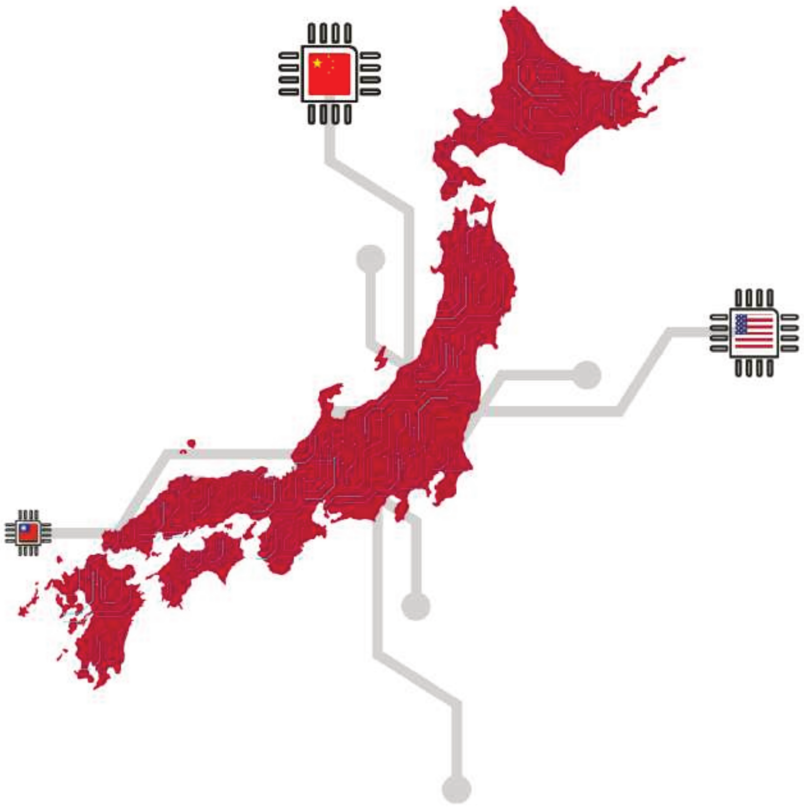
Micro-processing export-controls

The Japanese semiconductor industry's attempt to reconcile domestic capabilities with an increasingly securitised international setting.



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I would like to thank the three persons I interviewed for this report as well, for their knowledge allowed me to understand concepts and dynamics in a way that would have been unmatched otherwise.

At last, I would like to express the dearest feelings to my family and friends. Their unwavering support, love and belief is a fortune I reflect on every day. A particular note goes to my father, whose assistance and insight for this work I appreciated a lot.

Contents

Glossary

This glossary includes the currencies, acronyms and Japanese expressions used throughout this report.

- Currencies and exchange rate:

AUD: Australian Dollar (AUD 1 = USD 0,64 = JPY = 93,2)

EUR : Euro (EUR 1 = USD 1,13 = JPY 163,5)

JPY: Japanese Yen (JPY 100 = USD 0,69)

USD: United States Dollar (USD 1 = JPY 145,4)[1]

- Acronyms:

AIIB: Asian Infrastructure Investment Bank

BIS: Bureau of Industry and Security

BRI: Belt and Road Initiative

CPU: Central Processing Units

CPTPP: Comprehensive and Progressive Agreement for Trans-Pacific Partnership

CRM: Critical Raw Material

DoC: Department of Commerce

DRAM: Dynamic Random-Access Memory

EAR: Export Administration Requirements

ECRA: Export Control Reform Act

EUV: Extreme Ultraviolet

FDI: Foreign Direct Investment

FDPR: Foreign Direct Product Rule

FYXXXX: Fiscal Year

IC: Integrated circuits

IDM: Integrated Device Manufacturing

KYC: Know Your Customer

METI: Ministry of Economy, Trade and Industry

[1] All exchange rates have been retrieved on the 5th of May 2025 on Xe. https://www.xe.com/currencyconverter/

NATO: North Atlantic Treaty Organisation

NEDO: New Energy and Industrial Technology Development Organisation

POM: Polyoxymethylene

PRC: The People's Republic of China, China

R&D: Research and Development

RCEP: Regional Comprehensive Economic Partnership

REE: Rare Earth Element

SME: Semiconductor manufacturing equipment

SSWP: Specified Skilled Worker Program

TSMC: Taiwan Semiconductor Manufacturing Company

US: The United States

WTO: World Trade Organisation

- Japanese expressions:

一般包括許可: General Bulk License

株式会社: Joint stock company

吉田ドクトリン: Yoshida Doctrine

産業に必要不可欠な産業のコメ: Essential rice for all parts of the industries

特定包括許可: Specific Bulk License

日本国とアメリカ合衆国との間の相互協力及び安全保障条約: Treaty of Mutual Cooperation and Security between Japan and the United States

Sponsor

This policy report has been ordered by Rapidus 株式会社 Incorporation in January 2025 with an expected delivery date in late April 2025. Rapidus Incorporation ('The company') is a conglomerate formed by eight major Japanese companies i.e. Denso, Kioxia, MUFG Bank, NEC, NTT, SoftBank, Sony, and Toyota in August 2022, supported by the State[2]. The company's aim is the mass production of 2nm logic chips for 2027. Rapidus is the Japanese arm to boost its domestic capabilities, as planned by the government through the Economic Security Protection Act of May 2022. This report will assess the international setting of the semiconductor industry and its changing nature in order to establish proposals for lobbying strategies towards the Ministry of Economy, Trade and Industry (METI) and ways for improvement regarding the company.

[2] *The Japan Times*, "Sony and others to make extra investments in Rapidus", 29th of September 2024. https://www.japantimes.co.jp/business/2024/09/29/companies/sony-others-extra-investments-rapidus/

Executive Summary

Caught between the United States and China in a particularly strategic area of their confrontation - the microchip sector - Japan has been facing growing pressures from the two. Though it managed to balance these tensions to its advantage so far, the country must urgently gain leverage and strategic assertiveness in the sector to remain autonomous. Rapidus' order for this report comes at a critical moment to grasp the international environment that trickles down on the Japanese national semiconductor industry.

Over the last 3 three years or so, Japan has been pouring billions of dollars in its domestic microchip sector, Rapidus being at the forefront of this initiative. The microchip industry is highly capital-intensive, latest innovations are at the peak of human capabilities and thus require large investments to be sustained. Given their dual-use nature, microchips are strategic items on which States rely to be competitive on the international stage. Securing their supply encompass economic, security, and technology-related stakes, which translates in a manufacturing process established in mutual interdependencies, spread out throughout the world. This is especially complex due to the ideological discrepancies that divide the upstream (raw materials essentially) from the downstream part of the production chain (innovation, design), between authoritarianism and liberalism respectively.

Considering the geoeconomic competition that takes place in the industry, where companies project State power on the supply chain, government interventions have been a major steering arm of the industry. This has been the case back when Japan was perceived as a threat for leading it, and now, with China contending the US technological supremacy. Behind the wheel, American extraterritorial law has been pushing allies and rivals to reorganise their supply chains, rethink their partnerships. US export controls reach beyond national territory, individuals or products, to a degree unmatched prior to the 2022 Foreign Direct Product Rule update, specifically designating advanced semiconductor-related items.

Through the prism of Japan, the Sino-US rivalry prompts instability and uncertainty on deeply rooted conceptions and relationships. With China, Japan has maintained a strong economic bridge to defuse tensions, both bilateral and regional. Whereas since the Second World War, the US has been Japan's security provider, and the two country share ideological

conceptions. Given Tokyo's geographical, industrial and political setting, it is essential to maintain close ties with the two countries. Now that Japan can no longer - at least significantly less for now - sell the most advanced products to China because of the application of US extraterritorial law, the equilibrium is put at risk. Japan is pulled closer to the US sphere of influence while being driven further apart from China, potentially resulting in Japan being caught in the crossfire of its two main partners' competition. Overall, the rivalries and frictions involved in the microchip industry have triggered its growing securitisation, a dynamic that is not yet completed.

In that context, Japan has quite managed this issue, taking advantage of its position to levy its exports in the microchip sector at the same time as containing China's rise at a distance thanks to extensive US export controls. Far from being in a comfortable position, Japan's capacity to sustain a form of strategic autonomy relies on the results of a coordinated approach to meet its objectives in the microchip sector, involving its national companies and the State participation in and out of the country. Japan's current momentum in the sector could be used to hone its strategy further. Based on the conclusion of this report, Tokyo could find a sustainable position on the microchip supply chain by fostering a securitised industry in an open, international structure.

Bearing in mind the above axiom, the recommendations of this report are threefold. Rapidus should aim at building up an edge over the worldwide competition by securing human resources and private investments. A strong financial and know-how base to start the production with would ultimately encourage future qualitative innovation and market share. To support the Rapidus project, the METI could create more solid synergies in R&D through education, national information sharing among corporations of the sector and infrastructure integration of the latter to promote the two while limiting the costs. Benefiting from a history of industrial coordination, Japan can rely on the porosity between its national champions and public institutions.

By stepping in the traceability process of microchip exports when companies may be less inclined to do so, the Japanese State could protect its global domestic initiative further. Beyond a very detailed cartography of the supply chain, blockchain technology would insulate the Japanese industry from an economic-warfare use of US extraterritoriality to a greater extent. Paradoxically, the protection from Chinese interference would take a very

different approach. Tokyo could strengthen its interdependencies with China in targeted segments of the supply chain, i.e. legacy chips, while promoting dialogue and a more sequenced set of export control. Eventually, Japan's particular position is putting stress on its microchip industry though, although it can be an opportunity around which to redefine its conceptions of its two main partners so as to sustain its role in the technological leadership contest and the world order.

Introduction

At the start of April 2025, Rapidus Incorporation announced the launch of its 2nm pilot line in its IIM-1 plant in Chitose, Hokkaido. This announcement matches the calendar announcements made by the company two years ago down to a T. In late 2022, Rapidus estimated the start of its pilot line in the "latter half of the 2020s"[3]. Two months later, the company announced its prototype was due in 2025[4] and respected its commitment. While other countries with more resources at hand are struggling to be up to date, Japan appears to manage efficiently its national strategy of recovery in the semiconductors' market. The United States is currently seeing up to a two-year delay in the construction of a Taiwan Semiconductor Manufacturing Company (TSMC) plant in Arizona[5] which was expected for 2026 and is unlikely to see the light of day before 2028. In the meantime, a similar project by TSMC in Japan has started mass production of microchips in December 2024 and a new one is being set for 2027[6]. As the semiconductor industry has undergone seismic changes since the Covid-19 pandemic, with major shortages during lockdown, leading to a 26% decrease in automobile production in the first nine months of 2021[7] as well as growing governments' concern regarding their reliance on other countries for their supply of microchips i.e. translated through massive subsidies plans and the securitisation of their national industry, Japan's ongoing efforts seem rewarded. This therefore raises questions as to what makes the country able to manage its timeline according to plan, since others, who to some extent compete with Japan, do not necessarily achieve such prowess. It is especially surprising as the Japanese position on the international supply and value chain is

[3] Rapidus Incorporation Press release, 13th of December 2022, https://www.rapidus.inc/en/news_topics/information/ibm-and-rapidus-form-strategic-partnership-to-build-advanced-semiconductor-technology-and-ecosystem-in-japan/

[4] Rapidus Incorporation Press release, 28th of February 2023, https://www.rapidus.inc/en/news_topics/information/rapidus-selects-chitose-city-in-hokkaido-for-its-new-state-of-the-art-semiconductor-plant/

[5] Michelle Toh, "TSMC says its $40 billion chip project in Arizona faces a further delay", *CNN*, 19th of January 2024. https://edition.cnn.com/2024/01/19/tech/tsmc-taiwan-arizona-project-delay-intl-hnk/index.html

[6] *Kyodo News*, "TSMC begins mass production at 1st Japan chip plant in Kumamoto" 27th of December 2024, https://english.kyodonews.net/news/2024/12/2c5684e2454d-tsmc-begins-mass-production-at-1st-japan-chip-plant-in-kumamoto.html

[7] *JP Morgan Press*, Supply Chain Issues and Autos: When Will the Chip Shortage End?, 18th of April 2023, https://www.jpmorgan.com/insights/global-research/supply-chain/chip-shortage.

facing some major strains from its two main partners, the People's Republic of China ('China') and the United States, which this report will assess.

Microchips are a vital component of the world's economy, being part of every electronic and digital device one can think of, from fridges, phones, planes, cars, cloud infrastructures to missile guidance systems and the tackling of climate change in a digitalised economy[8]. Microchips, or integrated circuits (ICs), are electronic circuits etched onto a semiconductor material, often silicon or gallium, to perform functions through the passing, or not, of an electric current via the transistors (Lee, T.H., 2002). These microchips can have various degrees of advancement, depending on the size of their nodes varying from 2nm to more than 50nm, which ultimately translates in the processing power or storage capacities of the device[9]. Though it may be counter-intuitive, the smaller the node, the greater the performance. With growing automation and digitalisation, microchips play a central role in both horizontal and vertical concentration of means of production: they are both part of a finished product and a part of the instrument allowing the product to be finished[10]. In Japan, the recent refocus on the industry is brought with a form of doctrine-like view of what microchips bring to the economy. They are seen as the "rice of the industry, essential and irreplaceable to all industries (産業に必要不可欠な産業のコメ)" which recalls national survival and pride[11] with a symbol familiar to all.

On a macro perspective, microchips are related to how States conceive their power in relation with time. Since the best chips enable the fastest processing of information, they foster a certain edge when it comes to power dynamics, hence their strategic nature (Verhagen, P., 2023). Their volume in trade is also significant, with an estimated total sale of USD 630,5 Billion (JPY 9,3 trillion) in 2024, a 19% increase from the previous year[12] which

[8] Reinsch, William A *et al.,* Securing Semiconductor Supply Chains: An Affirmative Agenda for International Cooperation. Center for Strategic and International Studies (CSIS), 2022.
[9] Semiconductor Industry Association (SIA), 2024 Factbook, Sarah Rav, 14th of May 2024. https://www.semiconductors.org/wp-content/uploads/2024/05/SIA-2024-Factbook.pdf .
[10] Reinsch, W. 2022.
[11] Duchâtel. M, « Racing for the New Rice - Japan's Plans for Its Semiconductor Industry ». Institut Montaigne, 2021.
[12] Peterson, Dylan. Semiconductor Industry Association (SIA), "Global Semiconductor Sales Increase 19.1% in 2024; Double-Digit Growth Projected in 2025, Semiconductor Industry Association.", February 7, 2025.

underlines the growing demand while stressing the global acknowledgement of countries aiming at securitising their supplies. As eluded previously, microchips are by nature, and *de facto* exploitation, technologies used for both civilian and military purposes, thus making them dual use items[13]. Whether microchips are incorporated in civilian or military equipment is quite hard to determine since the military uses a wide range of chips (from cutting edge ones to 'legacy', older, ones) requiring features called field-programmable gate arrays (FPGA), enabling resistance to high altitude, radiation and a certain knowledge of the product to ensure its reliability[14]. In that sense, a company like TSMC produces chips, including advanced ones, that respond to orders from Apple Inc. orders as well as the US Department of Defense[15] for instance. In a context of rising tensions on the international stage, the use of microchips subsequently raises national security concerns, as suffering the irony of a rival using one's chips to deter one's capacities must be avoided. In the Western world, these national security concerns are, to an uneven extent, shared as the rise of China poses threats to the domination of the western-led world order[16].

These concerns do materialise empirically, with systemic changes in international trade affecting global supply chains of microchips and beyond. Translating the shift from a 'purely' economic concern to a national security one, the concept of friend-shoring – and its manifestation- unveils the recent dynamics reshaping the international economy of scale[17]. Friend-shoring describes "the relocation of manufacturing, supply chains, or both away from China and other geopolitically risky countries to friendlier ones[18]". This dynamic, though recent, is progressively asserting itself on the international stage, as pointed out by

https://www.semiconductors.org/global-semiconductor-sales-increase-19-1-in-2024-double-digit-growth-projected-in-2025/.

[13] Reinsch, W. 2022.

[14] Shivakumar, Sujai, and Charles Wessner. "Semiconductors and National Defense: What Are the Stakes?", June 2022.

[15] *Ibid.*

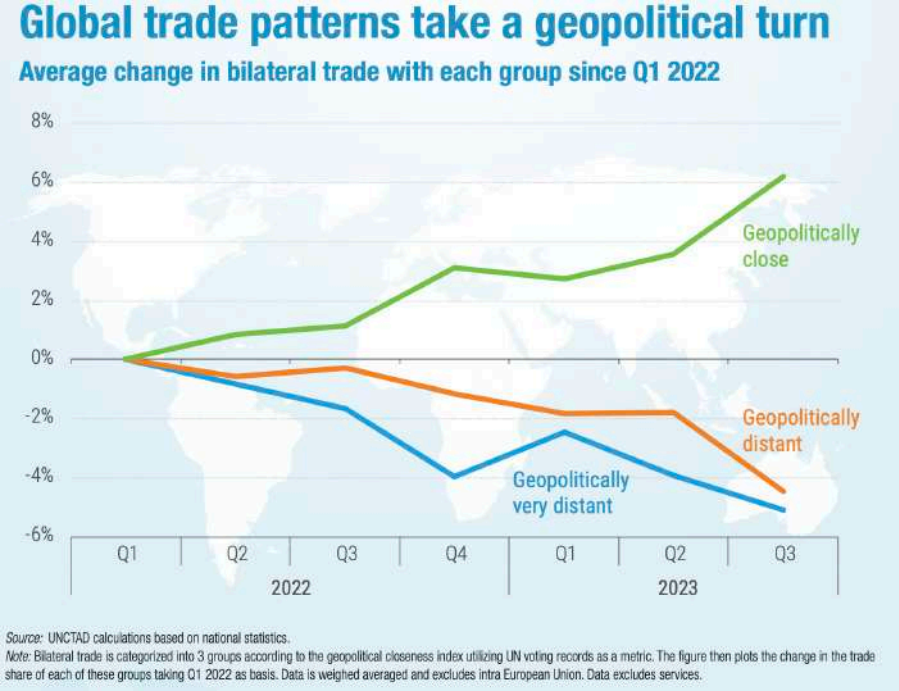
[16] "2023 REPORT to CONGRESS, U.S.-CHINA ECONOMIC and SECURITY REVIEW COMMISSION ONE HUNDRED EIGHTEENTH CONGRESS, FIRST SESSION," November 2023. https://www.uscc.gov/sites/default/files/2023-11/2023_Annual_Report_to_Congress.pdf.

[17] Braw, Elisabeth. *How to "Friendshore."* American Enterprise Institute, 2023.

[18] *Ibid*. p1.

the following graph[19]. Its assertion also takes place discursively, where leaders call for the "de-risking"[20] of China, a sign that the friendshoring trend is part of political agendas.

Table 1



The above graph clearly shows how, in the last three years, systems of values have penetrated the world economy to replace the pure pragmatism of economic exchange, with a 6% increase in trade from countries with like-minded partners and a 4% decrease with rather incompatible partners, from an ideological perspective. In that sense, States are willing to bear the additional costs that may occur by trading with less competitive countries if they reduce geopolitical uncertainties and the risk associated. Being highly strategic, the friendshoring trend is particularly visible in the semiconductors' industry and relevant when it comes to looking at the structural changes in semiconductors' supply chains in the

[19] UNCTAD, Global Trade Update December 2023.
https://unctad.org/system/files/official-document/ditcinf2023d3.pdf

[20] Ursula Von der Leyen's speech to the Mercator Institute for China Studies and the European Policy Centre on the EU-China relations, 30th of March 2023.
https://ec.europa.eu/commission/presscorner/api/files/document/print/hu/speech_23_2063/SPEECH_23_2063_EN.pdf

world[21] . The western world is looking to de-risk China and build a community supporting the resilience of the industry's supply chain.

Yet, the friendshoring trend of integrated circuits' manufacturing does not come easy, especially for Japan. First of all, the industry is particularly fragmented over the world with highly specialised companies playing a monopolistic role in niche parts of the complex manufacturing process[22], like AMSL (photolithography) in the Netherlands, IBM (R&D in design) in the United States or Tokyo Electron (etching and cleaning) in Japan. It is ultimately quite the challenge to build alternatives, in particular on the upstream part of the manufacturing process, where rare earths are essential components. China – and some authoritarian African countries- largely dominate the rare earths market, hence the difficulty to friendshore the whole manufacturing process[23]. In the microchips industry, friendshoring thus requires more assertive tools given the complexity of the industry and its strategic nature. The most prominent tool is probably the United States' export controls, which applies extraterritorially[24].

In short, the US extraterritorial law - through the Foreign Direct Product Rule, the *de minimis* rule, and sanctions (Entity List) – allows the United States to control the exportations of foreign companies based on the assumption that their products were made with US technology, components or persons[25]. This tool has been used extensively since the start of the Sino-US trade war in 2018[26]. The US is using extraterritoriality to force companies not to sell their advanced semi-conductors or equipment related to China and ultimately shape the contours of friendshoring in the industry. Export regulations have put a lot of stress on the Japanese microchips' industry supply and value chains since the

[21] Gupta, Manya, and Arnav Sharma. « Article: Friendshoring and Reshoring Semiconductor Supply Chains: US CHIPS Act and the Multilateral Trading System ». Global Trade and Customs Journal, vol. 19, no Issue 3, March 2024, p. 160-71.

[22] *Ibid.*

[23] Teer, Joris, *et al.,* "Fragile Balance: The Semiconductor and Critical Raw Material Ecosystem." *Reaching Breaking Point: The Semiconductor and Critical Raw Material Ecosystem at a Time of Great Power Rivalry*, Hague Centre for Strategic Studies, 2022, pp. 7–26.

[24] Benson, Emily, *et al.,* "United States Perspective: Export Controls as an Instrument of Foreign Policy." *The Post-October 7 World: International Perspectives on Semiconductors and Geopolitics*, edited by Gregory C. Allen, Centre for Strategic and International Studies (CSIS), 2023, pp. 48–55.

[25] *Ibid.*

[26] Ragul, P., "US-China Trade War: AN EXPLANATION." World Affairs: The Journal of International Issues, vol. 27, no. 4, 2023, pp. 34–61.

country enjoys both a strong commercial relationship with China in that field and a strong bilateral tie with the United States.

Facing an important risk - almost existential one - to its broader economic sovereignty and having once been the leader of the microchips' industry, Japan has started, with its Economic Security Protection Act of 2022 to reorientate its industrial policies towards the sector.

These "targeted government actions"[27] aimed at promoting the increase of capabilities in the semi-conductor sector are taking the features of a coordinated industrial strategy where various policies support the State's goal[28]. Though Japan has been aggressively supporting its microchip industry for the last 3 to 5 years, every country which have some stakes in the industry have been too, whether it is the US, China, European Union, South Korea, India, Malaysia or Mexico. This global shift aiming at increasing domestic production may ultimately result in a zero-sum game where countries have excessive capacities of production compared to the international demand, leading to a "general glut" and lower prices impeding on the return potential of these national initiatives (Jonsson, P.O., 1997). In order to make sense of the various dimensions that either justify or stress Japan's microchips industrial revival, this report will use sources from institutions and governments –notably Japanese- to grasp the stance of the State, academic references to position such stance in broader, structural implications for the international system, legal sources to make sense of the regulatory environment stemming from US extraterritorial law, sources from think tanks to build from the look of experts and corporate sources to understand how – and to which extent – national companies are affected by the aforementioned issues.

Overall, this literature provides the knowledge necessary to grasp the configuration of Japan's double dilemma, being torn between its closest ally (US), which pressures its domestic initiatives with export controls and a key market (China), which is also a threat for Japan's security. This leads to infer the following question, which will drive the analysis of this report:

[27] Alvis, Sam, *et al.,* "UNDERSTANDING INDUSTRIAL POLICY AND INDUSTRIAL STRATEGY." *MAKING MARKETS IN PRACTICE*, Institute for Public Policy Research (IPPR), 2023, pp. p.7.
[28] *Ibid.*

How does Japan reconcile US extraterritorial semiconductor export controls with its economic ties to China while reviving its own domestic industry?

The first part of this report will assess the reversing dynamic ongoing in the semiconductors' industry for Japan, which translates in growing securitisation of the market to project national security measures (I). The second part will tackle the US extraterritorial law being the main driver of this shift and its implications for the Japanese State and its companies on their supply chains (II). The third one will demonstrate how Japan has created opportunities to balance the exogenous strains on its domestic industry so far, though unlikely to remain so (III).

Methodology Outline

This report will mix both qualitative and quantitative methods.

Concerning qualitative methods, this piece of writing will dive into primary sources as well as academic and grey literature from legal, economic and international relations' publications, originally in English, French, and Japanese (translated in English). This piece of writing will also entail a particular focus on the annual reports of major Japanese companies of the sector, looking at their financial returns at crossing points as well as the evolution of the wording when it comes to geopolitical risks. I will offer throughout this report an analysis of the global supply chain of the microchips' industry with many graphs and visualisations of the sort to support the clarity of my analysis. While conducting my research for this topic, I have also relied on interviews to benefit from the views of experts. I have engaged in three interviews, one with a scholar specialised in the geoeconomics of technology and the Sino-US trade war; another with a professional from the public sector who helped in establishing France's doctrine in the industry and a last one with a professional from the corporate world who works in a major company of the industry, particularly impacted by US' export controls.

On quantitative methods, this report will rely on an analysis of Japanese exports of semiconductors-related products that I have conducted with the country's customs' database (*cf.* Appendix for the particular methodology of the analysis and its results). This report will also use an external quantitative analysis on the effects of port disruptions, assembled by the International Monetary Fund and the University of Oxford[29].

This topic is particularly dear to me as it mixes personal interests with professional orientation. Being fascinated by Japan, its culture and language, the choice of country is no coincidence. I am also keen on learning more about international economics and regulatory frameworks, which this topic required me to do quite thoroughly.

[29] University of Oxford; IMF PortWatch (portwatch.imf.org).

CHAPTER I. Japan's past struggle with the fragmentation of the industry and its strategic response to the securitisation of supply chains in an antagonistic world order.

A. Globalisation and US extraterritorial influence dismantled Japan's semiconductor dominance through industry fragmentation and increased competition.

a) The current use of US extraterritorial law was first designed to contain Japan's dominance in integrated circuits' manufacturing in the 1980s.

Following the Second World War, Japan fell under the control of the United States for 4 years so that the US could implement the administrative, economic and political base of the liberal, democratic model it was voicing in the world. As Japan was on the defeating side, and shocked by the US atomic bombing of two major cities, the country let go of its defense through a constitution that forbad – and still does to some extent- the Japanese State to nurture an offensive army[30]. The Japanese government endorsed the Yoshida Doctrine (吉田ドクトリン) as it delegated its defense to the United States and decided to focus primarily on its economic reconstruction (Hoshiro, H., 2022). This set the scene for Japan's economic miracle following the adoption of the San Francisco Treaty (1961) that declared Japanese sovereignty over the archipelago (*Ibid)*. The following years, Japan operated its economic shift towards a developed economy, to an extent that raised some concerns on the other side of the Pacific. Partly to contain such a rise and limit US' investments in the defense of allies, Japan included, Richard Nixon developed the Guam doctrine[31]. The latter voiced the US' willingness to commit to its allies' defense to a more limited extent, as

[30] Prime Minister's Office of Japan. "The Constitution of Japan, Article 9, Chapter 2," May 3, 1947. https://japan.kantei.go.jp/constitution_and_government_of_japan/constitution_e.html.

[31] Kimball, Jeffrey. "The Nixon Doctrine: A Saga of Misunderstanding." Presidential Studies Quarterly, vol. 36, no. 1, 2006, pp. 59–74.
The main rationale behind the doctrine was the financial and military stress poised by the Vietnam War on the United States, containing Japan was a very secondary objective at the time though the doctrine was a benchmark in that regard.

“America cannot - and will not - conceive all the plans, design all the programs, execute all the decisions and undertake all the defense of the free nations of the world. We will help where it makes a real difference and is considered in our interest”[32]. For Japan, this implied that the focus on economic development only was no longer possible, and that the country had to integrate more defense into its programs, though it did not manifest immediately. Indeed, by the 1980s, Japan enjoyed a strong leadership in the semiconductors industry with an estimated 45% of the world’s total exports[33]. Besides, Japan’s overall trade balance with the US was highly positive, with a 15 billion dollars surplus in 1981, counting about 860 million dollars for electronic components, systems and equipment[34].

This was in part due to a strong government support of the industry linked with dumping measures (tariffs, trade barriers) which the United States saw as unfair practices allowing Japan to have an edge on a strategic field[35]. Japan has a history of coordinated industrial policies, where the Ministry of Economy, Trade and Industry (METI) used to be in charge of the state-led economic development through the centralised control of national banks to pilot industrial expansion[36]. Such an approach eventually came into friction with the US free-market model. So, in reaction to Japan’s anti-free market approach, the US imposed anti-dumping measures and a 20% market share provision for foreign companies with the 1986 US-Japan Semiconductor Agreement (Baldwin, R.E., 1994). Additionally, the US created the Committee on Foreign Investments in the United States in 1988 to supervise mergers, acquisitions and buy-outs threatening national security[37]. All in all, the US used its national laws as a tool to tackle its lack of competitiveness compared to the Japanese market on the international value chain, with national security as a justification. This allowed American companies to progressively get an edge in this market, eventually penetrating it and competing directly with Japanese companies, regardless of the former

[32] Nixon’s address at Guam in 1969, "Foreign Relations of the United States, 1969–1976, Volume I, Foundations of Foreign Policy, 1969–1972, Document 60". Office of the Historian, Foreign Service Institute, United States Department of State. 18 February 1970.
https://history.state.gov/historicaldocuments/frus1969-76v01/d29

[33] Suzuki, Kazuto, *et al.,* “Japanese Perspective: Japan Embraces Its Strategic Indispensability in Alliance with the United States.” CSIS), 2023, pp. 19–24.

