

PUBLIC COMMENT FOR RIN 0694–AI94 AMERICA’S SEMICONDUCTOR EXPORT CONTROLS

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1. Review of Current Trade Controls

1.1 Domestic Production

The CHIPS and Science Act, enacted as part of the U.S. government's strategic efforts to enhance domestic capabilities, represents a substantial commitment of \$280 billion.¹ This act is not merely a financial package but a comprehensive policy aimed at strengthening the United States' semiconductor industry. Its scope extends beyond economic stimulation to include advancements in research, development, and the creation of a skilled STEM workforce. The act signifies a concerted effort to secure the US's position in the advanced technology sector globally.

The motivation behind the CHIPS Act is twofold: addressing economic disparities and mitigating security risks associated with semiconductor production. Historically, U.S. manufacturers have faced substantial cost disadvantages compared to foreign producers, often backed by significant government subsidies.² This disparity has led to an over-reliance on foreign sources, introducing vulnerabilities in the supply chain and potential national security risks. In response, the CHIPS Act introduces tax incentives and funding provisions aimed at encouraging domestic semiconductor production. This strategic shift is expected to reduce dependency on foreign sources, address supply chain challenges, and enhance the nation's ability to respond to technological demands, particularly in times of global disruptions.

The CHIPS Act has a broader impact on U.S. trade policy and control, especially in the realm of high-tech exports and imports. The act's guardrails provision, which restricts funding from bolstering enterprises that could threaten U.S. interests, is a clear indication of the intertwining of economic policy with national security concerns. By focusing on domestic production and limiting the expansion of semiconductor manufacturing in certain foreign countries, the U.S. aims to maintain a strategic advantage in the global technology race. This approach underscores a shift in U.S. trade

¹ Reinsch, W. A., & Denamiel, T. (2023, April 13). The Chips and Science Act Guardrails' implications for the U.S. trade agenda. CSIS.

<https://www.csis.org/analysis/chips-and-science-act-guardrails-implications-us-trade-agenda>

² LMBC. (2023, November 27). Chips act: Tax breaks encourage U.S. chip manufacturingx. CHIPS Act: Tax breaks encourage U.S. chip manufacturing. <https://www.lbmc.com/blog/chips-act-tax-breaks-us-manufacturing/>

policy, where economic measures are increasingly seen through the lens of national security and international competitiveness.

1.2 Export Controls

The U.S. government has been intensifying its export controls on semiconductors and chipmaking equipment, primarily focusing on curbing the technological advancement of strategic rivals, notably China. These controls, managed under the Export Administration Regulations (EAR), are a critical component of the U.S.'s broader strategy to maintain technological superiority, particularly in areas with potential military applications.

The implementation of these export controls represents a significant shift in U.S. policy. Previously, the U.S. aimed to maintain a relative technological advantage over competitors. However, the current approach seeks to maximize the technological lead, particularly in semiconductors, which are vital for advanced military and AI applications.³ This change reflects a growing acknowledgment of the strategic importance of semiconductors in national security and global power dynamics.

Key Developments and Cases

- **October 2022 and 2023 Updates:** The updates introduced by the BIS have significantly tightened restrictions on AI chips and SME. For instance, the October 2023 update established stricter controls based on TPP and performance density, categorizing chips into two tiers with varying levels of control. These measures have been instrumental in limiting China's access to advanced semiconductor devices necessary for supercomputing and AI applications. Indeed, within this policy, the US chip export policy was one where 13 firms were put on the US's 'blacklist' where certain exports were banned, specifically one's that involved Artificial Intelligence or impacted current US policy goals.
- **Licensing Restrictions:** In general, the US maintains the stance of choosing which restrictions to put on which exports from a case to case basis, which means the adjustment of rules regarding what falls under what category is sure to, "capture a far greater number of chips." Additionally, the administration has made it so that the qualifications for licensing restrictions expand to "countries with national security risks,...missile technology,...and arms-embargoed countries."

- Restrictions on SME: Additional technologies aiding in the production of advanced SME have been added to the control list. The aim is to prevent China from manufacturing advanced chips and developing state-of-the-art SME. This has broader implications, as it hampers China's capability to advance in the global semiconductor landscape.
- Impacts on U.S. and Global Industries: The implementation of these controls has affected U.S. firms and the global semiconductor market. For example, the loss of Chinese market demand for leading-edge chips and technologies has impacted American businesses. Additionally, foreign semiconductor equipment suppliers have begun to curtail their operations in China, indicating the far-reaching effects of these controls.
- Case of Chipmaking Equipment for 14nm and Below: In July 2022, the BIS informed manufacturers of chipmaking equipment capable of fabricating chips at the 14 nm node and below about new export restrictions to China. This action is particularly significant as it targets foundries and impacts the fabrication of logic chips, not memory chips.

The industry's reaction to the U.S. export controls has been swift. Major semiconductor firms and equipment suppliers have started to adjust their operations and strategies to comply with the new regulations. For instance, the response from SK Hynix, indicating a potential sale of its memory production operations in China, underscores the profound impact of U.S. policy on corporate decisions. This move by SK Hynix, a major player in the semiconductor industry, highlights the challenges faced by companies caught in the crossfire of U.S.-China technological rivalry.

Similarly, ASML, the world's leading semiconductor lithography equipment maker, reportedly directed its U.S. staff to align with the new restrictions, illustrating the far-reaching effects of these controls. This action by ASML not only affects its operations but also has broader implications for the global semiconductor supply chain, particularly in China.

