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Economic Security and New Industrial Policy

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Economic security and new industrial policy[1]

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Abstract

The paper analyzes the emergence of Japan's economic security strategy to address the risks of weaponized interdependence in a context of heightened geopolitical tension. We detail the rapid institutionalization of economic security measures through the adoption of an Economic Security Promotion Act, and ongoing reforms in areas such as foreign direct investment screening and export controls. We find however, that Japan has made little headway in reducing dependence on China on critical products and export controls have had ambiguous trade effects. We discuss the role of the private sector in economic security and find significant divides by firm size on the uptake of new measures to address supply chain vulnerabilities and the protection of sensitive technologies. We examine the new industrial policy on semiconductors and point to the exigencies of success in fostering cutting-edge technologies. Our conclusion identifies policy challenges going forward and offers possible solutions.

JEL Codes: F15;

Keywords: Japan; economic security; semiconductors; export controls

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Introduction

New geopolitical realities are reshaping the world economy. The United States and China have moved away from an era of engagement to one of great power rivalry. Under Xi Jinping, China has doubled down on state intervention to achieve self-sufficiency in core technologies and has flexed its economic influence abroad through carrots (such as infrastructure finance) and sticks (economic coercion). The United States has embraced the mantra that 'economic security is national security' to rapidly build a policy toolkit to restrict outflows of sensitive technologies and to encourage the onshoring of advanced manufacturing. The United States has been in retreat from a leadership role in the global trading system since the election of President Donald Trump.

Great power competition is giving rise to new "power economics" (Hosoya, 2024). The playbook of this chapter of weaponized interdependence will be distinct not just because of the extant high levels of economic integration between the United States and China; but also due to the leverage that comes from controlling chokepoints in the vast globalization networks in areas such as finance, data/information and production chains (Farrell and Newman, 2023). Geopolitical competition has not yet divided the world economy into two self-contained blocs. While direct U.S.-China economic ties are weakening, a lengthening of supply chains is afoot as developing countries such as Vietnam and Mexico reposition themselves (Gopinah, 2023).

This article analyzes Japan's economic security turn. As one of the largest economies in the world with companies that command key nodes in critical supply chains, a close ally of the United States, and a neighbor and large trading partner of China, Japan's economic statecraft is an important case to study. Tokyo is concerned about overdependence on China, has stepped up ambitions to nurture high-tech industries, and has developed a new pillar on economic resilience to its alliance with the United States. But there is more than one balancing act at play as Japan is not interested in decoupling from China, faces challenges in implementing the new industrial policy, and must address gaps with the United States in their respective economic security approaches.

Our analysis is divided in three parts. Section 1 analyzes the Japanese government responses to growing economic uncertainty through the introduction of economic security policies. Section 2 delves into views and responses of Japanese businesses to the securitization of the international economy. Section 3 examines the new push for semiconductor industrial policy as an important window into evolving patterns of government-business relations. The conclusion discusses the implications of our analysis for Japan's international economic role and future regional dynamics.

I. Japan's Path as an Economic Security State

Awareness of the risks of asymmetric interdependence — of import vulnerability and chokepoints — is not new for Japan, an island nation lacking natural resources. Beijing's 2010 informal embargo of rare earth minerals to punish Tokyo for the arrest of a Chinese trawler captain who rammed a Japanese Coast Guard vessel near the Senkaku/Diaoyu islands, was a wakeup call. Tokyo responded by tackling the specific problem at hand: it initiated a WTO case, and in conjunction with the private sector, it pursued diversification and recycling efforts to keep affected industries whole (Iida, 2018). A full-scale economic security turn would wait to the end of the decade when the onset of great power rivalry made it imperative to adapt to harsher geoeconomic realities.

The 2017 Trump administration's National Security Strategy accused China of seeking to displace the United States from the Indo-Pacific region and to shift the international system in its favor, aided by the expanding reach of its state-capitalism model. In 2018, the United States and China waged a tariff war and technology competition intensified. In 2018-19, the United States expanded the reach of security screening of inbound foreign direct investment (FDI) to cover non-controlling investments in critical technologies, infrastructure and personal data, amended its export control law to include emerging and foundational technologies, and placed Chinese technology firms deemed a national security threat, such as ZTE and Huawei, on the Entity List to cut them off from American knowhow and products (Solís, 2023). The onset of the COVID pandemic in 2020 further exacerbated concerns about overdependence in China since its protracted lockdowns disrupted global supply chains. For its part, China under Xi has tightened national security controls over the economy, adopted a dual-circulation strategy to increase self-reliance and foster others' dependency on China, and has developed its own legal arsenal on sanctions and countersanctions (Norris, 2023).