[34] Walsh, John. “Japan-U.S. Competition: Semiconductors Are the Key.” Science, vol. 215, no. 4534, 1982, pp. 825–29.

[35] Suzuki, K., *et al.,* 2023.

[36] S. Lechevalier, A. debanes *et al.,* Financialization and industrial policies in Japan and Korea Evolving complementarities and loss of institutional capabilities, 2016, EHESS Fondation France-Japon.

[37] de Catheu, Louis and Velliet, Mathilde. « Capitalismes politiques : la Guerre de Quarante Ans ». *Le Grand Continent*, July 2023.

government support they received. In that sense, the Japanese alliance with the US for security guarantees constrained its economic development by exposing it to economic coercion. This sheds light on the ambiguities of the US as a partner for the topic, where autonomy is the trade-off of protection.

This rivalry between the US and Japan has had long-lasting effects on Japan's microchips' industry. A very concrete example is the US' photolithography R&D partnerships with the Dutch company ASML in the 1990s. The US preferred the Netherlands because companies like Nikon and Canon in Japan had fallen out of favour with the US following the trade war (Miller, D., 2023). More than thirty years later, ASML has one of the biggest European stock market valuations (3rd in 2024 with a 329 billion dollars market cap)[38]. Ultimately, Japan is more than familiar with the pressure US laws can have on its domestic industry. This particular position and historic experience with US extraterritoriality are unique when it comes to semiconductors, which is something the METI can benefit from now. Indeed, some of the US tools used to tackle Japan's unfair practices are now used against China.

The blow taken by Japan in its semiconductors' trade war with the US resulted in the country's progressive decline in the industry. In 2023, Japan had only a 10% market share[39] of the microchip business for the country did not manage to adapt to the fragmentation of the industry, driven partly by US' extraterritorial influence on the Japanese monopoly.

b) *Japan transitioned from integrated dominance to peripheral specialisation as it failed to adapt to the worldwide fragmentation of the semiconductor industry.*

With the Japanese semiconductors' industry opening to foreign companies, more broadly to the competition on international markets, the METI-led economic development showed signs of weakness (Baldwin, R.E., 1994). As it protected Japanese companies from exogenous competition, the Japanese approach to its industrial policies hardly fostered resilience and adaptability. Companies were not pushed to constantly adjust to the changes

[38] Gaudiaut, T. (2024). Infographie : Les entreprises européennes les mieux valorisées. Statista Daily Data. https://fr.statista.com/infographie/30756/entreprises-les-mieux-valorises-en-europe-capitalisations-boursieres-les-plus-elevees/

[39] Suzuki, K., *et al.,* 2023.

of international demand and market directions[40]. With the US' economic coercion and forced opening to free-market practices, the manufacturing process of microchips shifted. Japanese companies were neither prepared nor willing to position themselves where it mattered, lagging behind the competition when they finally were.

Driven by US' influence, two major changes occurred in the industry in the 1990s. First, Japanese companies failed to recognise the progressive shift from dynamic random-access memory (DRAM) chips to central processing units (CPU)[41], Toshiba leading the market in the first and Intel, the second. The 1990s saw major instabilities in the DRAM market, leading to Toshiba selling its American DRAM-specialised subsidiary in 2001 to Micron technologies[42]. Due to the blow suffered by the US-Japan trade war, this innovation came at the wrong time for the Japanese leadership. Second, the manufacturing process of semi-conductors became increasingly fragmented, with complex supply chains divided all around the world, which Japan failed to adapt to[43]. The industry went from an integrated device manufacturing (IDM) model to a foundry/fabless model in the same decade; with globalisation and increased division of labour, the manufacturing process of microchips specialised, especially since the costs of development were and still are increasingly high, making the industry very difficult to enter and therefore more rational to specialise in a targeted segment of production.

The IDM model consists in the concentration of the different steps of production in the same company while the foundry/fabless model corresponds to various companies specialising in a particular part of the manufacturing process (Xiong, W., *et al.,* 2024). Japanese companies were notably strong in the first model of production, with national flagships such as Hitashi or Toshiba which have taken a step back in their monopolistic situation of the 1980s. Foundry/fabless companies are today's most prominent – and strategic firms- such as TSMC for the manufacturing of chips only or IBM for design. The following graph represents the two models, with each square representing a company:

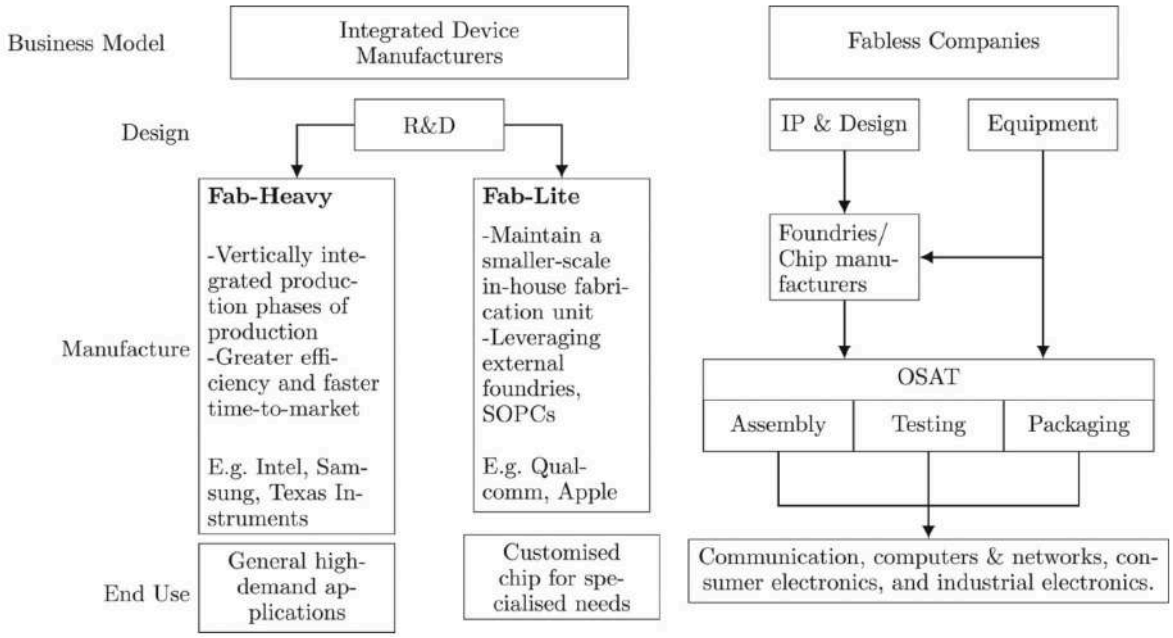
[40] *Ibid.*

[41] Future Horizons, Report: The Market Structure and Competition in the memory (DRAM) Industry to the European commission, 26th February 2002,

[42] Ken Benson, New York Times, Toshiba Will Abandon Commodity Chip Business, 19th of December 2001. https://www.nytimes.com/2001/12/19/business/toshiba-will-abandon-commodity-chip-business.html

[43] Suzuki, Kazuto. The Japanese Semiconductor Renaissance: Will It Be Successful?, The National Bureau of Asian Research (NBR). March 2025.

Table 2



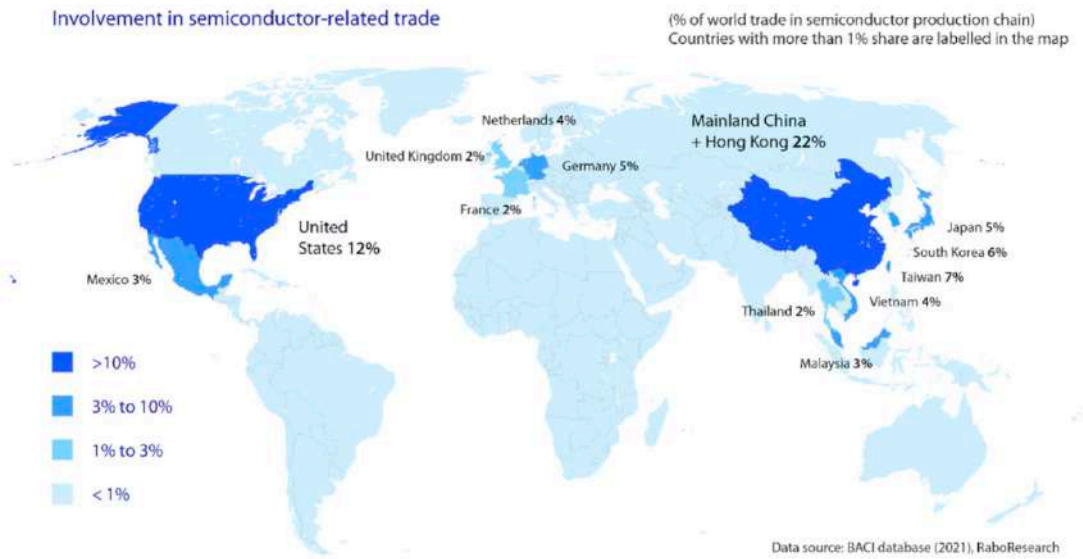
Xiong, W., *et al.,* 2024

This shift from horizontal concentration of labour to its horizontal division manifested through the offshoring of the industry[44]. As low skilled workers could be found elsewhere for a lower price, the competitiveness of IDM companies decreased rapidly. Taiwan for instance became a hub where companies could outsource the manufacturing of their microchips, leading to TSMC now producing half of the world's microchips[45].

With the offshoring of the industry, supply chains have become not only more complex but more global as well, with countries from all around the world playing strategic roles in the making of integrated circuits. The global and complex nature of the semiconductors' industry supply chain can be best summarised by the following graphs:

[44] Brown, C., & Linden, G., Offshoring in the Semiconductor Industry: A Historical Perspective. UC Berkeley: Center for Work, Technology and Society, 2005.
https://escholarship.org/uc/item/1t74114g
[45] *Ibid.*

Table 3



This graph indicates the extent to which east Asia is strategic for the industry, showcasing the present nature of the topic for the international order and the centre of gravity of states' interests[46]. Given the high capitalistic intensity of the semiconductors' industry, where large R&D investments are required to keep up to date with technical progress, east-Asian countries benefit from an edge in the industry due to a bottleneck effect of some well-established companies, with resources and extensive know-how of their field, thus creating high barriers of entry for newcomers in the market (Qiao, G., and Lu, Y., 2024). This calls for a short assessment of where Japan is currently strategically located on the supply chain, after having been set back by the US-led fragmentation of the industry.

Japan currently relies on external partners for its R&D and Design, being a few years late when it comes to the latest progress which impedes on the production of advanced microchips domestically[47]. Yet, Japan is very well-placed concerning semiconductors' manufacturing equipment (SME) with advanced machines that fuel its exportations, from

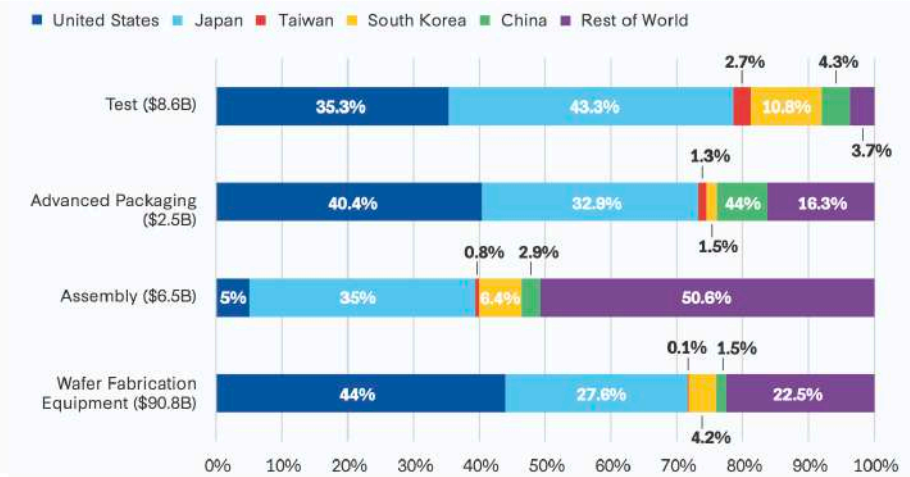
[46] Please note that the relative low representation of Taiwan in this graph is related to the fact that Taiwan produces foreign companies' chips, ultimately being underrepresented as these chips also count for these countries.

[47] Reinsch, William A., 2022.

companies like Tokyo Electron for instance[48]. The following graphs illustrate Japan's position compared to international competition in SMEs:

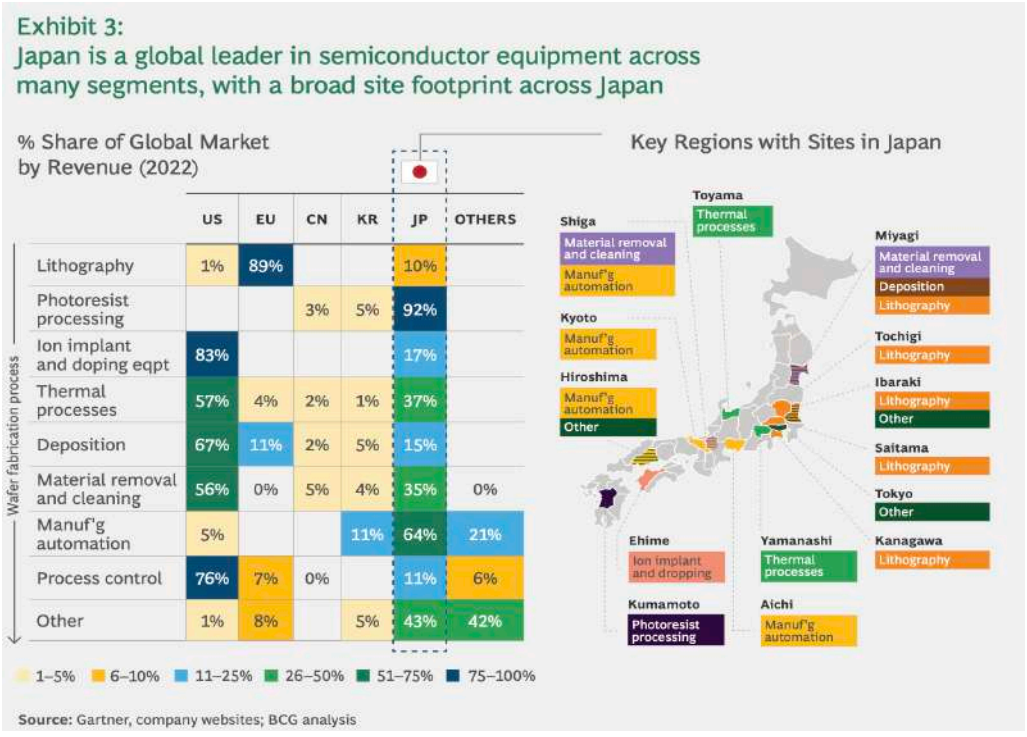
Table 4

Figure 6: SME Market Share by Company Headquarters (2021)
By SME category



Source: CSIS analysis; "Semiconductor Equipment Database," TechInsights.

Table 5



Source: Gartner, company websites; BCG analysis

[48] Akhil Thadani, Gregory C. Allen, 2023, Mapping the Semiconductor Supply Chain.

Japan has about a third of all types of SMEs sold on the market, from testing, advanced packaging, assembly to wafer fabrication equipment. The country is now looking to expand its areas of strengths, with the support of the industry's supply chain segments where it is already positioned. This will be tackled in the following part.

c) *Japan's reviving of its domestic semiconductor production reflects a broader securitisation trend, yet it confronts the entrenched interdependence that structures the industry.*

Among the many countries capitalising on their stakes in the semiconductors' industry to securitise their domestic supplies and benefit from a strategic leverage or independence on/from international markets, Japan is the biggest investor in proportion of Gross Domestic Product (GDP) with about 1% of its GDP being allocated to the industry[49]. In 2023, Japan had already allocated USD 25,7 billion (JPY 3,9 trillion) to its domestic boots[50]. In November 2024, the government announced an additional USD 65 billion (JPY 9,2 trillion) spread over the next 5 years[51]. Japan is, to a new degree, coming back to its coordinated industrial strategy roots with large amounts of subsidies to support *ex nihilo* domestic capabilities in advanced chips manufacturing – as well as the industry's segment where it lags- and to attract foreign companies[52].

As mentioned previously, the creation of the consortium of the country's electronic industry flagships -Rapidus- is at the forefront of the Japanese initiative. Having been selected by the Japanese New Energy and Industrial Technology Development Organisation (NEDO) in 2022 to benefit from State support[53], the company will have secured USD 6 billion (JPY 886 billion) in public investments between FY2022 and FY2024[54]. Japan's State support and involvement in its domestic industry can be best visualised with the next graph:

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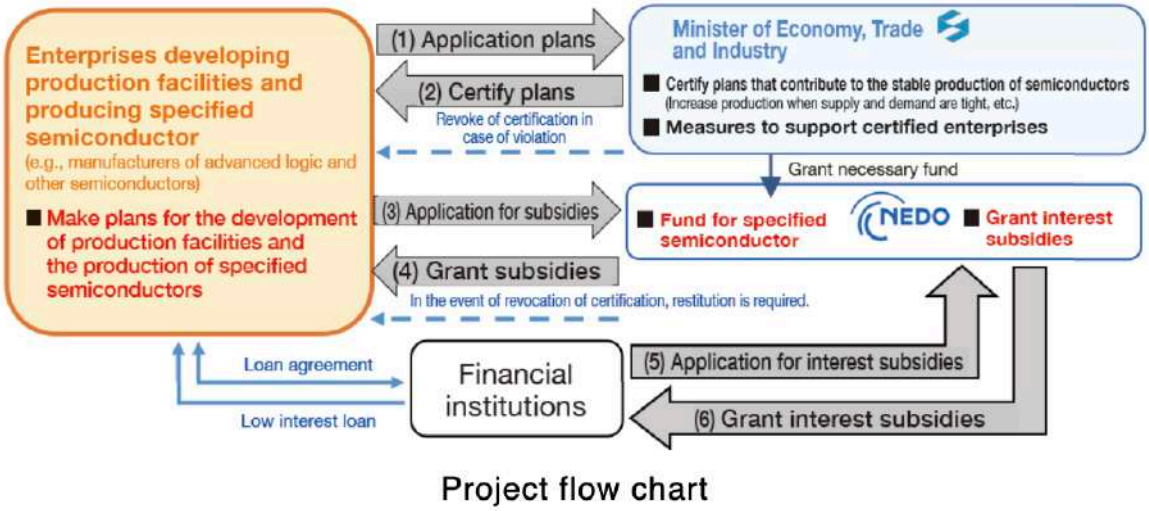
[49] Duchâtel. M, 2023.
[50] *Ibid.*
[51] Reuters, "Japan unveils $65 bln plan to aid domestic chip industry", Takaya Yamaguchi and Leika Kihara 11th of November 2024.
https://www.reuters.com/world/japan/japan-propose-65-bln-plan-aid-domestic-chip-industry-draft-shows-2024-11-11/
[52] METI, Outline of Semiconductor Revitalization Strategy in Japan, July 2024, Commerce and Information Policy Bureau.
https://www.meti.go.jp/english/policy/0704_001.pdf
[53] *Ibid*, slide 15.
[54] *Ibid*, slide 15.

Table 6



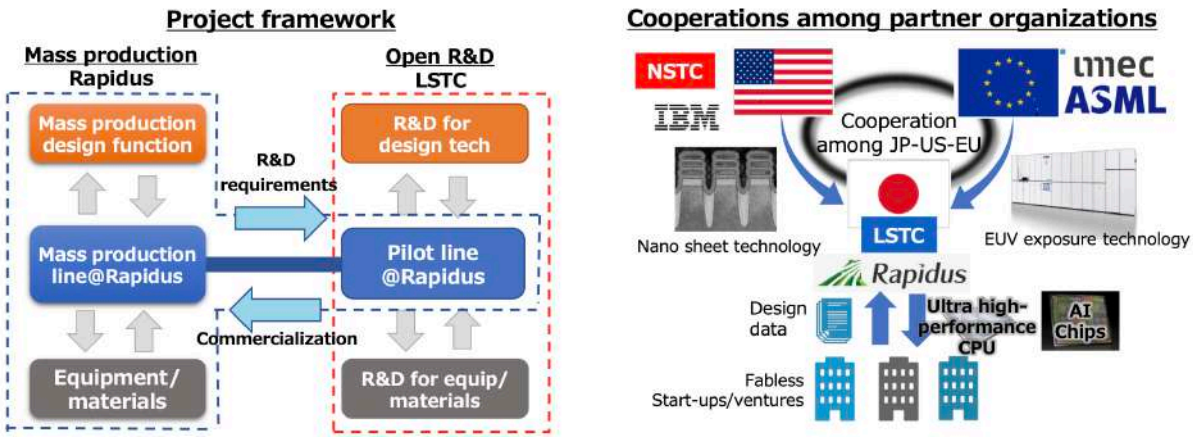
Project flow chart

METI, Outline of Semiconductor Revitalization Strategy in Japan, July 2024, Commerce and Information Policy Bureau.

The company is chaired by an experienced professional of the industry, former CEO of Tokyo Electron while it manages to secure key partnerships to meet its ambition, together with regional initiatives for human resources, national and international for broader support[55]. In 2024, Rapidus secured private investments from Toyota and Sony, amounting to USD 51 million dollars (JPY 7,3 Bn)[56]. Regarding foreign companies' investments and partnerships, a year after IBM announced its 2nm node prototype in 2021, Rapidus secured a partnership in R&D with the US design firm[57]. In December 2024, Rapidus also received ASML's Extreme-Ultra-Violet (EUV) NXE:38003 photolithographic machine to start its prototype line: a major, if not indispensable step in growing domestic capabilities with cutting edge products. Rapidus' ambition to build domestic capabilities with international support can be visualised as follows:

[55] *Ibid*, slide 20.
[56] Government of Japan, Kizuna : Japan's Pursuit of a Game-Changing Technology and Ecosystem for Semiconductors, March 1st of 2024.
https://www.japan.go.jp/kizuna/2024/03/technology_for_semiconductors.html
[57] IBM Newsroom, announcement for strategic partnership with Rapidus Inc.

Table 7



METI, Outline of Semiconductor Revitalization Strategy in Japan, July 2024, Commerce and Information Policy Bureau.

Besides, Japan has managed to attract new TSMC facilities on its territory. In 2021, TSMC opened its 3DIC R&D centre in Ibaraki, securing USD 400 million (JPY 59 billion) in public investments[58] while a new plant opened in December 2024 in Kumamoto. All in all, it appears Japan is on the right tracks to achieve success in bringing back its supply chain on national soil; the government is providing the means while national corporations join the initiative and manage to attract international ones onto the archipelago. Still, these initiatives are being matched by other competitors in the industry. The supply chain is not only being securitised but progressively nearshored on domestic territories.

As the Sino-US rivalry strongly impacts semi-conductors' supply chains, stakeholders try to take an edge in the industry. The United States have passed the CHIPS and Sciences Act in 2022 to allocate USD 52 billion in subsidies for their national industry to reinforce domestic capabilities, decouple from China and maintain their technological leadership[59]. The European Union has equipped itself with its own Chips Act, providing EUR 43 billion[60] while South Korea expects 153 companies investing a total USD 450 billion in the country. In China, a similar dynamic is on-going with USD 94 billion in public funds having been poured in its

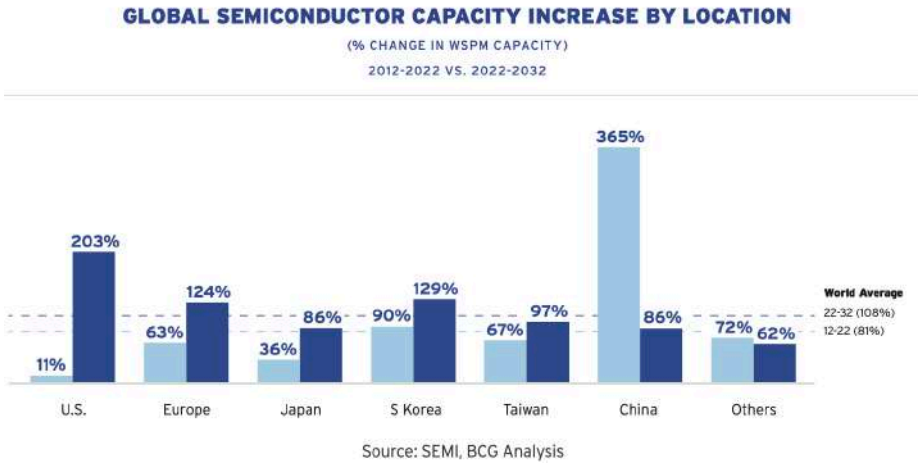
[58] Reinsch, William A, 2022.

[59] European Strategy and Policy Analysis System (ESPAS), Global Semiconductor Trends and the Future of EU Chip Capabilities, 2022.

[60] This figure comprises undisclosed private investments, which is not the case for the US figure.

domestic industry between 2014 and 2024[61]. The rationale of China is that of the opposite of the US', i.e. gaining technological leadership over the US by increasing R&D and manufacturing capacities, as well as expanding intellectual property to dominate the sector. The graph below sums up the various national efforts taken to boost domestic industries, and the projected efforts onwards:

Table 8

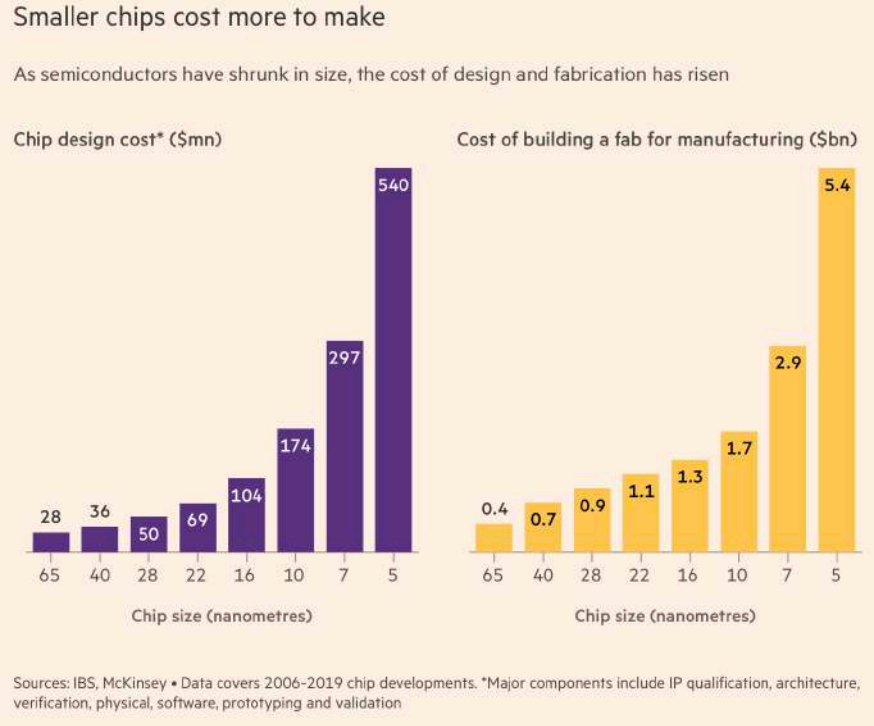


Echoing the world's map of semiconductors stakeholders[62], this graph shows the extent to which the main actors of the sector are leading this dynamic compared to the rest of the world. It also underlines the degree of inflation when it comes to securitising and nearshoring the supply chain, as these initiatives are copied by various each's counterparts. The recent intensification of this dynamic in the semiconductors' industry creates a lot of friction and paradoxes. As the sector is highly intensive in resources (financial ones as well as human), leading companies are well-rooted in supply chains and they benefit from the growing support of the State in which they are headquartered, pointed out by the initiatives mentioned. Catching up these companies ultimately takes a lot of time: building infrastructures to start the production of microchips or equipment targets a particular level

[61] *Op. cit.,* p.8.
[62] P.14 of the report.

of advancement while during that time, already-established companies keep on progressing towards new technologies, having already supported the upfront costs of original construction and increased their knowledge of the market and innovation-related fields[63]. This issue can be best summarised by the following graph:

Table 9



This therefore raises questions regarding the realism of policy makers aiming at domesticating the semiconductors' supply chain. Every stakeholder – i.e. the US, China, Japan, EU, South Korea and the likes- is competing on the international stage to become progressively autonomous in the various segments of integrated circuits manufacturing, from fabs, to equipment, design and R&D. From a political economy perspective, it therefore seems that the international structure of the supply chain is unlikely to change: the competition remains rather distributed over the world and is only intensified in terms of figures and state involvement.

[63] *Financial Times,* Inside the miracle of modern chip manufacturing, Lucy Rodgers, Dan Clark, Sam Joiner, Bob Haslett, Irene de la Torre Arenas, and Sam Learner, 28th of February 2024. https://ig.ft.com/microchips/

The economic paradox surrounding the growing state-involvement in the microchips industry calls for a broader assessment of the ongoing structural change in the world order and the role of the industry in such a transformation, which the next part will tackle.

