autocratic regime inevitably cuts its industry off from decentralized, and thus largely uncontrollable, sources of new ideas. Of course, by disengaging from China (and by dabbling in state capitalism with an equity stake in Intel,²¹ the US is following a similar strategy. But the level of authoritarian intervention is far higher in China, and, despite the country's huge population and multifold manufacturing capabilities, China will find it far harder to replicate the free flow of ideas and personnel that will remain at the disposal of the US and its allies.

Yes, cutting a country off from the international division of labor may energize that country to develop capabilities it wouldn't otherwise have possessed. But, especially at the frontier of innovation, those capabilities are unlikely to surpass those of countries well plugged into the division of labor.

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¹⁹ Miller, Chris. 2022. *Chip War: The Fight for the World's Most Critical Technology*. New York: Scribner.

²⁰ Frey, Carl Benedikt. 2025. *How Progress Ends: Technology, Innovation, and the Fate of Nations*. Princeton: Princeton University Press.

²¹ Ramkumar, Amrith, Robbie Whelan, and Brian Schwartz. 2025. "Trump, Intel Agree to 10% U.S. Stake as President Promises More Deals," *The Wall Street Journal*, August 22.