From awareness to capability: the institutionalization of economic security policies

Over the last five years, Japan has fleshed out an economic security strategy guided by two fundamental objectives: "strategic autonomy" to correct excessive dependencies so that core functions in society can be preserved despite external shocks or foreign acts of coercion; and "strategic indispensability" by leading in key technologies and industries widely coveted globally.[2]

The Ministry of Economy, Trade and Industry (METI) responded to intensifying U.S.-China technological competition with an attempt in 2019 to bring TSMC to Japan to revive a mature semiconductor fabrication industry (Duchâtel, 2024). That same year, Tokyo attempted to weaponize interdependence when it suddenly delisted South Korea from its preferential White List of export controls in the midst of a row over compensation for wartime forced labor. By withdrawing expedited approval (but not banning exports) of three advanced chemical products where Japanese companies were dominant suppliers to the Korean semiconductor industry, Tokyo may have intended to signal the potentially devastating economic costs of furthering political tensions. But as Makioka and Zhang (2023) show, the message delivered was quite different due to the adjustment strategies of Japanese and Korean firms. Their study suggests that both Japanese and Korean companies increased investments in Korea, that Korean firms deepened their operations in China, and that triangulation of trade through the U.S. or Europe reduced the effectiveness of the tightened rules.

Since these early forays, Japan has built its economic security strategy by adding bureaucratic capability, revising or creating new legal frameworks, expanding consultation with the private sector, and anchoring economic security to its national security and foreign policy priorities. 2019 saw the establishment of new economic security divisions in the Ministry of Foreign Affairs (MOFA) and METI,[3] and a year later the creation of an economic security team in the National Security Secretariat. In 2021, Prime Minister Kishida appointed the first ever minister for economic security.

The 2020 revision of the Foreign Exchange and Trade Control Law tightened screening of inbound FDI by lowering the threshold of stock acquisition (from 10% to 1%) for firms in designated sectors that

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[2] These concepts debuted in the LDP's Strategic Headquarters December 2020 report on the Creation of a New International Order: https://storage2.jimin.jp/pdf/news/policy/201021_1.pdf.
[3] The latter one became a full-fledged Economic Security Bureau in July 2024.

triggers a pre-investment notification requirement. While the new rule provided exemptions depending on the type of investor and degree of managerial control, it still resulted in vast expansion of oversight since 56% of listed Japanese companies operate in the designated sectors (Armstrong and Urata, 2021). Tighter screening of inbound investment aimed to stave off foreign acquisition of sensitive technologies that pose national security risks, but also to align Japan with similar regulatory regimes of like-minded partners. Nevertheless, the reform did not secure Japan the status of "exempted foreign state" under CFIUS. Given the much larger scope of firms subject to screening and a rapidly shifting technological landscape, it is not clear that the Ministry of Finance (MOF) and the other relevant ministries have sufficient capability to accurately assess national security risks.

Given the complexity of the economic security agenda, the government opted for drafting a standalone law, the Economic Security Promotion Act (ESPA). The effort was spearheaded by the Cabinet office with input from the private sector and academic experts (Vekasi, 2023). ESPA entered into force in the spring of 2022 and rests on four pillars:

1) Supply chain resilience with the government identifying essential products to the operation of Japan's economy and society that are susceptible to foreign exploitation and providing subsidies to companies in these sectors that develop supply chain sustainability plans;
2) Protection of critical infrastructure, covering 14 sectors in transportation, communication, energy, finance, etc. where the government has oversight over hardware and software procurement to ameliorate vulnerabilities;
3) Stepped up public-private cooperation to develop frontier technologies, most prominently in semiconductors, as explained in Section 3; and
4) A system of concealed patents to prevent disclosure of sensitive technologies developed with government support.

However, there is little evidence that Japan has made much of a dent in abating the risks of supplier concentration. Dependence on imports of rare earths from China has increased in the last decade from 50% in 2014 to 70% in 2022 (Vekasi, 2023), despite Beijing's tightening export controls over germanium, gallium, sharply slashing exports of graphite by 90% in response to tech restrictions from the West, and more recently restricting exports of antimony, a mineral used in products from batteries to weapons. And compared to the G7 average, Japan reports a large number of products with high supplier concentration (Herfindahl-Hirschman Index above 50) in machinery (Japan 148 vs G7 12), organic chemical goods (Japan 141 vs. G7 30), rare earths and metals (Japan 86 vs G7 12), and electric products (Japan 79 vs G7 12) (METI, 2024).

An ever-evolving economic security toolkit

Japan's economic security policies continue to grow and adapt. The Diet's approval in May 2024 of an economic security clearance system that will for the first time create a system of background checks for the private sector to facilitate the government's sharing of sensitive information on technology gaps and critical infrastructure.[4] It is also geared to facilitate Japanese companies bidding on international projects. Historically Japan has ranked low in cybersecurity readiness, but a new bill on active cyber defense is under consideration. It seeks new government powers to act preemptively in case of an imminent cyber-

[4] The protection of classified information in the civil service had already been addressed in the 2013 State Secrets Law.

attack, but it must also be compatible with the Constitution's principles on the privacy of communications and address the shortage of trained human resources.

Acute state rivalry in the midst of a technology revolution has rendered control over key technologies a focal point for economic security. It has a forced reckoning in Japan on how to adapt to the waning influence of a post-Cold War regime focused on non-proliferation of weapons of mass destruction with growing deadlock in the Wassenaar Arrangement in the aftermath of Russia's invasion of Ukraine and closer military ties to North Korea; and to the new uses of export controls for offensive and defensive purposes not only from China but also the United States.