B. States claim their control over microchip supply chains as geopolitical tensions redefine globalisation.

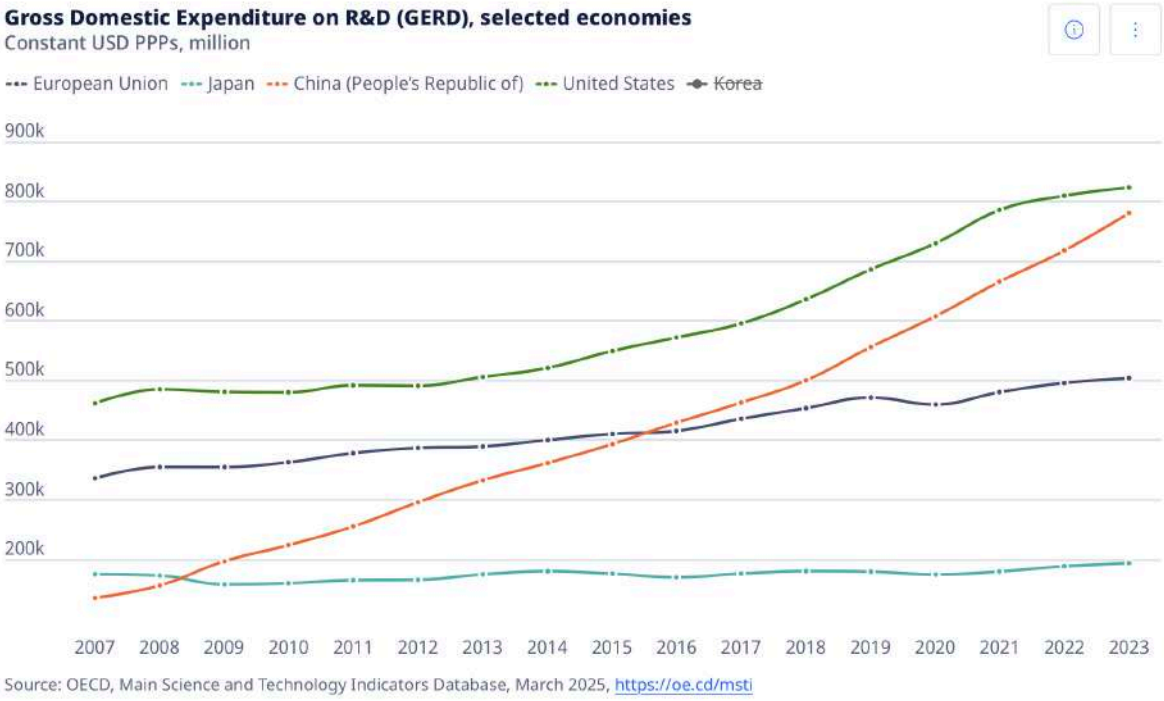
a) *Securitisation is penetrating the liberal paradigm of international relations and trade amidst power rivalry between the US and China.*

The bilateral relationship between the United States and China has been filled with growing frictions, tensions and competition over the last 10 years or so, affecting the setting of the international world order with growing contestation of its US-led nature (Bukovansky, M. 2017). As a matter of fact, the US has also adapted to this and progressively changed their type, and method of leadership, which the semiconductors' industry embodies. Although globalisation has fostered assumptions regarding the role of non-State actors in shaping interdependencies rather than States themselves, the recent shift in global trade – and particularly when it comes to strategic goods like microchips – has proven otherwise. The structure of international trade seems to go back to being determined by the power and interests of States looking to maximise their national goals on the world stage (Krasner, S.D., 1976), as demonstrated by the various initiatives to support domestic production of ICs. Moreover, the concept of geoeconomics is particularly relevant for the topic given the structural dynamics passing through the international order: States rely on their national companies – and interact with them, using levies such as subsidies or export controls- to accomplish their national security objectives (Lorot, P., 2009). The US-led international structure of trade is now surging to de-risk China and contain the latter's rise, as it is the cornerstone of US' foreign policy actions (Bukovansky, M. 2017). This results in major

frictions on that structure, since China is actively aiming at overcoming these barriers to its ascent.

China's ambition on the international stage have been supported by wide-reaching initiatives. Through the Belt and Road Initiative (BRI) and the Asian Infrastructure Investment Bank (AIIB), China offers assertive alternatives to post-WWII liberal institutions, both on a regional and international scale (Khobragade, V. & Avneet Kumar, N., 2021). The US on the other hand, as a liberal country, have imposed sanctions and tariffs on China, 25% in 2018 then 145% in 2025[64], inducing changes of conceptions and means to protect the liberal world order. As a matter of fact, China is closing in on the US, which is particularly visible in R&D spendings as shown by the following graph:

Table 10



In 16 years, China's spendings in R&D have gone from a USD (Constant, PPPs) 340 billion gap to a 20 billion gap, a figure that should be linked with the growing securitisation of the

[64] The Guardian, April 2025, China manufacturing activity plummets amid Trump tariff war.
Please note that these tariffs, though significant, do not apply on every good.

microchips' industry, induced by the United States fear of China's increasing capabilities and its implications for "its" world order.

Innovation is inherent to the microchips' market, thus making it a central concept to understand the interactions between the industry and the broader structure of world trade. Innovation is innately uncertain, filled with tensions as it may correspond to a gamble on what the future will hold for mankind (Jalonen, H., 2011). The state associated with innovation, where known and unknown variables come together, create frictions when they are met with States' political agendas (*Ibid.)*. Innovation – as a concept – contributes to shape the geopolitical landscape where rising tensions bend the structural setting of States' interactions. Furthermore, the microchips' industry is central to most aspects of what makes a State powerful i.e. trade, security, defense, technological leadership and communication (Gilpin, R., 2001). This contributes to explaining why the Sino-US rivalry is particularly keen in the semiconductors sector[65]. In that sense, through the prism of international relations, economic security fuelled by autonomy in the semiconductors' supply appears to be rational for each State, and particularly pressing in the Japanese case. Located about 600 kilometres from China's eastern coast, perceived as its main threat (Aoyama, R., 2023), Japan has a complex history in the East-Asian region. Once looking to be the region's hegemon (Babicz, L., 1994), Japan has put these aspirations aside[66] and relied extensively on the US for its national defense since WWII, eventually becoming one of the most prominent recipients of the world order's liberal structure (Hughes, C. W., *et al.,* 2007). This position has fostered Japan to be one of the pioneers in economic security these recent years, amid increased geo-economic uncertainties in the region and the world, with the Economic Security Promotion Act (2022) being a key step in that regard. Japan takes an active role in the securitisation of international trade, with sensitive technologies (i.e. integrated circuits) being a pillar of its focus[67]. It is important to note that economic security is not protectionism, as the former relies on multilateralism to enforce and strengthen such security with partners in order to make it real[68].

[65] Daniel Miller, Chip War: The Fight for the World's Most Critical Technology, 2022.
[66] Japan's role in international affairs remains significant and subtle but discussing that would be out of the topic.
[67] Ryo, R. Ward, A. Sakaki, F. Ghiretti, International Institute for Strategic Studies, Japan's Economic-security and Sensitive-technology Policy, January 2025.
[68] *Ibid.*

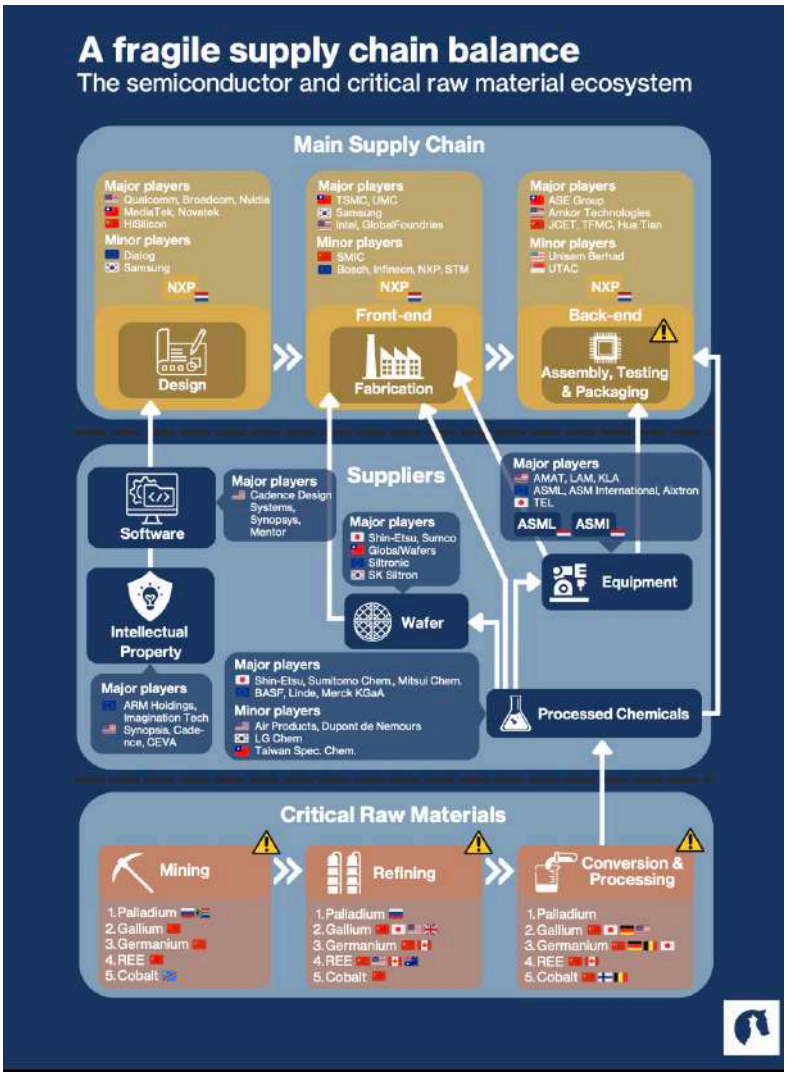
Eventually, the frictions on the structure of the international order are pushing the boundaries of national security, where the concept is expanding to a greater degree of flexibility and greater areas of States' core interests; an expansion that may impede on achieving economic security over time.

b) *With resources and innovation further apart on the political spectrum of the semiconductors' supply chain, friendshoring does not appear to foster long-term resilience in the sector.*

The upstream part of semiconductors' – and ultimately microchips – manufacturing requires the use of critical raw materials (CRM) with semiconductor attributes, such as silicon, gallium or germanium. Some of these materials are referred to as rare earths elements (REE), they are the ones responsible for the current passing or not essentially[69]. These CRM play a key role in the ecosystem of microchips' supply, being strategic themselves due to their use in advanced technologies (Hongwei, Z. *et al.,* 2022). In this context, the upstream and downstream part of the microchips' market are unequally distributed on the ideological spectrum. The upstream part is highly dominated by authoritarian, non-western States while the downstream part (i.e. manufacturing, design, assembly, packaging) is largely controlled by democratic, western(-ised) States, which the subsequent table clearly pictures:

[69] Teer, Joris, *et al.,* "Fragile Balance: The Semiconductor and Critical Raw Material Ecosystem." Reaching Breaking Point: The Semiconductor and Critical Raw Material Ecosystem at a Time of Great Power Rivalry, Hague Centre for Strategic Studies, 2022, pp. 7–26.

Table 11



Teer, Joris, *et al.,* 2022, p10.

The microchips' industry's supply chain structure has a strong ideological dimension, which intrinsically fosters additional frictions and reduces the likeliness of long-term friendshoring feasibility in the industry. With countries looking to boost their domestic industries and reach the 2nm threshold, the consumption of CRM and REE is set to increase drastically. The use of 2nm logic nodes in microchips requires more mask layers (so they can be small and perform) to a point where such a shift may increase the US' total material consumption by 60% in the coming years[70]. With that in mind, China dominates the market of CRM to a

[70] Bill Wiseman, Henry Marcil, Marc de Jong, Raphaela, Taylor Roundtree, and Teddy Stopford, McKinsey & Company, Semiconductors have a big opportunity - but barriers to scale remain, April 21, 2025. https://www.mckinsey.com/industries/semiconductors/our-insights/semiconductors-have-a-big-opportunity-but-barriers-to-scale-remain

large extent. Its territory is home to about 50% of the world's known reserves, which have been extensively used to weaponise the market: China controls more than 90% of the world's REE production (Niquet, V., 2011). The following table details the extent of China's hand on CRM and REE[71]:

Table 12

Concentration of materials in top 3 producers, %

[1]Critical concentration is defined as a single producer accounting for greater than 50% of material production in a market in which semiconductor consumption accounts for at least 10–15% of the material's consumption.
[2]Reference for neon because it has the highest share of all noble gases.
Source: C. Reichl and M. Schatz, *World mining data 2024*, Austria Federal Ministry of Finance, 2024; World Population Review

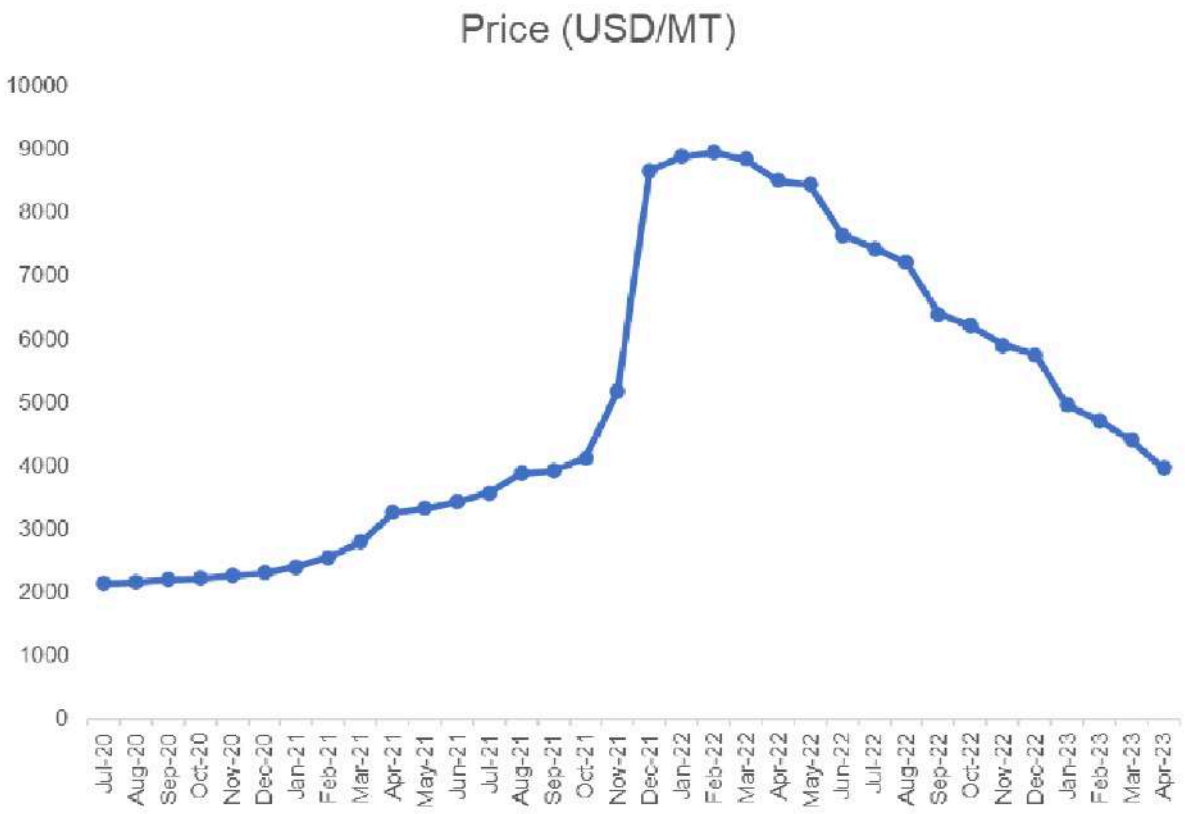
The PRC has used its monopoly in the CRM market as a tool to reach geoeconomic goals by enhancing its control on foreign companies requiring these materials for their production i.e. state of the art technology companies (Niquet, V., 2011). These companies are demanded to transfer their production on Chinese soil as well as their intellectual property, a form of economic coercion that underlines the extent to which the weaponisation of this key industry can be effective (*Ibid.).* For instance, the Japanese chip – and car –

[71] The 71% figure for REE on the graph relates to the share of REE that end up in semiconductors, hence the discrepancy with the 90% figure.

manufacturer Toyota has transferred a part of its hybrid cars production on Chinese territory to avoid disadvantageous quotas[72]. China also benefits from an edge in fixing prices of silicon for instance, which have become highly volatile:

Table 13

Price evolution of metal silicon between July 2020 and April 2023: a sharp rise towards progressive decline:



Gupta, Sadhna. "Exploring the Factors behind Volatility in the Silicon Market." Aranca, April 28, 2023. (https://www.aranca.com/knowledge-library/articles/business-research/exploring-the-factors-behind-volatility-in-the-silicon-market.)

Friendshoring the microchips' supply chain hardly seems feasible when taking into account the upstream part of the industry, especially since catching up with China would take vast amounts of resources (financial and timely): it takes indeed fifteen years between the

[72] *Reuters,* Yukio Inoue, and Julie Gordon, "Japanese Manufacturers Relocate to China." 12th of August 2011. https://www.reuters.com/article/business/environment/japanese-rare-earth-consumers-set-up-shop-in-china-idUSTRE77B3TH/

exploration for CRM and their production (if found)[73]. Overall, the international structure of the industry's supply chain is not only needed to avoid its collapse with a clear cut between up and downstream sections in case of war-like tensions but based on geological distribution which is very hard to mitigate when linked with geopolitical risks.

For Japan, this means that its domestic attempt at bringing back the production of microchips needs to be coordinated with external partners as well, with the aim of building some resilience in its supply chains. Japan has been doing so by extensively engaging with partners to decrease the risks of this critical vulnerability, though US' recent export controls have limited the potential for success using this strategy. The next section will tackle the dimensions of Japan's attempt at securing external supply chains; in order to understand the ambiguous effects of US' extraterritorial law in the following part.

c) *Japan's calling for external cooperation to diversify its semiconductors' supply chain is met with a certain degree of success on a medium-term basis.*

Japan has been particularly active to secure its partners in the segments of the industry where it lacks the most advanced capacities, being ahead of its competitors as it started very early on to engage with external partners. Echoing China's aggressive use of its rare earths' monopoly, Japan had suffered from it fifteen years ago and rapidly adapted to avoid being put through this again. In 2010, the Senkaku crisis occurred when two boats, one fishing Chinese ship and a Japanese coast guarding vessel, collided in the east-China sea, leading to the captain of the first boat being captured by the coastguards aboard the second (Smith, S. A., 2012). China announced countermeasures targeted on Japan to force the liberation of the captain, using a two months REE ban on the archipelago specifically which caused the soaring of prices the following year, up to ten times for certain minerals[74]. Japan ultimately took on long-term actions to reduce its dependency on Chinese REE, going from 90% in 2010 to 60% in 2019 as well as encouraging companies to stockpile their supply (Schmid, M., 2019). Though the 60% figure is still high, it does show the significant efforts undertaken by Japan. As it turns out, Japan recently benefited from luck when it comes to

[73] Teer, Joris, *et al.,* 2022.

[74] Tatsuya Terazawa (2023). How Japan solved its rare earth minerals dependency issue. World Economic Forum.
https://www.weforum.org/stories/2023/10/japan-rare-earth-minerals/.

critical raw materials. An exploration study led by the Nippon Foundation and the University of Tokyo off the shore of the Minami-Tori-Shima Island in 2016 discovered vast amounts of nickel and cobalt in 2024, valued at USD 26 billion (JPY 3,8 trillion)[75]. The next map offers a visualisation of the island's location:

Table 14

This major discovery is bound to affect Japan's conception of its microchips' supply chain and its security. It is a significant aspect of this report, which the recommendations further tackle.

In addition to raw materials, the State of Japan has also committed in multilateral agreements with allies, or at least groups of relatively converging interests. The US-Japan Economic Security Partnership has been a strong driver for cooperation, leading to the US-Japan-Philippines trilateral agreement which focuses on mitigating REEs dependency and

[75] India Defence Review, Japan's Billion-Dollar Breakthrough: The Rare Earth Minerals That Could Rule the World, January 2025.
https://indiandefencereview.com/japans-billion-dollar-rare-earth-minerals/

providing semiconductors manufacturing equipment[76]. Prior to that, the Chips4 group – or US- East Asia Semiconductor Supply Chain Resilience Group – comprising South Korea, the US, Japan and Taiwan was created in 2022 to foster knowledge sharing[77]. This group has yet to prove its capacity to enable more comprehensive partnerships, as the exclusion of China from the multilateral discussions creates dissonance and doubts, especially since east-Asian nations share free-trade agreements with China through the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) or the Regional Comprehensive Economic Partnership (RCEP).

Without mentioning Japan's incitation for partnerships with private companies for its Rapidus project again, it is essential to bear in mind the intellectual property aspect they entail. IBM's strategic partnership with the firm comprises the facilitation of several patents to help Rapidus achieve its 2nm chip production[78]. Going further with strategic partnerships, Japan has been particularly effective in securing one with Malaysia. The two countries' agreement aims at strengthening interdependencies in a context of friendshoring; it is particularly linked with the raw materials processing company Lynas Rare Earths (ltd.) operating in Kuantan[79]. Through public equity firms - Japan Australia Rare Earth BV, co-founded in 2011 by Sojitz Corporation and Japan Organization for Metals and Energy Security - Japan has taken an active role in Lynas' expansion, owning 3.3% of the company[80]. In 2023, the above-mentioned funds have injected an additional AUD 200 million in the company, further contributing to secure a key player in the upstream part of the supply chain[81].

Back on national soil, Japan has also established sets of norms in cybersecurity to protect itself from foreign interference and patent stealing. The regulatory dimension of securing external supply chain actors is key to proof strategic partnerships and the benefits they bring. So, to prevent the leaking of defense and cutting-edge technology, Japan has been

[76] Searight, Amy. Expanding the US-Japan Economic Security Partnership: Engaging Allies and Partners. Atlantic Council, 2024.

[77] Jacobs, Erik. (2022). *Challenges and Opportunities for the 'Chip 4' Group*. Global Taiwan Institute. https://globaltaiwan.org/2022/11/challenges-and-opportunities-for-the-chip-4-group/

[78] Benson, Emily, *et al.,* Securing Semiconductor Supply Chains in the Indo-Pacific Economic Framework for Prosperity: Squaring the Circle on Deeper Cooperation. Centre for Strategic and International Studies (CSIS), 2023.

[79] Please note the company is headquartered in Australia though its extraction plant in Malaysia is the world's second largest after China's (Ismail, T., *et al.,* 2015).

[80] Lynas Rare Earths limited, Annual Report, FY2023.

[81] Lynas Rare Earths limited, Annual Report, FY2024.

imposing more thorough screening measures on international students and researchers (Aoyama, R., 2023.). Yet, Tokyo has been struggling with a more structural dimension of its semiconductor initiative: human resources[82]. Japan's demography is declining, which means that there will be progressively less young and dynamic individuals to drive the nation's industry. Even though the country has been aiming at reversing this dynamic, it has not been met with much success; this is mentioned in the recommendations as well.

Alluding to the change in the structure of international relations, national security issues have penetrated even liberal conceptions of multilateralism, which puts some additional stress - and efforts to support - on the countries aiming to securitise their microchips' supply chains.

Although Japan's commitment to a certain degree of multilateralism has enabled the balance - to some extent - between the securitisation of supply chains through friendshoring, and the increasing of domestic microchips' capabilities without alienating China and risking retaliation, the US' growing concerns for their technological leadership put this fragile equilibrium at risk. The US' use of unilateral measures to contain, if not reverse, China's rise towards a cutting-edge technology industry put great pressure on the Japanese microchip market. These measures are applied through export-controls, which have an extraterritorial dimension to them, challenging Japan's national industry. The following part of this report will deal with the implications for extraterritorial law on the microchips' industry and particularly Japan's.

[82] Ministry of Economy, Trade and Industry (METI). "Third Report of Committee on New Direction of Economic and Industrial Policies." Industrial Structure Council, June 2024. https://www.meti.go.jp/english/policy/economy/industrial_council/pdf/240628001_01.pdf.

CHAPTER II. Whereas the US extraterritoriality redraws the microchip industry's map with thicker lines around China, Japan is exposed to a complex geoeconomic dilemma.

A. U.S extraterritorial law reshapes the microchip supply chain by reaching far beyond American borders, leaving little choice but to comply and compromise autonomy.

a) The US' legal arsenal to regulate advanced technology exports compels a revision of free trade.

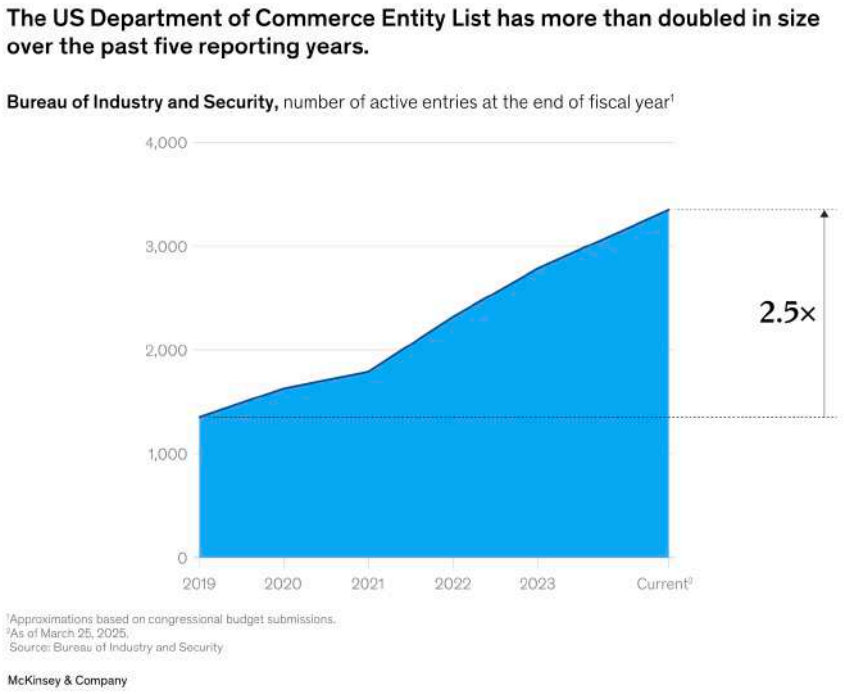
The US has used their extraterritorial influence in the 1980s to fragment the industry and open it to international competition. Now using similar tools though extensively more powerful and far-reaching, they attempt to reverse this dynamic and specifically target China as it is positioned to take advantage of this competition. Yet, extraterritorial law has been used in the past to achieve economic warfare goals (US-Japan trade war for instance) which ultimately sets off ambiguous effects on rivals and allies when used to fulfill vast national security objectives. Considering the international structure of the microchip supply chain, and its strategic nature for States' sovereignty, the "direct regulation of persons – physical or moral – and their conduct outside of the State's border" confers a major advantage on the world stage; this is a power that comes with the US' post-WWII hegemony (Putnam, T. L., 2009, p.459). On the 7th of October 2022, the US drafted its first advanced computing and semiconductor manufacturing items list of export controls specifically targeting China[83]. Since then, these export controls have increased and played a key role in reshaping the dynamics of the industry towards a friendshored system further apart from historical conceptions of free trade,

[83] Bureau of Industry and Security (BIS), Commerce Implements New Export Controls on Advanced Computing and Semiconductor Manufacturing Items to the People's Republic of China (PRC), 7th of October 2022. Office for Congressional and Public Affairs (OCPA).
https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3158-2022-10-07-bis-press-release-advanced-computing-and-semiconductor-manufacturing-controls-final/file

notwithstanding the structural contradictions of such an attempt explained in the previous part[84].

The following table offers a preview of this trend led by the US, where the State gets increasingly involved in its economy:

Table 15



This graph focuses primarily on so called 'Entity List', essentially sanctions, which the United States have deployed against rivals. Though Entity lists are one of the tools of US' extraterritorial law, they are not the most relevant when it comes to showcase the extent of the impact of such law on the microchip supply chain as they target precise end-users. Rather, this report focuses on the two other major rules' implications: the US Department of Commerce's (DoC) BIS' Foreign Direct Product Rule (FDPR[85]), more precisely Advanced Computing FDPR for the topic) and the *de minimis* rule which work in adequacy together[86].

[84] McKinsey, Cindy Levy, Matt Watters, and Shubham Singhal, with Bryce Bittner, Doron Hindin, and Isabella Bennett, Restricted: How export controls are reshaping markets, April 3, 2025. https://www.mckinsey.com/capabilities/geopolitics/our-insights/restricted-how-export-controls-are-reshaping-markets

[85] EAR 734.9

[86] Eileen Albanese, Sharron Cook and Charles Wall, The Foreign Direct Product Rules and De minimis Rules, BIS, 2022.

While the FDPR provides that the use of US content (technology, individuals, patents) in foreign-made items potentially subjects them to US export controls, the *de minimis* rule provides the threshold (in % of end-use item composition) they must meet in order not to be subjected to such export controls (Voetelink, J., 2023). This translates in BIS license requirements for exporting foreign made items to designated foreign countries, based on the level of US' origin in the product, regardless of other States' sovereignty (*Ibid.)*.

