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SEMICONDUCTOR DEPENDENCE AS CATALYST FOR THE PASSAGE OF JAPAN'S 2022 ECONOMIC SECURITY PROMOTION ACT

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ABSTRACT
This study examines how Japan's semiconductor supply chain vulnerabilities exposed structural weaknesses in its traditional security strategy and catalyzed the 2022 Economic Security Promotion Act (ESPA). Using a qualitative analytical-descriptive approach, the research analyzes government reports, academic literature, and economic data to trace the evolution of Japan's techno-nationalist orientation, which is defined as the pursuit of national security and autonomy through technological capability. The findings demonstrate that Japan's deep reliance on foreign semiconductors, particularly advanced chips from Taiwan and rare earth elements from China, created strategic exposures that global shocks such as the COVID-19 pandemic and intensifying U.S.–China rivalry made increasingly untenable. These disruptions revealed the limits of Japan's postwar model, which relied on market openness and U.S. security guarantees while outsourcing critical technological functions abroad. In response, Japan shifted toward a security-oriented techno-nationalism in which the state expands its role in safeguarding innovation ecosystems, reshoring production, and institutionalizing resilience. ESPA embodies this shift by securing critical supply chains, regulating strategic infrastructure, promoting next-generation technologies, and protecting sensitive intellectual property. Ultimately, Japan's semiconductor crisis accelerated a paradigmatic transformation by embedding economic security, technological sovereignty, and techno-nationalist principles at the core of national security strategy.

Keywords: Japan; Semiconductors; Economic Security; Techno-Nationalism

ABSTRAK
Studi ini menganalisis bagaimana kerentanan Jepang dalam rantai pasokan semikonduktor mengungkap kelemahan struktural dalam strategi keamanannya serta mendorong lahirnya Undang-Undang Promosi Keamanan Ekonomi (ESPA) 2022. Dengan menggunakan pendekatan kualitatif analitis-deskriptif, penelitian menelaah laporan pemerintah, literatur akademik, dan data ekonomi untuk memetakan evolusi orientasi tekno-nasionalis Jepang, yakni pandangan bahwa kemandirian dan keunggulan teknologi merupakan fondasi utama keamanan negara. Temuan menunjukkan bahwa ketergantungan Jepang pada chip canggih Taiwan dan mineral tanah jarang dari Tiongkok menciptakan kerentanan strategis yang semakin nyata akibat pandemi COVID-19 dan rivalitas teknologi AS–Tiongkok. Gangguan tersebut menyoroti keterbatasan model keamanan pascaperang Jepang yang mengandalkan keterbukaan ekonomi dan payung pertahanan AS sembari menempatkan fungsi teknologi kritis di luar negeri. Sebagai respons, Jepang bergerak menuju tekno-nasionalisme berorientasi keamanan, dengan memperluas peran negara dalam memperkuat ekosistem inovasi, meningkatkan produksi domestik, serta membangun ketahanan rantai pasokan. ESPA menginstitusionalisasi pergeseran ini melalui pengamanan produk strategis, regulasi infrastruktur penting, dukungan riset teknologi kritis, serta perlindungan kekayaan intelektual sensitif. Pada akhirnya, krisis semikonduktor mempercepat transformasi kebijakan Jepang, menempatkan keamanan ekonomi, kedaulatan teknologi, dan prinsip-prinsip tekno-nasionalisme sebagai inti strategi keamanannya.

Kata kunci: Jepang; Semikonduktor; Keamanan Ekonomi; Tekno-Nasionalisme

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INTRODUCTION

Semiconductors are vital to modern technology, with a global market valued at $627 billion in 2024, projected to reach $1 trillion by 2030 (Kamakura, 2022; Ou et al., 2024; Kusters et al., 2025). This growth relies on a complex, interdependent global production system that no single nation can fully control (Ou et al., 2024; Sacks & Huang, 2024). However, this interdependence creates vulnerabilities to market fluctuations and foreign coercion, especially for trade-dependent economies like Japan (Nishimura, 2024; Park, 2023).

Japan's economy is highly globalized, with trade averaging 37 percent of its GDP between 2014 and 2024 (World Bank, 2025). China is its largest trading partner, accounting for 20.3 percent (¥43.8 trillion) of Japan's total trade in 2022, while Taiwan is fourth at 5.4 percent (¥12.5 trillion) (MOFA, 2024). Japan's historical dominance in semiconductors, holding 50 percent of the market by 1988 (Kamakura, 2022), eroded as rivals adapted. This led Japan to rely on foreign chipmakers from China and Taiwan for domestic demand, though it maintained a significant share in manufacturing equipment, fostering mutual interdependence.

This very interdependence has introduced significant vulnerabilities due to international political events. Japan supplies China with high-tech manufacturing equipment but depends on China for rare earth minerals and Taiwan for advanced chips. The COVID-19 pandemic exposed these fragile supply chains, causing severe chip shortages. Simultaneously, geopolitical tensions, including China's tightening export controls and the U.S.-China technology rivalry, raised fears of economic coercion and supply disruptions in Japan. Taiwan's precarious geopolitical situation further exacerbates these risks, as any instability in the Taiwan Strait could severely jeopardize Japan's access to essential chips.

Japan views economic power as crucial to national strength and security (METI, 2024; Goto et al., 2023). Given China's authoritarian stance and efforts to reshape the international order, Japan recognizes the necessity of aligning with like-minded nations to uphold a rules-based global economic system (METI, 2024). This marks a significant shift in Japanese security policy.

For resource-scarce Japan, economic security is as vital for maintaining its sovereignty as military security. While global economic interdependence fosters cooperation, it also introduces vulnerabilities through asymmetrical power dynamics and the potential for "weaponization" (King, 2018). Therefore, economic security is a critical aspect of policy, focusing on promoting domestic industrial capabilities, safeguarding critical technologies, and building resilient supply chains through international alliances to reduce reliance on potentially hostile states.

