Economic security and new industrial policy

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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 its dependence on China for 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.

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1. 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.

This article analyzes Japan's economic security turn in the new normal of the world economy and politics, which has been shaped by heightened geopolitical tension. 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. For Japan, China's rise presents a challenge to the existing international order as well as an opportunity with a big market.

Our analysis is divided in three parts. Section 2 analyzes the Japanese government responses to growing economic uncertainty through the introduction of economic security policies. Section 3 delves into views and responses of Japanese businesses to the securitization of the international economy. Section 4 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.

2. A "normal Japan" and the emergence of economic security

Like many of its peers, Japan is responding to the technology race and the weaponization of economic interdependence with new tools of regulation, promotion, and international coordination to minimize risks and maximize opportunities. The concern with economic vulnerability is not new (see the 1980 concept of Comprehensive Security), but Japan's proactive security policy of the last decade has enabled Tokyo to more directly integrate national security goals into its international economic strategy across the areas of trade, investment, technology, and development. By putting aside its passive security policy, Japan's foreign economic policy has "normalized" as it partakes in the ongoing fusion of economics and national security. Nevertheless, Japan is not just band wagoning on the emerging trend of economic security but is seeking to chart its own path to balance the objectives of growth through economic integration and technology competitiveness while hedging against economic vulnerability.

The onset of great power rivalry made it imperative for Japan to adapt to harsher geoeconomic realities.[2] The 2017 Trump administration's National Security Strategy accused China of seeking to displace the

[2] Beijing's informal embargo of rare earth minerals in 2010 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 for Japan, but the full-scale economic security turn came at the end of the decade.

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).

Adjusting to this transformed international environment, 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 (see LDP, 2020). Japan enhanced its economic security decision-making with the establishment of new economic security divisions in the Ministry of Foreign Affairs (MOFA) and Ministry of Economy, Trade, and Investment (METI) in 2019,[3] the creation a year later of an economic security team in the National Security Secretariat, and Prime Minister Kishida's 2021 appointment of the first ever minister for economic security. In order to make sense of the hefty portfolio of economic security policies,[4] we group them into three distinct but related categories: 1) **protection** of key technologies, critical infrastructure, and supply chain resilience; 2) **promotion** of technological leadership[5] to boost competitiveness and acquire leverage over choke points; and 3) **partnership** with like-minded countries to achieve the defensive and proactive goals of economic security.

2.1 Economic Security Shield

We offer a brief overview of Japan's stepped-up efforts on screening of foreign direct investment, resilience of critical infrastructure and supply chains, and restrictions on the outflow of sensitive technology.

2.1.1 Inward FDI Screening

[3] The latter team became a full-fledged Economic Security Bureau in July 2024.

[4] Our discussion of economic security policies is not exhaustive. Other relevant measures are the Review and Regulation of the Use of Real Estate (limiting foreign acquisition of property near sensitive facilities), the Unfair Competition Act (to protect trade secrets), and the Development Cooperation Charter (articulating Japan's national interests guiding economic assistance programs). The government has also offered subsidies to re-shore and diversify supply chains away from China (Solís, 2021). In May 2024, the Diet approved an economic security clearance system of background checks that will extend to the private sector to facilitate the government's sharing of sensitive information on technology gaps and critical infrastructure (The protection of classified information in the civil service was addressed in the 2013 State Secrets Law). It is hoped the new measure will facilitate Japanese companies bidding on international projects. While historically Japan has ranked low in cybersecurity readiness, a new bill on active cyber defense is under consideration. It seeks new government powers to act preemptively in case of an imminent cyber-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.

[5] To be covered in section 4 through a case study of semiconductor industrial policy.

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 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 a 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 an "exempted foreign state" under the Committee of Foreign Investment in the United States (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 across a much higher level of economic transactions.

2.1.2 Supply chain resilience and critical infrastructure

Cementing its status as a front runner on economic security, Japan is the first country to have adopted standalone economic security legislation. The Economic Security Promotion Act (ESPA, in force since 2022), comprises 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, and
4) A system of concealed patents to prevent the disclosure of sensitive technologies developed with government support.

While protection goals loom large in ESPA, when it comes to the objective of strengthening the resilience of supply chains, there is little evidence that Japan has made much of a dent in abating the risks of supplier concentration. Japan's 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. Compared to the G7 average, Japan reports a large number of products with high supplier concentration (defined as an industry with a 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, 2024a).

2.1.3 Export Controls

Acute state rivalry in the midst of a technology revolution has 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 and to the new uses of export controls for offensive[6] and defensive purposes. Under Prime

[6] In 2019, Tokyo attempted to weaponize interdependence by delisting 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

Minister 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 (METI, 2024d).