Following the publishing of the Advanced Computing FDP rule in 2022, the US has further expanded – and targeted- their requirements with the December 2024 Supercomputer FDP Rule[87]. These rules target the most advanced semiconductors related products, as the rationale behind these extraterritorial laws is the containment of China's technological expansion; China is therefore part of the designated countries (D:5 group) for which a license is required. Though the *de minimis* threshold is in general cases 25% for non-designated countries and 10% for designated ones, the US reserves the right to require export licenses to foreign countries' companies for foreign-made exported items for which there is no *de minimis* subject to the October 2022 rule[88]. In other words, the item is controlled by US' national law whether or not it is linked to the US, based on the assumption that some US-related content must have been used somewhere in the process of developing the item; the US "presence" in the item is there, but not quantifiable[89]. In the 2022 rule, the items targeted for which there is no *de minimis* level for license requirements have to use 14nm non-planar transistor architecture (used for quantum computing) or below and 18nm for DRAM related chips[90]. The 2024 update uses a more specific metric to target the most advanced microchips: the adjusted peak performance which is not to surpass 70 weighted tera flops[91]. In that sense, the US strongly contains the leaking of their own – strategic - products towards their rival China but also their partners', through unilateral action. The use of extraterritorial law by the U.S. ultimately enforces a friendshoring dynamic - not only between the U.S. and its partners, but also within the relationships among those partners themselves, particularly in how they manage ties with

[87] EAR 734.9 (i).
[88] EAR 734.4.
[89] Voetelink, J. (2023).
[90] EAR 734.9 (i).
[91] *Ibid.*

China. This particularly affects a country like Japan with its own, peculiar position and commercial ties *vis à vis* the two superpowers.

Furthermore, license requirements must be complied with, the US supremacy over the financial system through the dollar is so that the risk of sanctions is hardly worth taking (Cipriani, M *et al.,* 2023). As pointed out during an interview with a geopolitical expert working in a major semiconductor related company, "There is no such thing as balancing export controls, we just have to comply with them. When it comes to US export control, a company must comply otherwise it will face some serious problems"[92]. To support these vast export requirements in the microchip industry, the US has created the Supply chain disruption task force to monitor and sequence the coming and going of the microchip trade[93]. Though this led to the world's supplier of microchips stopping its production of advanced products for China since November 2024[94], controlling the destination of every product under such large compliance requirements is very difficult : "For companies like TSMC who sell products but no services, following the entire production chain and having an idea of the origin of the product gets diluted in international trade"[95]. Indeed, TSMC is facing a USD 1 Billion-dollar probe by the US DoC as of April 2025 for having allowed advanced chips to pass the Chinese borders[96].

The US' use of extraterritorial law in the microchip industry raises several concerns: the various initiatives to boost domestic industries worldwide focus on advanced products (as shown by Rapidus mass production of 2nm logic node's goal) manufacturing capabilities, betting on a financial return on these investments, though ultimately prevented – relatively- from accessing a neighbouring 1.4 billion people market.

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[92] interview with a geopolitical expert working in a major semiconductor related company, conducted on the 10th of November 2024. *C.f.* Appendix 1.

[93] Bhandari, Konark. The Geopolitics of the Semiconductor Industry and India's Place in It. Carnegie Endowment for International Peace, 2023.

[94] Kathrin Hille and Ryan McMorrow, "TSMC to close door on producing advanced AI chips for China from Monday", *Financial Times,* 8th of November 2024.
https://www.ft.com/content/a736beeb-b38a-484e-bbe9-98e92ecb66d9

[95] interview with a geopolitical expert working in a major semiconductor related company, conducted on the 10th of November 2024. *C.f.* Appendix 1.

[96] Freifeld, K. "Exclusive: TSMC could face $1 billion or more fine from US probe, sources say." *Reuters,* 9th of April 2025.
https://www.reuters.com/technology/tsmc-could-face-1-billion-or-more-fine-us-probe-sources-say-2025-04-08/.

b) The expanding nature of US' national security puts additional strains for States positioned on the industry's supply chain.

With national security expanding to further parts of States' industrial base – a dynamic led by the Sino-US rivalry and followed by other States – the private sector plays a strategic role in implementing, or adapting to in the case of China, the shift of the semiconductors supply chain in substance and form. Since the start of the Sino-US trade war in 2018, the US has drastically expanded their prerogatives to control US technology exports (comprising foreign-made items for which there is no *de minimis* level as well) (Laïdi, A., 2021). Semiconductors' dual use eventually becomes a pretext to reach beyond strict boarders and notions, using national security to justify economic warfare. For example, the U.S. "9x515" and "600 series" rules provide that a 0% de minimis threshold is sufficient for certain foreign-made military items[97]. However, a similar control logic applies to civilian technologies such as ASML's EUV photolithographic machines (used by Rapidus) or Tokyo Electron's Clean Track Lithius Pro - tools that may, but do not necessarily, have military applications [98] . The absence of clear distinctions reinforces the ambiguity and extraterritorial reach of U.S. controls.

The Export Control Reform Act (ECRA), signed during the first Trump Administration, gives "the government the full power to authorize foreign sales of *fundamental and emerging technologies (Ibid.* p122*)*. Thanks to the lack of clarity behind the meaning of fundamental and emerging technologies, the US has granted itself the discretion for large flexibility to assert their control over foreign-made items[99]. This extensive control stems from the rationale behind extraterritorial law, which aims at avoiding US companies bearing the burden of US national law alone, thus expanding the control on foreign companies and items, which the following extract issued from an interview with a scholar specialised in the Sino-US rivalry, innovation and export controls best summarises:

[97] EAR 734.4.
[98] ECCN 3B993. F-1.
[99] L. Chetcuti, C. Vidotto Labastie and G. Wright, Institut Montaigne Explainer, US extraterritoriality, The Trump Card, 2024.
https://www.institutmontaigne.org/ressources/pdfs/publications/us-extraterritoriality-trump-card.pdf

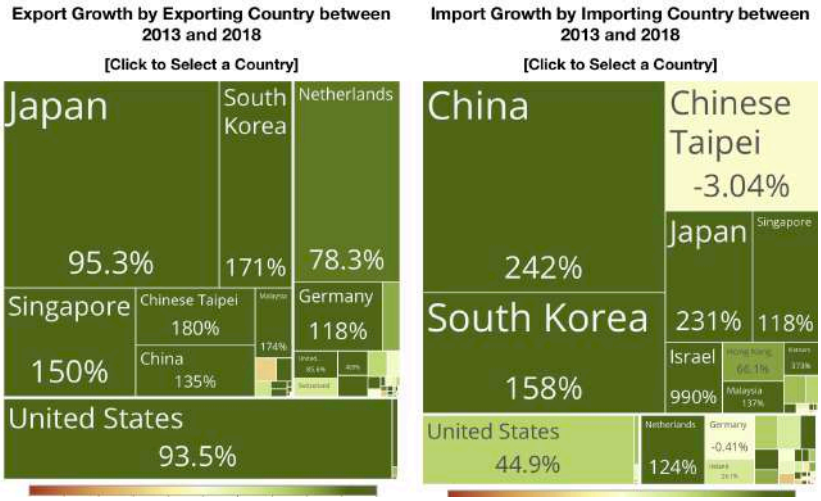
« Je pense que c'est un avantage pour les américains de bénéficier d'une dimension extraterritoriale de leur contrôle parce qu'ils décident unilatéralement de ce que vont pouvoir exporter ou non leur concurrent. C'est donc un avantage ; enfin ça évite un désavantage compétitif de leurs entreprises et c'est clairement l'objectif. (…) C'est exactement au moment où ils ont imposé des restrictions contre Huawei que les entreprises des semi-conducteurs américaines sont allées voir les autorités américaines en disant « vous n'empêchez pas du tout les entreprises étrangères d'exporter vers Huawei et donc on est les seules désavantagées dans cette affaire ». C'est donc pour répondre à ce désavantage compétitif qu'ils ont réactualisé la FDPR. »[100]

As the US use national companies to assert their national security objectives, i.e. containing China, they must make sure changing the rules does not affect their companies only, since it would undermine them. American technological leadership is therefore increasingly significant to national security though increasingly fragile as well, as pointed out by China's closing in on R&D spendings for instance[101]. The enlargement of US control over the microchip industry's trade shapes tangibly its friendshoring dynamic, which the subsequent series of charts of exports and imports of semiconductor machinery[102] show:

[100] Interview conducted with a scholar specialised in the Sino-US rivalry, innovation and export controls on the 18th of February 2025. *C.f.* Appendix 2.
[101] OECD main tracker Science and Technology Indicators database, March 2025. https://data-explorer.oecd.org
[102] These particular commodities seem relevant given Japan's strategic position in the Semiconductor Manufacturing Equipment sector.

Table 16

Growth of exports and imports of Semiconductor Manufacturing Equipment by countries, between 2013 and 2018.



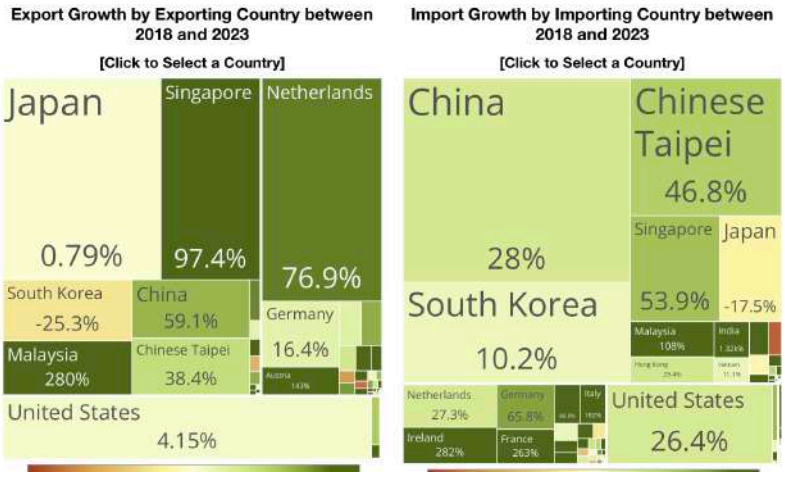
AJG Simoes, CA Hidalgo. The Economic Complexity Observatory, 2011

https://oec.world/en/profile/hs/semiconductor-manufacturing-equipment

The next graph offers a clear visualisation of the drastic shift in trade triggered by the securitisation of the industry's supply chain.

Table 17

Growth of exports and imports of Semiconductor Manufacturing Equipment by countries, between 2018 and 2023.

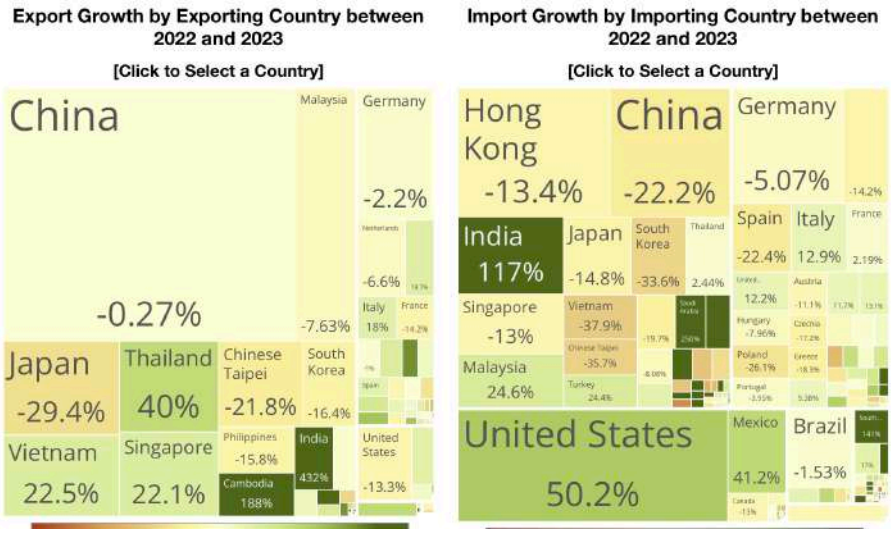


AJG Simoes, CA Hidalgo, 2011.

The trade of SMEs has slowed in a significant way over the period of increased State involvement; a dynamic that has intensified in 2022 following the US' draft of extraterritorial export controls.

Table 18

A closer look at the growth of exports and imports of Semiconductor Manufacturing Equipment by countries, between 2022 and 2023:



AJG Simoes, CA Hidalgo, 2011.

These charts also display another dimension of the implications for US export controls on other States: they experience economic drag due to the imposed constraints. In that sense, US' extraterritorial law puts the supply chain and its resilience at test, among US partners as well[103]. With all strategic players in the microchip supply chain securitising their domestic industries through subsidies, the supply chain itself becomes increasingly fragile and prone to disruption. The shared belief that semiconductors are vital to national security deepens interdependencies while distorting market dynamics - an effect significantly amplified by the extraterritorial reach of US export controls (Jean, S., 2023). All in all, the industry faces greater tension: massive public and private investments raise the financial stakes, while

[103] Lewis, James A. Comments to the Department of Commerce, Bureau of Industry and Security: Advanced Notice of Proposed Rulemaking: Review of Controls for Certain Emerging Technologies. Centre for Strategic and International Studies (CSIS), 2019.

strict compliance with export controls slows growth and reduces flexibility, leaving little margin for mistakes and escalating the overall risks.

The underlying uncertainty from the growing frictions between the jurisdictional, economic and political dimensions of the microchip trade forces Japan – and other States – to navigate this complex landscape carefully, considering its horizontal relations with states and vertical ones with its companies, which the following section will discuss.

c) *The US' pressure on Japan to reproduce export controls hinders Japan's economic autonomy.*

In the manner of US export controls, Japan has adopted, not without constraints, a similar set of national export controls. This is the result of extensive diplomatic actions from the US, which struck an agreement – originally secret- between Japan and the Netherlands in 2023, both major players in the SME part of the supply chain[104]. The two countries agreed to mirror the most significant parts of US legislation on semiconductors in their national regulatory texts. This rises the capacity to control exports, with more countries involved in the process and a closer look at the foreign (from a US perspective) industry reducing the chance for loopholes in the legislation[105]. Following the US' successful attempt at cooperation, Japan drafted a new version of export controls in 2023, closer to that of the US[106]. The METI uses similar licenses for exporting listed items, though less pointing at China[107]. Non-designated countries have to ask for a General Bulk License (一般包括許可) while separate groups of countries, such as China, are required to apply for a Specific Bulk License (特定包括許可)[108]. The next table summarises the conditions for the different types of licenses.

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[104] Allen, G.C. and Benson, E. (2023). Anh Nguyen, European Journal of International Law, December 1 2023 to the U.S.-Dutch-Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight (CSIS). https://www.csis.org/analysis/clues-us-dutch-japanese-semiconductor-export-controls-deal-are-hiding-plain-sight.

[105] *Ibid.*

[106] Amendment to the Ministerial Ordinance Specifying Goods and of Technologies Pursuant to the Provisions Attachment List No.1 of the Export Trade Control Order (ETCO), METI, 31st of March 2023. (https://www.meti.go.jp/policy/anpo/seminer/shiryo/guidance_english.pdf)

[107] *Ibid.*

[108] *Ibid.*

Table 19: Japanese export licenses to group countries.

Type	Description
(i) General Bulk License	A system that comprehensively permits such operations as exporting of relatively low sensitivity goods/technologies to certain combinations of destinations and items, limited to the countries (Group A) set forth in Appended Table 3 of the ETCO
(ii) Special General Bulk License	A system that comprehensively permits such operations as exporting of relatively low sensitivity goods/technologies to certain combinations of destinations and items, including to countries other than those set forth in Appended Table 3 of the ETCO, with the requirement of an export compliance program.
(iii) Specific Bulk License	A system that comprehensively permits such operations as exporting to the same counterparty with an ongoing business relationship

Nakagawa Hiroshige, Matsumto Taku and Zhang Chaopeng, Japan Tightens Export Regulations on Advanced Semiconductor Manufacturing Equipment, Economic Security and International Trade Legal Update, 17th of May 2023.
https://www.amt-law.com/asset/pdf/bulletins5_pdf/230517.pdf

At first, the METI was reluctant to expand its list of controlled semiconductor items drastically and only added 23 new items on its list[109]. Following a visit of the US' previous Undersecretary for Commerce and BIS director Alan Estevez in June 2024, Japan – and the Netherlands – agreed to broaden their scrutiny over exports, with more detailed controls on advanced computing technology[110]. Yet, Japan has maintained that re-exportations (i.e. exporting goods that have been imported) were not to be controlled by the METI, hinting

[109] Nakagawa Hiroshige, Matsumto Taku and Zhang Chaopeng, Japan Tightens Export Regulations on Advanced Semiconductor Manufacturing Equipment, Economic Security and International Trade Legal Update, 17th of May 2023.
https://www.amt-law.com/asset/pdf/bulletins5_pdf/230517.pdf
for items list, refer to Appendix 4.

[110] *Reuters,* US wants Netherlands, Japan to further restrict chipmaking equipment to China, Karen Freifeld and Toby Sterling, 18th of June 2024.
https://www.reuters.com/world/us-pushing-netherlands-japan-restrict-more-chipmaking-equipment-china-source-2024-06-18/

at its reluctance to mirror perfectly US export controls[111]. State sovereignty thus becomes eclipsed by US extraterritoriality, which supersedes Japan's directives, as alluded during the interview with the scholar when asked about the METI's potential loophole in allowing re-exportations of controlled semiconductors items to go unchecked: "Ah oui je crois bien que ce n'est pas le METI qui décide, de toute façon c'est l'extraterritorialité américaine qui prend le pas dessus"[112].

In that sense, taking on the burden of controlling exports already listed by the US primarily serves American interests, for other countries are coerced into abiding by the extent of US law and its extraterritoriality. The table thereafter shows the discrepancy between the Dutch export controls and the US ones, pointing to the US extraterritorial blow to the sovereignty of partners.

Table 20

TABLE 3
A comparison of US and Dutch lithography controls

ASML DUV immersion equipment	Released	NA	WPH	DCO/SMO	US controls: DCO ≤1.5nm or >1.5 to ≤2.4nm	NL controls: DCO ≤1.5nm
NXT:1965Ci	2013	1.35	250	⩽2.5nm	Not controlled	Not controlled
NXT:1970Ci	2013	1.35	250	⩽2.0nm	Controlled	Not controlled
NXT:1980Di	2015	1.35	275	⩽1.6nm	Controlled	Not controlled
NXT:2000i	2018	1.35	275	⩽1.4nm	Controlled	Controlled
NXT:2050i	2020	1.35	295	⩽1.0nm	Controlled	Controlled
NXT:2100i	2022	1.35	295	⩽0.9nm	Controlled	Controlled

NA = Numerical Aperture; WPH = wafers per hour; DCO = dedicated chuck overlay; SMO = single machine overlay

Reva Goujon and Jan-Peter Kleinhans, Rhodium Group, All in: US Places a big bet with October 17 Controls, 6th of November 2023.

https://rhg.com/research/all-in/

[111] Tomoshige, H. (2023). Key Differences Remain between U.S. and Japanese Advanced Semiconductor Export Controls on China | Perspectives on Innovation, CSIS. https://www.csis.org/blogs/perspectives-innovation/key-differences-remain-between-us-and-japanese-advanced-semiconductor.

[112] Interview conducted with a scholar specialised in the Sino-US rivalry, innovation and export controls on the 18th of February 2025. *C.f.* Appendix 2.

With that in mind, the Japanese reaction to this violation of autonomy could hypothetically result in engaging in evasive schemes. Japanese companies could export under a certain HS code (i.e. custom identification code for types of goods) to a designated country that would declare it under a new HS code; falsify export authorisations, undervalue the *de minimis* level, or producing documents certifying civil use[113]. As it stands, this would unlikely be worthwhile given Japan's roots in the liberal order of trade, ties with the US and, as the case of the TSMC probe suggests, exposure to highly damaging financial and judiciary penalties. As a matter of fact, the US extraterritorial legislation is so threatening for companies if they dare to challenge it that the law is rather built on assuming they will pay a fine rather than going to court (Laïdi, A., 2021).

In the end, Japanese companies ought to comply with US export controls – and their mirrored form in the national legislation. This means that Japanese companies have to face higher costs of production overall, with increased Know Your Customer (KYC) obligations and due diligence requirements[114]. Within the company, this means additional training for workers to apply for licenses and external help with consulting; among companies, this translates in potential delays in the supply chains (Tushe, N., 2011). As the corporate world is caught in States' diplomatic game, the sudden changes are difficult to adapt to and create a gap between the State and its companies. When referring to the reactions of the *de minimis* rule change in 2022 on the Japanese side, the interviewed scholar sarcastically sums up:

> *« Puis les entreprises japonaises, j'en parle dans mon étude, ont protesté car au moment de la modification de la règle de minimis en disant « mais attendez là, ça veut dire qu'unilatéralement vous pouvez changer les opérations de légales à illégales du jour au lendemain » donc je pense que tout le monde n'était pas hyper content ».*

[113] G7 Report, Preventing Russian Export Control and Sanctions Evasion: Updated Guidance for Industry, 2023. https://finance.ec.europa.eu/document/download/ae2e63e2-4c4d-4f77-9757-c408ddbcede1_en?filename=240924-preventing-russian-export-control-sanctions-evasion%20.pdf

[114] What is KYC, Lexis Nexis Explained.
https://www.lexisnexis.com/en-gb/glossary/kyc
Every year, 1000 regulatory bodies issue 60,000 regulatory alerts (about 240 a day), making compliance an industrial effort for companies (Demarais, A., 2022).

Consequently, Japan's horizontal relation with other States – the US and China notably- is fragilised, pressured, by US export controls while its vertical relation with the companies of its technology sector is alienated due to the same controls (Bradford, A., 2023). Through the prism of Bradford's abovementioned horizontal and vertical conflicts shaping technological and numerical warfare for leadership, Japan is in a disadvantageous position. Having discussed the role of US extraterritoriality in shaping the structural changes of the microchip trade, the next part will cover its empirical effects and the discomforting implications it has for the Japanese position on the supply chain.

B. Japan is confined into a dilemma that puts its economic security in the microchip sector at risk.

a) Due to the interconnected nature of the microchip supply chain, export controls are more likely to backfire in the long run, while driving US partners in an economic dead-end.

The level of aggressivity in the recent US' export controls on microchip products is hardly the apparatus of an ascending world hegemon, but rather a concerned one. In that sense, they reveal a foreseen vulnerability, as to the capacity to maintain US leadership in the long term. In this shape, US export controls tend to close the economies on themselves, creating a world that does not allow a hegemon to thrive (Krasner, S, D., 1976). The hegemonic state is to prefer an open structure, where it can take advantage of the extent of its hegemony through trade and political relations, rising its aggregate national income and power (*Ibid*). The trajectory of closure brought by export controls is therefore opposing the one of China, which sees these regulations as an obstacle to its ascending direction[115]. The professional interviewee confirms this issue: "Yes. It is actually a big worry that Chinese competition is boosted, and it ultimately ends up with a similar situation as solar panels. There is a fine line to maintain advantage without encouraging China to strengthen its domestic capabilities further". While the U.S. aims to restrict Chinese capabilities, these same

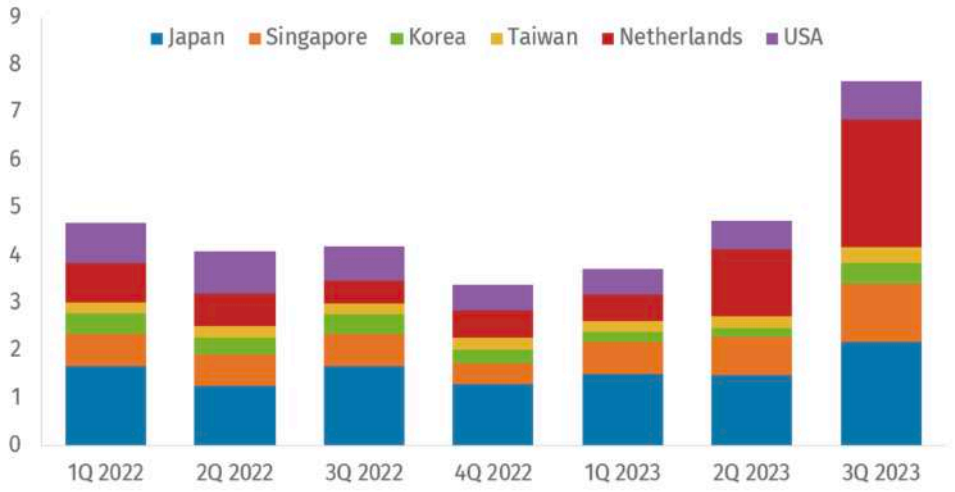
[115] Shivakumar, Sujai, *et al.,* The Limits of Chip Export Controls in Meeting the China Challenge. April 2025. https://www.csis.org/analysis/limits-chip-export-controls-meeting-china-challenge

controls are accelerating China's domestic innovation response: the fine line appears to be crossed indeed.

The adverse effect of export controls is the motivation they confer China to securitise, rapidly, its own domestic microchip industry – already benefiting from a monopoly on REE – in its downstream part. China has been launching various initiatives to support this dynamic and counter the US move. Following the announcement of new export controls on October 2022, Chinese companies have placed massive orders to equip themselves with – and stockpile- photolithographic machineries, to the extent that the Dutch ASML had to warn its investors that this revenue growth was to be nuanced[116]. The subsequent graph shows the extent of Chinese acceleration of its indigenous efforts:

Table 21

FIGURE 2
Chinese imports of semiconductor manufacturing equipment, Q1 2022-Q3 2023
USD billions



Source: General Administration of Customs. HS code 848620 "Machines and apparatus for the manufacture of semiconductor devices or of electronic integrated circuits"

Besides, China's Huawei has more recently proven its capacity to build advanced products at home by putting out in April 2024 the Pura 70 Series, a phone that incorporates thirty-three China-sourced components and only five coming from outside the country[117]. In

[116] ASML, Annual report, FY2023.
Chinese companies rushed to place SME orders before the US export controls came into effect, they have kept on demanding equipment since then, though less advanced.
[117] Shivakumar, Sujai, *et al.,* April 2025.

parallel, the University of Peking and Beijing have unveiled a carbon nanotube device in March 2025 said to have the potential to outperform silicon in speed and efficiency[118]. Overall, China's self-sufficiency level in the microchip sector is estimated at 22% when measuring domestic manufacturers' share of domestic sales; a figure likely to grow though still far from indigenisation[119].

The paradox is sharpened when high domestic demand in China cannot be met by global actors due to U.S. restrictions - distorting both market logic and production priorities. The progress made by China in its domestic industry shows that the demand in the country is high, in particular for advanced products (Zhang, A, H., 2024). Yet other countries are prevented to meet such a demand with their own advanced products due to US extraterritoriality. Quite paradoxically, the most incentivised domestic parts of the microchip supply chain are targeted at cutting-edge capabilities, for mass production, to be positioned at the top of the value chain eventually. This trend is especially visible in the US – despite Japan is facing the same issue – which the following indicates:

Table 22

CHIPS and Science Act funding recipients and planned fab investments in the US

Company	Award	Planned US Investment	Technology
Intel	$8.5 billion in grants, $11 billion in loans	>$100 billion over 5 years	Leading-edge
TSMC	$6.6 billion in grants, $5 billion in loans	$65 billion	Leading-edge
Samsung	$6.4 billion in grants	>$40 billion	Leading-edge, mature node, advanced packaging
GlobalFoundries	$1.5 billion in grants, $1.6 billion in loans	$12 billion over 10 years	Current-generation, mature-node
Microchip Technology	$162 million	$880 million	Mature-node
BAE Systems	$35 million	N/A	Mature-node
Micron	$6.1 billion in grants, $7.5 billion in loans	$50 billion	Leading-edge (DRAM)
Coherent	$15 million	N/A	Mature-node
Texas Instruments		$41 billion	Mature-node
Wolfspeed		$5 billion	Mature-node
Skywater		$1.8 billion	Mature-node
NXP		$2.6 billion	Mature-node
Bosch		$1.5 billion	Mature-node

Source: CHIPS Program Office as of May 1, 2024, SEMI World Fab Forecast as of Q1 2024, company financial reports

[118] *Ibid.*

[119] Reva Goujon, Jan-Peter Kleinhans and Laura Gormley, Rhodium Group, Thin Ice: US Pathways to Regulating China-Sourced Legacy Chips. May 13th, 2024.
https://rhg.com/research/thin-ice-us-pathways-to-regulating-china-sourced-legacy-chips/

In the United States, there are no leading-edge technology manufacturing project supported with less than USD 6 Billion by the government, 5 times more than for current generation technology. In the case of Japan's Rapidus, the company has also been awarded no less than USD 6 Billion (JPY 886 billion) by the METI. Now, these future advanced microchips, heavily subsidised, will not be allowed to be sold to Chinese companies, while other friendshored States like South Korea, members of the European Union, or Taiwan will also have these chips for themselves as well as increased manufacturing capabilities, resulting in an economic dead-end. On a long-term basis, this raises questions regarding the feasibility and rationality to consider a decoupling from the US, amid its decline of power. This may be especially relevant for Japan when linked with the inherent international structure of the microchip supply chain. In June 2024, a report on the future outlook for Japan towards 2040 by the METI suggested that it was highly likely for the semiconductors industry to remain divided among various countries, recognising the decline of US power in international relations[120]. Being pulled backwards by their main ally, Japan's historic focus on economic success and autonomy becomes brittle due to its strong economic relation with China, assessed in the part thereafter.

