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The Historical Mirror of Japan-US Friction under Semiconductor Strategic Competition and the Systematic Comparison of Sino-US Game

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Abstract

Historical Mirror of Japan-US Friction under Semiconductor Strategic Competition and Systematic Comparison of the Sino-US Game As a strategic highland for scientific and technological competition among major powers, the development trajectory of the semiconductor industry profoundly reflects the changes in the international power structure. The superposition of the U.S. technology blockade against China and Japan's export controls to China has made the Sino-US technology game and the semiconductor trade friction between Japan and the United States in the 80s of the 20th century present a similar historical logic. This paper systematically compares the evolution of the Japan-US trade friction in the semiconductor industry (1970s-1996s) and the Sino-US science and technology game (2018s-2025s), and reveals the shaping mechanism of technological sovereignty iteration and supply chain power reconstruction on the competition pattern of major powers. The research finds that the essence of friction between Japan and the United States is industrial competition under the framework of allies, and the United States forces Japan's technology to depend on it through market quotas and generalization of security issues. The Sino-US game is characterized by systematic confrontation, with the United States

imposing a blockade of the entire industrial chain on China. The difference in response strategies between China and Japan is rooted in the division of technological sovereignty consciousness: Japan has fallen into industrial decline due to security dependence, and China has built an independent technology ecology through asymmetric competition. Finally, it is further proposed that China needs to enhance the resilience of the industrial chain through "regional cooperation + precise countermeasures", break through the technological blockade through the policy combination of "short-term countermeasures and long-term layout", focus on disruptive technologies such as third-generation semiconductors to achieve corner overtaking, and finally build a new paradigm for the semiconductor industry, providing a theoretical reference for emerging economies to break through technological dependence. A systematic comparison of the historical mirror of Japan-US friction under semiconductor strategic competition and the Sino-US game.

Keywords: semiconductor, Japan-US trade friction, Sino-US technology game, technological sovereignty iteration, industrial chain reconstruction.

1. Introduction and literature review

As the strategic cornerstone of the modern economic system, the semiconductor industry has a complex division of labor and geographical distribution in its industrial chain, which deeply shapes national competitiveness. Against the backdrop of globalization ebb and geopolitical reconstruction, the semiconductor industry has become the core battlefield of the technological game between great powers. From the Trump administration's "tariff war" to the Biden administration's "small courtyard and high wall" strategy, and then to the Trump 2.0's "reciprocal tariff", the US's semiconductor technology blockade against China has shown a multi-dimensional escalation trend. The competition for technological sovereignty has always run through the deep logic of international power transfer and has evolved into a systematic confrontation covering standard setting, capital flow, technology competition and talent exchange. This new feature makes the Sino-US semiconductor technology game and the Japan-US semiconductor trade friction in the 1980s not only have the continuity of historical logic, but also highlight the differences in strategy choices.

Existing research has formed a multi-dimensional interpretation of the competition between major powers in the semiconductor field. In foreign research, the industrial organization school emphasizes the influence of market structure. Saxenian (1994) pointed out the efficiency advantage of Japan's vertical integration model in DRAM competition by comparing Silicon Valley with Tsukuba Science and Technology City [1], but underestimated the geopolitical intervention in the technological route. The new institutional economics school pays more attention to policy tools differences. Baldwin (2016) reveals that the United States reconstructs the innovation ecosystem through the SEMATECH alliance [2], but does not explain the mechanism of forming the power of technical standards. In terms of technical catch-up theory, Lee and Lim (2001) proposed the concept of "path creation", believing that late-developed countries can achieve transcendence through technical jumping [3], but failed to combine supply chain power analysis. In domestic research, Feng Zhaokui (2019)'s research on Japan-US frictions is groundbreaking, revealing the binding role of the security alliance on Japan's compromise [4], but it has not extended to the contemporary Sino-US game comparison. Tao Tao and Shi Keyu (2023) started from

the motivation for provoking two conflicts in the United States, and analyzed the nature of the two conflicts, the means and strategies of the United States, as well as the impact on Japan and China's semiconductor industries [5], but did not involve the differentiated response strategies and their core logic of China and Japan. Based on the Plaza Accord, Wang Guannan and Xiang Weixing (2023) believe that US sanctions have changed from the "economic dominant" type of Japan and the United States to the "comprehensive" competition between China and the United States [6], but only remain in the comparison of the nature and motivation of the two sanctions, and have not yet involved other dimensions such as sanctions means and legal tools. Zhou Jinkai (2021) focuses on analyzing the industrial impact issues in the trade imbalance between Japan and the United States [7], and has not yet involved the core logic of the response strategy.