Historically, Japan's policy prioritized domestic growth, with the U.S. alliance handling security and economic resilience consolidating stability (Samuels, 1994). This emphasized the role of its massive manufacturing industry. Samuels (1994) highlights that Japan's pursuit of autonomy through technological innovation aligns with Techno-Nationalism, the concept that technological self-sufficiency, achieved through the state and individuals' dedication to advancing innovation, is the foundation of security.

Japan views economic power as critical to national strength and security (METI, 2024; Goto et al., 2023). This necessitates a policy shift, driven by the need to uphold a rules-based global system against states like China, which seeks to reshape the international order (METI, 2024). For resource-scarce Japan, economic security is paramount for sovereignty, especially as asymmetrical power dynamics allow the potential "weaponization" of economic interdependence (King, 2018).

Historically, Japan's security policy has always leaned toward Techno-Nationalism (Samuels, 1994), which is the pursuit of security through technological self-sufficiency. This is achieved via a strategic, multi-stage process: first, indigenization by acquiring foreign technology through imports and licensing; second, diffusion by spreading these capabilities widely across industries; and finally, nurturing through developing indigenous innovation to eventually own the technology. This process is a hybrid phase where the goal of technological sovereignty coexists paradoxically with initial reliance on foreign technologies (Samuels, 1994).

Policymakers ultimately recognized that a purely domestic approach was insufficient as highlighted by Techno-Nationalism. This led to the formal integration of economic security into national strategy, culminating in the 2022 Economic Security Promotion Act (ESPA).

ESPA institutionalized measures to safeguard critical supply chains, protect sensitive technologies, and foster strategic cooperation with allies. Breaking from its past domestic-only focus, Japan now prioritizes collaboration with like-minded states to build resilient supply chains. This strategy involves active investments in essential high-tech industries, particularly semiconductors, to ensure technological superiority and enhance Japan's economic power. ESPA's core aim is to prevent economic activities that could compromise national security by ensuring stable supply of critical products, protecting infrastructure, supporting critical technology development, and safeguarding intellectual property (Koyu et al., 2023). It expands state control into the private sector, especially regarding critical and emerging technologies (Nishimura, 2024).

Prior research on this topic, like Kamakura (2022) only evaluated Japan's semiconductor industry in face of its attempts on revitalizing the industry without detailing the reasons such measures were implemented. Meanwhile, Park (2023) evaluates not only Japan's semiconductor industry, but also the shift in techno-nationalism in Japan's economic security policy, but it is limited as it only describes the shifts broadly without explaining too much into depth why such a shift happened. As such, this study specifically analyzes how Japan's experience with global interdependence and crisis-driven shortages catalyzed the 2022 Economic Security Promotion Act (ESPA).

It offers a holistic perspective, connecting Japan's past doctrines with modern policies and highlighting the interplay between economic resilience, geopolitical events, and national security. The research explores vulnerabilities in Japan's semiconductor supply chains, where Japan supplies manufacturing equipment but depends on China for rare earths and Taiwan for advanced chips. The COVID-19 pandemic and escalating geopolitical tensions, including China's export controls and Taiwan's precarious situation, exposed how economic interdependence creates strategic vulnerabilities. Historically, Japan's economic policy prioritized domestic growth and relied on the U.S. alliance for security. However, these supply chain disruptions forced a reevaluation toward integrating economic security into national security. This pivotal shift culminated in the ESPA, which institutionalizes measures to safeguard critical supply chains and foster strategic cooperation with allies. Against this backdrop, this research asks: How did Japan's vulnerabilities in semiconductor supply chains reveal the limitations of its security strategy and catalyze the passage of the 2022 Economic Security Promotion Act (ESPA)?

RESEARCH METHOD

This research employs an analytical and descriptive methodology to examine the characteristics of Japan's semiconductor industry. It investigates how global political events compelled the government to reshape its economic security policies, addressing semiconductor vulnerabilities and leading to the 2022 Economic Security Promotion Act (ESPA). Adopting a qualitative approach, this study explores the meanings and interpretations surrounding these issues. Data collection will primarily utilize secondary sources, encompassing peer-reviewed articles, academic books, and official government reports. Specifically, this research will draw reports from Japan's Ministry of Economy, Trade, and Industry (METI), Ministry of Foreign Affairs (MOFA), and Cabinet Secretariat, to understand governmental perspectives and policy frameworks. To provide a broader economic context, the analysis will also incorporate economic databases from diverse sources, such as the World Bank, OEC World, UN Comtrade, and Taiwan's Ministry of Finance. However, there will be limitations in this approach as it relies on diverse sources that may affect the reliability of conclusions.

RESULT AND DISCUSSION

The State of Japan's Semiconductor Industry

Once a global leader, Japan's semiconductor industry peaked at 50.3 percent of global manufacturing in 1988 (Kamakura, 2022). This growth was fueled by post-war economic expansion, robust domestic demand for consumer electronics, and strategic collaborations with U.S. firms to indigenize integrated circuit (IC) technologies. By 1976, the government recognized semiconductors as a strategic priority, launching significant public-private initiatives.

Highlighting the importance of research and development (R&D), Japan increased spending in semiconductor manufacturing equipment from 2 percent to 26 percent (Tomoshige, 2022). A pivotal initiative was the Super LSI Technology Research Association, a $300 million government-funded consortium of major computer firms like Fujitsu, Hitachi, NEC, Mitsubishi Electric, NTT, and Toshiba (Tomoshige, 2022). This fostered public-private collaboration, leading to advanced chip technologies, preventing intellectual property loss, and ensuring high-quality designs and processes.