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, biotechnology — 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. We replicate and extend Hayakawa's (2024) analysis to March 2024, examining the impact of U.S. regulations on Japanese and Dutch exports of integrated circuits (ICs) and IC manufacturing equipment (IME) products to China. The U.S. 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 U.S. regulations in October 2022.

These findings align with Hayakawa's (2024) study, which suggest that Dutch IME products are more likely to incorporate U.S.-origin technology, making them subject to U.S. export controls, whereas Japanese

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.

IME products appear to be less dependent on U.S. technology. Business strategy is a key factor in the effect of economic security measures.

2.2 Partnering with like-minded countries

Keenly aware that Japan cannot achieve its strategic autonomy and indispensability goals alone, Tokyo has embedded its economic security agenda into its foreign policy doctrine and diplomatic activity. The 2022 National Security Strategy states that "in the face of various threats at hand through economic means, Japan will coordinate ideas on necessary economic measures and execute these measures comprehensively, effectively and intensively to enhance Japan's self-reliance and to secure the advantage and indispensability concerning our technologies and others" (Cabinet Secretariat, 2022).

Economic security has emerged as a core track of the U.S.-Japan relationship. In 2021, Prime Minister Suga and President Biden launched the Competitiveness and Resilience Partnership to advance technology cooperation on AI and quantum computing and deliver secure telecom networks among other goals. The trilateral partnership U.S.-Japan-Korea has elevated economic security as a key area of cooperation through the development of early warning systems for supply chains, among other measures. And the Quad (among the United States, Japan, Australia, and India) has established a working group on emerging technologies. Japan has participated in broader undertakings that include different aspects of the economic security agenda. The Supply Chain Resilience pillar of the Indo-Pacific Economic Framework (with 13 members and robust participation from Asia's developing and emerging economies) seeks to preemptively identify vulnerabilities and to facilitate communications during supply chain emergencies. Moreover, Tokyo used its 2023 G7 chairmanship to elevate the economic security agenda with pledges from major industrialized nations to address non-market policies that foster overdependence, to curb economic coercion, and to root economic security "in maintaining and improving a well-functioning international rules-based system."

3. 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.

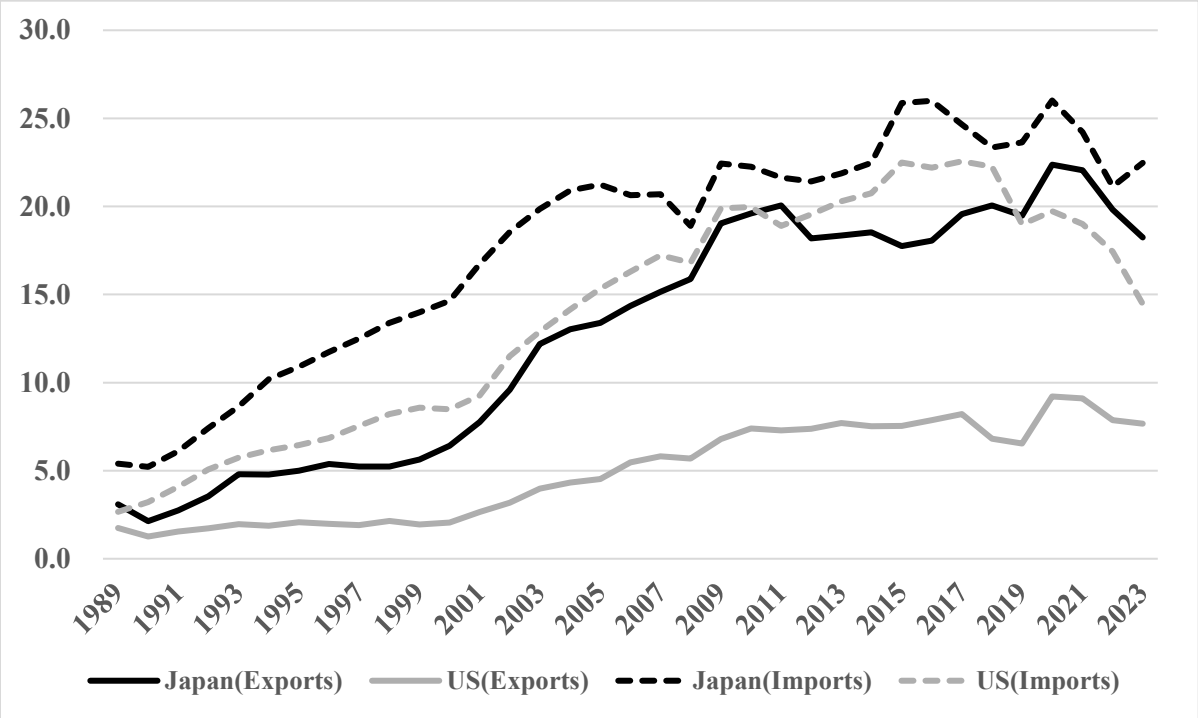
3.1. Quantitative analysis: Dependence on China for trade and foreign direct investment (FDI)