Under the increasingly fierce trend, what are the similarities and differences between the Sino-US technological game in the process of sanctions? Why did Japan-US friction end with Japan's compromise, but China achieved independent control in the Sino-US game? What is the core logic that forms this difference? What historical mirror can you give to latecomer countries? This article systematically compares the evolution process, response strategies and its core logic of the Japan-US friction and the Sino-US game in the next phase of semiconductor strategic competition. This not only reveals the institutional roots of technological dependence in Japan-US friction, but also analyzes the reconstruction logic of supply chain power under the Sino-US game, provides a new theoretical perspective for understanding the technological competition of major countries, and further provides reference and comparison for late-developed countries to actively respond to technological competition.

2. Japan-US friction and China-US game under semiconductor strategic competition

2.1 Japan-US trade friction: market quota against Japan

2.1.1 Initial Stage (1970s-1985s): The Rise of Japanese Technology and the US Industrial Crisis

Lower semiconductor trade barriers; In 1983, the United States and Japan had its first semiconductor negotiations, the United States accused the Japanese market of closure and demanded to expand imports of US chips. Japan was forced to promise to "independently restrict exports"; in 1985, the United States passed the "Platform Agreement", forcing the Japanese yen to appreciate and weaken Japan's export competitiveness. However, at the beginning of this trade friction, Japanese companies maintained the competitiveness of the domestic semiconductor industry through continuous technology absorption and cost control [14], and the US market share continued to lose.

2.1.2 Upgrade phase (1986s-1990s): Agreement signing and sanctions upgrade Globalization has further accelerated

The United States positioned semiconductors as the "core field of national security" and launched all-round suppression to promote technological hegemony in the name of "national security". In 1986, the two countries signed the "Japan-US Semiconductor Agreement", and the United States required Japan to open up its market and restrict DRAM export prices. Japan was forced to accept the clause that "foreign semiconductors account for more than 20% of the Japanese market" and corporate profits shrank significantly[15]; in 1987, the United States used the "Toshiba Incident" to launch a precise strike against

Japan, imposed comprehensive sanctions on Toshiba on the grounds that "Toshiba sold precision machine tools to the Soviet Union", and jointly put pressure on Japan's technical cooperation with allies, and the reputation of Japanese semiconductor companies was severely damaged; in 1988, the United States passed the "Comprehensive Trade Act", which listed semiconductors as a "key industry" and imposed 100% tariffs on Japan's US$330 million chips. The signing of the first semiconductor agreement and the heavy blow to the "Toshiba Incident" has led to the rise in costs of Japanese semiconductor companies, the price advantage of DRAM is lost, and the global share has begun to decline [16].

2.1.3 Peak stage (1991s-1996s): Japan's industrial recession and industrial chain reconstruction

After the end of the Cold War, globalization accelerated, the United States dominated the rules of globalization, Japan fell into "lost thirty years", and South Korea took the opportunity to rise into a new semiconductor force. The United States integrated industry, academia and research resources through the SEMATECH alliance, regained the dominance of technology, and returned to the world's first-ranked semiconductor market share in 1993. At this time, Japan's bubble economy burst (1991), corporate R&D investment shrank, and the vertical integration model was difficult to adapt to the trend of Fables (fabs) in the PC era [17]. The second US-Japan Semiconductor Agreement was signed in 1991, further requiring Japan to expand imports of US chips, mandatory increase of US share in the Japanese market to 20%, and impose tariffs; in 1993, the United States regained the first market share, Intel turned to microprocessors, and Japan's global share of semiconductors dropped from 50% in 1988 to 20% in 1993, and further fell to 10% in 2000. South Korea's Samsung surpassed Japan to become the leader in DRAM; in 1996, the US-Japan Semiconductor Agreement was terminated. At this point, Japan's semiconductor industry has basically withdrawn from global competition, and the DRAM field has been replaced by South Korea, and only retains the advantages of segments such as automotive electronics and materials and equipment.