Under Kishida, Japan joined a set of unprecedented economic sanctions that included technology restrictions to degrade Russia's military machine. The clear-cut violation of international law facilitated Tokyo's decision to join technology sanctions. But even in this case, questions abound on whether the sanctions have been effective in hampering Russia's industrial defense base and how to restrict access to common components that can be repurposed for military use without unduly restricting international trade.[5]

This is not the only conundrum that Tokyo faces. A few months after the plurilateral technological sanctions were lined up, the so-called Sullivan doctrine launched, this time trained on the threat of Chinese military build-up by diverting advanced commercial technologies to weapon programs. Warning of the security risks posed by Chinese military-civil fusion, U.S. National Security Advisor Sullivan noted that the past approach of staying ahead of China would be insufficient. In an important set of technologies — AI, quantum, microelectronics, bio tech — the U.S. objective would be to slow down Chinese technological development for national security purposes, keeping a "small yard and high fence." The October 7 2022 export control rules on semiconductors rapidly implemented the new approach prohibiting all firms that rely on U.S. technology and tools to sell advanced chips to China at determined thresholds, forbidding American companies to sell advanced equipment that could help China indigenize the production of the targeted chips, and proscribing U.S. nationals from assisting with fab operations in the mainland.

The U.S. has utilized a critical chokepoint (its dominance in chip design) to frustrate China's ambitions, but it may only succeed if it enlists the support of like-minded technologically advanced partners (Solís, 2024). Hence, negotiations with the Netherlands and Japan to align export controls on advanced semiconductor equipment were a top priority. As a result of these talks, in March of 2023 Tokyo added to its list of controlled items 23 categories of semiconductor equipment but did not target any specific country. In contrast to the United States, Japan maintains a country-agnostic approach to be consistent with non-discrimination rules (Suzuki, 2023). Moreover, Japan does not have anything akin to the U.S. Entity List nor does it apply its export restrictions extraterritorially.

The export controls have had mixed effects on trade with the level of restriction and dependence on U.S. technology as important factors. Hayakawa et al (2022) found that Japan's tightening of controls on some electronic, communication and propulsion related items in compliance with multilateral export control agreements had no significant impact on Japanese exports. In contrast, the export restrictions related to the US adding Huawei to the Entity List resulted in a significant reduction of Japanese smartphone related

[5] See the report from METI's Subcommittee on Strategic Trade Control: 20240424_1.pdf (meti.go.jp).

exports to China. The authors argue that obtaining export permission from the US government is likely more costly than from the Japanese government.

Hayakawa (2024) examined the trade effects of US export regulations on integrated circuits (ICs) and IC manufacturing equipment (IME) from January 2018 to September 2023 on third economies. The study found that the Foreign Direct Product Rule (FDPR) led to decreased Korean semiconductor exports to China, while Taiwanese exports remained unaffected, relative to the counterfactual of no FDPR. Interestingly, the study observed that Japanese IME exports to China did not change significantly, whereas both American and Dutch IME exports to China decreased substantially. The results for Japan are ambiguous with the quantity of Japanese exports of IME to China having fallen but with the price rising, with no clear effect on the value of the exports.

We replicate and extend Hayakawa's analysis to March 2024, examining the impact of US regulations on Japanese and Dutch exports of IME products to China. The US addition of Semiconductor Manufacturing International Corporation (SMIC) to the Entity List in December 2020, did not appear to affect Japanese IME exports to China, but the Netherlands' IME exports to China experienced a significant decrease. Furthermore, we did not observe any significant impact on exports of IME products from either Japan or the Netherlands to China following the tightening of US regulations in October 2022.

These findings align with Hayakawa's (2024) study, which suggested that Dutch IME products are more likely to incorporate US-origin technology, making them subject to US export controls, whereas Japanese IME products appear to be less dependent on US technology. Business strategy is a key factor in the effect of economic security measures.

II. Response of Japanese firms to increased economic security risks

How have Japanese firms coped with an increased economic security risk? To answer this question, we use a quantitative approach examining statistical data on economic activities such as international trade and investment by Japanese firms, and a qualitative approach using information obtained from questionnaire surveys conducted on Japanese firms.[6].