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 face 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 on China given the experience of China's 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 U.S. for comparison). 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 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 U.S. trade.

Figure 1 Share of China in Overall Trade for Japan and the U.S. (%)



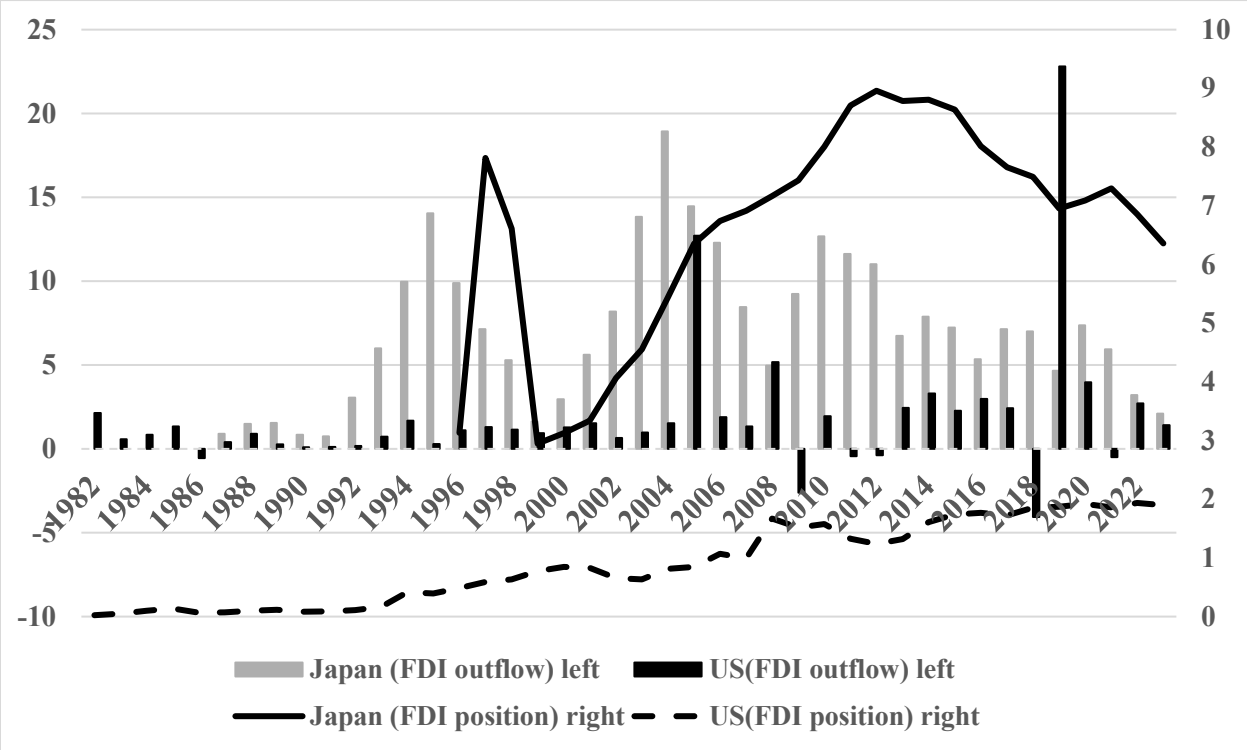
Source: Authors' calculations using data taken from StatsAPEC, https://statistics.apec.org/

Japan's dependence on China for its import supply is very high. An examination of 4,344 HS 6-digit products indicates 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 of 567and 221 for the U.S. and Germany, respectively (METI, 2024a).

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 devices (66.6%), and lithium-ion battery (66.1%) (METI, 2022). 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 for 2017-2022 period, China is the number one source of imports for 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. Some of these concentrated markets are likely more contestable than others and potential alternatives and elasticities of substitution need to be studied. 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 outflows and outward FDI stock. FDI outflows show substantial fluctuations 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 a FDI destination (JBIC, 2023). The decline in the share of China in Japan's FDI can be explained by a decline in China's growth rate, increases in China's wages, and increases in uncertainty due to geopolitical tensions. In contrast, the share of China in the U.S. outward FDI stock, which is significantly lower compared to Japan, continued to increase albeit at a slow rate (BEA, 2024a).