2.2 Sino-US technology game: decoupling of technology from China

2.2.1 Initial friction (2016s-2017s): Technological dependence and sanctions test

With the deepening of globalization and the highly divided semiconductor industry chain, the Trump administration has begun to promote the return of manufacturing. In 2015, China proposed "Made in China 2025" and listed semiconductors as a strategic industry, but technology relies on imports (such as lithography machines, EDA tools, etc.), and the import chips exceed oil, accounting for 70%. The semiconductor industry is highly dependent on imports, with a domestic production rate of less than 20%. In 2016, the import volume of integrated circuits reached US$227 billion, and market demand grew rapidly. The United States is worried that China will achieve technological catching up and launches technology export restrictions to China on the grounds of "national security". March 2016: The US Department of Commerce included ZTE on the "Entity List" for the first time, restricting its acquisition of US technology, and opening the prelude to sanctions; in 2017, China issued the "National Outline for the Development and Promotion of the Development of Integrated Circuit Industry", proposing the goal of domestic substitution, but the core technology is still subject to US equipment and materials.

2.2.2 Comprehensive Confrontation (2018s-2021s): Tariff War and Technology Blockade

At the end of 2019, the new crown epidemic hit the supply chain, and the global chip shortage intensified technological competition. China has proposed a "dual circulation" strategy to increase investment in the semiconductor industry (such as the second phase of the National Big Fund), but the technology gap is still significant. The Trump administration puts pressure on the tariff war, and Biden continues the "small courtyard and high wall" strategy and forms a technical alliance to encircle China [18]. In April 2018, the United States imposed a "7-year ban on sales" on ZTE, forcing it to pay a $1.4 billion fine and reorganize its management ; in October of the same year, sanctions on Jinhua, Fujian, cut off DRAM technology cooperation , China's memory chip autonomous process was frustrated; in May 2019, Huawei was included in the entity list, restricting it from obtaining EDA tools and chip foundry, and TSMC cut off Kirin chip supply; in September 2020, the United States upgraded Huawei's ban, restricting companies using American technology from around the world to produce their foundry, forcing Huawei's mobile phone business to shrink; in December 2020, SMIC was included in the entity list, and the import of equipment below 14nm was blocked, and China's advanced process research and development stagnated; in June 2021, the United States passed the "2021 Innovation and Competition Act" to allocate funds US$52 billion supports local chip manufacturing, and clearly restricts technical cooperation with China. A series of tariff wars and layered technical blockades have led to a rapid increase in China's semiconductor import costs, but at the same time, the domestic substitution process has accelerated, and SMIC has achieved a breakthrough in 14nm process.

2.2.3 Technology Decoupling (2022s-2025s): Supply Chain Cutting and Alliance Encirclement

Regionalization replaces globalization, and East Asia has formed a semiconductor regional cluster of Chinese packaging, Japanese materials, and South Korean storage. China's semiconductor localization rate has increased significantly, reaching 30% in 2022, but key equipment such as lithography machines still rely on imports. The United States promotes the "Chip4 Alliance" (Chip4), jointly builds an anti-China supply chain with Japan, South Korea and Taiwan, and restricts ASML's export of advanced equipment to China. July 2022: The United States prohibits ASML from exporting lithography machines below 14nm to China, and jamming advanced process development; August 2022: The United States issued the Chip Law, prohibiting subsidized enterprises from expanding production capacity below 28nm in China, and TSMC's Nanjing factory was frozen; in January 2023, the United States, Japan and the Netherlands reached a secret agreement to restrict the export of DUV lithography machines to China.