3.1. Quantitative analysis: Dependence on China for trade and foreign direct investment (FDI)

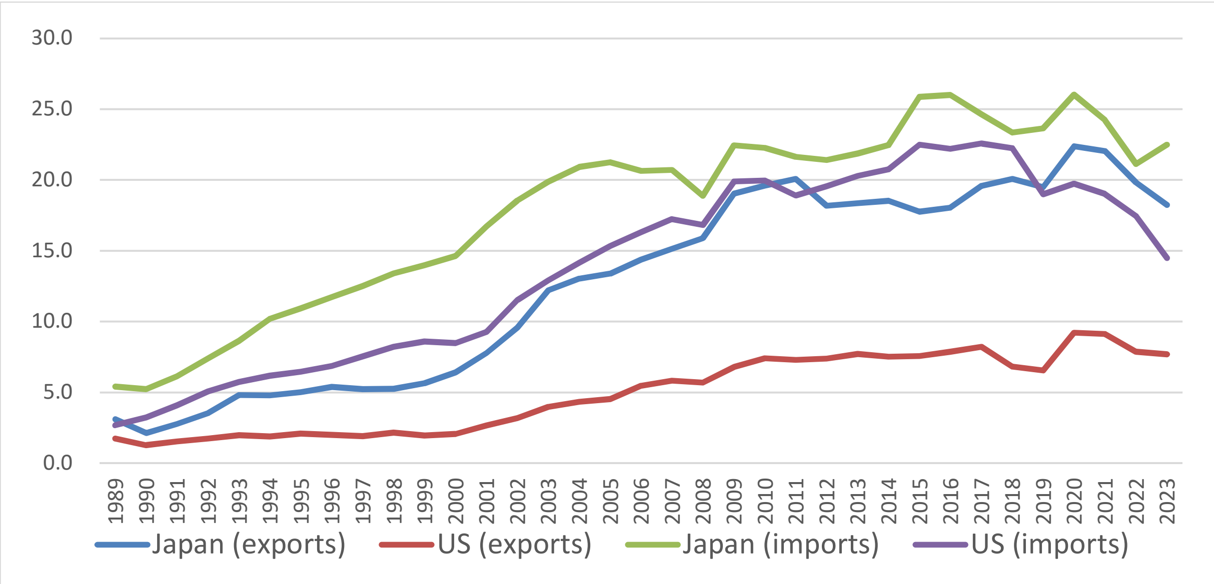
Dependence on a single or a few countries for the supply of essential materials and products can put a country at risk. During the COVID-19 pandemic, Japan suffered from a shortage of a variety of products such as facial masks, medical gowns, auto parts, and others, for whose supply Japan depended largely on China, where manufacturing activities were paralyzed due to the COVID-19 pandemic. This experience reinforced concerns about overdependence given China's prior resort to economic coercion. With this in mind, we examine Japan's relations with China in terms of trade and FDI.

Figure 1 shows the shares of China in Japan's total exports and imports (including the US for comparison)[7]. China's share in Japan's exports (imports) increased steadily from 3.1% (5.4%) in 1989 to 20.1% (22.4%) in 2011 (2009), then fluctuated to reach a peak at 22.4% (26.0%) in 2020, before declining to 18.2% (14.5%) in 2023. A large part of these changes is attributable to China's macroeconomic performance. China achieved very high economic growth from the 1980s through the 2000s, substantially increasing its importance in Japan's trade. Economic slowdown in the 2010s and

[6] See an appendix about these surveys.
[7] Data are taken from StatsAPEC, https://statistics.apec.org/

very low growth during the COVID-19 pandemic period led to a decline in the share of China in Japan's trade. Similar patterns can be found for the share of China in US trade; the magnitude of the share of China in US imports is similar to that of Japan, but the share of China in US exports is significantly lower compared to that of Japan. The US-China trade war beginning in the late 2010s contributed to a decline in the share of China in US trade, particularly in its imports.

Figure 1 Share of China in Overall Trade for Japan and the US (%)



Source: Authors' calculation from StatsAPEC, https://statistics.apec.org/

Japan's dependence on China for its import supply is very high. Examining 4,344 HS-6 digit products, the number of products, for which 50% or higher proportion come from China, is 1,406 for Japan, significantly higher compared to the corresponding figures at 567and 221 for the US and Germany, respectively (METI, 2024).

Concerning products which are sensitive to economic security, high import dependence on China is found in laptop PCs (99.4%), mobile telephones (83.7%), photovoltaic semiconductor device (66.6%), and lithium-ion battery (66.1%).[8] According to the Mitsubishi Research Institute (2023), which computed the import sources and shares of ten specified critical materials designated in pillar one of ESPA, China is number one importing source in fertilizers, 42%, machine tools and industrial robots, 30%, rechargeable batteries, 52%, and ship parts, 22%. China ranked second in permanent magnets. 36%, semiconductors and integrated circuit, 16%, and metallic minerals, 13%. China ranked 6th in antimicrobial substance formulations, 8%, and did not rank among the top 7 sources in aircraft parts, and flammable natural gas. [9]

[8] METI (2022).

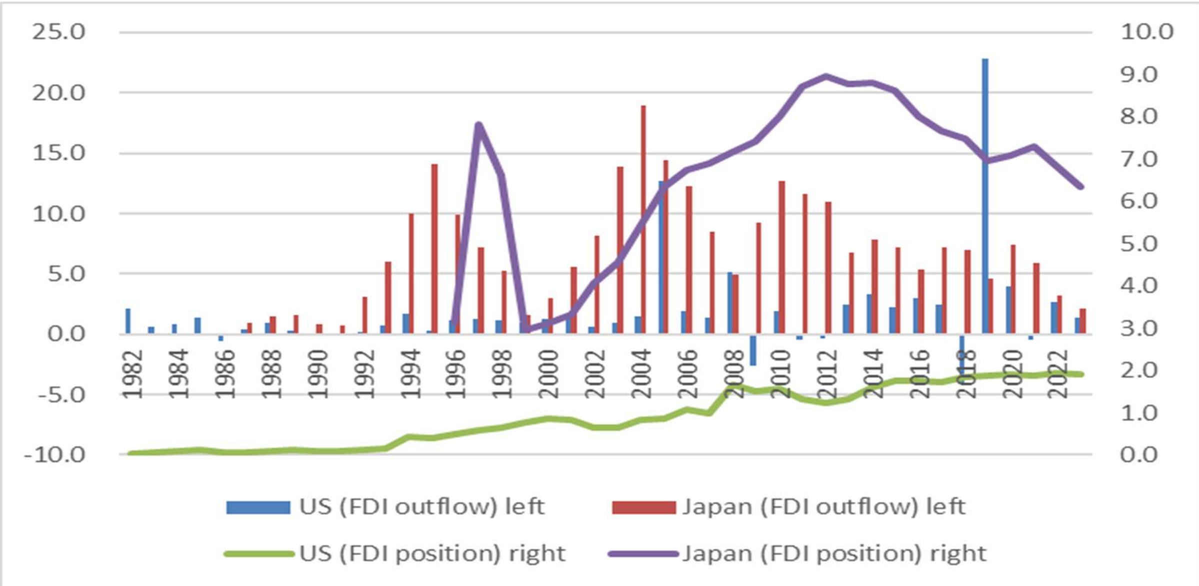
[9] Mitsubishi Research Institute (2023) computed the shares for 2017-2022 period using UN Comtrade at the product level of HS 4 digit and 6-digit classification.