Japan's industrial policy also contributed to semiconductor companies gaining global market share through public-private initiatives. MITI (Ministry of International Trade and Industry) played a key role by actively directing investments and providing support to develop manufacturing businesses, while at the same time restricting foreign competition through government preference to domestic businesses. Meanwhile, businesses collaborated to align with national interests, influencing policy through influential groups like zaikai and gyokai, individuals representing capitalist viewpoints and industrial association groups respectively (Park, 2023). Government policies were supported by Japan's business model of "all-Japan" doctrine, where every part of production is domestic, fostering a "Buy Japan" mentality among consumers and manufacturers that made Japanese hesitant on foreign-made chips (O'Laughlin, 2022). This strong domestic demand and integrated production enabled Japan to flood the international market with high-quality, but inexpensive chips.

However, Japan's rapid ascent alarmed foreign competitors, especially the United States. American chipmakers, struggling against Japan's quality and pace, withdrew from the DRAM memory chip market by 1983, with Japan monopolizing 80 percent by 1987 (O'Laughlin, 2022). Accusations of predatory practices and "dumping" by Japan led to the 1986 Semiconductor Agreement. This accord allowed the U.S. government to set minimum market prices and mandated a 20 percent foreign share in Japan's market (Tomoshige, 2022; Armstrong et al., 2025). While intended to halt price wars, it inadvertently allowed foreign companies to improve and adapt, eroding Japan's competitiveness (Tomoshige, 2022; O'Laughlin, 2022).

Japan's semiconductor market share plummeted to 20 percent in the 1990s due to economic stagnation, a shift from consumer electronics to personal computers, and the flaws of its vertically-integrated device manufacturer (IDM) model (Tomoshige, 2022; Taipei Representative Office in Singapore, 2024). Japanese producers, often divisions of large conglomerates, struggled with the immense capital investment needed for their all-encompassing operations (IOG, 2025). Their failure to specialize resulted in higher costs, longer production times, and stifled R&D, leading to offshoring production to access advanced semiconductors and be closer to customers amidst rapid technological advancements (Taipei Representative Office in Singapore, 2024; Armstrong et al., 2025; Kamakura, 2022).

Attempts to revive the industry in the 2000s, such as the $300 million Hinomaru Foundry aimed at shifting to a fabless model involving 11 companies, largely failed (Tomoshige, 2022). This industrial restructuring could not unify talent and production in a capital-intensive market. Stagnant domestic digital product sales, core to Japanese businesses demand, made companies unwilling to divest from high-revenue departments, undermining specialization efforts.

Japan's semiconductor industry is a shadow of its former self, depreciating to 10 percent in 2019 (Kamakura, 2022). However, Japan remains a significant player in the specialized supply chain. In 2021, Japan had 146 semiconductor plants, the most globally. It holds strong market shares in materials (56 percent) and manufacturing equipment (32 percent). For instance, Tokyo Electron dominates EUV lithography developers (100 percent), while Shin-Etsu Chemical and SUMCO hold a 30 percent share of the silicon wafer market (Kamakura, 2022). The high cost of R&D for materials means these functions largely remain in Japan.

Nevertheless, challenges persist. Around 110 of Japan's 146 factories were built before the 1990s, producing lower-end legacy semiconductors (28-nanometer nodes and above) (METI, 2024; Kamakura, 2022). Its integrated circuit (IC) production for leading-edge chips (2.459 million wafers/month) lags slightly behind China's (2.575 million wafers/month) (Taipei Representative Office, 2024). Consequently, Japan is 10 years behind the global trend in rapid generational cycles, leading to its domestic semiconductor demand being supplied overseas. This exposes Japan's semiconductor industry to significant economic vulnerability.

The Active Threat of Chinese Semiconductor Trade

China is Japan's largest trading partner, accounting for 20.3 percent ($43.8 trillion) of its total trade in 2022 (MOFA, 2024), driven by substantial trade in technology-sensitive machinery, especially semiconductors. Japan profits significantly as a major supplier of semiconductor manufacturing equipment, dominating a $110 billion market (Kamakura, 2022).

This deep economic tie is further evidenced by China being the third-largest recipient of Japanese direct investments (¥1 billion) and hosting 31,000 Japanese companies in 2022 (MOFA, 2024). Moreover, 92.8 percent of Japanese manufacturers in China plan no production site review, and 80 percent benefit from indirect exports from China, which is also their largest foreign procurement source and sales destination (Kamakura, 2022; CIPE, 2024; METI, 2024).

Fueling this dynamic, China's "Made in China 2025" strategy, aiming for semiconductor self-sufficiency, boosts demand for Japan's high-tech manufacturing equipment. This initiative has spurred Chinese innovation in logic chips and IP development. China's global semiconductor value-added share quadrupled from 8 percent to 31 percent between 2001 and 2016, and its global semiconductor sales share reached 7 percent in 2023 (Ezell, 2024), underscoring the industry's critical importance to China.

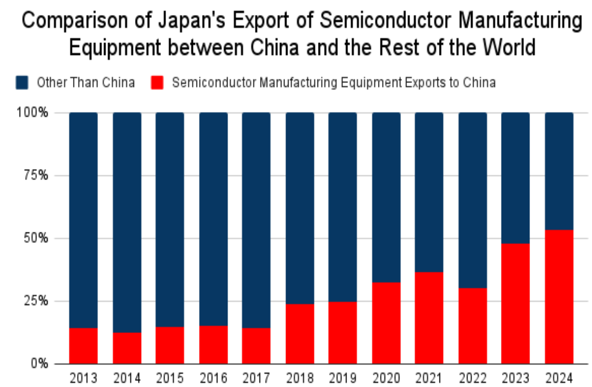

Figure 1. Comparison of Japan’s Exports of Semiconductor Manufacturing Equipment Between China and the rest of the world

Japan's semiconductor manufacturing equipment exports to China dramatically rose from $867 million in 2013 to $5 billion in 2022, further increasing to $10 billion (53 percent of total) by 2024 despite economic security regulations (UN Comtrade, 2025). This surge significantly benefits Japanese firms like Tokyo Electron and Screen Holdings, with 44 percent and 43 percent of their revenue, respectively, coming from China, underscoring China's crucial role in sustaining Japan's manufacturing equipment industry, now surpassing its domestic demand of $8.35 billion (Taipei Representative Office in Singapore, 2024).