3. Analysis on the difference between Japan-US trade friction and China-US technology game

3.1 Strategic positioning differences: Allied competition and systematic containment

As the core ally of the United States in East Asia, Japan's security and defense are highly dependent on the US-Japan Security Treaty, which fundamentally compresses its policy autonomy space. The signing of the US-Japan Semiconductor Agreement in 1986 is a typical manifestation of this dependence. The United States has made technology disputes pan-secured through the "Toshiba Incident" (1987) and

imposed comprehensive sanctions on Toshiba, but in fact, it has used security issues to suppress technology competitors. This operational logic of "security in economic issues" has created a dimensionality reduction blow to Japan under the framework of allies. The conflict is concentrated in the manufacturing fields such as DRAM and automobiles. Compared with the current Sino-US game, the United States has not systematically blocked Japan's technological development. Japan can still obtain key equipment such as lithography machines (such as the procurement of Nikon lithography machines is not restricted). Companies such as Toshiba and NEC continue to obtain US patent authorization. This relatively moderate competition model has caused Japan to lose its market share, but it can still maintain technical accumulation in materials, equipment and other links. At that time, the global industrial chain showed the characteristics of "center-peripheral" linear division of labor. Japan transferred DRAM production to South Korea and Taiwan through the "geese array model", effectively evading direct sanctions. However, this transfer is essentially a space transfer in the production link, rather than an extension of the dominance of technical standards. Japan has never been able to establish a technical system independent of the United States (such as the JEDEC standard is still led by the United States), resulting in the continued weakening of its industrial foundation. By the time the agreement expired in 1996, Japan's global share of semiconductors had plummeted from 50% to 10%. It could only maintain its advantages in the fields of material such as photoresist and silicon wafers, confirming the fundamental limitation of the development of dependence.

The 2017 National Security Strategy Report of the United States defined China as a "revisionist country" and a "strategic competitor" for the first time, and the 2022 National Security Strategy was upgraded to "the only competitor who intends to reshape the international order and has comprehensive economic-military-technical strength." Under this positioning, the US technology blockade to China has expanded from semiconductors to cutting-edge fields such as AI algorithms, quantum computing, and biotechnology, and has built a "Hague secret" blockade chain: in January 2023, the United States, Japan and the Netherlands reached a secret agreement to completely restrict the export of DUV lithography machines and deposition equipment to China, which has increased the cost of expanding production of China's 28nm mature process by 15%. This three-dimensional encirclement across fields and countries is essentially a geopolitical project to curb China's technological systemic rise [19]. Compared with the trade deficit correction of Japan-US frictions, the United States has implemented a "technology-capital-standard" trinity to China. International organizations such as 3GPP have excluded Huawei's 5G proposals and promoted alternatives such as Open RAN to weaken China's standard voice. This ecological level containment aims to lock China at the edge of global technological innovation networks [20], and its intensity is far greater than that of the technological competition with Japan back then.

3.2 Technology curbs differences: single product pressure and full-chain blockade

As mentioned above, although the United States has a large time span on the trade frictions with the semiconductor industry with Japan and the technological blockade with China, both show obvious similarities and differences. The similarities are that, first, both are initiated by the United States, and both originate from the economic catch-up of later countries, and sanctions are imposed in the name of "national security"; second, the essence of both sanctions is to curb the technological rise of competitors.

However, these two trade frictions have different sanctions dimensions, which are specifically reflected in the four aspects of sanctions targets, legal tools, allied coordination and technical supply cutoff. The most obvious one is the pressure on Japan's single product and the full chain blockade on China. Japan-US trade frictions focus on single products such as DRAM, and the United States has not cut off Japan's technology upgrade path. Although Toshiba was sanctioned, it was still able to purchase Nikon lithography machines and upgrade NAND technology. In the 1990s, Toshiba's global share reached 35%. The main reason is that the United States needs Japan as a backup of the technology supply chain (such as Japan's chip supply during the Gulf War to ensure the needs of the US military), so it retains some of its technical capabilities. On the other hand, the "technology-capital-talent" full-chain blockade was implemented to restrict the export of equipment below 14nm to China, resulting in an increase of SMIC's capital expenditure by 40% in 2025 to transform it into a mature process production line; NSF funds are prohibited from funding scholars who cooperate with Chinese institutions, and the proportion of Sino-US cooperation in the authors of China AI Top Conference papers in 2024 decreased by 62%.