Mitsubishi Research Institute (2023) Gaiko・Anzenhosho: Tokutei Juyo Busshi no Antei Chotatsu ni Mukete [Toward Stable Procurement of Specified Critical Materials]
February 9. https://www.mri.co.jp/knowledge/column/20230209.html

Some of these concentrated markets are likely more contestable than others and potential alternatives and elasticities of substitution need to be studied. Among ICs, for processors and controllers, and memory device, Taiwan is a major import source. For critical minerals, China's dominance in processing them is well known. According to IEA (2023), China is the world's largest producer and processor of rare earth elements, accounting for 70% of production and 90% of processing.

China has been an important destination of Japan's FDI, although its importance has been declining. Figure 2 shows the share of China in Japan's FDI outflow and outward FDI stock (position). FDI outflow shows substantial fluctuation throughout the period, but we observe a steady downward trend after hitting a peak at 18.9% in 2004. The share in 2023 was 2.1%. The share of China in Japan's outward FDI stock increased from 3.1% in 2000 to 9% in 2012, and then declined continuously to record 6.4% in 2023. The future prospects of Japanese FDI to China are not favorable since it is losing the attractiveness as FDI destination.[10] The decline in the share of China in Japan's FDI can be explained by a decline in growth rate, increase in wages, and increase in uncertainty due to geopolitical tensions. In contrast, the share of China in the US outward FDI stock, which is significantly lower compared to Japan, continued to increase albeit at slow rate[11].

Figure 2. Share of China in Overall FDI for Japan and US (%)



Sources: Authors' calculation from JETRO and U.S. Bureau of Economic Analysis

Nevertheless, China is still a very important market for Japanese firms operating overseas. The sales of Chinese affiliates of Japanese firms rose sharply and continuously from the early 1990s through the early 2010s. Although at a slower pace, their sales continued to rise through the early 2020s with some fluctuations. Moreover, the share of sales in China in worldwide sales for overseas affiliates of Japanese

[10] Japan Bank for International Cooperation, Report on the study of Japanese manufacturing firms' overseas operation 2023 [Wagakuni Seizogyo Kigyo no Kaigaijigyoutennkai nikanuru Chosa Hokoku 2023] https://www.jbic.go.jp/ja/information/press/press-2023/image/000005619.pdf

[11] U.S. Bureau of Economic Analysis, "Balance of Payments and Direct Investment Position Data"

firms rose rapidly from almost zero in the early 1990s to approximately 15% by late 2000s and maintained that level through the early 2020s[12]. The corresponding pattern for the US firms shows similarity but at lower magnitude, registering 7.4% in 2021[13].

These findings indicate that China is an important trading partner and FDI destination for Japan, but at the same time China is a source of economic security risk because Japan depends on China for the supply of some important products and Beijing may influence Japanese firms operating in China negatively through formal and/or informal measures.

3.2. Qualitative analysis: Identifying and trying to deal with economic security risks

We find that a large proportion of large firms and a small portion of small and medium-sized enterprises (SMEs), recognize the importance of dealing with economic security risk but, particularly SMEs, have not made much progress in finding ways to achieve this objective. They are also eager to receive government assistance in dealing with the issue.

3.2.1. Firms' response to economic security risks: supply chain resilience and technology protection

What specific geoeconomic/geopolitical risks are identified by Japanese firms? According to a survey conducted by KPMG (2024), the following three risks, which are related to the US-China conflict, are prominent: potential escalation of the situation surrounding Taiwan (64.3%), strengthening trade related regulation by China (58.2%), and strengthening restriction on China by the US (57.3%). Russia-Ukraine war and the conflict in the Middle East ranked lower at 36.0 and 23.2 percent, respectively. These findings indicate two different kinds of concern by the Japanese firms: stable supply of important products, or resilience of supply chains; and restriction on their business in China or business related to China.

Another economic security risk for Japanese firms is technology theft, particularly by China. In response to a question about important challenges in the competition against Chinese firms, research and development (46.5%), protection/management of intellectual property rights and patents (38.0%), and protection of data (33.8%) were found to be top three items in a survey by the Institute of Geoeconomics (2023). Below we examine Japanese firms' response to the challenges related to resilience of supply chains first, and then protection of technology.