This trade relationship is mutually beneficial, particularly concerning rare earth elements (REEs). Japan's growing demand for REEs, driven by advanced semiconductor and automotive electrification needs, increasingly relies on China, which dominates the global REE market with 70 percent of production, 90 percent of processing, and 44 million metric tons of reserves out of the global value of 90 million metric tons (Armstrong et al., 2025; U.S. Geological Survey, 2025). China's strategic policies, leveraging low labor costs and relaxed environmental regulations, have made its REEs more affordable, reinforcing Japan's dependence.

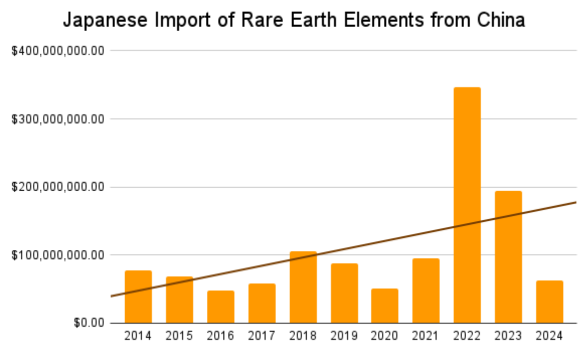

Figure 2. Trade Value of Japanese Imports of Rare Earth Minerals from China

Japan's demand for Chinese Rare Earth Elements (REEs) surged 24 percent from 2014 to 2022, reaching $345 million. However, China's 2023 export restrictions on extraction technology drastically cut Japanese imports by 67 percent to $62 million in 2024 (UN Comtrade, 2025; Baskaran, 2024). This severe impact is magnified because nearly 60 percent of Japan's REE supply comes from China, leading to a 30 percent price hike for gallium (Gill, 2025). Consequently, Japan is actively seeking alternative REE sources, such as deep-sea mud, and stockpiling resources, as evidenced by a 263 percent demand spike in 2022 post-COVID-19 (Pereira, 2023). However, these long-term projects mean REE dependence remains a persistent issue

China's assertive actions, leveraging its dominant position in rare earth elements (REEs) and Japan's reliance on semiconductor manufacturing equipment profits, pose a significant threat to Japan's economic security and semiconductor industry. The 2010 halt of Chinese REE shipments over territorial disputes, which sent prices soaring and impacted Japanese industries exemplifies this (Foss & Koelsch, 2022).

This vulnerability worsened as Japan aligned with the U.S. in their rivalry against China, imposing joint export controls to limit China's technological competitiveness and prevent economic leverage. Japan's restrictions, like those in July 2023 on 23 types of semiconductor manufacturing equipment and an additional 21 types in April 2024, including EUV lithography where Japan holds overwhelming market share, aim to curb China's semiconductor competitiveness (Kelly & Uranaka, 2023; Kyodo News, 2023; Taipei Representative Office in Singapore, 2024; Armstrong et al., 2025). Consequently, Japanese semiconductor-related businesses, like Tokyo Electron (which holds 100 percent of EUV lithography shares), saw their stock fall 1.9 percent after export restriction announcements (Leonard et al., 2024). Other companies, such as Toyota, expressed concern to Chinese officials over potential retaliation, fearing a threat to Japan's industrial base (Leonard et al., 2024; Gill, 2025). This highlights China's willingness to use economic leverage and the consequences that Japanese companies can feel because of the rivalry.

These actions successfully curbed China's technological competitiveness. As of 2021, China accounts for only 12 percent of global semiconductor production, achieving just 30 percent of its planned 70 percent self-sufficiency, and remains heavily reliant on advanced chips from Taiwan and other nations (Ezell, 2024). This significant technological gap drives Beijing's strategic focus on Taiwan's dominant cutting-edge chip industry, intensifying regional security risks and, consequently, directly threatening Japan's semiconductor supply chain, amplified by their reliance on Taiwan's manufacturing.

The Passive Threat of Japanese Dependence on Taiwan's Advance Semiconductors

Taiwan is a crucial partner in Japan's semiconductor-dependent economy, and its importance rivals China's. As Japan's fourth-largest trading partner, Taiwan received $86 billion (5.4 percent) of Japan's total trade in 2022. Japan, in turn, relies heavily on Taiwan, which is its second-largest source of imports after China, totaling $54.6 billion (14.7 percent). Despite being behind China in overall trade volume, Taiwan remains a critical actor in Japan's manufacturing sector.

Taiwan is crucial for Japan's advanced semiconductor chips, producing 60 percent of all semiconductors globally and 90 percent of leading-edge chips. Its companies, like TSMC, control over 50 percent of the global foundry market and make nearly 90 percent of the most advanced (sub-10-nanometer) chips. Taiwan also produces most of the world's 28/45-nanometer chips (50 percent) and above 45-nanometer chips (30 percent). This makes Taiwan's economy highly dependent on semiconductors, contributing $284 billion (64 percent) in 2022, with $172 billion from integrated circuits. Due to this strong production, Taiwan imports less semiconductor manufacturing equipment and integrated circuits than China.