3.3 Differences in response strategies: Japan's passive compromise and China's independent control

In dealing with the regulation of the US semiconductor industry, Japan has a government-led but lacks coordination [21]. Although it promotes technical research through the "Super LSI Project", it compromised with the "Japan-US Semiconductor Agreement" in the face of US pressure and accepted market share restrictions. Foreign chips account for more than 20% of the Japanese market; secondly, technology dependence has not yet been broken, Japanese companies rely too much on US technical standards and have not established an independent technology system, resulting in the subsequent technical route being rigid, and their response in the semiconductor field has always been subject to the rigid constraints of the US-Japan alliance [22]. In January 2025, the Japanese government announced the implementation of export controls on more than ten semiconductor-related items and included many Chinese companies in the "end user list". This move is widely regarded as a continuation of the US technology blockade. However, such policies seriously damage the basis of China-Japan economic and trade cooperation, resulting in a decline in Japan's export of semiconductor equipment to China , and did not substantially improve the country's technological autonomy, but instead aggravated the risk of industrial chain migration. In addition, Japan's monopoly advantage in the field of material such as photoresist was weakened by China's rare earth countermeasures (such as gallium and germanium export controls). In 2025, China's further regulation of tungsten and tellurium materials has led to an increase in the production costs of Japanese semiconductors, forcing companies to turn to high-priced alternative sources, but it is difficult to get rid of their dependence on China in the short term. China accelerates technological research through the "new national system" and targeted investment through the "national big fund" to help mature processes scale.At the same time, lock in the asymmetric competition path, avoid advanced process blockade, focus on third-generation semiconductors (GaN, SiC) and Chiplet packaging technologies, and achieve asymmetric innovation. The DeepSeek-R1 big model has made breakthroughs at low cost training, impacting the global AI chip market, promoting computing power independence, and indirectly weakening the US technological hegemony.

4. The core logic of response strategy differentiation: independent technology iteration and global supply chain reconstruction

4.1 Technology independent iteration: dependency compromise and breakthrough innovation

In the Japan-US semiconductor dispute, although Japan temporarily occupied the DRAM market advantage through technical research such as "Super LSI Project", it has not broken through the US-led technical standard system (such as JEDEC memory standard). The Japan-US Semiconductor Agreement forces Japan to accept market share restrictions, and its technological iteration path is locked into "improved innovation" rather than a breakthrough in the underlying architecture. For example, Japanese companies rely on American EDA tools and lithography machines (such as Nikon equipment), which led to the rigidity of the technology route in the 1990s and was eventually surpassed by South Korea's Samsung. Japan's lessons show that the lack of technological sovereignty will lead to fragile industrial foundations. Although it maintains its advantages in the fields of material such as photoresist and silicon wafers, its core equipment and design tools are still subject to the United States, and eventually fall into a vicious cycle of "technology dependence-industry recession" and loses industrial dominance.

China chose the path of "technology independent iteration + ecological reconstruction", and supported the localization of 14nm processes through a new national system (such as the National Fund), and focused on third-generation semiconductors (GaN, SiC) and Chiplet packaging technology. The proportion of related patents increased to 32% worldwide. Bypassed the blockade of advanced processes and achieved underlying breakthroughs; jointly formulated third-generation semiconductor regional standards under the RCEP framework, weakening the influence of the US Chip4 alliance; the scale of the digital RMB cross-border settlement pilot has increased significantly, and using financial empowerment to evade the US dollar system's clampdown on technology transactions. This path breaks through technological blockade with "asymmetric advantage" and forms a "technology-standard-financial" trinity autonomous ecosystem.