Japanese firms have adopted various strategies to deal with supply chain risks in semiconductors and critical minerals. According to the KPMG survey, they include building up inventories (58.2% for semiconductors, 51.3% for critical minerals), diversification of production sites/procurement sources (50.9%, 53.9%), reconsideration of product design (30.9%, 17.9%), and recycling (10.0%, 14.1%). As for the challenges regarding the management of supply chains, many firms indicate securing of the entire supply chain (38.2%), development of scenarios concerning supply chain risks (35.1%), and formulation of strategy to respond to supply chain risks (30.8%) are of utmost importance. As for the future prospects of supply chains, almost equal proportion of firms indicate the expansion of "friendshoring (27.5%)," "reshoring to Japan (32.6%)," and "further globalization (30.5%)." Proportion of reshoring is greater for SMEs, compared to large firms. (Japan Chamber of Commerce and Industry, JCCI, 2023)

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[12] METI, Comprehensive Report on Japanese Firms' Overseas Operation [Kaigai Jigyo Katsudo Kihon Chosa]
[13] U.S. Bureau of Economic Analysis, "Data on activities of multinational enterprises".

Firms rely primarily on two approaches to protect technology: treatment of employees with access to technology and of business partners involving technology. On the former, METI[14](2023) lists the following measures: providing incentives to skilled and tech-savvy employees to prevent them leaving the firm, extending retirement age, and restricting access to important technology to a small and limited number of employees. On the latter, firms make sure that business partners have established an appropriate policy/measure to deal with security risk and maintain good communication regarding the use and importance of technology. There are cases where firms demand their business partners use materials/products with important technology only inside Japan.

3.2.2. Firms' attitude toward economic security in general

Concerning the Economic Security Promotion Act, large firms are interested and have good understanding, while small firms' interest and knowledge is limited (JCCI, 2023). The proportions of firms that indicate "not knowledgeable nor interested" for SMEs and large firms are 60% and 25%, respectively. This divide by firm size is reflected in the high proportion of SMEs that have not implemented policies to deal with economic security risks (56.5%), versus large firms (9.3%). The most commonly implemented measures to deal with economic security risk include: strengthening the capability of information collection (21.9%), protecting information on technology and products (15.8%), formulating business continuation plans in the case of emergency (11.5%), and setting up a section specialized in economic security (5.6%). A relatively small proportion of Japanese firms have implemented concrete measures to deal with economic security risk probably because it is a newly emerged challenge for many firms.

What are the challenges faced by Japanese firms in dealing with economic security risk? Respondents for the KPMG survey pointed to information collection and risk evaluation (56.1%), recruitment and development of capable human resources (33.5%), and commitment by top managers (23.5%). METI (2023) reports the importance of setting up a section, which specializes in economic security, under the strong leadership of high level of management that can coordinate across different sections of a firm effectively.

Many firms are eager to receive government support to deal with increased economic security risks. According to the survey conducted by Japan Chamber of Commerce and Industry (2023), many firms would like the government to provide information on new developments concerning economic security as well as specific measures adopted by firms both inside and outside Japan. They also want financial assistance for constructing resilient supply chains. Some firms indicated that it would be very helpful if the government prepares and provides a checklist for firms to deal with economic security risks (JCCI, 2023).

In addition to risk management, a new chapter in government-business relations is unfolding with the current industrial policy push.

III. Semiconductor Industrial Policies

[14] Ministry of Economy, Trade and Industry (METI) prepared a report, which contains several specific firm cases obtained from interviews, to provide assistance to private firms in dealing with economic security.

A central aim of Japan's economic security policies is access to semiconductor chips for Japan's advanced manufacturing sector. Japanese firms play an important role in global semiconductor supply chains, supplying equipment and materials. Some estimates suggest Japan's global market share is 56 per cent in materials and 32 per cent in manufacturing equipment (WEF, 2023).

Japan went from holding a share of 50.3 per cent of the global semiconductor industry in 1988 to around 10 per cent by 2019. Between 1978 and 1986, Japan's market share in Dynamic Random-Access Memories (DRAMs) rose from under 30 per cent to roughly 75 percent, largely displacing US market share which fell from 70 to 20 per cent in that period (Tyson, 1992). Under the threat of US antidumping measures, Japan signed the 1986 Japan-United States Semiconductor Agreement that moved Japan and the United States away from free trade towards a partially managed trade agreement, with market access of 20 per cent in Japan for US firms and Japan imposing a voluntary export restraint (Irwin, 1996). The 1986 Agreement was challenged by the European Union and found in violation of GATT rules, and renegotiated in 1991. The Agreement was only partially responsible for the loss of competitiveness and loss of global market share for the Japanese semiconductor industry.

. The decline of the Japanese semiconductor industry appears to be from the inability to adapt the business model away from vertically integrated firms to specialization in either design or manufacturing, the stagnant sales of digital products in Japan that led to a decline in R&D investment and to divest from either design or manufacturing (Hideki, 2022).

Japanese industrial policies under the Ministry of International Trade and Industry (MITI) in the 1970s and 1980s, and even earlier, were aimed catching up to the technological frontier, including in the semiconductor industry. The Japanese government is once again deploying large-scale semiconductor subsidies, this time in the name of economic security. The new industrial policies are being deployed in the context of Japan being at the technological frontier and with more complex global value chains in the semiconductor industry. The Japanese government's industrial policies today are aimed at producing the final stage integrated-circuits in fabrication plants, or fabs, going beyond Japan's current role as an equipment and materials supplier in semiconductor global value chains.