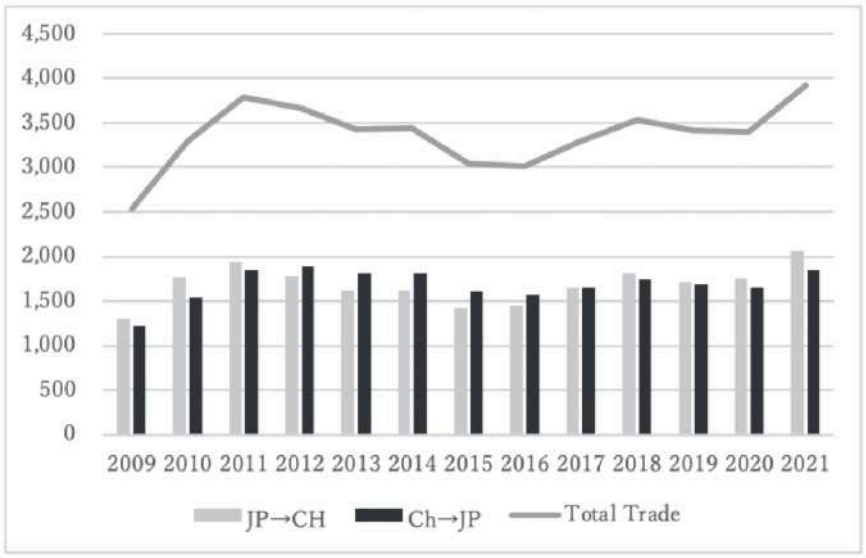
b) Though Japan is demanded to look beyond its Chinese partner, it cannot realistically do so without risking an economic collapse.

Japan and China enjoy strong interdependencies in their overall trade and semiconductors' sector. Although this commercial relationship had been an asset for Japan's economic development – as well as China's- it is now becoming a burden for Japan *vis à vis* the US, due to the pressure exerted by the latter. Even if China is perceived as a threat to the security of Japan – leaving aside the fact that China also sees Japan as an extension of US influence- the two countries have used their economic ties to balance their dissonances (Aoyama, R., 2023). Being cordial towards each other, China and Japan can both benefit from their interdependence, as has been the case for the last decade:

[120] Ministry of Economy, Trade and Industry (METI). "Third Report of Committee on New Direction of Economic and Industrial Policies." Industrial Structure Council, June 2024. https://www.meti.go.jp/english/policy/economy/industrial_council/pdf/240628001_01.pdf.

Table 23

Figure 1: Japan-China Trade, 2009–2021 (unit: billion US$)



Source: Japan External Trade Organization.

The two countries have a steady, equal trading relationship in terms of commercial balance, which encourages stability. In 2022, the total economic exchanges between the two amounted to USD 335,4 Billion (JPY 43,8 trillion), a 14% increase[121] compared to the previous year[122]. China is Japan's largest trading partner, and Japan is China's second largest trading partner following the U.S. Indeed, Japan's exports to China amount to 19,3% of its total exports, with 18,7% for the US[123]. The pressure to put this strong commercial relation at risk – by no longer cooperating and preventing China from accessing advanced semiconductors equipment- is ultimately an existential threat for Japan's economy.

When it comes to microchips related products, Japan and China have a similar way of looking at things. China consumes about half of the world's microchip sales, hence the attractiveness of the Chinese market for foreign companies (Zhang, H. A, 2024). As alluded before, Japan is strategically positioned in the SME part of the supply chain therefore selling

[121] Please note this important increase can be explained by the end of COVID-19 Pandemic, with world trade going progressively back to normal.

[122] Japanese Ministry of Foreign Affairs, Japan-China Economic Overview, January 2024. https://www.mofa.go.jp/files/100540401.pdf

[123]World Bank. "Japan Trade Balance, Exports, Imports by Country 2018, WITS Data." Worldbank.org, 2022. https://wits.worldbank.org/CountryProfile/en/Country/JPN/Year/LTST/TradeFlow/EXPIMP/Partner/by-country.

most of its equipment to China: in 2024, Japan sold over half of its SME exports to China[124]. Consequently, the Japanese domestic microchip industry is closely linked with China, as it relies on the latter to unload its production. The prospect of having to risk the benefits of these commercial ties as well as their broader implications for the stability of the Sino-Japan relation because of the US-led securitisation of the industry poses a major puzzle for Japan to solve[125]. These geopolitical tensions luring Japan in two opposite directions -one of economic pragmatism and one of security guarantees- are displayed tangibly in Japan's corporate galaxy. On a less macro-perspective, the major Japanese companies of the semiconductors sector have recognised, and started to adapt to, the geopolitical risks of disruptions for their supply chain, which the following analysis of their annual, integrated reports unveils.

[124] *Nikkei Asia,* « China Accounts for Half of Japan's Chipmaking Equipment Exports », June 2024. https://asia.nikkei.com/Economy/Trade/China-accounts-for-half-of-Japan-s-chipmaking-equipment-exports.
[125] David Keohane, Leo Lewis, and Harry Dempsey, "Japan's audacious bid to become semiconductor superpower", *Financial Times,* 4th of December 2024.
https://www.ft.com/content/3037a7fa-6260-4435-a58d-89aa12cf474f

This qualitative analysis will use the annual reports of Tokyo Electron, Toshiba, Hitashi and Renesas – all flagships of Japan's semiconductor industry and positioned on the SME segment as well as the manufacturing of the microchip supply chain – of FY2023 and FY2024 to assess the differences of wording when mentioning the implications of geopolitics on their business activities. Given these reports are approved by government-affiliated auditors, making them responsible for their content provided with a legal value, the findings of the analysis are subtle. Yet, the minor changes indicate a different look on the world's order, and a certain concern for the sustainability of their activities.

In Tokyo Electron's 2023 Annual report, ""Geopolitical tensions **could** undermine the international order and global macroeconomic conditions, affecting national and regional security, foreign, industrial or environmental policy"[126]. Then, the company's 2024 report states "Geopolitical tensions and regional conflicts **that** influence international order and global macroeconomic conditions **can** affect the national security, diplomatic, industrial or environmental policies of countries and regions"[127]. In Toshiba's Annual reports, the 2023 provides **no mention** of the word "geopolitics" (or related words)[128] while the 2024 one refers to "**rising geopolitical risks**"[129]. Furthermore, Hitashi's 2023 and 2024 reports go from outlining "**changing geopolitics**"[130] to "**geopolitical risk**" in itself[131]. At last, Renesas is the only studied company for which no change in the wording occurred between 2023 and 2024; the company alludes to "political, social and economic risk including changes in trade policies, trade barriers and **heightened trade conflicts** among countries" which still summarises well the issue faced by Japan and its companies[132]. These shifts in language, though subtle, are not only semantic for they signal how firms internalise and anticipate long-term strategic realignments instigated by US policy pressure.

[126] Tokyo Electron Ltd, Annual report, FY2023, p76.
https://www.tel.com/ir/library/ar/f3gfkt000000003v-att/ir2023_all_en_r.pdf
[127] Tokyo Electron Ltd, Annual Report, FY2024, p36.
https://www.tel.com/ir/library/ar/egp82m00000000h7-att/ir2024_all_en.pdf
[128] Toshiba, Integrated report, FY2023.
https://www.global.toshiba/content/dam/toshiba/ww/ir/corporate/finance/annual-report/pdf/ar2023/tir2023e_a3.pdf
[129] Toshiba, Integrated report, FY2024, p17.
https://www.global.toshiba/content/dam/toshiba/ww/ir/corporate/finance/annual-report/pdf/ar2024/tir2024e_a3.pdf
[130] Hitashi, Annual report, FY2023, p38.
https://www.hitachi.com/IR-e/library/integrated/2023/ar2023e_17.pdf
[131] Hitashi, Annual report, FY2022, p31.
https://www.hitachi.com/IR-e/library/integrated/2024/ar2024e_13.pdf
[132] Renesas, Annual Report, FY2023, p9.
https://www.renesas.com/en/document/rep/financial-report-2024?r=25469341

The change of wording in Japan's semiconductors flagships' assessment of risks just in between 2023 and 2024, in other words the two years that followed the US' expansion of the FDPR to advanced microchips, sheds light on the progressive realisation of the structural change in the supply chain and the fears it triggers. The cornering of Japan's position on the supply chain, with the country's attempt to rise its cutting-edge manufacturing capabilities in a world where these capabilities will be constrained by relative closure of the main market for the country and compliance requirements, is felt beyond policy makers and affects – vertically – the corporations involved in the matter.

The concerns of getting pulled away from the Chinese partners are also exacerbated by Japan's ambiguous relation with South Korea, which has deteriorated in their bilateral exchange of semiconductors associated products. In 2019, Japan announced export restrictions targeting South Korea on essential chemicals for semiconductors production (notably hydrogen fluoride and photoresist)[133]. This export curb fuelled South Korea's intentions to operate a certain degree of decoupling with its Japanese partner. South Korea went from a 44% dependency on Japan for hydrogen fluoride to a 11% one the following year (while Japan allowed further shipments for photoresist, so the situation has not affected this chemical's market)[134]. Since then, Japan and South Korea have been progressively decoupling their semiconductors industry, which further increases the risk of Japan benefiting less from its exports to its Chinese partner[135]. As Japan has alienated a potential support and market for its SME industry, decoupling from China becomes nor commendable or feasible, especially when considering the broader cultural closeness of the two countries through a shared history[136]. With South Korea drifting from economic cooperation and the U.S. pushing for strategic alignment, Japan finds itself with constricting leeway to manage its commercial and diplomatic ties in East Asia. Now, this issue is especially trickier when considering the benefits brought by Japan's ties with the US and the ideological-defense nexus they entail.

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[133] Dumas, Loïc., JAPAN-SOUTH KOREA'S RIVALRY: The Semiconductor Industry Instrumentalization and its Implication for the Future of Japan-South Korea Economic Interdependence, IRIS Asia Programme, March 2021.
https://www.iris-france.org/wp-content/uploads/2024/07/Asia-Focus-157.pdf

[134] *Ibid.*

[135] *Ibid.*

[136] Johnson, Chalmers. "How China and Japan See Each Other." Foreign Affairs, vol. 50, no. 4, 1972, pp. 711–21.

c) *Japan relies on the United States as its primary partner because no other country matches its strategic and technological support.*

Due to the US occupation of the Japanese archipelago following the Second World War, the two countries share administrative similarities which facilitate the alliance projection when it comes to security concerns[137]. It also creates synergies for economic interdependence and cooperation in a way that is exclusive to the US-Japan relationship, nurturing Japan's microchip industry[138].

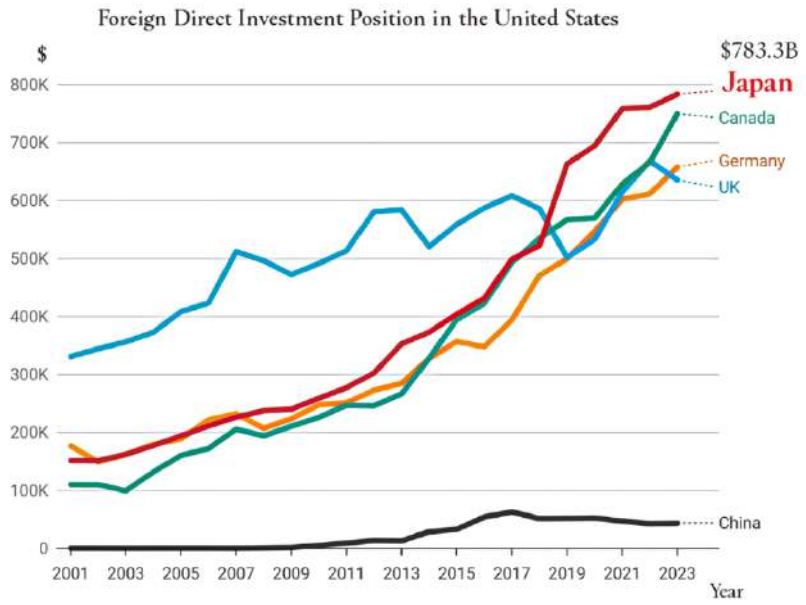
Echoing export controls, Japan's legal base to replicate the American regulations is the Foreign Exchange and Foreign Trade Act (1951), a *de facto* US design as it was created during the occupation[139]. A similar dynamic appears in the Japanese defense approach – delegated to the US – through the Treaty of Mutual Cooperation and Security between the United States and Japan (日本国とアメリカ合衆国との間の相互協力及び安全保障条約). This 1960 treaty allows the US to have military bases on Japanese territory, which now displays the interconnectedness of the relationship between the two countries. On the one hand, this enables the protection of the Japanese State; on the other, it positions the latter on the world's geopolitical chessboard and establishes Japan as an essential function of US' strategic goals and policy towards China (Feske, S., 1997). Considering the rise of China and the aforementioned implications for the world order (whether led by the US' containment of China or China's growing assertiveness), Japan's security is closely linked with that of the US. In other words, when Japan is looking to minimise the existential threats it may face, Japan is to naturally look at the US, as its own constitution requires so[140]. Furthermore, Japan has been a key instrument in US foreign policy in the Indo-Pacific region. The US' approach to coalition building in the region has led Japan to engage in multilateralism through the CPTPP or bringing economic security at the forefront of the G7 political

[137] Eunmi, Choi. The Evolution of the U.S.-Japan Alliance and Its Implications for South Korea. Asan Institute for Policy Studies, 2024.
[138] *Ibid.*
[139] Pajon, Céline. La culture stratégique et la normalisation militaire du Japon, Institut Français des Relations Internationales (IFRI), Février 2008.
https://www.ifri.org/fr/la-culture-strategique-et-la-normalisation-militaire-du-japon
[140] Article 9, Chapter II of the Japanese Constitution (1947), "Renunciation of war", https://japan.kantei.go.jp/constitution_and_government_of_japan/constitution_e.html

agenda[141]. The mediator role played by the US has probably prevented Japan to bear the full costs of its poor semiconductors' partnership with South Korea: the Camp David Principles, agreed trilaterally in 2024, comprise an important dimension to technological partnerships among the three countries, which mitigates their decoupling in the microchip sector[142]. This mediation is also driven by the reciprocal role Japan and the US have in their respective economy, creating a stronger bond between the two.

In the last fifteen years, Japan has intensified its foreign direct investments towards the United States to become, since 2018, the largest foreign investor in the US[143]. This trend is particularly visible in the ensuing graph:

Table 24



Japan's US investment dynamic, Reflecting on the Economic Contributions by Japanese Companies, Japanese External Trade Organization, 2025 https://www.jetro.go.jp/usa/japan-us-investment-report/#:~:text=Since%201990%2C%20Japanese%20direct%20investment,United%20Kingdom%20(%24635.6%20billion)

[141] Searight, Amy. Expanding the US-Japan Economic Security Partnership: Engaging Allies and Partners. Atlantic Council, 2024.

[142] January 6th, 2024, Joint Statement on the Trilateral United States-Japan-Republic of Korea Indo-Pacific Dialogue. https://web.archive.org/web/20240107034113/https://www.state.gov/joint-statement-on-the-trilateral-united-states-japan-republic-of-korea-indo-pacific-dialogue/

[143] Amanda Chu, Alexandra White and Oliver Roeder, "Biden's economic legacy tied to fate of his industrial policies" *Financial Times*, 2nd of December 2024. https://www.ft.com/content/c46354fe-c1cc-4e9b-b18b-0c3f7b62c093

Japan is therefore securing its partnership with the US amid rising tensions to potentially gain further leverage in its capacity to influence the decision-making process on the other side of the Pacific. In 2024, Japan's FDI in the US reached a USD 77,3 billion (JPY 11,73 trillion)[144]. Overall, the vast actions of the Japanese economic strategy taken on to harness the US economy to its own can be condensed in the following table:

Table 25

COMPARISON OF THE TOP U.S. FOREIGN INVESTORS

Rank of FDI	Japan #1	Canada #2	Germany #3	U.K. #4
Amount of FDI (2023)	$783.3 billion	$749.6 billion	$657.8 billion	$635.6 billion
U.S. Employment (2022)	968,700	887,900	871,400	1,223,000
U.S. Manufacturing Employment (2022)	529,200	158,300	304,500	245,500
R&D Investment (2022)	$11.5 billion	$1.7 billion	$12.8 billion	$6.6 billion
U.S. Merchandise Exports (2022)	$82.4 billion	$16.8 billion	$60.0 billion	$71.0 billion
Top Industry Sectors By # of announced FDI projects in the U.S.	1.Industrial Equipment	1.Software&IT services	1.Industrial Equipment	1.Business Services
	2.Auto Components	2.Business Services	2.Software & IT Services	2.Software&IT services
	3.Software & IT services	3.Financial Services	3.Transportation	3.Financial Services
	4.Plastics	4.Real Estate	4.Auto Components	4.Communications
	5.Automotive OEM	5.Industrial Equipment	5.Electric Components	5.Industrial Equipment
	6.Chemicals	6.Food & Beverages	6.Chemicals	6.Transportation

Sources:
1) Balance of Payments and Direct Investment Position Data, Foreign Direct Investment in the U.S. on a Historical-Cost Basis Country of UBO and Industry (NAICS) U.S. Department of Commerce, Bureau of Economic Analysis (BEA)
2) Activities of U.S. Affiliates of Foreign Multinational Enterprises: Preliminary 2022 Statistics, U.S. Department of Commerce, Bureau of Economic Analysis (BEA)
3) Direct Investment by Country and Industry, 2023, U.S. Bureau of Economic Analysis (BEA)

The proximity between the Japanese and US economy has another order of magnitude compared to partners like Canada or Germany: the intertwining of the two subsequently foster key partnerships in the microchip industry. The R&D capacities of the US when it comes to the semiconductor sector are putting the US in the centre of the supply chain strategic bottleneck, ergo the capacity to use export controls to contain China without

[144] Y. Hirose, *Nikkei Asia,* 11th of February 2025.
https://asia.nikkei.com/Economy/Japan-investment-in-U.S.-hits-record-amid-China-concerns

immediately suffering from it. Indeed, 53% of the value added along the supply chain accounts for the R&D segment, where the US are leaders[145]. IBM's 2nm logic node is the state of the art of the industry; the US-headquartered company's innovation demonstrates a 45% increase in performance while using 75% less energy than the 7nm process technology[146]. As it happens, the progress and technological requirements to manufacture these chips are so high that TSMC – the only company yet capable of producing these chips – will start manufacturing them in the latter half of 2025, 4 years after the design's completion[147]. In that regard, the strategic partnership between IBM and Rapidus does show the significance of the US-Japan bilateral ties, which procures major gains for Japan, both in its security and future growth, for now.

Eventually, Japan is confronted with an impossible dilemma in securitising its semiconductor supply chain at the crossroads of wider strategic considerations: it must choose between alienating its indispensable Chinese partner - thus growing the threat Beijing also poses or resisting U.S. demands, which would compromise the benefits and guarantees of the alliance, ultimately exposing Japan to an increased vulnerability in the East-China Sea as well.

As it turns out, the interwoven nature of the U.S.-Japan bilateral relationship provides a certain degree of leverage, to avoid making that impracticable choice at the present time and balance the two powers further. In this light, inverting this dilemma provides a new look onto the Japanese microchip sector's constraints; the situation becomes less of a binary trap and more of a platform for agile manoeuvring. Despite the situation eventually becoming rather pressing for Japan, the current setting of the industry displays some major advantages for the country. The next – and last- chapter of this report will provide an outlook onto Japan's particular incentives to maintain the *status quo* while preparing to cope with the intensification of the dynamics identified in this report.

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[145] Semiconductor Industry Association (SIA), Strengthening the global semiconductor supply chain in an uncertain era, April 2021.
https://www.semiconductors.org/wp-content/uploads/2021/05/BCG-x-SIA-Strengthening-the-Global-Semiconductor-Value-Chain-April-2021_1.pdf

[146] IBM, Press release, 2021.
https://research.ibm.com/projects/advanced-logic-technology-at-2nm-node

[147] *Focus Taiwan,* "TSMC won't produce 2 nm chips in U.S. next year", 3rd of April 2024.
https://focustaiwan.tw/business/202503040014#:~:text=TSMC%20is%20currently%20expected%20to,1.6%20nm%20chips%20in%202026.

CHAPTER III. Avoiding the derailment of Japan's current strategy in the microchip industry is essential to maintain its position at the crossroads of major shifts in the world order.

A. Japan is balancing the *status quo* to strengthen its position on the supply chain while holding on to its security.

a) Tokyo safeguards its exposure cautiously while the US takes on a confrontational stance towards China.

The US leads the transformation of the international order of trade with coercive tools used on China; being arguably still the world hegemon, it has to be its initiative to preserve its contested leadership. In that sense, the use of export controls with an extraterritorial dimension to do so prevents other countries, which also have a stake in maintaining the US leadership, in having to assume the Chinese containment directly themselves. This is a convenient effect of US export controls that Japan has been leveraging to its advantage, thus nuancing the constraints they impose.

Starting with Shinzo Abe's term in office and more recently Shigeru Ishiba's, Japan has adopted an ambiguous stance towards China, progressively turning into a rather tough approach. In the South China Sea, Japan has become a major player of the contest dividing East-Asian nations (Yu, H., 2023). The country has aimed at both balancing and containing China so as to defend the liberal world order[148]. After being elected in October 2024, Shigeru Ishiba has vowed to work towards the implementation of a North Atlantic Treaty Organisation (NATO)- like alliance among Asian nations[149]. These elements of context signal Japan's gradual shift to take part in limiting China and the potential threats the latter poses. Going further, US export controls may be a part of this shift for Japan itself, raising the question as to whether Japan has been involved in asking the US to use these tools and take

[148] *Ibid.*

[149] Macikenaite, V., *Chinaobservers*., What the New Cabinet Means for Japan's China Policy, 19th of November 2024.
https://chinaobservers.eu/what-the-new-cabinet-means-for-japans-china-policy/

the blame. Echoing the US-Netherlands-Japan trilateral agreement to mirror export controls among the three, this deal was originally secret which leads to think Japan had an advantage in being a silent player of these measures[150]. As alluded by the scholar interviewee, this question was also raised in the BIS' spheres when the export controls were announced:

> *« Je ne sais pas si vous avez entendu ça mais moi j'ai plusieurs personnes quand j'étais à Washington, qui ont soulevé l'argument qu'en fait c'était les japonais qui avaient demandé aux Etats-Unis de mettre en place les contrôles, y compris extraterritoriaux, pour pouvoir les blâmer plutôt que blâmer les autorités japonaises elles-mêmes et qu'en fait ça fournissait un bouclier dans cet objectif de ne pas s'aliéner la Chine pour les japonais.* [151]*»*

In addition, BIS director Alan Estevez also alluded to the relative facility his administration had had to convince allies, as if the move was all planned in advance with the US taking the lead when asked about the potential multilateral dimension of the controls two weeks after the US implemented them unilaterally:

> *"That over time I expect to have a multilateral deal done before that time. (…) So we expect to have a deal done in the near term, then this was not a surprise to our allies. What we keep hearing is ensure that you also, US have skin in the game. We've shown we have skin in the game, we've taken action, we've viewed it as a down payment for what we're going to do. And the discussions we're having are good. So I'm very bullish. I have zero confidence that we're not going to have a deal when we go there. (…) We made the decision that, as I said earlier, we were willing to go this alone as a down*

[150] Allen, G.C. and Benson, E. (2023). Clues to the U.S.-Dutch-Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight (CSIS). https://www.csis.org/analysis/clues-us-dutch-japanese-semiconductor-export-controls-deal-are-hiding-plain-sight.

[151] Interview conducted with a scholar specialised in the Sino-US rivalry, innovation and export controls on the 18th of February 2025. C.f. Appendix 2.

payment and show that we had skin in the game while we're having the discussions with our allies.[152]"

It is important to treat this information with caution, the scholar could not confirm this point of view, nor the sort of common agreement and "downpayment" hinted by Alan Estevez. Still, whether or not Japanese authorities asked the US precisely to use export controls – which would explain a lot - they appear to find themselves in a position that is relatively satisfactory when considering the various pressures, issues and frictions on the microchip supply chain.

First, the Japanese have maintained a low exposure to Chinese retaliation with a more lenient national regulation. As mentioned before, though there are specific licenses depending on the risk posed by the player, all countries must require a license to export Japanese controlled semiconductors items, therefore avoiding to directly point at China[153]. In the July 2023 export controls, Japan only added 23 items to show its cooperation with the US without incurring China's anger, enabling Tokyo to balance the Sino-US rivalry to its advantage in the meantime[154].

Second, China's response has been very limited and cautious, for Japan as well as the US. China only warned Japan of retaliation if it were to go further with export controls in August 2024, over a year after Japan incorporated the 23 items to its control list[155]. Concerning the US, Beijing banned the US memory chipmaker Micron Technology[156] from selling its chips to key domestic infrastructure companies in May 2023 and imposed license requirements on gallium and germanium (REEs) exports in July 2023 – which was absorbed thanks to

[152] Rasser, Martijn. "A Conversation with under Secretary of Commerce Alan F. Estevez." Centre for New American Security, October 27, 2022. https://www.cnas.org/publications/transcript/a-conversation-with-under-secretary-of-commerce-alan-f-estevez.

[153] Nakagawa Hiroshige, Matsumto Taku and Zhang Chaopeng, Japan Tightens Export Regulations on Advanced Semiconductor Manufacturing Equipment, Economic Security and International Trade Legal Update, 17th of May 2023.

[154] *Ibid.*

[155] Trueman, C. (September 2024). China warns of economic retaliation in response to Japanese chip equipment export restrictions – report. Datacenterdynamics.com. https://www.datacenterdynamics.com/en/news/china-warns-of-economic-retaliation-in-response-to-japanese-chip-equipment-export-restrictions-report/.

[156] Milmo, Dan, and Graeme Wearden. "China Bans US Chipmaker Micron from Vital Infrastructure Projects." The Guardian, May 22, 2023, sec. Business. https://www.theguardian.com/business/2023/may/22/china-bans-us-micron-technology.

Japan's stocks[157]. The Chinese reaction was consequently quite moderate in the aftermath of the controls, which also points at Japan's agility. With the US taking the lead on the containment of China, the prism of the rivalry has been very much centred on their bilateral competition and its effects on the countries in between. Indeed, following the first set of export controls in 2022, China filed a complaint to the World Trade Organisation (WTO) Settlement Body arguing that "'The United States not only imposes export controls itself on China, but also compels other WTO Members"[158]. This argument matches Japan's attempt at appearing as a second-ranking player, hence the benefits of having the US containing China for Japan. This is especially true when looking at the economic dimension of this issue, which the ensuing section will deal with.

b) Japan's domestic semiconductor market has taken advantage of the situation to increase its profits and strengthen itself.

China's economic response to US export controls has been the accumulation of microchip related goods, from equipment to chips themselves[159]. This increased demand has triggered a soar in prices, benefiting Japan extensively thanks to the close ties of its economy with China. The following demonstration will be dedicated to a quantitative analysis of Japan's official customs statistics to assess the extent to which the empirical manifestation – from a macro perspective- of export controls has had an actual positive effect on Japan's microchip sector. It will then be complemented by a micro analysis of these effects on Japan's microchip sector's flagships – Tokyo Electron, Hitashi and Renesas – using on their annual reports of FY2024.

[157] Shivakumar, S., Wessner, C. and Howell, T. (2024). Balancing the Ledger: Export Controls on U.S. Chip Technology to China. CSIS. https://www.csis.org/analysis/balancing-ledger-export-controls-us-chip-technology-china.

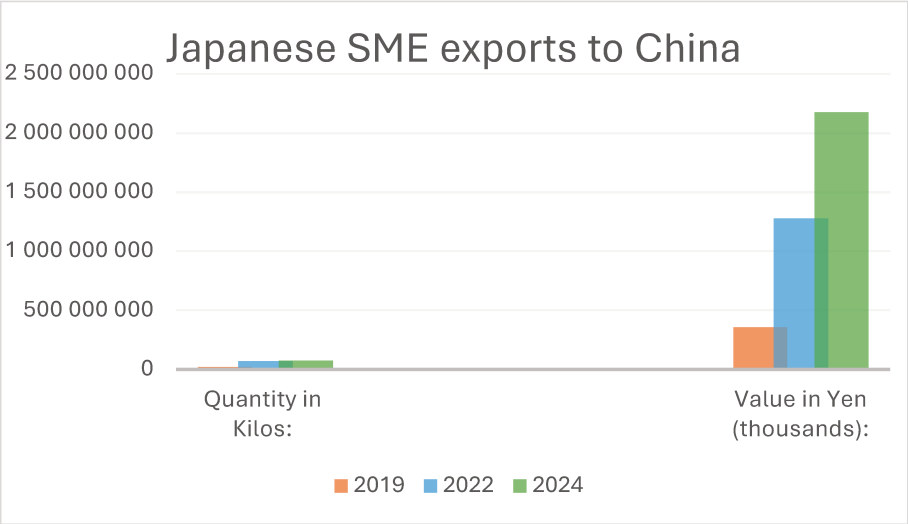
[158] Anh Nguyen, "The discomfort of extraterritoriality: US Semiconductor Export Controls and why their Chokehold on Dutch Photolithography Machines Matter, European Journal of International Law, December 1, 2023. https://www.ejiltalk.org/the-discomfort-of-extraterritoriality-us-semiconductor-export-controls-and-why-their-chokehold-on-dutch-photolithography-machines-matter/

[159] Reva Goujon and Jan-Peter Kleinhans, Rhodium Group report, US Places a Big Bet with October 17 Controls, 6th of November 2023.

