
US Export Controls on AI and Semiconductors

TL;DR

Background: The United States implemented unprecedented restrictions on semiconductor exports to China in October 2022, which were subsequently expanded in 2023 and 2024.

Aimed at limiting China's AI capabilities, the controls serve to restrict the export of advanced graphics processing units (GPUs) and semiconductor manufacturing equipment, and even prohibit U.S. persons from supporting advanced Chinese chip facilities.

But... The effectiveness of these controls hinges on several critical timeline questions. Most importantly, should policymakers expect that transformative AI capabilities will emerge within two-to-three years, or will such developments take a decade or more?

If development is slower, China may achieve semiconductor self-sufficiency in the interim. This would render the controls counterproductive by accelerating China's technological independence, while simultaneously harming U.S. companies and potentially exacerbating the geopolitical risks around Taiwan.

However... Policymakers should design export controls with sufficient flexibility to adapt as the technological landscape evolves.

The relative effectiveness of AI export policy will depend heavily on multilateral cooperation with allies like Japan and the Netherlands. The potential economic impacts extend beyond immediate revenue considerations to long-term technological leadership and strategic positioning.

KEY TAKEAWAYS

The Timeline Debate Is Fundamental

The core debate centers on whether transformative AI capabilities will emerge in the near term of two or three years, or the longer term of a decade or more. If the "short-term advancement" scenario is correct, chip export controls could effectively limit China's ability to deploy advanced AI at-scale, providing a strategic advantage to the United States and its allies. But if significant AI advancements take longer, China will likely develop its own chip-manufacturing capabilities during that timeframe. This would render existing controls ineffective while denying revenue to U.S. companies and accelerating China's technological independence, especially from Taiwan.

Two Competing Visions

Figures like Anthropic CEO Dario Amodei predict that "super powerful AI" could emerge by 2026-27, therefore justifying strong export controls to maintain U.S. advantage. An opposing view, voiced by Stratechery's Ben Thompson and others, questions the long-term efficacy of such restrictions if AI advancements take a decade or longer, during which time China could develop domestic manufacturing capabilities.

China Has Demonstrated Impressive Adaptation

Chinese firms have shown a remarkable ability to adapt and innovate despite the constraints imposed by the existing export controls. DeepSeek released a competitive (although not leading) reasoning model (R1) that reportedly uses far fewer computational resources than American companies typically employ. Similarly, Huawei has produced smartphones with domestically manufactured 7nm processors, despite significant restrictions. These developments suggest that export controls may drive

innovations in efficiency, with Chinese companies learning to "squeeze every little bit of IQ out of every flop" under hardware constraints.

Economic Impact on US Companies

Export controls' effects on U.S. semiconductor companies have been multifaceted. Suppliers of wafer-fabrication equipment (WFE) initially warned of a potential "death spiral," but industry research suggests that the initial two years of export controls have been very good for their business. For AI-chip manufacturers like Nvidia, the picture is more nuanced. Export controls harm them by reducing market access but may potentially help by impeding Chinese competitors.

Taiwan's Position Creates Strategic Vulnerability

The success of Taiwan's semiconductor industry, particularly industry leader TSMC, contributes to a complex geopolitical dynamic. U.S. export controls might inadvertently reduce China's dependence on Taiwanese chip production, even as Taiwan remains critical to the United States. This raises the possibility that Chinese leaders might calculate the economic costs of military action would disproportionately harm the United States rather than China, potentially lowering the perceived threshold for conflict.

Catastrophic Economic Risks of Taiwan Conflict

A Chinese invasion of Taiwan poses potentially catastrophic risks to the U.S. economy. Taiwan's semiconductor manufacturing represents a critical chokepoint in technology supply chains. While much attention has focused on the cutting-edge chips used in AI systems and high-end smartphones, Taiwan also produces vast quantities of "trailing-edge" chips essential for automobiles, consumer electronics, industrial equipment, and military systems. A conflict that disrupts Taiwan's manufacturing capacity would likely trigger widespread

supply-chain failures across virtually every sector of the U.S. economy.

Effective Controls Require Multilateral Cooperation

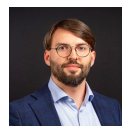
The success of export controls hinges on cooperation from key U.S. allies, particularly Japan and the Netherlands, which host critical semiconductor equipment manufacturers like ASML. But these countries may have different economic interests and threat perceptions. In 2023, 29% of the Netherlands' ASML sales went to customers in China, creating a strong disincentive to further restrict exports. Without aligned international policies, unilateral U.S. actions face significant limitations, as China can procure restricted technologies through third-party countries or alternative suppliers.

Export Controls Need Adaptive Flexibility

Given the fundamental uncertainty about technological trajectories, export controls should be flexible to adapt as the landscape evolves. Static policies risk becoming either irrelevant or counterproductive as conditions change. The controls imposed by the Biden administration have already evolved from focusing on both computing performance and interconnection bandwidth to primarily targeting computing performance, with different versions of chips created specifically for the Chinese market. Future policies will need to be similarly adaptable to remain effective, as both AI capabilities and semiconductor manufacturing techniques continue to advance.

For more on this issue, see the International Center for Law & Economics (ICLE) issue brief "[US Export Controls on AI and Semiconductors: Two Divergent Visions.](#)"

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