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



Sources: Authors' calculation from JETRO (2024) and U.S. Bureau of Economic Analysis (2024a)

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 firms rose rapidly from almost zero in the early 1990s to approximately 15% by late 2000s and maintained that level through the early 2020s (METI, 2024b)). The corresponding pattern for the U.S. firms shows similarity but at lower magnitude, registering 6.7% in 2022 (BEA, 2024b).

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 U.S.-China conflict, are prominent: the potential escalation of the situation surrounding Taiwan (64.3%), a strengthening trade-related regulations by China (58.2%), and a strengthening restriction on China by the U.S. (57.3%). The Russia-Ukraine war and the conflict in the Middle East ranked lower at 36% and 23.2%, respectively. These findings indicate two different kinds of concern by the Japanese firms: stable supply of important products or resilience of supply chains; and restrictions 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 (2024). 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 KPMG (2024), 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%)" (JCCI, 2023). The proportion of reshoring is greater for SMEs, compared to large firms.

Firms rely primarily on two approaches to protect technology: the treatment of employees with access to technology and the treatment of business partners involving technology. On the former, METI[7](2024c) 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

[7] METI (2024c) prepared a report, which contains several specific firm cases obtained from interviews, to provide assistance to private firms in dealing with economic security.

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

, Large firms are interested in and have good understanding of the Economic Security Promotion Act, while small firms' interest and knowledge is limited (JCCI, 2023). The proportions of firms that indicate they are "not knowledgeable nor interested" are 60% and 25% for SMEs and large firms, 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 an 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%), the recruitment and development of capable human resources (33.5%), and commitments by top managers (23.5%). METI (2024c) 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 were to prepare and provide 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.

4. Semiconductor Industrial Policies

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% in materials and 32% in manufacturing equipment (WEF, 2023).

Japan went from holding a share of 50.3% of the global semiconductor industry in 1988 to around 10% by 2019. Between 1978 and 1986, Japan's market share in Dynamic Random-Access Memories (DRAMs) rose from under 30% to roughly 75%, largely displacing U.S. market share which fell from 70 to 20% in that period (Tyson, 1992). Under the threat of U.S. 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% in Japan for U.S. firms and Japan imposing a voluntary export restraint (Irwin, 1996). The 1986 Agreement was challenged by the European

Union and found in violation of General Agreement on Tariffs and Trade (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 its 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 research and development (R&D) investment and to divest from either design or manufacturing (Tomoshige, 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. Success would contribute to the Liberal Democratic Party's (LDP's) goals of strategic autonomy and strategic indispensability for Japan. The *new* industrial policies (and what differentiates them from previous MITI 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. Old industrial policy had clear targets or goals in the process of catching up to the technological frontier, whereas the new industrial policy does not have clear or explicit targets beyond becoming strategically autonomous and indispensable. 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.

4.1 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 the three years to April 2024 which is the equivalent of 0.71% of gross domestic product (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% of U.S. GDP (Ogawa, 2024). 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 (Economist Intelligence Unit, 2024).

These large subsidies to revive the Japanese semiconductor industry are in the context of record public debt in Japan with gross debt at around 260% of GDP, the highest in the world by some margin.

Over half of the Japanese government subsidies have gone to two initiatives: Taiwan Semiconductor Manufacturing Company (TSMC) (1.2 trillion yen) and Rapidus (920 billion yen). TSMC established a semiconductor fabrication facility in Kumamoto, the southwestern most of Japan's main islands, known as the 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. These subsidies collectively aim to create an ecosystem in Japan to support a vibrant semiconductor industry, led by Rapidus and TSMC.

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.

4.2 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 (2021) argues 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 minimize 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 (Incoronato and Lattanzio 2024). Industrial policies can dampen decline in manufacturing jobs (Criscuolo et al. 2019). 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.