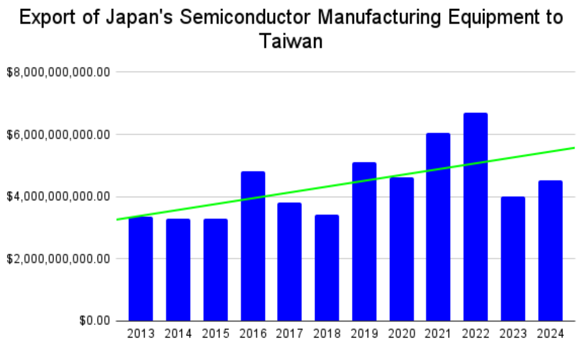

Figure 3. Export of Japan's Semiconductor Manufacturing Equipment to Taiwan

Taiwan is a significant market for Japan's semiconductor manufacturing equipment, peaking at $6 billion in 2022 and growing at 3 percent annually through 2024 (Ministry of Finance R.O.C., 2025). While Taiwan received over 50 percent of Japan's equipment exports in 2013, this share has since declined due to China's self-sufficiency efforts, though Taiwan remains a major recipient (UN Comtrade, 2025). Geopolitical concerns have caused turbulence in these imports, particularly in 2022-2023 due to tightening export controls that created supply chain bottlenecks and increasing great power tensions led Japan to diversify exports.

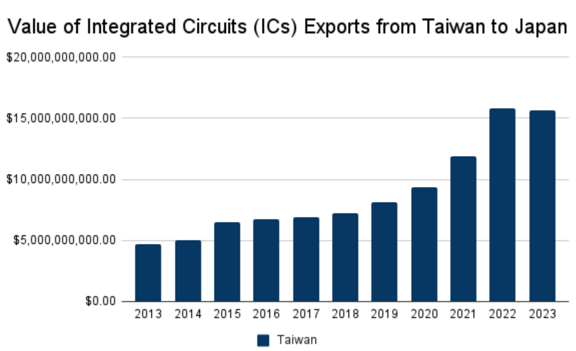

Figure 4. Value of Integrated Circuits (ICs) Imported from Japan to Taiwan

Japan's IC imports from Taiwan surged from $4 billion to $15 billion (30 percent to 60 percent of Taiwan's total IC exports) over the past decade, reflecting Japan's manufacturing, especially automotive, dependence on Taiwan's advanced chips (Ministry of Finance R.O.C., 2025; AMRO, 2024). However, with increasing threats to Taiwan from China, Japan is diversifying. IC imports from Thailand, for instance, jumped from $481 million in 2020 to $1 billion in 2023 (UN Comtrade, 2025; OEC World, 2025), evidenced by a $100 million drop in Taiwan's IC exports to Japan in 2023 (Ministry of Finance R.O.C., 2025).

Taiwan's crucial role in the global semiconductor supply chain is a strategic asset, yet a vulnerability, for Japan. The COVID-19 pandemic exposed critical supply chain weaknesses, while China's increasing aggression toward Taiwan adds to the risk. Taiwan's "silicon shield," or national defense through its dominance in advanced chip production, deters military action by making conflict economically devastating for major powers (Sacks, 2023). However, as China's self-sufficiency goals fall short, the threat of a rapid Chinese seizure in their attempts to take over Taiwan's capabilities can lead it to become a "silicon trap." Global efforts to diversify semiconductor supply chains highlight both Taiwan's indispensability and the inherent risks of this dependence. Consequently, while Taiwan's "silicon shield" offers deterrence, it also creates strategic regional security risks, forcing Japan to adapt its security stance due to China's direct threat and Taiwan's passively critical position.

The Evolution of Japan's Security Posture in the Semiconductor Era

Japan's semiconductor industry faces a critical dual threat: active coercion from China and passive disruption from reliance on Taiwanese chips, exposing inherent limitations in its traditional economic security policy.

Historically, Japan's security strategy, rooted in the postwar Yoshida Doctrine, prioritized economic strength and avoided international political conflicts (Samuels, 1994). Influenced by its pacifist constitution, this doctrine blurred military and economic security, championing economic self-sufficiency and technological innovation as keys to strategic autonomy and national prosperity (Hoshiro, 2022; Samuels, 1994). Japan adopted a techno-nationalist framework, championing state-business cooperation to foster global competitiveness in high-tech industries (Park, 2023). Under this doctrine, Japan minimized military spending (under one percent of GDP) by relying on U.S. protection, channeling resources into economic and technological innovation to meet self-sufficiency goals (Park, 2023; Hoshiro, 2022). While this approach secured peace and prosperity through economic power, its export-oriented nature ultimately created Japan's current trade dependency, contributing 46 percent ($1.9 trillion) of Japan's 2022 GDP (World Bank, 2025). This directly shows how Japan's export-oriented industries rely on foreign sources, linking semiconductor vulnerabilities to industrial growth.

Since China's 2010 rare earth export ban and amidst escalating U.S.-China rivalry, Japan has grown acutely aware of its economic security vulnerabilities and fears China's coercive actions (CIPE, 2024). Now viewing semiconductors as strategic assets, Japan faces the complex task of aligning with U.S. efforts to curb China's technological ambitions while minimizing economic disruption from its largest trading partner (METI, 2024). Japan's general policy language, notably avoiding direct mention of China, suggests a recognized dependence that could severely impact its economic resilience in a crisis. These structural vulnerabilities and concentrated supply chains were starkly exposed by the COVID-19 pandemic, intensifying Japan's drive to overhaul its economic security strategy.

Japan's perspective shifted dramatically with the COVID-19 pandemic, as its manufacturing sector, particularly the automotive industry, faced severe disruptions. This sector accounts for 3 percent of Japan's total GDP and about 24 percent of its manufacturing GDP (ITA, 2024). The automotive industry's reliance on semiconductors is rapidly increasing, with global sales growing from $29.2 billion in 2015 to $42 billion in 2019, driven by electrification and modern car models (PR News Wire, 2017; PWC, 2024). Despite Japan's relatively low overall semiconductor market share, it held over 28 percent of automotive semiconductor sales in 2019, making this dependency crucial for its industrial competitiveness.