4.2 Global supply chain reconstruction: linear division of labor and camp division

Japan transferred DRAM production to South Korea and Taiwan through the "Geese Array Model", forming a linear division of labor of "American Design-Japanese Materials-Made in East Asia". Although this move eases friction, it has not changed the US control over technology nodes (such as EDA tools and lithography machines). After the Toshiba incident, Japan's semiconductor industry chain moved out faster, but its technical standards were still dependent on the United States, and eventually lost its ecological dominance. This reconstruction is essentially a "technical colonization" under the hegemony system, and Japan becomes the secondary node of the American technology chain, rather than an independent ecological builder. During the Sino-US technological game, camp-based separatism and regional cooperation coexist. First, the technology alliance camp (Chip4+EU), which controls EUV lithography machines (ASML), EDA tools (Synopsys) and other strategies.The second is the East Asian manufacturing cluster. Mainland China focuses on the expansion of production of mature processes above 28nm . Taiwan and South Korea undertake advanced process OEM, forming the "decentralization-recentralization" paradox; the third is China's counter-system, which hedges isolated risks through rare earth control (gallium, germanium export restrictions) and regional cooperation (RCEP). China uses

"regionalization to replace globalization", builds a self-centered supply chain resilience network, breaks the unipolar pattern of US technological hegemony, and reshapes the global power structure with "asymmetric countermeasure + ecological closed loop".

5. Historical mirror of Japan-US trade friction and its inspiration to China

5.1 A historical mirror of Japan-US trade friction

5.1.1 Loss of technological sovereignty leads to industrial recession

In the 1980s, Japan temporarily occupied 50% of the global DRAM market through the "Super LSI Project", but due to excessive reliance on US technical standards (such as JEDEC memory standards) and the mandatory market opening clause of the Japan-US Semiconductor Agreement, it eventually led to the stagnation of technological iteration and the decline of industrial competitiveness to 10% of the global share. The rise of Japan's industry is based on the framework of American technical standards: in the field of memory chips, the technical standards formulated by JEDEC in the United States, the deposition equipment technology authorization of the United States Applied Materials Corporation (AMAT) is dependent on the equipment link, and the design platform of Cadence and Synopsys in the United States is adopted at the EDA tool level. The dependence of this technology system has led to two serious consequences: First, Japanese companies have always been in the position of following technical standards and cannot dominate the formulation of industrial rules; second, key technology upgrades are subject to the US patent pool, and Toshiba's breakthrough in NAND flash memory (the world's first in 1987) has not changed the overall pattern. China needs to avoid dependence development and strengthen the autonomy of underlying technologies, especially in the "bottleneck" links such as lithography machines and EDA tools.

5.1.2 Security dependency compression policy space

As the pillar of the United States East Asia security system, Japan established the security guarantee model of "nuclear protection umbrella + US military stationed in Japan" in the "US Security Treaty" signed in 1951. This strategic dependence is directly transformed into policy constraints in the economic field and is forced to accept pressure from the US economy, including market share restrictions and industrial chain migration. In order to meet the requirements of the United States, Japan implemented a "dual-track strategy": on the one hand, it transferred DRAM production capacity to South Korea, and on the other hand, it retained the production of local materials and equipment. This "demanufacturing" strategy directly led to the triple crisis of technological hollowing out, standard aphorism and profit chain breakage. Currently, the United States is promoting the "Chip4 Alliance" (Chip4) to unite Japan and the Netherlands to block technology from China, and China needs to be vigilant against similar security dependence traps. China needs to build an independent technology ecosystem, reduce its dependence on the US technology alliance, and strengthen its countermeasures. Only through systematic technological ecological reconstruction can we break the dependence dilemma of "safety technology exchange" and achieve true strategic autonomy in the semiconductor field.