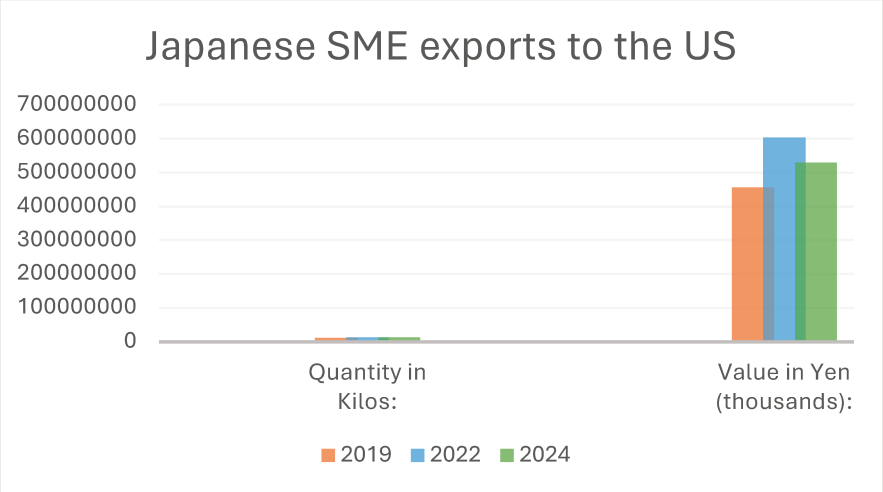
The quantitative analysis of Japan's exports to China, in parallel with the US, has been conducted thanks to the dataset provided by the official statistics of Japan. For each country, three datasets have been retrieved: one from 2019 to gather pre-Covid export levels, one from 2022 to set the last level of these exports before the US implemented its export controls and the most recent one from 2024 to infer their effects[160]. To identify the commodities relevant for the study, the analysis relies on the HS-Codes provided by the Japanese government statistic office, allowing to differentiate between semiconductors, integrated circuits and SME[161]. Country codes were retrieved on the same website[162]. Please note the subsequent data may face imprecisions due to some differences of aggregates, as other commodities may comprise semiconductors or electronic machinery used for IC manufacturing and the Japanese customs database do not account for re-exportations. Nevertheless, the data retrieved on China corroborates the total quantity and value of the goods provided by the government statistics and by other sources citing the consumption of Japanese SME by China being over 50% of Japan's total exports in the sector[163].

The data can be visualised as follows[164]:

[160] Japanese Government Statistics.
https://www.e-stat.go.jp/en/stat-search/files?tclass=000001008804&cycle=1&year=20240&month=24101212
[161] *Ibid.*
https://www.customs.go.jp/toukei/sankou/code/GH202401e.html
[162] *Ibid.*
https://www.customs.go.jp/toukei/sankou/code/country_e.html
[163] Bao, Anniek, *CNBC,* "Japanese chip equipment firms count on China sales amid U.S. moves to block high-end exports to Beijing", 6th of September 2024.
https://www.cnbc.com/2024/09/06/japanese-chip-equipment-firms-count-on-china-sales-even-as-us-piles-pressure-to-block-exports.html
[164] Please refer to Appendix 3 for the whole data. The tables are from the author.



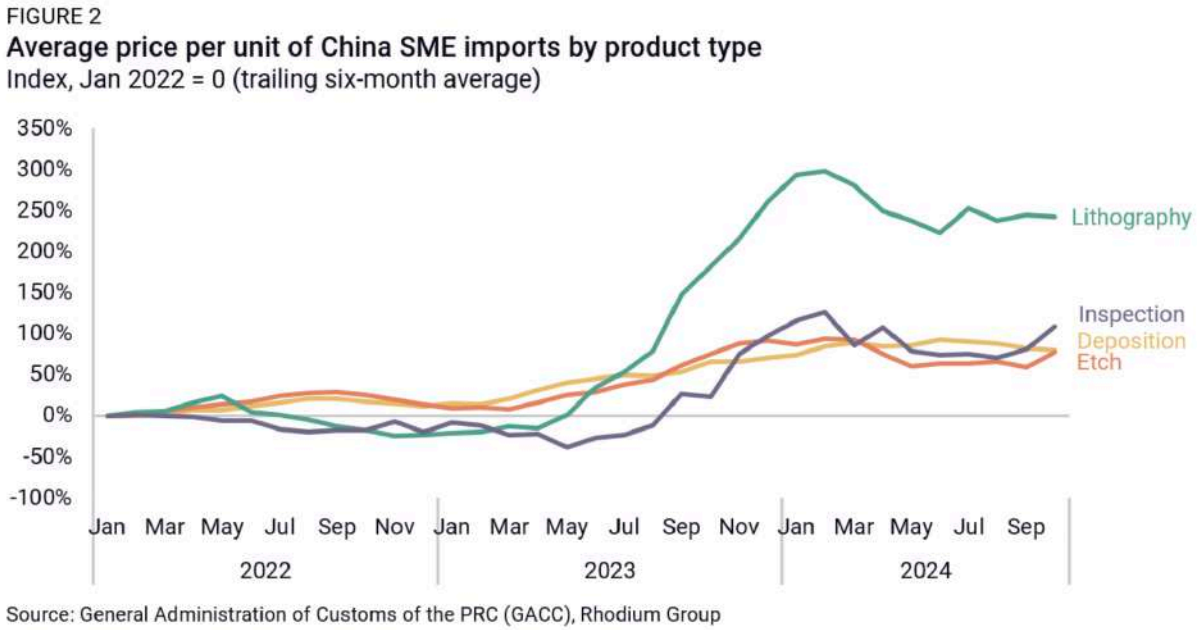
In comparison to the US:



First, the US has not taken advantage of its export control in its trade of SME with Japan and is on a lower level of trading partnership in the sector, though this is not the main concern of the analysis. Between 2019 and 2022, the quantity of Japan's SME exports to China has drastically increased, going from about 17,800 tons to 70,000 tons while remaining very similar in 2024. Logically, the value of these exports between 2019 and 2022 have increased themselves; yet, for a similar quantity, the value between 2022 and 2024 has exploded, going from JPY 1,2 trillion (USD 8,3 billion) to JPY 2,1 trillion (USD 14,5 billion). On a state level basis, this has improved Japan's positive trade balance in the sector with China, strengthened its position in the supply chain and fostered strategic investments. Although unit price of SME has inflated, this has played a minor role in this significant

shift[165]. Rather, China has been placing orders for the most advanced machinery it could import until US export controls tightened even more, stockpiling equipment to fuel its indigenisation efforts[166]. The next graph indicates this sharp rise in China's SME imports:

Table 26



All in all, it appears that Japan has leveraged its position on the microchip supply chain with export controls with agility, maximising overall economic performance in the industry regardless of the dilemma it faces. Now, it seems relevant to look at targeted companies to understand their more peculiar position and gather more data on the current trend in Japan's microchip industry.

[165] Reva Goujon & Ben Reynolds, Rhodium Group, Slaying Self-Reliance: US Chip Controls in Biden's Final Stretch, 9th of December 2024.
https://rhg.com/research/slaying-self-reliance-us-chip-controls-in-bidens-final-stretch/
[166] *Ibid.*

The qualitative analysis of Japan's semiconductors flagships has been conducted based on their FY2024 Annual report's financial statement, looking at the revenues and gross profit margins. Please note that, contrary to the first annual report-based analysis, this one excludes Toshiba for the company reported a drastic fall in its financial returns caused by its automotive entity as well as the selling of one of its subsidiaries[167]. Please refer to the documents provided in the appendix for more detailed information and data.

Tokyo Electron and Hitashi reported a very similar dynamic in their financial reports. They both experienced a decrease in net sales but an increase in gross profit margin as well as an increased market capitalisation[168]. They explained this discrepancy was due to a rise in R&D spendings in uncertain times. Besides, Renesas Electronics reported an overall decrease in net sales and gross profit margins[169]. What can be deduced through these statements is the less visible effects of the rise in prices – mentioned above- experienced just by these companies. Moreover, the increase R&D spendings translate an attempt at internal growth, in order to solidify the companies. In that sense, it appears that even if the current situation has benefited Japan in the end, its strategic companies are preparing for upcoming market disturbances and distortions in the years to come.

So, the dilemma poised on Japan for its semiconductor industry has been an opportunity to best position itself. If not a concerted decision with the US, the export controls have proven to profit Japan's industry for the last two years but unlikely to keep on doing so for eternity. The next section will reflect on Japan's current overall position in the structural order of trade and in the Sino-US rivalry's frame while highlighting the gradual signs of the erosion of such a position.

c) *Japan has leveraged the deadweight effect of U.S. extraterritoriality to preserve its role as a pivotal actor in the Sino-US rivalry, thereby in a position to temper shifts in the international trade order.*

[167] Toshiba, Annual report, FY2024.
[168] Tokyo Electron, Annual Report, FY2024 & Hitashi, Annual Report, FY2024.
[169] Renesas Electronics, Annual Report, FY2024.

Over the last two and a half years, Japan has kept good relations with the US and China while implementing its agenda. It has started to consolidate its domestic industry while reinforcing its position on the international supply chain. Tokyo has done so by maintaining a balanced position on China, bringing it closer in terms of trade and restricting – not without contradictions – its immediate access to advanced technologies. Besides, Japanese companies benefit from a certain degree of stability in the case of REE export curbs by China, as history has given Japan a certain experience in that regard[170]. The 2010 shock has led some of them to stockpile up to a year worth of raw materials, allowing for some margin in case of increased tensions[171].

As it turns out, these tensions are likely to intensify, making the Japanese dilemma less favourable as it had been until then. In February 2025, Japan added 110 Chinese companies to its export list for oversight, pointing more directly at China thus fuelling additional tensions on the microchip supply chain[172]. The United States, China and Japan are part of a strategic triangle that enabled Japan to manoeuvre the two other powers' rivalry (Aoyama, R., 2023.). Indeed, the power asymmetry in the triangle - where Japan perceives China as its main threat and China perceives the US as its main threat – increases the likeliness for China to take on a seductive, friendly stance towards Japan since the latter is aligned with the US; this has been the case under Xi Jinping's charm offensive strategy[173]. From a structural point of view, this asymmetry has played a key role in allowing Japan to take advantage of the current *status* quo. Yet, this dynamic can be overturned if China shifts its approach towards the archipelago, as the following representation entails:

[170] Keith Bradsher, New York Times, "China halts critical exports as trade war intensifies", 13th of April 2025. https://www.nytimes.com/2025/04/13/business/china-rare-earths-exports.html

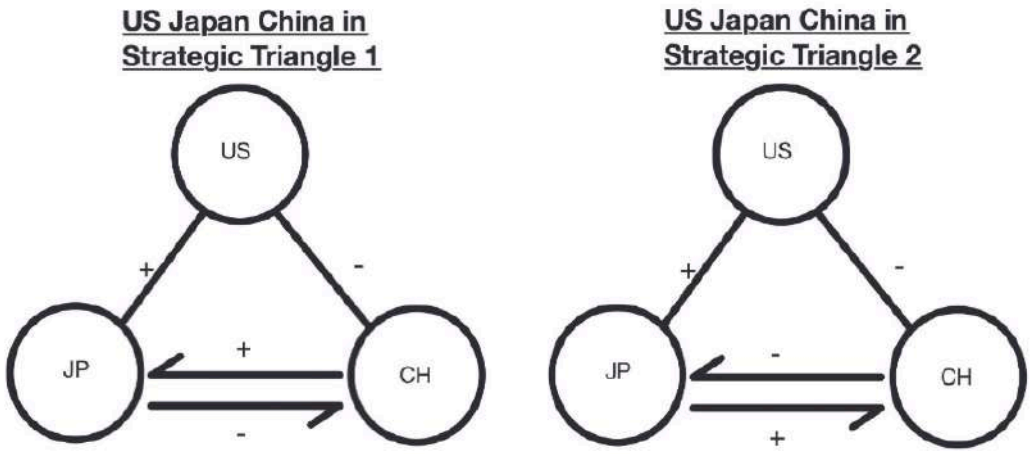
[171] *Ibid.*

[172] Mayumi Negishi, "Japan plans to curb exports of chips and quantum-computing tech". *The Japan Times*, 1st of February 2025. https://www.japantimes.co.jp/business/2025/02/01/tech/japan-plans-chip-export-curbs

[173] Stewart, Devin. "China's Tactics to Influence Japan." *China's Influence in Japan: Everywhere Yet Nowhere in Particular*, Center for Strategic and International Studies (CSIS), 2020, pp. 3–18. http://www.jstor.org/stable/resrep25323.4

Table 27

Figure 3: U.S.–Japan–China in Strategic Triangle



Aoyama, R., 2023.

By tightening its own export controls, Japan faces the risk of moving its position from Triangle 1 to Triangle 2, eventually having to engage in charming China to lessen its threat exposure and potentially alienating the US (Dittmer, L., 1981). As China has recently raised its voice concerning export controls, and increasingly restricted access to REEs, Japan's current benefits from the complex setting of the microchip supply chain may shatter in the coming years. At the present, Japan must use its momentum and recent success in balancing the Sino-US rivalry to adapt and infuse the norms that best suit the country in the new world order to come.

Alluding to the concept of geoeconomics and the forecasts of its theorists, the subsequent quote from Edward Luttwak's *The Endangered American dream* (1993) particularly resonates with the topic and Japan's role:

> *"(…) economic priorities are no longer suppressed but can instead emerge and become dominant. Trade quarrels may still be contained by the fear of their purely economic consequences, but not by political interventions that have powerful strategic reasons. And if the internal cohesion of nations and countries must still be*

preserved by a unifying external threat, that threat must now be economic, or rather geo-economic."[174]

Amid the ongoing change in the international order and its structure of trade, with national security, strategic interests and economic rivalries all expanding, the above quote calls for a slight reassessment, at least when applied to the microchip industry. When it comes to semiconductors, the intertwined nature of stakes - industrial, innovative, defense and security-related- as well as the close synergies between the private sector, the State and among states themselves take the concept of geoeconomics further. In reference to Luttwak's quote, it appears that "economic consequences" and "political interventions for strategic reasons" do merge and overlap themselves in the microchip supply chain. The use of corporations by States to gain more market shares and access becomes a securitisation tool in a coordinated effort, not only to project the State on external markets but to make their internal one impervious to the penetration of others.

Here lies the need for Japan to actively shape this dynamic; beyond pure economic competitiveness, Japan must stay ahead of the game in allying its market forces with security objectives to get an edge on the microchip supply chain. In that sense, Tokyo should take part in constructing the norms that maintain an open world market to secure its supply chain and position itself in an increasingly strategic way in the industry. This would allow the relative de-risking of China since Japan would be more domestically secure, with more leverage in an open world rather than a friendshored, decoupled supply chain. All in all, Japan's position on the microchip supply chain from a structural level is the result of a complex reasoning between the vertical and horizontal interactions of the State. This, Japan is to use as a levy to face the coming changes in its industry and wider implications on its security, for the Sino-US rivalry is growing in intensity. Given this pressing issue, Japan has highly prioritised its microchip industry and supply chain resilience, which makes abiding by the precise and ambitious calendar of the Rapidus project a necessity.

[174] Luttwak, E. (1993). The Endangered American dream: how to stop the United States from becoming a Third World country and how to win the geo-economic struggle for industrial supremacy. New York: Simon & Schuster, p.40.

The coming section will discuss the future of the Japanese position in the microchip supply chain. Since Donald Trump took office in the White house, more uncertainty, pressures and doubts have indicated the tipping point of the Japanese dilemma in the semiconductors sector is coming close.

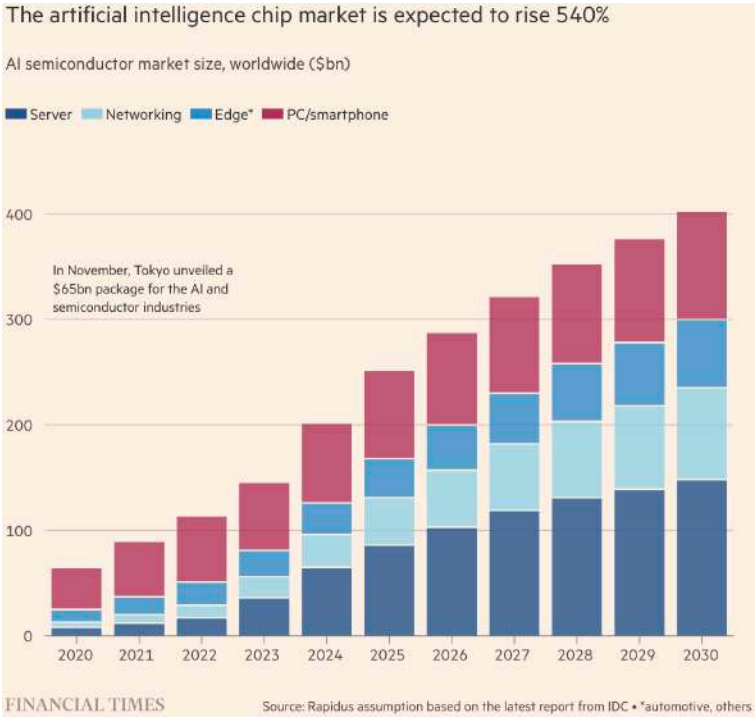
B. In an era of volatility, Japan's potential success in its domestic microchip boost may not be sufficient to come out unharmed of the dilemma it faces.

a) Increased capabilities in the microchip sector put a target on Japan's back amid the Sino-US rivalry.

As Japan has been maximising the performance potential of its position on the microchip supply chain for the past three years or so – gaining a certain edge on its domestic initiative along the way, as the advancement of the Rapidus project indicates – the country seems likely to find some success on an international level as well as in the short term. As pointed out by the METI's 2040 outlook report, Japan's domestic production of semiconductors should exceed JPY 15 trillion (USD 100 billion) by 2030, compared to the JPY 6 trillion (USD 41 billion) in 2022[175]. In comparison, the world's total growth for the industry is forecasted to go from a USD 600 billion (JPY 86,380 trillion) value in 2022 to a USD 1 trillion (JPY 143,967 trillion) in 2030[176]. So, Japan's industry is to grow more rapidly than the world's average, a 150% value increase for the former and a 66% for the latter. Japan will ultimately be playing with higher stakes in the international contest for technological supremacy in the coming years; this is notably impacted by AI becoming a major component of the digital world, as the next chart shows:

[175] Third Report, Committee on New Direction of Economic and Industrial Policies, Industrial Structure Council, Ministry of Economy, Trade and Industry, June 2024.
[176] Burkacky, O., Dragon, J. and Lehmann, N. (2022). The semiconductor decade: A trillion-dollar industry. *McKinsey & Company.* https://www.mckinsey.com/industries/semiconductors/our-insights/the-semiconductor-decade-a-trillion-dollar-industry.

Table 28



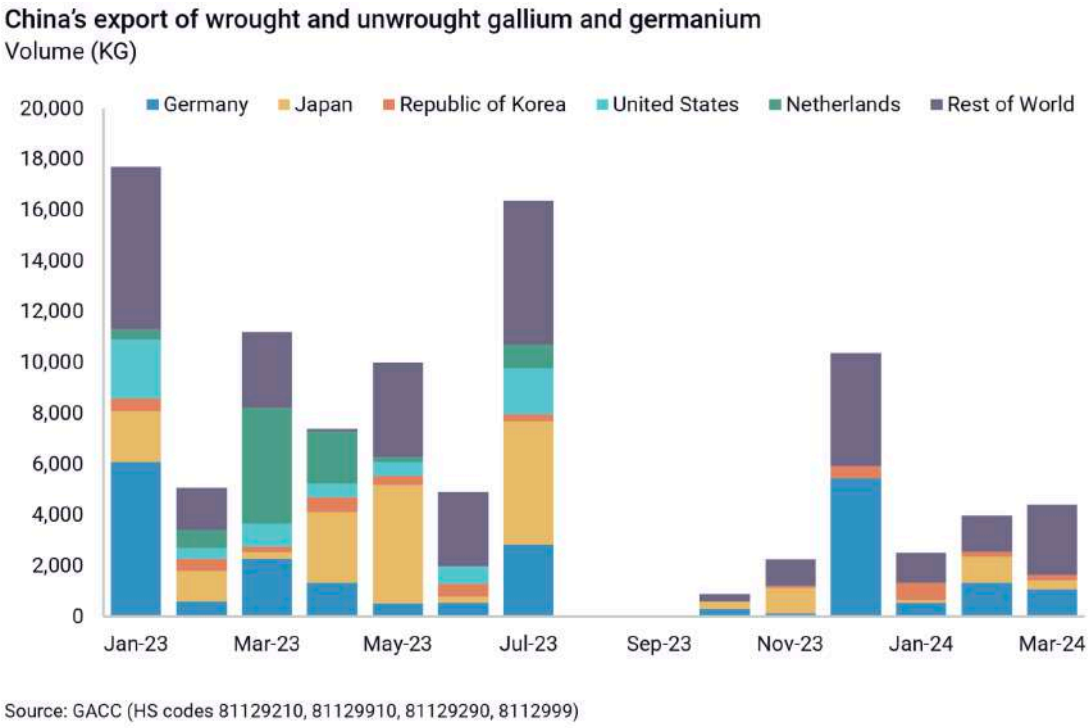
This implies that Japan's exposure to disruptions, levies and the sorts will increase, especially since China has an interest in targeting US partners rather than the US itself, similarly as the Japanese situation with export controls. The scholar interviewed for this report agrees when asked about China's potential strategy to levy the US with its allies : « Oui, après il y a aussi une stratégie d'action officieuse vis à vis des partenaires américains, notamment sur l'anti-trust, avec une utilisation un peu dévoyée des autorités régulatrices chinoises pour opérer des représailles sans dire leur nom »[177]. As a matter of fact, China has recently used anti-trust on its ideological rivals, i.e. the European Union, US, Taiwan and Japan. In May 2024, China's commerce ministry launched an anti-dumping probe on a plastic type (POM copolymers) imported from these countries[178]. The investigation is ongoing and translate the hidden conflicts and disruptions that take place elsewhere than

[177] Interview conducted with a scholar specialised in the Sino-US rivalry, innovation and export controls on the 18th of February 2025, c.f. Appendix 2.

[178] *Reuters*, Qiaoyi Li, Sarah Wu, China launches anti-dumping probe into EU, US, Japan, Taiwan plastics, 19th of May 2024.
https://www.reuters.com/business/china-launches-anti-dumping-probe-into-eu-us-japan-taiwan-chemicals-2024-05-19/

in the microchip galaxy. China has also been using REEs increasingly to signal its discontent. Referring to the July 2023 export controls on gallium and germanium, the previous trade levels in these raw materials' exchange between Japan and China (as well as the US and the Netherlands) are unlikely to go back to normal. The ensuing chart demonstrates this shift:

Table 29



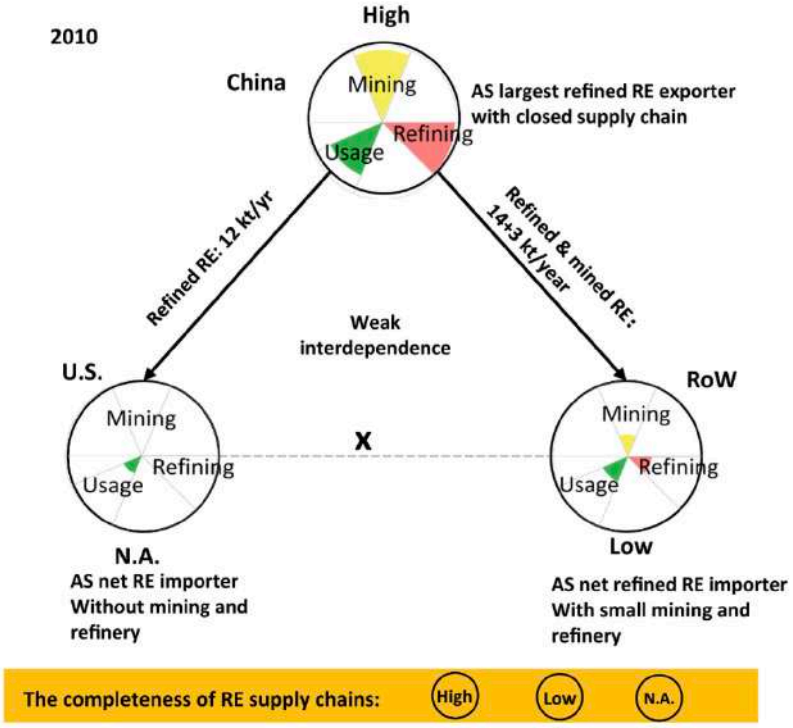
The unlikeliness of trade volumes going back to the July 2023 levels is bolstered by the more recent, tighter export controls on REEs issued by China in February 2025[179]. With China's weaponisation of trade dependencies to retaliate against the coercive measures that were introduced against it, the pressure on Japan is set to increase rapidly. Japan becoming a proxy is even more likely on the REE part of the supply chain, unless it manages to rapidly product its own reserves with the newly found source off the coast of the Minami-Tori-Shima Island[180]. As a matter of fact, the US itself – putting aside its intertwined

[179] Keith Bradsher, *New York Times*, "China halts critical exports as trade war intensifies", 13th of April 2025. https://www.nytimes.com/2025/04/13/business/china-rare-earths-exports.html

[180] *India Defence Review*, Japan's Billion-Dollar Breakthrough: The Rare Earth Minerals That Could Rule the World, January 2025. https://indiandefencereview.com/japans-billion-dollar-rare-earth-minerals/

economy with the rest of the world – has succeeded in creating mutual dependencies with China in the rare earth sector (Wei-Qiang, C., *et al.,* 2024). Between 2010 and 2020, the US started extensive REE production so as to get some resemblance of self-sufficiency, though the refining part of the production process is still largely dominated by China. The 2010 outlook of the relation in the sector is summarised as follows:

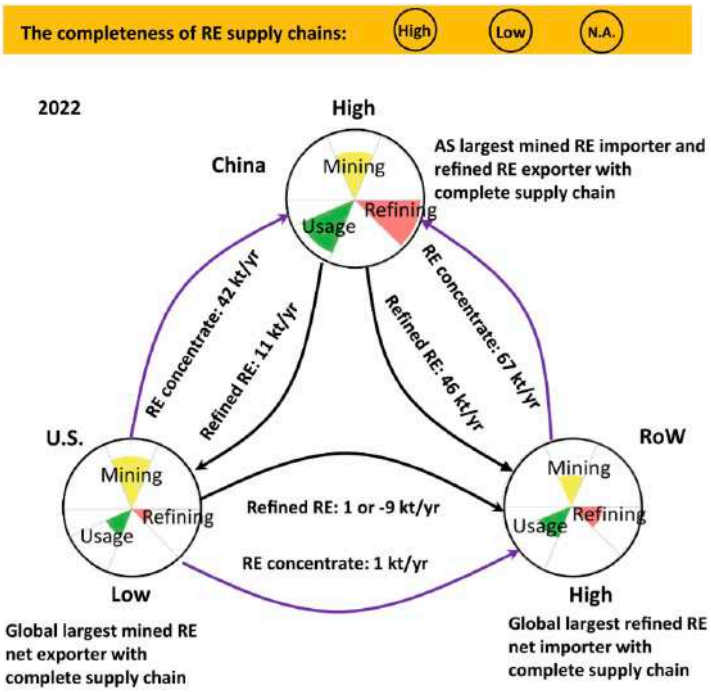
Table 30



Wei-Qiang, C., *et al.,* 2024*,* p.249*.*

In 2017, China was importing 5% of its REEs from the US; this has risen to 44% in 2022 (*Ibid*). The US is ultimately China's largest external REE supplier. The 2020 state of the above interdependence does show a significant change:

Table 31



Wei-Qiang, C., *et al.,* 2024, p.249.

In this context, Japan should stress the comprehensiveness of its strategy in focusing both on the upstream and downstream part of its microchip supply chain, thus avoiding the shortcomings that may go paradoxically hand in hand with a strong bottleneck position on the downstream part. Going further with trade interdependencies issues, the next section will cover the potential fallouts due to counterparts incentivising their domestic industries as well as the risks it poses to the security of Taiwan, thus limiting the projection capacities of Japan's strategy.

b) To shape and maintain the international structure of the microchip supply chain, Japan must prepare to absorb the various shocks it is likely to cope with.

In spite of the securitisation trend in the microchip industry, maintaining interdependencies with China in this sector may contribute to solving long-term issues; first, to find a market with a sustained demand, second, to get a hold on the country's indigenisation efforts. It is important to bear in mind that as it stands, the production of

2nm logic nodes by Rapidus will fall under the control of US extraterritoriality when it comes to exporting these chips to China – Japan's main export destination- for they are too advanced and strategic[181]. With many countries – stakeholders in the semiconductor manufacturing process- aiming at reaching the 2nm threshold, it is possible the production capabilities of Japan will be too high compared to domestic and international demand if it only focuses on cutting-edge items.

Using the Brender-Spencer model, the contradictions stemming from the general subsidiarisation of the cutting-edge segment of the industry are most visible (Brander, A. & Spencer, B., 1985). The model essentially illustrates, in game theory, in which conditions a government should subsidise domestic firms to help them enter a market against foreign firms. This model is relevant in situations where two firms, one domestic and one foreign, are competing and only one has the certainty of making a profit. Now, if the government subsidises its domestic firm to enter the market regardless of the foreign firm entering it or not, the government guarantees a profit for the firm, therefore making it rational to enter the market; fostering the foreign firm to anticipate its loss and avoid entering as well. The subsequent table shows the two different situations, one where no subsidies are promised, the second where the domestic firm benefits from them.

