

Study on the influence of Chip Act on China-Japan semiconductor industry chain

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Abstract: The U.S. technology blockade, represented by the CHIPS and Science Act of 2022 (hereinafter referred to as the “CHIPS Act”), reflects America’s strategic intent to maintain its technological hegemony and curb the development of China’s semiconductor industry. As a major semiconductor power that the U.S. aims to court and pressure, Japan’s cooperation with China’s semiconductor industry and the resilience of its industrial chain have been particularly affected. This article analyzes the impact of the CHIPS Act on the Sino-Japanese semiconductor industry chain over time. The study finds that in the short term, the CHIPS Act will have a significant impact on the Sino-Japanese semiconductor industry chain, but in the long term, the impact is relatively minor, leaving considerable room for deeper and more extensive cooperation between China and Japan. The article proposes strategies to mitigate the negative impacts of the CHIPS Act from four aspects: enhancing the resilience of the Sino-Japanese semiconductor industry chain through coordinated industrial policies, leveraging the RCEP opportunity to boost the clustering effect of the Sino-Japanese semiconductor industry chain, promoting networked cooperation in China’s semiconductor industry through multi-dimensional resource integration, and expanding horizontal technological linkages in the Sino-Japanese semiconductor industry through innovation-driven development, all aimed at boosting the resilience of the Sino-Japanese semiconductor industry chain.

Keywords: “Chip Bill”; China-Japan Semiconductor Industry Chain; Impact

Introduction

The semiconductor and chip industry is a pivotal component supporting various industrial activities and serves as the foundation for the development of emerging technologies such as artificial intelligence, cloud computing, 5G, and the Internet of Things. It plays a crucial role in building a country’s manufacturing competitiveness, technological standing, and information capabilities, becoming the core of modern electronics and the bedrock of an informatized society. Since the birth of the semiconductor industry in the 1950s, the United States has led in chip design, research and development, and manufacturing. However, with the increasing hollowing out of domestic industries, the focus of chip manufacturing has gradually shifted to East Asia. In recent years, the technological rise of emerging powers and intensifying global tech competition have raised concerns in the U.S., prompting it to redirect chip manufacturing back to its domestic base to ensure economic and defense supply chain security. In August 2022, President Joe Biden signed a significant federal law, the — “CHIPS and Science Act” (Creating Helpful Incentives to Produce Semiconductors for America Act), also known as the “U.S. Chip Act,” which spans 1,054 pages and authorizes \$280 billion in funding. The act stipulates that if companies receive subsidies under this law, they will be prohibited from establishing new advanced semiconductor plants with processes below 28 nanometers in China and Russia for the next decade. This U.S. technology blockade, primarily based on export controls and policies, will significantly impact the current landscape of the global semiconductor industry.

In the 1980s and 1990s, Japan’s semiconductor industry declined under U.S. trade sanctions, losing its international competitiveness and falling into a prolonged period of recession. To enhance technological competitiveness in international competition and reclaim the “lost 30 years,” Japan relied on the “three-step” plan outlined in the Semiconductor Digital Strategy released in 2021. This strategy focused on expanding domestic semiconductor production capacity through raw material security, new material development, talent cultivation, and international cooperation. As significant players in the global semiconductor market, China and Japan have seen increased technical cooperation and exchange in recent years due to more frequent trade interactions. Advanced technologies and products can now enter the Chinese market more easily, bringing new opportunities for China’s semiconductor industry. However, the U.S. technology blockade, represented by

the “CHIPS Act,” has curbed semiconductor trade between China and Japan, affecting the safety and resilience of the semiconductor supply chains in both countries and impacting the sustainable development of the Asia-Pacific region’s semiconductor industry. Will the “CHIPS Act” affect the competitive and cooperative dynamics between China and Japan’s semiconductor industries? What specific impacts will it have on the semiconductor supply chains of both countries? What measures should China and Japan take to counter the U.S. technology blockade and maintain and strengthen the resilience of their semiconductor supply chains? These are questions that need to be addressed and answered, aiming to deepen cooperation based on the foundation of Sino-Japanese semiconductor industry collaboration, promote the security of the Sino-Japanese semiconductor supply chain, and seek stability in the international semiconductor landscape.

1. In the short term, it will have an impact on the semiconductor industry chain between China and South Korea

(1) Forcing Japanese semiconductor companies to invest in the United States and abandon their investments in China. Although the semiconductor industry is a core strategic sector for both China and Japan, due to differences in development paths, Japanese investment in China has become an important avenue for effective linkage and complementarity between the two value chains and industrial chains. Japanese investment in China’s electronics industry is crucial for promoting technology transfer between the two countries, while the restrictions imposed by the Act will guide Japanese semiconductor companies to shift their investment focus to the United States, weakening their willingness to invest in China through non-market means, leading to a loss of foreign capital within China and artificially severing the industrial chain link between China and Japan.