5.1.3 Fragile exposure under global division of labor

The "geese array model" implemented by Japan in the 1980s was essentially a transfer of technology dependence under the vertical division of labor system. Through the "Platform Agreement", Japan forces the industry to move out, although it accounts for 50% of the world's manufacturing links such as DRAM., but it has never broken through the technical standard system dominated by the United States. Japan transferred production capacity to South Korea and Taiwan through the "Gean Array Model", but did not establish independent technical standards, and eventually lost its voice. This "responsive rise" has led to the global share of Japan's semiconductors plummeting from 49% in 1990 to 10% in 2020, retaining only the advantages of materials such as photoresist, which verifies that the globalization model that efficiency is preferred but lacks technological sovereignty will eventually be subject to others. The decline of Japan's "Gay Formation Model" and the dilemma of "friendly strait outsourcing" in the United States reveal that technological dependence will eventually become a bargaining chip for geopolitical games. Only by building an independent standard system (such as the RISC-V architecture) can we break the cycle of "chasing and suppressing"; camped separatism intensifies global systemic risks, and open regional cooperation (such as the "Belt and Road" technical standard output) is the right solution to the supply chain crisis.

5.2 Inspiration to China

5.2.1 Construction of industrial chain resilience: regional cooperation and precise countermeasures

Build mature process (28nm and above) wafer factories in Malaysia and Vietnam, form a division of labor for "China Design-ASEAN Manufacturing", deepen cooperation with ASEAN through RCEP, and form a new goose formation model of "China R&D-Southeast Asia Manufacturing-Global Market". To promote the output of the "Belt and Road" technical standards, Huawei has built a 5G-A network in Saudi Arabia (rate up to 10Gbps). China-led 5G millimeter wave standard was adopted by the International Telecommunications Union (ITU), breaking Qualcomm's monopoly and promoting the construction of regional supply chain networks. Accurate countermeasures against key resources such as rare earths. China's rare earth processing technology accounts for 90% of the world. Export controls on gallium and germanium directly impact the US military and semiconductor industries, forcing the United States to restart local rare earth production. In 2024, China's lithium-ion battery shipments reached 1214.6GWh, a year-on-year increase of 36.9%, 2.6 percentage points higher than in 2023, and the overall shipment of lithium-ion batteries in the world reached 78.6%. CATL ensures the security of the new energy industry chain through "lithium mine shareholding + recycling technology", and needs to actively establish strategic resource reserves such as graphite and lithium mines to ensure the safety of the industrial chain.

5.2.2 Policy combination: short-term countermeasures and long-term layout

Precise strikes such as rare earth controls can force the United States to return to the negotiating table, while RCEP regional cooperation and open source ecological construction lay the foundation for long-term technological autonomy. Transfer tax incentives from equipment procurement to chip

application, and provide 15% income tax exemption to enterprises that purchase domestic chips to accelerate the commercialization of technology; establish a semiconductor supply chain risk monitoring platform, track key equipment and material inventory in real time (such as photoresist reserves, ASML equipment maintenance cycle), and warn of supply interruption risks 6 months in advance; long-term layout of the ten-year basic research plan, establish a special fund for basic semiconductor research, focusing on cutting-edge fields such as EUV light sources and quantum chips;implement the "Ten Thousand Chip Engineers Plan" to target the cultivation of talents in the fields of lithography machine technology, EDA algorithms, etc.

5.2.3 Technology breakthrough: Independent innovation and breakthrough "bottleneck"

Through the "posting and taking the lead" mechanism, we will accelerate breakthroughs in core technologies such as EUV lithography machines and EDA tools, focus on the "bottleneck" field, activate innovation potential, and realize technological iteration with a phased strategy; continue to invest in key areas, and overcome remaining "blocking points" such as EUV lithography machines and EDA tools. Adhere to the dual-wheel drive of "independent innovation + open cooperation" to avoid working behind closed doors, and at the same time build countermeasures based on market size, resource control and technological iteration, and ultimately achieve a breakthrough in the Sino-US technological game. In the short term, we will stabilize the basic market with scale and precise countermeasures (rare earth controls); in the medium term, we will break through key links such as lithography machines and EDA tools to build a regional technical standard alliance; in the long term, we will overtake through disruptive technologies such as quantum chips and photon computing, dominate the new global semiconductor order, and build a new paradigm of the semiconductor industry.

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