Table 32

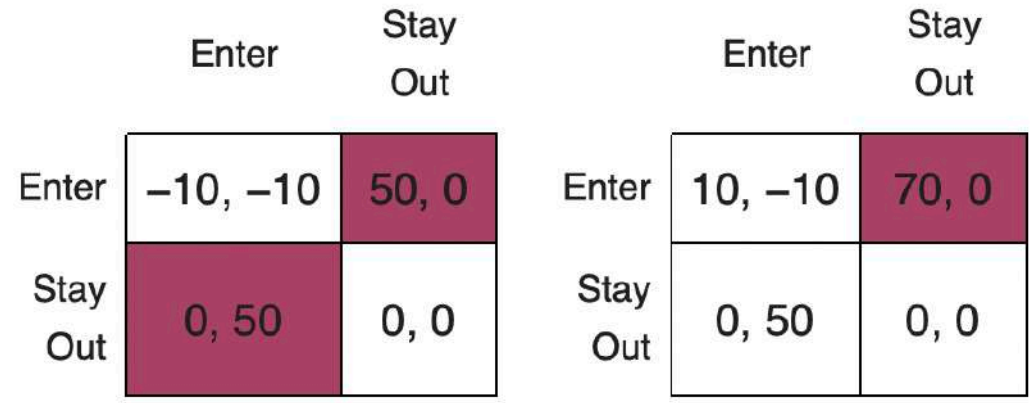


***Fig. 1**: Entry game with multiple equilibria*

***Fig. 2**: Entry game with subsidy, single equilibrium*

(Krugman, P.R., 1995)

[181] EAR 734.4.

This model consequently underlines the issue that a global increase in cutting-edge manufacturing capabilities could raise. Since the firms involved in these initiatives are all incentivised – to different degrees of course - to enter the market with subsidies, the economic model goes back to one of multiple equilibria, putting therefore more risks on the prospect for financial return. In that sense, it appears essential for the Japanese industry to focus on less advanced parts of the industry as well, so as to maintain a strong access to the Chinese market and increase interdependencies; this would help in securing Japan's relation with China as well.

As a matter of fact, China's 22% self-sufficiency in the microchip industry paves the way for opportunities[182]. The relative limited success of China's indigenisation so far gives Japan a potential margin to strengthen Chinese reliance on Japan's older, legacy equipment and chips. Making sure China and Japan are closely tied in the sector could reduce the risks of an invasion of Taiwan or at least reduce the impact of this invasion on the microchip sector if Japan poises itself as an alternative to Taiwanese supply[183]. On the one hand, competing with TSMC – a highly strategic company with the most advanced intellectual property on the manufacturing segment of the value chain – makes the protection of Taiwan in case of an invasion less valuable. On the other hand, creating additional interdependencies with China increases deterrence capacities. Subsequently, it seems relevant to go in that direction, as a Chinese invasion in Taiwan would have major disruptions effects on Japan's microchip sector and affect its security greatly. To have a general idea of Taiwanese port disruptions' impact, the following charts correspond to the Japanese industry output at risk if the port of Kaohsiung and Keelung were to be disrupted for 7 days only[184]. This simulation uses the database of the study conducted by the International Monetary Fund "port watch" in partnership with the university of Oxford[185]:

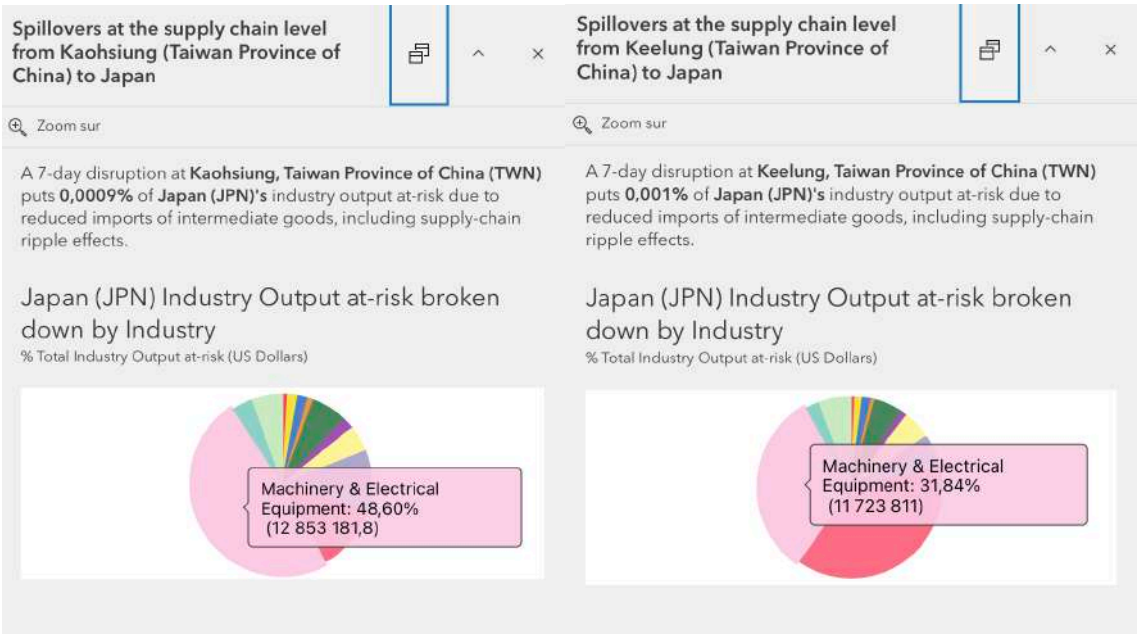
[182] Reva Goujon, Jan-Peter Kleinhans and Laura Gormley, Rhodium Group, Thin Ice: US Pathways to Regulating China-Sourced Legacy Chips. May 13th, 2024.

[183] China's invasion of Taiwan has been vowed since Mao came into power in 1949. According to Chinese authorities, Taiwan is a part of China and thus requires its reunification with the mainland (Chinese Ministry of Foreign affairs, China's Policies on Asia-Pacific Security Cooperation (White Paper), January 2017.) https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1429771.shtml

[184] Mambra, S. (2022). 8 Major Ports of Taiwan. Marine Insight. https://www.marineinsight.com/know-more/8-major-ports-of-taiwan/.

[185] Please note this simulation is originally intended for port disruptions resulting from climate catastrophes though it appears relevant to use for a potential invasion of the island as well.

Table 33



University of Oxford; IMF PortWatch (portwatch.imf.org).

Even if this simulation is run for only 7 days, the above visualisations clearly show the particular exposure of Japan's machinery and electrical equipment sector, which encompasses semiconductors-related goods. Ultimately, Japan's role in de-risking Taiwan's potential invasion can be more active and use the industrial dimension to its full extent, beyond the welcoming of TSMC' plants on its territory, but by encouraging its legacy chip sector to position itself *vis à vis* China's demand. This greater role for Japan is especially important given growing US scepticism to contribute to allies' defense, which the last section of this report will deal with, before offering its recommendations.

c) *Under the second Trump Administration, the US casts uncertainty on the world stage, eventually calling for Japan to step up.*

Echoing the Guam doctrine developed by Nixon in the 1960s[186], the US' reluctance to protect extensively its allies – bearing high financial costs – has resurfaced under the Obama

[186] Kimbal J., 2006.

Administration (Gros, P., 2012). The latter developed the "leading from behind" approach, essentially initiating a step back of the US from the world affairs and a new approach to collective defense. With Donald Trump, this dynamic has accelerated in a manner that is both unexpected and volatile, which could be summarised as "if they don't pay, I'm not going to defend them"[187]. Beyond the change in defense conceptions, the US has relied on unilateral measures to assert its objectives, preferring coercion instead of diplomacy, which signals a profound change in US' support of the liberal order, with a State that is becoming increasingly rogue on the world stage[188]. As pointed out by the scholar interviewed for the report when asked about the friendshoring dynamic of the US which does not treat its allies as friends and the implications for the future:

> *« C'est vrai que ça a été pointé du doigt par certains élus dans des auditions parlementaires, qui ont souligné l'ironie de la tentative de… « Out-China» China avec la multiplication des outils d'intervention de l'État dans l'économie, d'interdiction des applications, des restrictions sur les importations et exportations. C'est sûr qu'à mesure que les Etats-Unis s'éloignent d'un modèle de soutien au libre-échange, de laisser-faire ou d'absence d'intervention de l'État - relatif - dans l'économie. Il y a des points communs avec le modèle chinois qui sont pointés par certains. Après la différence, même si elle est un peu plus théorique sous l'administration de Trump, c'est le modèle démocratique contre le modèle non-démocratique à la fin, et le système de pouvoir et de contre-pouvoir est très différent. »*

This has therefore created a worry among US allies, including Japan, as to the likeliness of the US protecting them in a regional/world war scenario (Aoyama, R., 2023.). In Tokyo, the aforementioned change in US foreign policy has first triggered a revision of the country post-WWII pacifism and remains of the Yoshida doctrine; in 2015, Shinzo Abe passed a law that allowed Japanese Self Defense Forces to defend themselves in external conflicts,

[187] *The Guardian,* 7th of March 2025, « Trump Casts Doubt on Willingness to Defend Nato Allies 'If They Don't Pay' ».
https://www.theguardian.com/us-news/2025/mar/07/donald-trump-nato-alliance-us-security-support.
[188] Michael Beckley, 16th of April 2025, Foreign Affairs, The Age of American Unilateralism: How a Rogue Superpower Will Remake the Global Order.
https://www.foreignaffairs.com/united-states/age-american-unilateralism

ultimately setting a precedent for future, more explicit changes in the country's defense conceptions[189]. At the same time, the Trump Administration's clear priority, i.e. deterring China, also positions Japan with more centrality on the international stage. This has been welcomed by some Japanese policymakers, as alluded by the scholar's observation during a conference following Trump's election: « Et finalement les premières personnes qui ont parlé, je crois même la première, c'était un japonais. Et a commencé par dire qu'eux, ils avaient franchement un bon souvenir de l'administration Trump I, que c'était un bon bilan et qu'ils étaient plutôt satisfaits, que ça allait bien se passer. »

To get a grasp of the Japanese State's perspective, the publications of the Japan Economic Foundation are enlightening as to the level of ambiguity the country deals with. At first, there are growing calls to improve Japan-China relations to stabilise and expand economic transactions[190]. Second, Japan estimates that the US-Russia interactions in Ukraine have made it more difficult for China to invade Taiwan in the coming years[191]. Third, Japan still relies heavily on the US; as if Taiwan was to be invaded, Japan would provide its "maximum assistance and cooperation"[192]. With that in mind, it seems that Japan is particularly focusing on improving its ties with the US so as to reduce the uncertainty it faces and maintain an access to the benefits of the relation, in microchips development notably. Following Trump's taking office, Tokyo rushed to organise a bilateral summit in February 2025. This was a success -relatively - as the two leaders committed to "pursue a new golden age for US-Japan relations"[193]. Yet, on Trump's "liberation day" -when the US president issued reciprocal tariffs on a large series of countries, regardless of their diplomatic relations and including Japan -Tokyo had to renew its diplomatic efforts and managed to be the first country to secure priority tariffs negotiations[194].

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[189] Mizuho, A and Yoshida, R., 19th of November 2015, *The Japan Times,* "Diet enacts security laws, marking Japan's departure from pacifism".
https://www.japantimes.co.jp/news/2015/09/19/national/politics-diplomacy/diet-enacts-security-laws-marking-japans-departure-from-pacifism-2/

[190] Japan Economic Foundation. "Japan's Diplomatic & Security Strategy & External Economic Policy in Light of the Situation in Ukraine & the Confrontation between the United States & China". *Japan Spotlight.,* 2023, p.7.

[191] *Ibid*, p.4.

[192] *Ibid.* p.5.

[193] The White House. "United States-Japan Joint Leaders' Statement," February 8, 2025. https://www.whitehouse.gov/briefings-statements/2025/02/united-states-japan-joint-leaders-statement/.

[194] Dempsey, H. and Lewis, L. (2025). Japan secures priority tariff negotiations with Donald Trump. *Financial Times.*
https://www.ft.com/content/849a4845-f05a-41d1-87fb-05b7c130e117.

Eventually, it seems likely that despite what could be seen as a form of preferential treatment by the Trump administration - for now- Japan will have to take increasingly care of its power on the international stage itself. In implementing a successful strategy to secure its microchip supply chain over time, Japan will accomplish an important step towards strategic autonomy in a sector that has incredible spillover effects on the rest of the industry, with increased leverage on other States, thus mitigating the potential for escalation and disruptions in the Sino-US rivalry. To do so, the recommendations ensuing the conclusion thereafter will provide a set of potential tools Rapidus could use and request from the METI as well as suggestions for the METI on the international stage, to increase Japan's likeliness for success in an international setting.

Conclusion

Looking at Japan’s evolving position in the semiconductor supply chain through the prism of Edward Luttwak’s geoeconomic insight - that "fear of economic consequences" and "political interventions for strategic reasons" increasingly merge - offers the structural framework to assess the country’s strategic recalibration. As the microchip industry is increasingly intertwined with national competitiveness, innovation, and security goals, Japan’s actions in the sector - embedded in the Sino-US rivalry - must navigate the various pressures stemming from the changing global trade architecture. The initiative to revive its national industry where strategic autonomy, global interdependence and competitiveness coexist in a state of tension, revealing both the constraints and opportunities of Japan’s approach.

Throughout the past few years, Japan has steadily reasserted its ambitions in the global semiconductor landscape. Once a dominant force in the 1980s before declining due to international competition and internal stagnation, Japan has been engineering a return for the last five years - not by attempting to replicate past structures, but by embracing a new model of integration and resilience. This model, however, is not without ambiguities, as a coordinated effort comes into frictions with many forces, both internal and external.

One of the most relevant dilemmas to grasp the dynamic that reshapes the microchip supply chain is the extraterritoriality of U.S. export controls. Although Japan is a long-time partner of the United States, it remains subject to coercive compliance mechanisms that can undermine its own strategic setting. U.S. controls on advanced chip manufacturing equipment and semiconductor technologies - targeting sales to Chinese firms - have placed Japanese companies in the uncomfortable position of having to restrict exports, not primarily because of national interest, but because of U.S. jurisdictional overreach. This extraterritorial dimension blurs the line between allyship and dependency. It showcases the geoeconomic reality that supply chain influence on a key - yet niche - sector is not just about economic competitiveness but also about legal and normative dominance in international relations.

Paradoxically, Japan has also been an active contributor to the very export control regimes that constrain it. Tokyo's 2023 decision to align with Washington and the Netherlands in curbing the export of cutting-edge SME to China sheds light on its strategic intent to limit

China's influence in major technological advancements. This move speaks to Japan's desire to shape, rather than be subject to, global supply chain norms. It is also a pragmatic recognition that the sustainability of its semiconductor resurgence depends not only on internal reforms but also on the stability and coherence of allied strategies. By joining these regimes, Japan ensures it has a seat at the table where the future of the industry is negotiated, also maintaining an ambiguity *vis à vis* China.

Nonetheless, these controls carry a double-sided consequence. On one hand, they help keeping advanced technology away from geopolitical rivals; on the other, they risk undermining Japanese firms' market access and revenues, particularly in China, still the world's largest semiconductor market. This loss is not marginal. For firms deeply embedded in upstream activities - chemical production, deposition tools, and etching systems - China remains a critical customer. The erosion of this customer base due to restrictive trade measures threatens the very sustainability of the Japanese initiative in the sector. In addition, the architecture of the industry reflects structural contradictions. While states rush to domesticate and friendshore semiconductor production - building fabs, offering subsidies, and investing in workforce development - the reality is that the value chain remains inherently international. Equipment manufacturers in Japan, designers in the U.S., foundries in Taiwan and South Korea, and chemical producers in Europe are all part of this structure and rely on each other to innovate. As such, total industrial sovereignty remains largely a concept rather than an empirical possibility. Japan's effort with the Rapidus project at home will arguably find some success but this approach cannot replace global interdependencies - nor should it.

This asymmetry extends to the raw material base particularly when it comes to friendshoring. China holds a strategic, weaponised monopoly in the extraction, refining, and exports of Rare Earth Elements which are essential to high-performance semiconductors. At the same time, the U.S. has maintained an edge in downstream capabilities - such as chip design - and remains partly dependent on access to rare earths controlled by its rival.

Another layer of complexity emerges when assessing the use of state subsidies as a policy lever. The Rapidus pilot line's on-schedule launch in Hokkaido or the TSMC plant beginning mass production tend to demonstrate Tokyo's ability to combine strategic planning with industrial pragmatism. But even these potential successes raise questions about the

sustainability of subsidy-led development. Without a long-term commercial rationale, state aid can lead to misallocation, overcapacity, and led to major financial loss.

From a structural perspective, these collective national efforts signal a broader reconfiguration of the international trade regime. The WTO-based model that emphasised free markets, open competition, and rules-based liberalism is giving way to a model where security, state intervention and interference take precedence. In this new system, Japan's balancing act stands out - not only because it reflects careful diplomacy between the U.S. and China, but because it attempts to retain elements of multilateral openness, which are to be key if Japan were to enjoy the long-term benefits of its domestic strategy. Indeed, it has managed - even in a system marked by fragmentation and uncertainty - to wield influence on the international stage and delay the pressing dilemmas it faces.

As the Sino-American rivalry intensifies and microchips remain central to the broader techno-industrial competition, Japan would need to further refine its balancing act. Its success depends not only on the pace of technological advancement but on the ability to shape - and adapt to - the emerging geoeconomic order. The country's challenge is not merely to compete but to structure the competition in ways that preserve its autonomy and core security.

To sustain its current momentum and navigate the structural, geopolitical, and industrial dilemmas that shape the contemporary semiconductor order, Japan must now implement short, medium and long-term measures to hone its current strategy, whether for Rapidus itself or the wider setting. These should address downstream vulnerabilities, workforce shortages, and the inherent contradictions of friend-shoring - through more precise export control governance, horizontal industrial collaboration, and future-proof planning mechanisms. The following recommendations will aim at operationalising Japan's strategic across its semiconductors supply and value chain.

Informed Recommendations

The suggestions thereafter are based on the analysis conducted throughout this report. They are regrouped in three main objectives, from bottom to top-level. Their timeline is divided in three time-compartments, starting with short-term to medium-term and long-term. The time scale offered for the recommendations may vary depending on the focus and level of feasibility. When possible, an estimated cost will be offered.

Please note that the results of Rapidus' 2nm logic prototype production should be published in late July 2025[195]. These results may have a positive or adverse effect on the attainability of the measures addressed below.

I- **Consolidation of Rapidus' financial and human frame to reduce uncertainty.**

- Short-term: Evaluate the opportunity to secure skilled national workers by providing incentives and increase the company's overall transparency.

~ *implementation scale between 6 months to a year*

~ low to medium cost

To attract high-skilled labour force inflows over time, Rapidus could provide incentives to its employees and connect its IIM-1 plant in Chitose, Hokkaido, to Tokyo more closely, as a quarter of the country's population lives in the capital's periphery. Chitose and Tokyo are separated by 900 kilometres, a distance that can deter high skilled - present or future- labour force to apply and work in Chitose due to personal considerations. The two cities are yet well connected by airplane transportation, with the average return ticket between the two amounting to USD 50 (JPY 7,200) whether for the company Spring Airlines Japan or

[195] Mukano, R. (2025). Japan's Rapidus in talks with U.S. tech giants to mass-produce chips: CEO. Nikkei Asia. https://asia.nikkei.com/Business/Tech/Semiconductors/Japan-s-Rapidus-in-talks-with-U.S.-tech-giants-to-mass-produce-chips-CEO

Jetstar Japan. The company currently employs about 700 people, making it financially feasible to take in charge one plane commute to Tokyo once every two months, which would amount to USD 210,000 (JPY 30 million) per year (this figure does not take into account the reduction of marginal costs if the company was to secure an offer with an Airline). Considering the average starting salary for engineers in the country amounting to USD 31,000 (JPY 5 million)[196], this incentive seems particularly valuable to attract the highest skilled labour force looking to set up a life in less urban areas of the country as well as better link the Rapidus plant in Chitose with the Headquarters in Tokyo.

Rapidus Corporation appears to lack some transparency, which may have a negative impact on attracting private investments. The company could provide financial reports, forecasts and shareholding structure on its website, to provide the public with additional knowledge and confidence in the project. Besides, there are significant discrepancies between the Japanese and English version of the website, which could scare off foreign investors from looking more closely at the company and feel inclined to invest. The company could work towards homogenising its communication in both languages/versions of the website to increase its international exposure while still screening the potential new partners before they enter a business relationship with the company. This would potentially contribute to help the company secure private investments from national and foreign entities.

- Medium-term: Evaluate the opportunity to reach an offtake agreement with public institutions to gain the trust of the private sector.

~ *implementation scale between 2 to 5 years*
~ low cost for Rapidus, medium to high costs for the State

At the end of April 2025, the Japanese government passed a law that allowed the State to acquire equity stake in Rapidus[197]. This move may indicate the will to prepare for an initial

[196] Glassdoor, Japan 2025, https://www.glassdoor.fr/Salaries/tokyo-japan-engineer-salary-SRCH_IL.0,11_IM1071_KO12,20.htm?countryRedirect=true
[197] Li, L. (2025). Japan passes law to buy into Rapidus, boosting control over chip strategy. DIGITIMES ASIA. https://www.digitimes.com/news/a20250425PD227/rapidus-government-legal-2025-budget.html

public offering (IPO) on Japan's financial markets while securing a public anchor shareholding that would prevent adverse interference from penetrating the company's board. For now, Rapidus has struggled to attract the corporate world when it comes to investments though the company will eventually need JPY 4 trillion (USD 25 Billion) to reach mass production stage[198]. Yet, before considering an IPO as the solution to increase private investments in the company, it appears relevant to look at the options that would further secure the company's financial viability and consequently reassure the private sector. An IPO could present itself with negative effects if the company was not to meet its raised capital expectations, endangering these interests Japan's wider stakes in it. Going further, it appears that an offtake agreement with the State could be a solution to this issue as well as being suited for the situation. By promising to purchase a determined level of production before it starts, the State would reassure the market and provide certainties to the project (Byoun, S *et al.,* 2013) . This could in turn attract the private sector towards the company, potentially securing offtake agreements with new investors along the way. There is a negative correlation between the use of debt and offtake agreements, which may optimise the subsidies for the company as well[199]. Besides, an offtake agreement could also reduce the propensity for the State to focus on subsidising the external growth of the company (new fabs, R&D centre and the likes), which may present high risks if private partnerships and contracts fail to arrive in time and that the company is only hooked on public financial support to amortise the spendings[200].

After having set a clear timeline for the start of the mass production stage, depending on the results of the prototype in July, the company would be advised to approach the government and discuss the potential agreement.

- Long-term: Evaluate the opportunity to progressively engage in vertical integration if the conditions allow it.

[198] Nenni, D. (2024). Rapidus faces three major challenges in 2nm chip production, SemiWiki. https://semiwiki.com/forum/threads/rapidus-faces-three-major-challenges-in-2nm-chip-production.21687/

[199] *Ibid.*

[200] As a comparison, European green battery maker Northvolt collapsed in March 2025 after receiving billions in public funds and failing to attract the private sector credibly.

~ implementation scale between 3 to 10+ years

~ high cost

Once up and running, the company could, if it finds the success it expects, engage with other companies close to its manufacturing segment of the supply chain to build a form of vertical integration. Such integration would not imply a return to the traditional IDM model of chip fabrication but would instead foster a hybrid model tailored to Japan's strengths, contributing to the securitisation and resilience of the domestic industry. Through this structure, Rapidus could ensure continuity of supply, with visibility into downstream demand and capacity needs - helping align production targets with realistic consumption forecasts across its ecosystem. In this scenario, partners would not simply be suppliers but co-dependent stakeholders with shared risk and performance incentives. In the first phase, Rapidus could establish strategic industrial partnerships with key Japanese players such as SME manufacturer Tokyo Electron and materials supplier JSR, synchronising production planning, and aligning investment in additional capacities (Bikram, K., *et al.,* 2009).These relationships would not only enhance Japan's production competitiveness but could also generate economies of scope and scale in next-generation nodes, enabling Rapidus to compete more credibly with the market leader TSMC.

Furthermore, a more integrated microelectronics ecosystem would strengthen the Japanese semiconductor sector's political voice. As these companies would coordinate on the economic side, they could begin doing the same towards the political one, providing government bodies like the METI with homogenised input on policy, regulation, and export controls. This would create a virtuous cycle to improve the reviving of the microchip industry and increase the government's effectiveness in this attempt.

II- Coordination of efforts and synergies with the METI to increase momentum while aligning with export controls.

- Short-term: Evaluate the opportunity to attract external sources of labour force and improve connections of the Hokkaido Semiconductor Human Resources Development Promotion Council.

~ *implementation scale between 1 and 2 years*
~ medium cost

The METI could work with the Japanese immigration authorities so as to hone the Specified Skilled Worker Program (SSWP). Created in 2019, the SSWP provides a framework that facilitates the inflow of skilled migrants in Japan[201]. This program has the (i) status, quite restrictive, which is only valid for five years; and the (ii) status for higher skilled jobs, which allows the migrant to bring his family (partner and children) and stay indefinitely based on the renewal of the status. Yet, the SSWP (ii) could be improved further, as it is confined to a very narrow range of sectors and very difficult to obtain. First, it could ask the migrant to renew the status only upon leaving the company that first sponsored the application or if a change of home occurs. Besides, the ten-year delay for permanent residency could be reduced to five under the SSWP (ii) status only.
This program only gives the State an increased capacity to let migrants in. It would therefore seem relevant to have an international outreach dimension to the country's immigration as well. Given Japan is likely to face human resources shortages in the medium to long term, such an attempt could contribute to mitigate this issue[202]. With Rapidus' partnerships with foreign companies (IBM, ASML) and Japan's attraction for companies like TSMC, the country could aim at facilitating talent mobilities in between the companies. This could also be implemented through foreign partnerships with universities to target graduates and bring dynamism to the various projects aiming at boosting the domestic microchip industry.

[201] OECD. "Recruiting Immigrant Workers: Japan 2024," 2024. https://doi.org/10.1787/0e5a10e3-en.
[202] Third Report, Committee on New Direction of Economic and Industrial Policies, Industrial Structure Council, Ministry of Economy, Trade and Industry, June 2024.

Coming back on national soil, the Hokkaido Semiconductor Human Resources Development Promotion Council – regional project in the region of the Rapidus plant looking to train students and create long-term innovation centres- should connect the Hokkaido University in Sapporo with the Chitose Institute of Sciences and Technology more directly. Despite the geographic proximity - only about 50 kilometres - commute times between Sapporo and Chitose can exceed two hours when relying on regional buses. Establishing a direct and dedicated transport link between Hokkaido University and the Chitose Institute of Science and Technology would encourage greater academic and industrial synergy, particularly in the context of the Council's nine-year plan for regional semiconductor development.

- Medium-term: Evaluate the opportunity to boost the country's industrial base by supporting information sharing to forecast production needs.

~ *implementation scale between 3 and 6 years*
~ medium to high cost

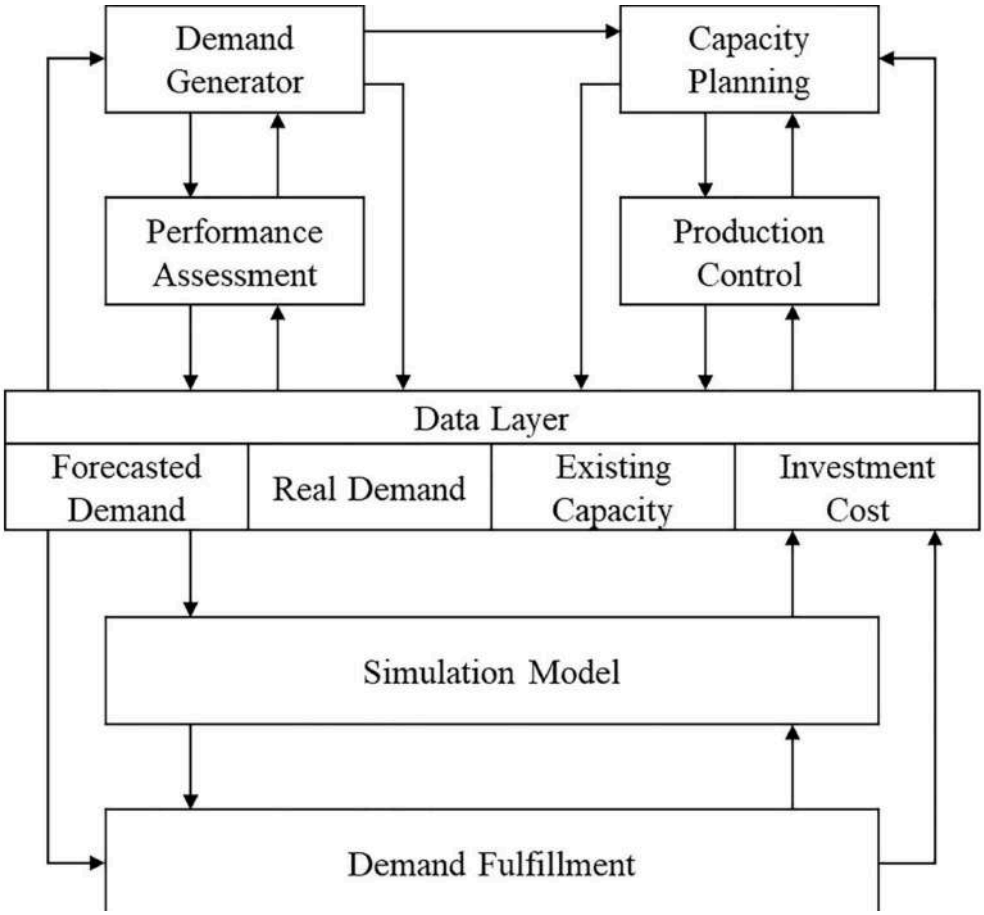
Alluding to the need of securing high skilled labour force to sustain the initiative as well as the vertical integration of the production, the creation of fab-clusters supported by the METI would promote the two, in a perspective of a knowledge sharing and learning-by-doing model[203]. Though this did not seem to be part of the considerations of the TSMC project in Kumamoto, creating clusters - around the Rapidus plant in Chitose especially - should be an important aim in the future. This would also reduce costs by allowing the potential sharing for infrastructures and logistics. The METI's role in this recommendation would be primarily financial, by using advantageous fiscal policies to set shop in the Chitose region for instance.
Through the prism of knowledge sharing, it would also appear relevant for the METI to engage in gathering strategic intelligence on the national projects as well as the international competition. This would provide the Ministry with a greater capacity to

[203] Baue, Harald, Ondrej Burkacky, Peter Kenevan, Stephanie Lingemann, Klaus Pototzky, and Bill Wiseman. "Semiconductor Design and Manufacturing: Achieving Leading-Edge Capabilities," 2020. https://www.mckinsey.com/industries/industrials-and-electronics/our-insights/semiconductor-design-and-manufacturing-achieving-leading-edge-capabilities.

implement guidelines that suit the future trends of the industry. With better information, Rapidus and the METI could implement a well-functioning demand planning model to the production of chips, limiting the risks for excess or insufficient supply.