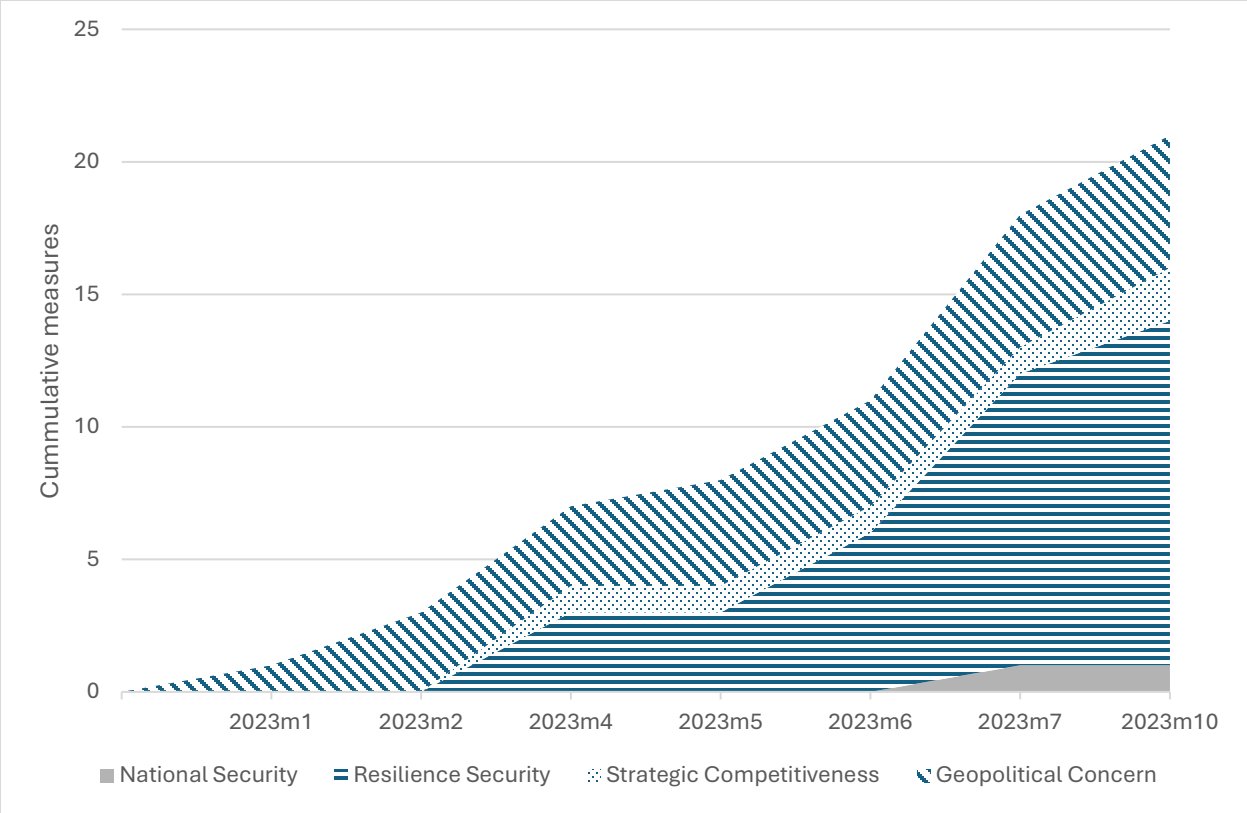
Japan has the capacity to once again become a major semiconductor manufacturer. There are strengths and weaknesses in Japan's ecosystem. Japanese companies are global leaders and play an important role in materials and equipment supply in global semiconductor supply chains. Japanese research capacity in its universities, research institutes, and companies may be relatively latent compared to other countries and when Japan dominated global markets in the 1980s but is likely to be given a significant boost from the national efforts led by the subsidies. Japan has a high-skilled workforce, but the challenge will be mobilizing a workforce in the context of acute labor shortages.

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 is explained by METI's (2021) Strategy for Semiconductors and the Digital Industry as needing to "ensure Japan remains strategically essential and strategically independent amid the conflict for technological hegemony between the U.S. and China". U.S.-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) run 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 data in Evenett et al. (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.

5. 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 U.S., EU, Korea, Australia in the forms such as the Indo-Pacific Economic Framework for Prosperity (IPEF) and the Quadrilateral Security Dialogue (QUAD), while carrying out nimble diplomacy vis-à-vis China to avoid confrontation. Preservation, management, and promotion of a rules-based international trade and investment system may contribute to achieving these objectives and promoting economic growth by expanding trade and investment.

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.

It is too early to provide an overall evaluation of Japan's economic security strategy. When the new policies mature, it will be possible to carefully elucidate their costs/benefits and tradeoffs. Central to such assessment will be the impact of economic security on economic welfare. Revamped government tools of regulation and promotion will alter economic rules and market incentives for investment, innovation, and supply chain management. Equally significant will be the fate of the international economic order in the midst of an economic security turn. Leadership will be judged by the ability to show self-restraint in invoking national security exemptions in order to preserve a rules-based system.

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