The scale of Japanese subsidies

The adoption of industrial policies to ensure semiconductor manufacturing in Japan has seen government subsidies of 3.9 trillion yen ($25.5 billion) in three years to April 2024 which is the equivalent of 0.71 per cent of GDP. Japan's subsidies were second only to the United States – and likely China – that allocated the equivalent of 7.1 trillion yen over a five-year period, accounting for 0.21 per cent of US GDP[15]. It is difficult to estimate the magnitude of China's industrial spending on semiconductors due to the lack of publicly released data. Moreover, direct subsidies are but one measure of government support, given China's heavy reliance on below market equity investments and credits (OECD, 2019). While an approximate measure, Chinese state-led investment in semiconductors is estimated to be $150 billion since 2014.

Over half of the Japanese government subsidies have gone to two initiatives: TSMC (1.2 trillion yen) and Rapidus (920 billion yen). TSMC established a semiconductor fabrication facility in Kumamoto, the

[15] 'Japan outspends U.S., Germany on chip subsidies as share of GDP', Nikkei Asia, 10 April 2024 https://asia.nikkei.com/Business/Tech/Semiconductors/Japan-outspends-U.S.-Germany-on-chip-subsidies-as-share-of-GDP

southwestern most of Japan's main islands, known as Japan Advanced Semiconductor Manufacturing (JASM) producing legacy semiconductors. It became operational in early 2024 and a second factory is being built.

Government subsidies helped to create Rapidus in August 2022, comprising eight Japanese companies: Denso, Kioxia, MUFG Bank, NEC, NTT, SoftBank, Sony and Toyota. The government subsidies mobilized 7.3 billion-yen investment from the eight companies and went into partnership with IBM to eventually jointly produce cutting-edge 2-nanometer semiconductors. The factory construction started in late 2023 in Chitose, Hokkaido. The private capital that Rapidus has mobilized is dwarfed by the public subsidies and it is uncertain whether the trial production line of cutting-edge semiconductors scheduled for 2025 or the mass production by 2027 will succeed or become commercially viable.

Of the 3.9 trillion yen of semiconductor subsidies, 1.24 trillion yen is for R&D. The subsidies include 20 billion yen to Samsung Electronics to establish an R&D center in Yokohama and 37 billion yen to TSMC for an R&D facility in Tsukuba.

Subsidies to encourage foreign direct investment are more often seen in developing countries, but are becoming more commonplace in advanced economies in the current industrial policy race.

Justification and track record of subsidies

There are a number of drivers for the large-scale government subsidies. In its Strategy for Semiconductors and the Digital Industry, METI argued that the semiconductor industry will serve as "foundation of a digital industry that will support the economy, society, and democracy", and will be "conducted as a national project that goes beyond the framework of general private-sector support". Instead of buying cutting-edge semiconductors from other countries, the Japanese government is attempting to catch up to the frontier of semiconductor manufacturing with industrial policy. There is no guarantee that it will succeed.

Beason and Weinstein (1996) cast doubt on the effectiveness of Japan's earlier industrial policies with findings that the government's targeted support for industries between 1955 and 1990 largely went to low growth sectors and decreasing returns to scale. They found no evidence that the industrial policies enhanced productivity.

Some recent literature on the effects of industrial policy can provide justification for large scale subsidies. The majority of the evidence of successful episodes of industrial policy, however, are for developing country cases. Their utility for predicting success or assisting with the design of policies in an advanced economy like that of Japan's, is likely limited. Industrial policy for a developing country catching up to the technological frontier helps with absorbing, emulating and adapting imported technologies. At the technological frontier, the challenge is to innovate new technologies that do not yet exist. Catch-up growth and growth at the technological frontier are qualitatively different. TMSC's production of legacy semiconductors in Kumamoto is importing a proven technology and production system and therefore is relatively straightforward compared to the intended production of cutting edge semiconductors by Rapidus. Even well-designed subsidies do not guarantee success in creating new technology.

More recent studies with new empirical approaches to measurement and care with causal inference find evidence of some industrial policies succeeding in their economic growth objectives, especially in developing East Asia (Juhász et al, 2023; Choi and Levchenko, 2023). The concern about government waste and picking losers (instead of picking winners) can be somewhat allayed with evidence that subsidizing upstream sectors in developing countries tends to minimizes policy mistakes (Liu, 2019).