(2) In the short term, restrictions on China’s semiconductor industry development potential will compress growth space. For a long time, China has maintained strong appeal to Japan’s electronics manufacturing sector, with substantial investments flowing from Japan into China, creating spillover effects. Besides direct technology transfer, the increase in Japanese companies in China has also intensified domestic competition and spurred a broader and more rapid wave of learning and imitation among Chinese enterprises, significantly promoting technological innovation and R&D in China’s electronics industry. However, the new “Act” not only curbs Japanese investment in China but also restricts technical cooperation between some universities and research institutions and Chinese companies. Coupled with the dual pressures of U.S. export controls on China in recent years, China’s semiconductor industry will face adverse impacts in the short term, including reduced foreign investment inflows, a shortage of industry talent, insufficient supply of advanced technology products, and hindered technological growth.

(3) Destruction of Sino-Japanese semiconductor trade ties. Over the long term, Sino-Japanese semiconductor trade and investment have formed a relatively close and stable relationship. Specifically, Japanese investment in China’s electronics industry can boost semiconductor trade with China, where direct investment creates a value chain structure that links both sides upstream and downstream in the value chain. Trade ties are the visible form of this industrial and value chain connection. However, the Act forces Japan to join the camp surrounding and isolating our country, disrupting the complementary and mutually beneficial landscape of Sino-Japanese semiconductor industries in terms of products, technology, and benefits.

Therefore, in the short term, the Act not only worsens the development environment of China’s semiconductor industry itself, but also involves Japan, and impacts the industrial chain, value chain and supply chain cooperation between China and Japan in the semiconductor field.

2. In the long term, the impact on the semiconductor industry chain between China and Japan is limited

(1) The semiconductor industry is a pillar of Japan’s economic revival, with China being its primary export market. Japan’s reliance on China for high-tech industries has been growing, and its dependence on semiconductor exports to China has increased nearly 13 times over the past 20 years. In 2022, Japan’s exports of integrated circuit products to China reached \$48.81 million. The United States’ continuous actions to suppress China’s semiconductor industry could lead to a shrinking Chinese market, directly impacting Japanese semiconductor

companies from the demand side, reducing their production scale and hindering their development space. In the long term, this would not align with Japan's own interests.

(2) The semiconductor industry is characterized by prominent global industrial division and networked supply chain layout. Taking the integrated circuit industry as an example, it currently exhibits a large-scale global division of labor, which can be mainly divided into four production areas: first, equipment, design, and EDA software, currently dominated by the US and Europe; second, materials and equipment, with Japan being the most critical supplier; third, manufacturing, showing a clear trend of concentration in Japan and Taiwan, China regions; fourth, packaging, testing, and product assembly, primarily located in Chinese mainland. Therefore, there is a clear upstream-downstream relationship between Chinese mainland and Japan, determined by their respective endowments and comparative advantages. This relationship will not undergo qualitative changes in the short term, so the semiconductor industry chain between China and Japan will exhibit strong stickiness and stability. At the same time, the trend of large-scale global division of labor in the semiconductor industry will not easily change.

(3) The Biden administration's bill, after being concealed in the short term, will ultimately be fully exposed. On the surface, it encourages Korean semiconductor companies to set up factories in the U.S. through subsidies and tax breaks. However, in the long run, this will become a significant means for the U.S. to constrain Japan, facilitating its use of political and diplomatic pressures on technology transfer. At the same time, the reduction in production scale in China has increased cost pressures on Japanese semiconductor companies, expanding adverse factors affecting their operations and indirectly aligning with the U.S. goal of strengthening Japan's dependence on the U.S. market, policies, and even politics. In April 2023, the U.S. Department of Commerce released the "guardrails" provisions of the bill, imposing stringent requirements on corporate information disclosure and profit levels, which sparked strong concerns across Japanese society. Additionally, the U.S. reducing its reliance on the East Asian semiconductor supply chain over the long term also poses a major threat to Japan. Therefore, despite the substantial subsidies provided by the United States, considering the industrial characteristics and development trends of both China and Japan, and given that Japan's isolation from the Chinese market and its compliance with U.S. constraints come at a greater cost, in the long term, Japan is more likely to choose to balance the Sino-Japanese-Korean and Sino-Japanese-ROK cooperation, maintaining close ties with the Chinese market and enterprises. The semiconductor supply chain between China and Japan may remain highly stable, demonstrating sufficient resilience against external pressures.