Japan's position worsened with the pandemic. Lockdowns led to a collapse in semiconductor demand, and fires at Japanese plants (AKM and Renesas) further disrupted production (Frieske & Stieler, 2022). The core of the shortage stemmed from the market's structure: automotive chips constituted only 10.6 percent ($66 billion) of production in 2020, while communications and data technology made up 65 percent ($393 billion) (Frieske & Stieler, 2022). When automotive chip orders were canceled during initial lockdowns, manufacturers shifted to personal electronics to meet surging demand from remote work (SEMI, 2020; Frieske & Stieler, 2022). Consequently, the unexpected rebound in automotive demand strained the globally interconnected production process, creating severe bottlenecks. Japan's automotive industry bore the brunt, with major automakers like Nissan and Toyota cutting or suspending operations (Paukert, 2020; Reuters, 2020; Kyodo News, 2020). When demand surged, Japanese carmakers struggled to recover due to their heavy reliance on Chinese automotive parts (45 percent), which also faced bottlenecks (Goto et al., 2023).

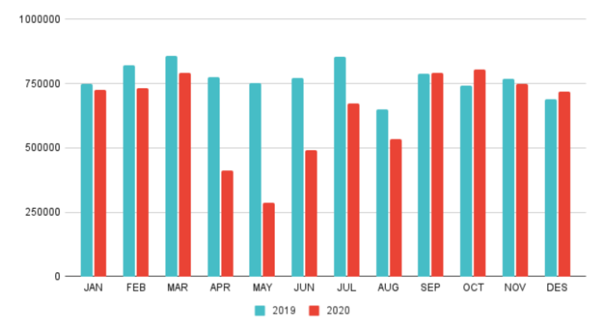

Figure 5. Comparison of Passenger Car Production in Japan Between 2019 and 2020

In 2020, Japanese automakers experienced a sharp 16.3 percent decline in passenger car production compared to the previous year, with April and May seeing particularly severe drops of 46.7 percent and 61.8 percent respectively (Marklines, 2025). Automakers attributed these significant reductions to the negative impacts of COVID-19 (68.8 percent), including diverted workers, decreased sales (72.3 percent), and restricted product movement (45.9 percent).

The COVID-19 crisis revealed systemic vulnerabilities: interconnected, geographically concentrated manufacturing networks and just-in-time inventory models proved fragile, highlighting the risks of over-reliance on a few suppliers. This underscored the urgent need for diversified, resilient supply chains for critical technologies. Post-COVID-19 geopolitical rivalries, with China consolidating economic security and intensifying ambitions for Taiwan's semiconductor ecosystem, and the U.S. countering Chinese technological advancement, further fueled instability (Armstrong et al., 2025; Wu, 2024). These dynamics prompted nations like Taiwan ("silicon shield") and Japan (diversified collaborations with TSMC) to bolster economic security. However, rising tensions around Taiwan remain problematic: a one-month suspension of Taiwan's semiconductor production could cost the global GDP $67.1 billion, escalating to $800 billion over a year (Nogimori, 2021). A two-month disruption of 80 percent of China's imports to Japan could reduce Japan's production machinery value-added by over ¥3 trillion (Goto et al., 2023).

These developments starkly reminded Japan of its vulnerability due to proximity to Taiwan and reliance on its semiconductors. Consequently, Japan pivoted to a more assertive economic security policy, increasing domestic chip production, diversifying supply chains, and forming strategic alliances. This aims to mitigate risks and ensure resilience in a volatile geopolitical order, exposing limitations in its traditional security policy (Hoshiro, 2022; Samuels, 1994). Its export-oriented nature, once a strength, became a liability in an era of weaponized interdependence.

This reality prompted a fundamental policy shift. In 2020, Japan’s ruling-Liberal Democratic Party (LDP) emphasized the importance of economic security in ensuring Japan’s independence. Their recommendations would later be implemented into government action, with then-Prime Minister Fumio Kishida emphasizing building a "scientific and technological nation" for sustainable growth and an autonomous economic structure (Shiraishi, 2024). He then positioned economic security as another critical factor, focusing on securing strategic goods, preventing technology outflows, and building resilient supply chains. Japan's 2022 National Security Strategy (NSS) formally broadened security to include economic sectors, acknowledging that over-reliance could lead to coercion. This new framework pursues "strategic autonomy" and "strategic indispensability" by leading in crucial global technologies (Shiraishi, 2024).

Ultimately, Japan's security policy has fundamentally shifted from cautious non-intervention to a proactive, security-oriented framework. This recognizes that economic factors and technological dependencies are now inseparable from national security (Park, 2023; Shiraishi, 2024). By redefining economic security to safeguard strategic industries and technologies, Japan aims to reduce external coercion and enhance its autonomy. This evolution reflects a broader techno-nationalist approach, protecting and advancing Japan's technological capabilities and global competitiveness (Park, 2023). Japan has moved from domestic economic self-sufficiency to strategic autonomy and indispensability in critical sectors like semiconductors, driven by new geopolitical realities.

Japan’s Strategic Response for the Semiconductor Industry

In 2021, Japan's METI (Ministry of Economy, Trade, and Industry) launched the "Strategy for Semiconductors and the Digital Industry," later evolving into the "Basic Semiconductor Revitalization Plan." This three-phase approach aims to enhance IoT production, achieve next-generation semiconductor technology through U.S.-Japan collaboration, and foster future R&D (METI, 2024). By July 2024, the strategy's goal is to double Japan's global semiconductor market share to $720 billion by 2030, reducing economic vulnerabilities from foreign dependence. This strategy aligns with Japan's broader economic security goals: reshoring manufacturing and building a resilient supply chain to ensure its indispensable position.

Japan's manufacturing industry, especially automotive, heavily relies on mature-node semiconductor chips, making chip reshoring a top priority. The initial step in this process focuses on establishing basic mature-node chip production. To achieve this, Japan successfully attracted foreign investment, notably from Taiwan Semiconductor Manufacturing Company (TSMC), to partner with major domestic firms like Sony. This collaboration led to the JASM Kumamoto plant, showcasing how combining advanced technological capabilities (TSMC) with domestic market demand and expertise (Sony) can work (METI, 2024). Such strategic alliances with local businesses are crucial for reshoring, as they provide easier access to government-backed capital and help reduce the high costs involved (Park & Hong, 2017).