The export controls are significantly impeding China's ambition to develop a self-reliant semiconductor industry. By restricting access to advanced semiconductor manufacturing equipment and technology, the U.S. is effectively stalling China's progress in this critical sector. The controls strike at the heart of China's efforts to

advance its semiconductor capabilities, which are central to its broader strategic objectives in technology and national security.

China's response to these challenges will likely involve increased investment in domestic research and development to circumvent the restrictions. However, the complexity and sophistication of semiconductor technology mean that overcoming these barriers is a daunting task. The U.S. controls not only limit China's access to advanced technologies but also potentially slow down its overall technological advancement in areas crucial for economic and military development.

1.3 Trade Tariffs

The US-China trade war, marked by the imposition of tariffs on a wide range of goods including semiconductors, has significantly reshaped the landscape of global trade, especially in the high-tech sector. The introduction of tariffs on semiconductors and related components has led to increased prices and notable supply chain impacts.

The trade conflict escalated in 2018 when the U.S. imposed 25% tariffs on \$50 billion of Chinese goods, followed by an additional 10% on \$200 billion worth of goods, which directly affected the semiconductor industry. China retaliated with tariffs on U.S. chips and other goods. This escalation led to increased costs for semiconductor manufacturers and reshaped global supply chains. The U.S. Trade Representative's (USTR) decision to levy a 10% tariff, later increased to 25%, on imports from China, including semiconductor-related products, illustrates the direct impact on this vital industry.

The U.S. policy of imposing tariffs and restricting chip-related exports is part of a broader strategy to curb China's advancement in AI and other technologies with potential military applications. This move represents a significant departure from the norms of the integrated global economy. It reflects the growing concerns about the security of supply chains for nationally important goods like semiconductors. The trade war's emphasis on semiconductors acknowledges the dual-use nature of these technologies, with both commercial and military applications, thereby raising concerns over national security and espionage.

China plays a crucial role in the global semiconductor supply chain, not only as a significant market but also as a rising producer and a major provider of chip assembly, packaging, and testing (APT) services. China's attempts to produce and use advanced semiconductors, especially for developing AI capabilities, have been significantly impacted by the U.S. trade restrictions. Despite these challenges, China has focused on achieving semiconductor self-sufficiency, responding with favorable policies and state subsidies to bolster its domestic chip sector. However, analysts from *South China Morning Post* have pointed out that replicating each part of the existing global chip supply chain is a daunting and perhaps unrealistic task given the significant investments required.

From the industry's perspective, semiconductor companies caught in the middle of the U.S.-China trade war, like Intel Corp. and Qualcomm Inc., are keen to avoid taking sides. However, the prolonged trade conflict continues to affect their business outlook. A resolution of the trade war could potentially lead to a loosening of policies on the import and export of semiconductor technologies, which would be beneficial for the industry. Both U.S. and Chinese companies are navigating this complex geopolitical landscape, balancing the need to access critical markets and technologies with the imperative to comply with national regulations.

2. Analysis of the proposed trade restriction & edits

2.1 Relationship with China

Due to the very nature of trade control, restrictions and regulations on exporting semiconductors to China may impact the political relationship and economic supply chain between the two countries. More specifically, China may see export controls as a threat, retaliating by more strictly enforcing its own laws for not just Chips but other industries, creating a tit-for-tat escalation scenario.

Such controls therefore may inadvertently hurt US businesses that depend on the Chinese market for sales. For instance, Qualcomm, a US chip company, depends on China “for more than 60% of its sales” while eight US companies in the semiconductor space are the most dependent on China for sales. With a loss in sales, this may create a vicious cycle where less capital means less R&D spending which stifles innovation

Thus, in order to solve this issue, we propose to strike a balance between full restrictions, ensuring that high-tech, cutting-edge semiconductors used for the military and technology be restricted for national security. However, for routine commercial chips, trade should still occur.

2.2 Confusing Bureaucracy

With the proliferation in new export regulations, it may be confusing for businesses in deciding which actions follow specific guidelines. This especially hurts medium to small businesses in which they don't have the resources to examine what is and isn't legal. Indeed, furthermore, with the continued development of new semiconductors, this problem only becomes worse because there is a blurred line between what constitutes as protection to "national security."

In the worst case scenario, such regulations may further create a black market of unregulated shipping of semiconductors without governmental oversight, possibly worsening the situation. With the incentive to catch up to the US state of semiconductor innovation, smuggling has already existed without regulations.

As a solution, the BIS can further inform the public through infographics that provide the broad overview of the new regulations to spread outreach. Smuggling can further be reduced by reinforcing stricter regulations on US companies to protect intellectual property and the flow of chip products.

2.3 Other Suppliers

In the case of export controls, China still has the ability to obtain chips from other countries, hindering US efforts uselessly. For instance, after initial US export restrictions, while America's share for China "dropped to 9%," the Dutch share "jumped to 30% from about 15%." Indeed, on a macro level, China's chip equipment imports still rose by 93%. However, it is important to note that for the ASML Holding, a Dutch company, the Dutch government further enforced export controls on China.

Such solutions could be global modeling in which neighboring allies follow the US. With South Korea, Japan, and Germany all exporting huge amounts of semiconductors every year, it is crucial for America's model to be adopted internationally to create the

strongest effect. In the event a single country has no restrictions, it may hinder export controls' effectiveness.