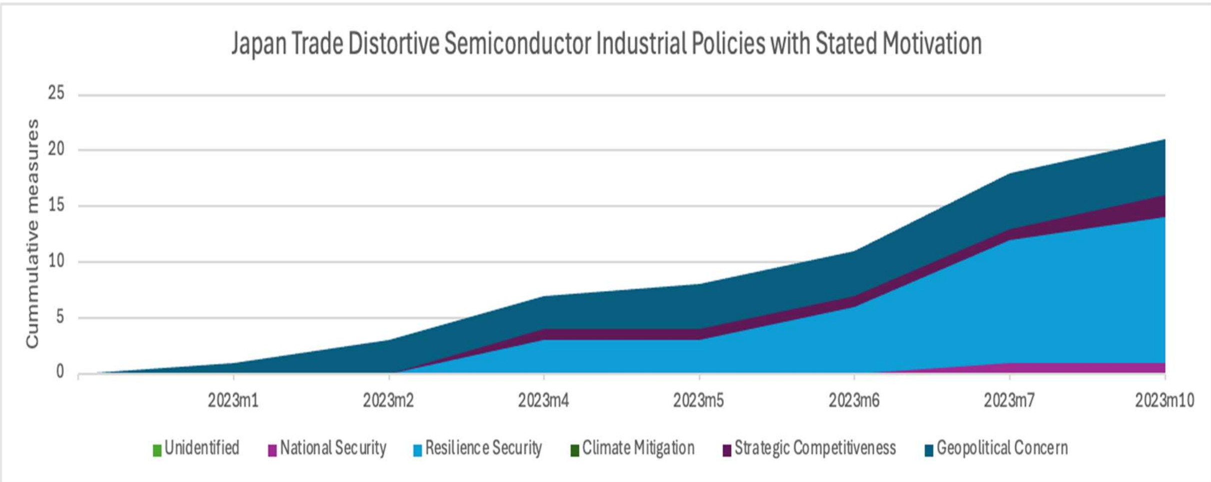
There is some limited evidence of well-designed government support creating and sustaining agglomeration in lagging regions in Japan and Italy (La Point and Sakabe 2021, Incoronato and Lattanzio 2023). Industrial policies can dampen decline in manufacturing jobs (Criscuolo et al. 2019, Cingano et al. 2022). The evidence around TSMC's introduction in Kumamoto has seen some positive spillovers already with Mitsubishi Electric and Sony building new factories in Kumamoto as a result.

In addition to the positive externalities from the semiconductor industry, there is a security externality with advanced semiconductor manufacturing concentrated in Taiwan, a potential geopolitical flashpoint.

The geopolitical dimension to the subsidies are explained by METI's Strategy as needing to "ensure Japan remains strategically essential and strategically independent amid the conflict for technological hegemony between the U.S. and China". US-China strategic competition and the fact that advanced cutting edge semiconductor manufacturing is dominated globally by TSMC in Taiwan is causing concern in many governments and industries that require cutting edge semiconductors and feeding efforts to geographically diversify risk.

The New Industrial Policy Observatory (NIPO) by Evenett et al (2024) has, since the beginning of 2023, tracked the announcement and implementation of industrial policy measures and their stated motivation. Figure 3 shows a simple cumulative count of Japan's semiconductor policy measures, and underscores that they have been mostly deployed for 'resilience and security of supply' reasons, referring to 'improving the stability or security of local supplies of non-food products now or in the future'. The four measures implemented in the name of 'geopolitical concern' are related to 'sanctions in response to Russian invasion of Ukraine'. Four other policy measures aim to boost Japan's strategic competitiveness. According to the NIPO database these measures cover US$88.5 billion worth of trade and subsidies in the name of resilience and security of supply total US$1.69 billion.

Figure 3. Japan's Trade Distortive Semiconductor Industrial Policies with Stated Motivation



Source: Authors' calculation from Evenett (2024)

The large-scale subsidies to revive semiconductor manufacturing in Japan, beyond the equipment and materials where Japan is an integral part of supply chains, are a return to significant industrial policy in the name of economic security. Unlike the MITI industrial policies of the past when Japan was catching up to the technological frontier and importing technology, there is significant uncertainty as to whether the large subsidies to TSMC and especially Rapidus will succeed now that Japan is at the technological frontier and needs to create the technology.

IV. Conclusion

Over the span of a few years, Japan has developed a hefty economic security toolkit to address the risks of economic interdependence at a time of heightened geopolitical conflict. Concerns over vulnerable supply chains, pressure to advance in the technological race, and the desire to protect critical technologies, infrastructure, and data have led to the rapid adoption of measures on supply chain resilience, industrial policy, investment screening, and export controls. The emergence of an economic security track has important implications for Japan's foreign policy as it seeks to de-risk from China and to deepen the alliance with the U.S. It is also significant for the future of the regional economy both as the buildup of domestic advanced manufacturing and diversification efforts shape the flow of Japanese trade and investment activities going forward. The economic security turn is also reconfiguring government-business relations both as officials resort to new tools of regulation and promotion, and the private sector crafts strategies to respond to heightened risk.

As Japan embarks on this grand policy experiment several challenges lie ahead. The effective implementation of ESPA and ongoing reforms of cyber defense and technology protection regimes will require the government to deploy sufficient number of capable staff, maintain good communication with the private sector, and sustain proactive coordination with like-minded partners such as the US, EU, Korea, Australia, while carrying out nimble diplomacy vis-à-vis China to avoid confrontation. The role of the private sector to the success of economic security is critical. And yet, we find a clear divide by firm size on the awareness and resources that companies in Japan are devoting to address economic security. To deal with these challenges, the training of capable workers, good communication with the government, and the utilization of business association such as Keidanren (for large firms) and the Japan Chamber of Commerce and Industry (for SMEs) are important. The Japanese government has allocated hefty subsidies to the national project of semiconductor revival, but significant uncertainties remain given the ongoing international subsidy race and the exigencies of cutting-edge technology. To overcome the challenges, subsidies need to be spent effectively, proactive investments from the private sector should be encouraged, and talent bottlenecks need to be addressed by promoting engineering education at technical colleges and universities. Japan's economic security turn is recent, consequential, and still under-development.

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