Beyond basic production, Japan aims to become a leader in cutting-edge semiconductor chips. The government, alongside major Japanese companies, founded Rapidus, a semiconductor manufacturer tasked with mass-producing next-generation 2-nanometer chips and beyond (METI, 2024). This initiative serves as a risk mitigation strategy for the next wave of innovation and aims to achieve technological superiority over China (Solís & Duchâtel, 2024). Rapidus relies on the Leading-edge Semiconductor Technology Center (LSTC), which involves universities, for the necessary R&D (METI, 2024). LSTC provides the technology for Rapidus's commercialization of advanced chips, with the ultimate goal of Rapidus becoming a global leader in high-performing computing and AI chips (METI, 2024; Solís & Duchâtel, 2024).

Recognizing that independent revitalization isn't enough, Japan is also fostering global cooperation. It's actively collaborating with like-minded countries like the U.S., EU, and Taiwan for cutting-edge semiconductor R&D in order to create a resilient supply chain against external threats (METI, 2024; Armstrong et al., 2025). This includes diversifying its economy beyond concentration, such as TSMC building a plant in Kumamoto to diversify Taiwan's exposure and expanding partnerships with Southeast Asian nations like Malaysia and Thailand for IC imports (OEC World, 2025).

This strategy hinges on significant government support which can be seen as significant, especially financially. Japan has invested heavily, providing ¥580 billion in subsidies for TSMC and Kioxia plants, and another ¥920 billion for Rapidus. Total semiconductor subsidies between 2022 and 2025 reached ¥3.9 trillion (0.71 percent of Japan's GDP) (METI, 2024).

Collectively, these initiatives mark a fundamental transformation in Japan's economic security. It's shifting from traditional domestic industrial development to a security-oriented framework that integrates techno-nationalism and multilateral engagement. By emphasizing resilient supply chains, strategic alliances, and robust support, Japan now views economic and national security as inseparable amid global tech rivalry. This paradigm shift is institutionalized by the Economic Security Promotion Act (ESPA), embedding economic security into national law to safeguard critical industries and secure Japan's technological future.

Overview of the Economic Security Promotion Act (ESPA)

Responding to its outlined economic security strategy, Japan's policymakers swiftly passed new regulations, largely due to then-Prime Minister Fumio Kishida's adoption of the LDP's economic security recommendations and METI's pre-existing economic security sections that became part of Japan's 2022 NSS (Shiraishi, 2024). This led to the rapid passage of the Economic Security Promotion Act (ESPA) in Japan's parliament. ESPA mandates the Japanese government to formulate a basic policy introducing comprehensive measures to ensure national security (Koyu et al., 2023). It establishes four regulatory systems to guide this basic policy:

I. The System for Ensuring Stable Supply of Critical Products;
II. The System for Ensuring Stable Provision of Essential Infrastructure Services;
III. The System for Enhancing Development of Designated Critical Technologies;
IV. The System for Non-Disclosure of Selected Patent Applications

The first measure focuses on securing a stable supply of "specified critical materials." These materials are chosen based on their criticality, foreign dependence, supply disruption risk, and the necessity of ensuring stable access (METI, 2024). While specific ministers designate these, they generally include machinery and critical minerals vital for critical technologies' development, such as semiconductors (METI, 2024). Companies handling these materials must submit "secure supply plans," outlining strategies like diversification and stockpiling, for government approval (METI, 2024; Koyu et al., 2023). Approved companies receive subsidies and financial aid but face mandatory progress reports and penalties for non-compliance, effectively encouraging localization efforts and resilient supply chains.

The second measure regulates foreign business involvement in essential infrastructure. Fourteen sectors, including railway, electricity, gas, water, telecommunications, and financial services, are considered essential infrastructure (METI, 2024). Businesses outsourcing key suppliers for these facilities must submit their plans for government review (Koyu et al., 2023).

The government can force revisions or block plans if they pose a national security risk. Additionally, there is a screening period that forbids companies to install key facilities for 30 days which can be extended to as much as 4 months or more (Koyu et al., 2023).

The third measure promotes research and development (R&D) of critical technologies (DCTs), including space, marine, quantum, and AI (Koyu et al., 2023). Fundamentally, the law requires the government to provide information, financial, and human resources to assist companies in these sectors (Koyu et al., 2023). The Public-Private Cooperation Council (PPCC), comprising government and research representatives, allocates support for each project, such as subsidies and other financial incentives. The council will also decide the application of the technology and its permission to acquire patent and intellectual rights.

Finally, the fourth measure establishes a "secret patent system" to prevent the disclosure of sensitive technologies that could compromise national security. These are often dual-use technologies with both military and civilian applications. The process involves a two-stage review: first by the Japan Patent Office (JPO), which analyzes patents for national security threats, focusing on a limited number of dual-use and single-use technologies (like nuclear arms) (Itabashi et al., 2022). The Cabinet Office then conducts a further security review to assess national security impairment and potential industry impacts if the patent is designated as secure. If designated, researchers must submit management conditions within 14 days, with annual reviews. Such patents require government approval for any work and can have their publication suspended or foreign filing restricted (METI, 2024).

Analysis of TSMC's Kumamoto Plant as the Implementation of ESPA Through Techno-Nationalism

Japan's Economic Security Promotion Act (ESPA) and the TSMC Kumamoto fabrication plant, announced in 2021, represent a pivotal shift in Japan's approach to economic security. The Kumamoto fab directly addresses Japan's concerns about trade dependence and potential Chinese coercion, exacerbated by pandemic-induced shortages (MOFA, 2024; Frankie & Stieler, 2022). Its location in Kumamoto, Kyushu, was strategically chosen due to an existing cluster of semiconductor firms and a robust ecosystem, including proximity to key clients like the automotive sector. This project embodies ESPA's aim to bolster economic resilience by securing supply chains, safeguarding infrastructure, and advancing semiconductor technologies (Koyu et al., 2023).