3. Enhance the resilience strategy of the semiconductor industry chain between China and Japan

3.1 Strengthen the risk resistance capability of the semiconductor industry chain between China and Japan with coordinated industrial policies

China and Japan should actively explore synergistic industrial policies to enhance the risk resistance capability of the semiconductor industry chain from an institutional perspective. First, in terms of policy direction synergy, both sides should actively expand common development interests, clarifying that the goal is to maximize development benefits rather than to cater to international hegemonic forces, promoting the establishment of a balanced, neutral, and mutually beneficial industrial chain relationship. Second, regarding policy tool synergy, industrial chain policies include supply-side, demand-side, and environmental aspects, each involving numerous specific measures such as industrial planning, institutional setup, basic research, technological innovation, safeguard measures, supervision and management, legal liabilities, etc. China and Japan should further explore synergies and complementarities in policy selection and planning to strengthen the stability and cohesion of their semiconductor industry chains through institutional conditions. Third, concerning policy implementation synergy, policy coordination not only requires consistency in stance and content but also necessitates coordination in the level and progress of specific policies. Both sides should promote the establishment of a diverse, inclusive, efficient, and convenient policy exchange mechanism, enhancing cooperation and interconnection at all stages of policy implementation to ensure the continuity and sustainability of the semiconductor industry's development.

3.2 Seize the opportunity of RCEP to enhance the agglomeration effect of China-Japan semiconductor industry chain

Under the impact of external non-economic factors, China and Japan should make good use of their free trade zone relationship to

maintain the stability of bilateral economic and trade cooperation. First, they should leverage the China-Japan Free Trade Agreement to promote the “chain extension and cluster development” of the semiconductor industry. The semiconductor supply chain is characterized by long chains, numerous links, and complex interconnections. Therefore, it is essential to seize the favorable orientation of the China-Japan Free Trade Zone construction, integrate the advantages and conditions of both sides, accelerate the formation of a semiconductor industry cluster, strengthen upstream and downstream linkages, and fully leverage the penetration and spillover effects between different segments of the semiconductor supply chain. Second, they should seize the opportunity presented by the entry into force of RCEP, actively explore and promote the upgrading of agreement rules, and expedite the expansion of semiconductor industry cooperation to a broader scope, wider fields, and higher levels. This includes accelerating the upgrade of provisions on investment, competition, intellectual property rights, and encouraging companies from both countries to develop in clusters based on comparative advantages. At the same time, they should continuously enhance the practical effectiveness of clauses related to independent innovation, data information, and technology research and development, allowing and encouraging the sharing of data resources under certain conditions, achieving collaborative R&D and innovation, and fostering a favorable business environment to gradually build a higher-level, higher-quality semiconductor industrial base and research center between China and Japan.

3.3 Promote the network cooperation and development of China’s semiconductor industry by integrating multi-dimensional resources

Under the U.S. series of containment and pressure measures, our country should actively unite and expand partnerships with non-U.S.-based semiconductor manufacturers to stabilize our semiconductor industry chain and supply chain. On one hand, in the mid-to-high-end market sector, we should continue to maintain cooperation with South Korea, the EU, and Japan. First, we need to establish a more robust reserve and emergency system, guiding companies to timely replenish relevant products, equipment, and raw materials during critical periods, avoiding political uncertainties. Second, we should seize the significant opportunity when Europe and the U.S. aim to capture our market, accelerating the expansion of cooperation with European semiconductor giants, deepening technical collaboration and technology introduction, and enhancing the security of our semiconductor industry chain and supply chain. On the other hand, in the mid-to-low-end market sector, we should further expand industrial and value chain linkages with Southeast Asia, leveraging the favorable conditions of Malaysia and Singapore as neutral markets for semiconductors and important global transit markets. In the short term, we should ensure the import channels for high-end chips, semiconductor raw materials, and key equipment remain intact. We should fully leverage the substitution and complementary roles of European, Japanese, and Southeast Asian markets in the Sino-Japanese semiconductor industry chain, reducing the impact of U.S. technological competition on our semiconductor industry.

3.4 Expand the horizontal technology association between Chinese and Japanese semiconductor industries driven by innovation

In the face of pressure from the United States and others on our semiconductor and chip industries, the most fundamental response should focus on encouraging domestic innovation to enhance international competitiveness and risk management capabilities. First, at the macro-policy level, we need to continuously deepen our understanding and grasp of new trends, characteristics, and changes in global semiconductor industry development. We must strengthen our focus on key areas, place greater emphasis on innovation investment in critical links, and increase efforts to encourage high-level innovation outcomes, especially in advanced process chips and next-generation chips. We must continuously expand support and guidance across the entire industrial chain to reinforce the competitive advantages of domestic enterprises and maintain a relatively fair market position. Second, we need to deepen cooperation with China and Japan in technology and standards, strengthen vertical and horizontal collaboration with multinational corporations, make good use of Chinese and Japanese investments in China’s electronics industry, actively seek cooperation upstream and downstream in the industrial chain, guide Japanese capital to shift towards higher value-added and high-tech content, and promote mutual patent licensing and international industry forums to enhance horizontal connections between both sides’ advanced technologies.

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