ESPA's mandate for stable critical product supplies is met by the Kumamoto fab, which produces 12/28-nanometer mature-node logic chips for electronics and automotive industries (Kamakura, 2022). TSMC's joint venture, Japan Advanced Semiconductor Manufacturing (JASM), includes investments from Sony, Denso, and Toyota, securing government subsidies through local investment requirements (METI, 2024; Taipei Representative Office in Singapore, 2024). Mass production began in December 2024, aiming for 55,000 wafers/month for 22/28-nanometer and 12/16-nanometer chips. To achieve ESPA's goals of indispensability and supply chain resilience, the fab targets 60 percent local procurement by 2030, up from the current 25 percent.

ESPA's infrastructure protection goals are evident in JASM's design, with plans for a second fab producing advanced 6-nanometer chips by late 2027. Together, these foundries will produce over 100,000 wafers/month, offering dual-site redundancy crucial for mitigating disaster and supply chain risks exposed by the pandemic (METI, 2024). JASM also prioritizes energy resilience with 100 percent renewable energy and aims to reduce groundwater usage from from 13,000 to 8,500 tons by partnering with Kumamoto Prefecture, aligning with ESPA's strict foreign ownership regulations for critical infrastructure (Koyu et al., 2023; Jen-chieh & Lin, 2024).

ESPA's public-private cooperation mandate for developing critical technologies is exemplified by JASM's management. The Japanese government provided substantial subsidies, ¥476 billion and ¥732 billion for the two foundries, respectively (METI, 2024). These subsidies are conditional on technology transfer and local procurement. TSMC and JASM are partnering with Japanese universities like Kumamoto and Kyushu University for semiconductor training and joint research, with

Kyushu being part of Japan's Leading-edge Semiconductor Technology Center (LSTC) (METI, 2024). Cumulatively, JASM and TSMC have created 10,700 jobs (17 hired from Kumamoto University), with over 3,400 more expected with the second fab (METI, 2024).

Despite ambitious goals, the Kumamoto fab faces significant challenges due to its ESPA adherence. Japanese chip production costs are 10-15 percent higher than Taiwan's (Shilov, 2023), compounded by a severe shortage of skilled semiconductor engineers (Japan requires 1,000 annually). This forces TSMC and JASM to import around 400 Taiwanese workers at 30 percent higher salaries, pushing up general wages (METI, 2024). Furthermore, local Japanese companies struggle to meet TSMC's stringent quality demands, necessitating reliance on more costly overseas suppliers. Low domestic demand for the Kumamoto fab's primary product of mature-node semiconductor chips exacerbates these issues (Frankie & Stieler, 2022).

The Kumamoto fab underscores the limitations of Japan's state-driven industrial autonomy. Despite significant government investment and minority stakes held by major Japanese companies like Sony, Toyota, and Denso, the foundry's majority foreign ownership by TSMC means Japan remains technologically dependent. It simply can't yet replicate TSMC's advanced manufacturing knowledge and supply chain networks independently (Luo, 2022). This arrangement highlights that national governments can't fully control critical semiconductor capabilities without integrating global expertise.

Local Japanese SMEs face significant hurdles in meeting the JASM Kumamoto Foundry's stringent quality, technological, and sustainability standards, which demand advanced capabilities and rigorous practices. A CIPE (2024) survey indicates SMEs often struggle to adapt to economic security policies like ESPA due to limited awareness, insufficient utilization of government support, and challenges in upgrading capabilities. This gap hinders local procurement ambitions and exposes a structural weakness in Japan's economic security strategy, which relies heavily on SME participation for resilient, localized semiconductor supply chains.

Nevertheless, for all of its limitations, it is important to emphasize that Japan's ESPA and the Kumamoto fab epitomize a significant evolution in its techno-nationalist approach, directly linking technological advancement to national security (Luo, 2022; Park, 2023). ESPA's 2022 passage was a direct response to acute semiconductor vulnerabilities exposed by COVID-19 disruptions, escalating tensions with China, and Taiwan's precarious status. These threats forced Japan to prioritize securing critical supply chains and technological capabilities, shifting from its traditional postwar economic focus on open markets.

ESPA institutionalized this shift, prioritizing the protection and localization of key industries and technologies through subsidies, regulations, and strategic investments. The Kumamoto fab, a joint venture with Japanese firms like Sony and Toyota, embodies this policy, aiming to reduce external coercion and supply disruptions by localizing advanced semiconductor fabrication. This project exemplifies Japan's techno-nationalist strategy, viewing technological self-sufficiency and supply chain security as essential components of national power (Park, 2023; Samuels, 1994).

Despite challenges like higher costs, skilled labor shortages, and industry hesitation, the Kumamoto fab is a concrete step in Japan's broader effort to mitigate geopolitical risks, diversify supply sources, and assert greater sovereignty over critical technologies. Ultimately, ESPA's implementation reflects Japan's evolving recognition that semiconductor security is a core national security imperative, signaling a new era of techno-nationalism in its policy.

CONCLUSION

Japan's traditional separation of economic policy from national security, coupled with its reliance on the U.S. alliance, proved inadequate when semiconductor supply chain vulnerabilities exposed its dependence on foreign suppliers for critical resources like rare earth minerals and advanced chips. This realization, spurred by geopolitical tensions and disruptions, highlighted how economic interdependence could be weaponized, threatening Japan's technological competitiveness and national security. In response, Japan enacted the 2022 Economic Security Promotion Act (ESPA), a landmark law that integrated economic resilience as a core component of national security by institutionalizing measures to secure critical supply chains, protect sensitive technologies, and foster strategic cooperation with allies. This marked a significant shift towards an integrated economic and security strategy in a contested global landscape.

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