The rolling horizon capacity expansion model created for the semiconductors industry could be an interesting solution in the case of the Rapidus project (Kuo, H & Chien, C., 2023). This model is based on predictive evolutions which reduces the risks for capacity shortages or surpluses to enhance overall efficiency of the manufacturing process; this model is particularly relevant in case of actual demand being lower than the planned demand, a problem the Japanese microchip industry may face. Here is a visualisation of the model:

Table 34



Kuo, H & Chien, C., 2023

Upon realisation of these suggestions, the METI could improve the coordination of its industrial policies in the sector, generate additional value and maintain a pragmatic approach to potential disruptions and fluctuations of the market.

- Long-term: Evaluate the opportunity to improve quality management by using blockchain technology.

~ *implementation scale between 3 and 10+ years*
~ high cost

In the context of tightening export controls, monitoring the supply chain is becoming a strategic aspect of the microchip competition to avoid being caught in economic warfare-style penalties. With that in mind, blockchain technology appears to be a long term, sustainable solution with positive spillover effects on the Japanese domestic industry[204]. Blockchain technology essentially consists in a database that gathers all the exchanges a product undergoes among various users (in this light, stakeholders on the microchip supply chain). This technology consequently enables a very detailed traceability of controlled semiconductors items, especially when it comes to selling them to US 'designated' countries like China (Ceo, C. *et al.,* 2025.). Implementing this technology would help to prevent Japanese companies from doing so by having a clear idea of the final destination of their chips for each customer. In that sense, blockchain technology would reduce the risk of facing US probes due to export control breaches, resulting in having to bear the burden of US extraterritoriality.

Yet, blockchain technology is very expensive to implement, making it unlikely for companies to encourage this development themselves. The METI could therefore come into play by subsidising this particular tool to improve its supply chain security and control. All in all, blockchain – coupled with AI- could improve the semiconductor's cartography in and out of Japan, improve the risk assessment capacities of companies like Rapidus for the customer to end-user segment of the supply chain and better protect the country against the potential use of extraterritoriality as an economic warfare tool.

[204] Interview conducted with a professional from the public sector on the 17th of February 2025, c.f. Appendix 1.
« Avec les dernières innovations dans l'intelligence artificielle et la blockchain, il sera plus simple de retracer les chaines d'approvisionnement de près et savoir où va quoi ».

III- **Promotion of an international environment that integrates security in an open structure.**

- Short-term: Evaluate the opportunity to provide state-support to the manufacturing of legacy chips.

~ *implementation scale between 1 and 3 years*
~ medium cost

As pointed out in the last part of this report, fostering interdependencies with China through legacy chips exports appears to be an essential element of the balancing rationale led by Japan these last 3 years. China's market in this segment is expanding yet the PRC still lacks the domestic production capabilities to feed entirely its internal market. Going further, Japan could provide incentives to its legacy chip production, above the US' *de minimis* level and far less expensive than cutting-edge items since Japan already has the capacity to develop them – the technology for these chips starts at about 20nm logic nodes[205]. Positioning the archipelago as a key supplier for Chinese demand would help in de-risking China by increasing leverage over the former, a vision that could be argued to explain this move to the US. In addition, a healthy business relationship between the two countries has shown its advantages when it comes to the security and stability of the region, hence the relevance to keep working in that direction.
Besides, it seems highly valuable to maintain a dialogue with China throughout the implementation of export controls, as Japan cannot afford to alienate its relationship with the country.

- Medium-term: Evaluate the opportunity to engage in multilateral talks to coordinate microchip efforts and establish consensus on export controls.

[205] Rühlig, T. (2024). Curbing China's legacy chip clout - Reevaluating EU strategy. European Union Institute for Security Studies.
https://www.iss.europa.eu/publications/briefs/curbing-chinas-legacy-chip-clout-reevaluating-eu-strategy.

~ implementation scale between 2 to 5 years

~ low cost

In reference to demand planning (rolling horizon capacity expansion model[206]), Japan could improve this model and translate it in an international setting of governance. Collaboration with allies and counterparts in the industry appears to be key to avoid useless spendings and mitigate the risks of oversupply, especially when considering the international nature of the microchip supply chain. Such an initiative would contribute to a form of multilateralism that does not require extensive sensitive information sharing but provides benefits to all participants. This could eventually encourage collaboration and trust in between States, even China and the US, which should prove particularly helpful once China will be a same-level competitor than the US as it is likely to happen in the long term. This multilateral dimension to the recommendations is key due to Japan's peculiar position in the Sino-US rivalry and need to balance it as long as possible, ideally not being a situation that would demand to make a clear-cut choice.

Moreover, Japan should work closely with the US to detail their export controls, based on the information provided by the integrated corporate world in the country. Indeed, Japan could engage in bilateral – or multilateral if possible – negotiations with the US to suggest a scaled export control system. Such a system would attach a risk level to various types of semiconductors' related items, allowing, up to a certain point and a certain level, exportations to China rather than the quite high, thus potentially inconsistent, current *de minimis* levels. This would first of all clarify the strategic intent of US export controls, as whether it tries to contain China's military modernisation or overall technological advancement – of course, if it is the latter, the current system is unlikely to change even though it may prove counterproductive. For the US, this would foster mutual, targeted efforts towards the most critical, advanced microchips used for military purposes. Eventually, this would give some margin for the corporate world to adapt, prepare and still benefit from an important market with high value items, consequently generating higher profits for Japanese companies. Overall, Japan's diplomatic alignment with the US could be

[206] *Cf.* Informed Recommendations II, medium term.

reinforced while pushing Japanese interests forward, making the country a major contributor to multilateral talks related to export control regimes, and ensure that strategic objectives are met without undermining its domestic industrial interests or critical economic ties in the region.

- Long-term: Evaluate the opportunity to export rare earths and create upstream interdependencies on the micro-chip supply chain.

~ *implementation scale between 5 to 10+ years*
~ low cost

At last, Japan could consider becoming an exporting country of REEs. Depending on the exact estimation of the stock discovered off the shores of the Minami Tori Shima Island, and the forecasts for Japan's own domestic demand, the archipelago could aim at exporting REEs to its counterparts on the supply chain, whether allied or relative rivals. This would make Japan a major stakeholder in the industry, with a relative very low exposure to disruptions and market distortions. Japan could position itself as a comprehensive alternative to Taiwan along the many segments of the supply chain, from CRM, SME to cutting edge logic nodes.
At home, the stocks of REE could be used to secure the Japan's initiative in the industry, using government subsidies to lower the prices of these materials to domestic companies as well as foreign ones willing to set up microchip related infrastructures in Japan, therefore increasing their competitiveness on international markets.
Through a very long-term prism, it is likely China will retain its dominance in the CRM market. Japan could eventually re-direct the benefits it gets from a strong temporal position on the supply chain towards strategic bottlenecks (SME, far advanced manufacturing capabilities), ultimately getting an edge over the competition and leveraging the market to maintain its international structure, and with that, promote the regional stability that stems from such a framework.

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Appendix

Appendix 1: table of interviews

Name	Date and time of interviews	Length of the interview	Role
Interviewee A	22nd of November 2024, at 4 P.M.	32 minutes	Professional from a major company in the microchip sector
Interviewee B	17th of February 2025, at 6 P.M.	30 minutes	Professional from the public sector who contributed to establish France's position in the microchip sector
Interviewee C	18th of February 2025, at 6 P.M.	41 minutes	Scholar specialised in the Sino-US rivalry, technological competition and export control

Appendix 2 : Interview with Interviewee C

Deshann : Bonjour, merci de prendre le temps de répondre à mes questions, j'espère avoir été clair sur l'explication de mon sujet. J'ai récemment effectué une analyse quantitative relative aux exports japonais du secteur des semi-conducteurs à partir de leur site Trade. J'ai pris les années 2019, 2022 et 2024 pour regarder la Chine et les États-Unis. Les exportations en produits du secteur sont encore largement supérieures au niveau pré-covid vis-à-vis de la Chine, ce qui a attiré mon attention.

Interviewee: N'y aurait-il pas un effet d'aubaine – non parce que ce ne sont pas les plus avancés – ce ne serait pas un effet d'aubaine face justement aux Américains qui exportent moins ?

D : Ça risque d'être un de mes angles de lecture là-dessus justement. Il y a l'enjeu d'une demande chinoise qui augmenterait du côté chinois du fait des sanctions appliquées par les Américains ; qui ont une législation qui s'est beaucoup plus durcie. Alors que les Japonais, typiquement, n'ont que 23 items sur leur liste d'export controls. J'imagine qu'empiriquement les possibilités d'outrepasser ça sont un peu plus grandes (M soupire)
En revanche, ce qui est intéressant, c'est que la valeur en dollars, enfin en yen, a doublé sur la période.

Interviewee: Entre 2019 et 2024 ?

D : Entre 2022 et 2024. Le prix a explosé sur les équipements.

Interviewee: Le prix par équipement a explosé ou le nombre d'équipements a explosé aussi ?

D : Le nombre d'équipements a légèrement baissé, mais le prix a augmenté.

Interviewee: Ah ouais… ok

D : Je pense attribuer ça à la loi des marchés, où la rareté imposée par les Américains a eu peut-être un impact.

Interviewee: Je ne sais pas s'il faut tout lire par ça, parce que dans l'industrie des semi-conducteurs il y a aussi des cycles, des choses propres à l'industrie qui ne sont pas… Parce que quand même les Américains ont fait un très gros effort de persuasion auprès des alliés pour que les contrôles soient alignés. Je ne sais pas si fondamentalement les Japonais peuvent exporter beaucoup plus que les États-Unis. Pour les machines et les équipements les plus avancés, lithographiques par exemple, ils sont soumis aux mêmes restrictions. Donc je ne sais pas si c'est principalement à cause des US.

D : C'est encore très frais dans mes datas, mais peut-être que c'est aussi lié à la Chine qui a une demande plus forte pour se constituer un stock. Pour ASML c'est ce qu'ils avaient fait.

Interviewee: Oui, c'est ce qu'ils ont fait pour Nvidia aussi, pour récupérer le plus de puces au-dessus du seuil avant que le seuil ne descende.

D : Ok très intéressant. Question pour faire écho à ce que l'on disait. J'aurais aimé savoir ce que vous pensiez de comment les puissances démocratiques – États-Unis et occidentaux et « occidentalisées », dans mon cas Japon mais aussi Corée par exemple ; les pays qui tendent plus vers les US en général – ne s'aliènent pas la Chine sur les terres rares, sur la première partie de la chaîne de valeur des semi-conducteurs. Pour mon sujet, ça semble quand même inimaginable de rapatrier l'ensemble de la chaîne de valeur de l'industrie sur le plan domestique. Comment est-ce qu'on balance le calcul de la Chine dans…

Interviewee: Je n'ai pas beaucoup d'éléments pertinents pour répondre à votre question, je vous invite à contacter X. Je pense que c'est une grande préoccupation du Japon et de l'Europe. On pense aux chiffres qui montrent le monopole chinois de ces terres rares. Je dirais qu'il y a une stratégie de partenariat, notamment entre le Japon et les US sur les minerais critiques pour balancer ça. Mais vaste question, vaste question sur laquelle je n'ai pas travaillé.

D : Question plus US maintenant ; en termes de ressenti, j'ai le sentiment que les Américains sont très puissants sur le plan du discours, en termes de demandes vis-à-vis des partenaires sur les export-controls mais que par force de socialisation, de friction, la manifestation empirique de ces demandes tend à être moins puissante et est limitée, peut-être plus douce, plus lente. Est-ce qu'il n'y a pas une forme de baisse de volume par rapport aux discours américains quand les partenaires doivent appliquer ces demandes ?

Interviewee: Hmm non. Je pense qu'il n'y a pas grand-chose qui peut atténuer le discours américain à l'heure actuelle. À la limite, ça peut être chronologiquement. Avec un travail sur le séquençage à quelques mois près des restrictions. Et encore je serais assez mitigée car il y a eu un gros travail de l'administration Biden pour actualiser en permanence les contrôles exports pour fermer le maximum de failles possibles. S'ils étaient conscients d'une forme de faille existante, je ne crois pas qu'ils attendraient pour les Japonais avant de la fermer. Ça je ne pense pas tellement. Je pense que ce sont globalement des calculs internes du BIS en termes de chaînes de valeur, les exportations et les échanges avec la communauté du renseignement américain pour savoir ce qui va où et ce qui contribue aux capacités chinoises. Je parlais d'un travail de séquençage car on l'a vu avec l'annonce en janvier 2023 de la fuite concernant l'accord trilatéral entre le Japon, les Pays-Bas et les États-Unis qui a été suivie de réglementations nationales au Japon et aux Pays-Bas par la suite. Mais qui, finalement, en octobre a été outrepassée par les réglementations américaines qui sont allées encore plus loin. Je pense surtout aux Pays-Bas, je ne sais pas ce qu'il en était pour les Japonais mais, par exemple, ils s'étaient mis d'accord lors de la discussion trilatérale pour contrôler les exportations d'un certain nombre de machines DUV et finalement en octobre, les États-Unis sont allés encore plus loin en appliquant extra-territorialement des restrictions sur des machines DUV d'ASML qui allaient plus loin que les restrictions nationales en vigueur. Il y a un rapport de Rhodium Group qui a un tableau très bien fait là-dessus et qui compare ces machines DUV prises en compte par les Pays-Bas et les États-Unis pour montrer ce dépassement.

D : Par dépassement on entend l'usage de la règle de de minimis pour faire levier ?

Interviewee: Je ne sais plus exactement si c'est la FDP ou la de minimis. En fait c'est juste qu'il y a certaines machines qui tombent sous le contrôle export américain avec une application extra-territoriale. Je ne sais pas s'il y avait déjà en octobre 2023 de minimis. Je ne sais pas si les États-Unis sont prêts à réduire le périmètre de leur ambition restrictive par discussion avec les alliés. Je pense qu'il faudrait vraiment de très très bons arguments.
Je ne sais pas si vous avez entendu ça mais moi j'ai plusieurs personnes, quand j'étais à Washington, qui ont soulevé l'argument qu'en fait c'étaient les Japonais qui avaient demandé aux États-Unis de mettre en place les contrôles, y compris extraterritoriaux, pour pouvoir les blâmer plutôt que blâmer les autorités japonaises elles-mêmes et qu'en fait ça fournissait un bouclier dans cet objectif de ne pas s'aliéner la Chine pour les Japonais. Et qu'en fait ça aurait été eux… Alors ça je crois que c'était pour ceux d'octobre 2022. Je crois que ça a été dit au moins par Estevez, le directeur du BIS en 2022, lors de la conférence CSET. Je crois qu'il l'a dit à ce moment-là mais je ne suis pas totalement sûr. Je crois qu'il l'a dit parce que j'ai posé la question et c'était sa réponse à ma question ; en tout cas moi on me l'a redit en entretien. Je ne sais pas si c'est vrai… Estevez avait aussi expliqué lors de cette conférence qu'il n'y avait pas eu de friction et que c'était magnifique, tout le monde était d'accord et extrêmement motivé à l'idée de se faire « extra-territorialiser ». Donc ça je pense que ce n'était clairement pas vrai. Mais plusieurs fois certains m'ont dit que dans une certaine mesure… Puis les entreprises japonaises, j'en parle dans mon étude, ont protesté car au moment de la modification de la règle de minimis, en disant « mais attendez là, ça veut dire qu'unilatéralement vous pouvez changer les opérations de légales à illégales du jour au lendemain ». Donc je pense que tout le monde n'était pas hyper content. Mais peut-être que… en tout cas c'est à creuser : les autorités japonaises auraient préféré que ce soit une action américaine plutôt que japonaise pour s'éviter les foudres chinoises.

D : D'autant plus que les Japonais ont été un peu critiqués dans leur propre réponse « législative » qui était globalement assez timide et ne prenait pas le pas, nationalement, sur ce que les US proposaient. Ce qui ne change au final absolument rien, mais ils sont restés assez évasifs. D'ailleurs je n'ai pas encore trouvé le document de source primaire sur ça mais les Japonais ont laissé un grand flou concernant les réexportations.

Interviewee: Mais ce n'est pas eux qui décident. Des réexportations américaines ?

D : En fait, les besoins de licence, auprès du METI, du Japon vers la Chine s'ils viennent d'un autre pays d'Asie du Sud-Est par exemple, dans la façon dont je l'ai compris, il n'y a pas forcément besoin d'une licence pour réexporter ces produits ?

Interviewee: Ok

D : De toute façon l'extraterritorialité américaine prend le pas là-dessus.

Interviewee: Ah oui je crois bien que ce n'est pas le METI qui décide. Mais j'aurais bien aimé creuser, mais je n'ai pas eu plus d'infos, ceux à qui j'ai parlé étaient un peu… difficiles.

D : J'imagine que c'est compliqué d'assumer ces choses-là publiquement dans un cadre diplomatique.

Interviewee: Oui, dans tous les cas, même quand ils ne l'assument pas quand ils le disent... C'est comme quand ils nous expliquent qu'ils ont tout coordonné avec les alliés... Avant octobre 2022, non juste après les restrictions américaines, j'ai parlé aux membres du Conseil de sécurité nationale de la Maison blanche qui expliquaient qu'en fait c'était juste une avance ; littéralement. C'était un Down Payment sur un accord multilatéral donc ils étaient assez sûr de leur coup quand même. Je pense que la diplomatie ne devait pas y aller de main morte quand même.

D : C'est extrêmement intéressant. Pour continuer sur l'idée de l'extra-territorialité du droit américain, est-ce que ce n'est pas aussi, voire surtout, un moyen de limiter la concurrence des pays alliés ? Peut-être plus que du rival désigné, la Chine, dans le sens où les partenaires européens et asiatiques sont très vites limités par cette extra-territorialité qui fait que les entreprises de ces pays peuvent moins se développer. Contrairement à la Chine qui va, en quelque sorte, bénéficier d'une motivation nouvelle pour « s'autonomiser » dans le secteur.

Interviewee: Non non. Je pense que c'est un avantage pour les Américains de bénéficier d'une dimension extraterritoriale de leur contrôle parce qu'ils décident unilatéralement de ce que vont pouvoir exporter ou non leur concurrent. C'est donc un avantage ; enfin ça évite un désavantage compétitif de leurs entreprises et c'est clairement l'objectif. C'est d'ailleurs même comme ça qu'ils en sont arrivés à la renaissance de la FDPR (Foreign Direct Product Rule).

C'est exactement au moment où ils ont imposé des restrictions contre Huawei que les entreprises des semi-conducteurs américaines sont allées voir les autorités américaines en disant « vous n'empêchez pas du tout les entreprises étrangères d'exporter vers Huawei et donc on est les seules désavantagées dans cette affaire ». C'est donc pour répondre à ce désavantage compétitif qu'ils ont réactualisé la FDPR. Un peu par tâtonnement, ils sont arrivés à ce nouvel outil d'extra-territorialité très puissant. Mais ce n'est pas leur objectif d'affaiblir leur concurrent économique, leur objectif, et ça c'est vrai pour le contrôle export et toute la panoplie de restrictions et même de politiques industrielles qui ont été développées ces dernières années, c'est la compétition avec la Chine.
Il y a effectivement un débat, un débat très nourri aux Etats-Unis, sur l'efficacité de ces sanctions, le risque que ça encourage l'innovation et l'autosuffisance chinoise. C'est un débat qui est même renouvelé à chaque nouvelle annonce chinoise, que ce soit le Huawei Mate 60 à l'été 2023 au moment de la visite de Raymondo en Chine parce qu'il (le téléphone) contient une puce que n'était pas sensé pouvoir fabriquer Huawei, que ce soit plus récemment DeepSeek… A chaque fois ça relance ce débat sur l'efficacité des restrictions, voire leur caractère contre-productif.
Mais l'objectif principal c'est quand même d'éviter… il y a une question sur est-ce que c'est pour éviter la modernisation militaire chinoise ou plus généralement, le développement technologique. Ça, je veux bien qu'il y ait débat mais par contre je ne pense pas que leur

but soit de couler Samsung ou Tokyo Electron, ce n'est pas leur objectif. On n'est plus dans les années 80.

D : Oui c'est ça, c'est parce qu'ils s'en sont servi pour couler le Japon à cette époque.

Interviewee: Bien sûr, bien sûr. Si cela vous intéresse, j'avais fait un papier avec X pour le X qui expliquait que la plupart des outils qui sont utilisés actuellement contre la Chine, à l'exception des contrôles aux exportations, sont nés ou ont adopté leur forme actuelle dans le cadre de la compétition technologique avec le Japon dans les années 80.

D; Je suis tombé dessus en me préparant pour l'entretien mais je ne sais plus si j'avais l'accès, peut-être que je l'ai. J'irai me le procurer.

Justement pour faire écho à un papier que vous avez écrit sur les modèles de batailles verticales et horizontales menées par les grandes puissances - à portée hégémonique - est-ce que le modèle américain, avec Trump, n'est pas en train de devenir de plus en plus contraignant, pas similaire à la Chine car ce serait trop, mais dans un contexte de rapprochement dans l'idée de friendshoring par rapport au changement de modèle américain, il n'est pas un peu contreproductif, paradoxal ? Est-ce que ce n'est pas un rapprochement de circonstance plutôt que long-termiste, basé sur des valeurs ?

Interviewee: C'est vrai que ça a été pointé du doigt par certains élus dans des auditions parlementaires, qui ont souligné l'ironie de la tentative de… « OUT CHINA » China avec la multiplication des outils d'intervention de l'Etat dans l'économie, d'interdiction des applications, des restrictions sur les importations et exportations.
C'est sûr qu'à mesure que les Etats-Unis s'éloignent d'un modèle de soutien au libre-échange, de laisser-faire ou d'absence d'intervention de l'Etat - relatif - dans l'économie. Il y a des points communs avec le modèle chinois qui sont pointés par certains. Après la différence, même si elle est un peu plus théorique sous l'administration de Trump, c'est le modèle démocratique contre le modèle non-démocratique à la fin, et le système de pouvoir et de contre-pouvoir est très différent.

Juste pour corriger quelque chose, j'ai écrit une recension du livre *Digital Empires* d'Anu Bradford qui élaborent ce concept de batailles verticales et horizontales. Je ne suis pas sûre qu'elle parle beaucoup du Japon mais elle parle beaucoup des empires numériques américains, européens, et chinois. Son livre est vraiment super et je pense que son concept de bataille horizontale et verticale pourrait tout à fait s'appliquer à votre cas d'étude au sens où ce serait intéressant de regarder la relation des autorités japonaises avec leur propres entreprises, notamment leur géant des semi-conducteurs ; et comment ils doivent concilier cette relation verticale avec leur relation horizontale avec les autorités américaines et chinoises.

D : Ça mérite d'être creusé davantage merci beaucoup.

Par rapport à la rivalité entre super-puissances, j'entends Chine d'un côté et Etats-Unis de l'autre, est-ce que vous pensez que pour des puissances de second niveau - type Japon, Corée du Sud, France…- il est envisageable de faire le choix du parti pris ? Est-ce qu'on peut

imaginer des pays qui arrivent à balancer éternellement entre les deux États et leurs revendications ? Et justement comment essayer de s'imposer dans ça ? Voire dans un cadre plus théorique, est-ce que ces grandes puissances n'auraient justement pas intérêt à voir une moindre puissance qui s'impose plus fortement sur une industrie, typiquement les semi-conducteurs, pour « désamorcer » des tensions plus larges ?

Interviewee: Non je pense que les Etats-Unis et la Chine n'ont pas envie que des puissances moyennes s'imposent, elles ont envie d'être dominantes. C'est très très visible dans les textes américains, que ce soit de l'administration Biden ou Trump, à travers la notion de préservation du leadership technologique. Pour ne pas dire de la suprématie technologique américaine. C'est vraiment au cœur de leur objectif.
Par rapport à la première partie de la question, j'aurai une réponse différente sous l'administration Biden. Ils ont fait un énorme effort de diplomatie, à la fois intense et en essayant d'améliorer les relations avec leurs partenaires par rapport à l'administration Trump I. Et donc comme c'était corrélé avec un changement de position de l'Europe vis-à-vis de la Chine, ils sont parvenus à faire évoluer pas mal de pays dans leur direction, avec toute une rhétorique autour de la coalition des démocraties, démocraties versus autocraties et aussi leur multiplication de liens avec des pays non-démocratiques pour travailler sur l'aspect de coalition building, central dans leur stratégie.
Sous cette administration (Biden) je dirais que c'était moins probable, ou du moins plus difficile, de se positionner comme équidistante, en tout cas autonome ou non-aligné.

Pour l'administration Trump je pense que c'est encore trop tôt pour le dire mais ça fait exploser tous les partenariats existants. Même vis-à-vis de l'Europe, ça remet en question l'évolution de la relation avec la Chine au sens où s'il n'y a plus de relations à la fois fermes et amicales, avec un partenaire américain qui nous incite vivement à se rapprocher d'un côté, elle n'est plus seule.

Pour le Japon, je ne sais pas exactement comment ça va se manifester. J'étais assez surprise lorsque le centre Asie de l'IFRI a organisé une conférence en Novembre sur justement « allié ou aligné » l'Indopacifique, dans la relation de cette région avec les Etats-Unis. Et finalement les premières personnes qui ont parlé, je crois même la première, c'était un Japonais. Et a commencé par dire qu'eux ils avaient franchement un bon souvenir de l'administration Trump I, que c'était un bon bilan et qu'ils étaient plutôt satisfaits, que ça allait bien se passer. En tout cas une vision assez positive donc peut-être que c'est un peu différent dans leur cas.

D; Peut-être que aussi lié au rapport culturel avec les fleurons nationaux au Japon ? Dans le sens où il y a déjà une certaine culture « mon pays d'abord ».

Interviewee: Oui, je pense que c'est aussi lié à une vision stratégique plus large, ils vont avoir un allié qui devrait se réengager beaucoup plus sur le terrain pacifique qu'ailleurs, donc potentiellement ça peut être intéressant.

Mais c'était assez étonnant parce qu'après l'élection américaine, l'Europe était assez sonnée et on voyait arriver les partenaires asiatiques qui étaient guillerets.

D : C’est sûr qu’ils sont du bon côté de la pièce.

Interviewee: Mais en même temps les Coréens doivent aussi se poser beaucoup de questions par rapport aux exports. Je pense que ça doit quand même être l’imprévisibilité qui est inquiétante.

D : Peut-être qu’avant même de rentrer dans une guerre économique plus musclée avec les Etats-Unis, je pense que la Chine aurait peut-être encore plus intérêt à déstabiliser les chaines de valeurs des partenaires des Américains qui sont clés dans les chaînes de valeurs, pour un petit peu échelonner les tensions ?

Interviewee: C’est à dire ?

D : La chine aurait intérêt à déstabiliser les chaines de valeurs des partenaires stratégiques américains plus que des Etats-Unis directement ?

Interviewee: Par exemple ?

D : Limiter l’accès aux terres rares du Japon, chercher à endiguer le rapprochement occidental vers la Malaisie sur la partie chimique…

Interviewee: Oui, après il y a aussi une stratégie d’action officieuse vis à vis des partenaires américains, notamment sur l’anti-trust, avec une utilisation un peu dévoyée des autorités régulatrices chinoises pour opérer des représailles sans dire leur nom.

D : Je n’ai plus de questions, en tout cas merci beaucoup pour votre aide, c’était extrêmement précieux.

Interviewee: Merci et bon courage, n’hésitez pas à m’envoyer vos travaux, je serais intéressée.

D : Bien sûr, quand ce sera fait je vous l’enverrai ! En tout cas merci beaucoup, au revoir.

Appendix 3: Qualitative Analysis.

The sources for the following table come from the following documents, which account for the Japanese exports list by commodity and country.

The HS codes relevant for this quantitative study are as follows:

- HS CODE 8486 / 8486,10 & 8486,20 correspond to semiconductor machinery, equipment
- HS CODE 8523,52 / 8540 & 8542 / 8542,31 & 8542,39 correspond to semiconductors and integrated circuits.

Japanese exports to China (country code 105):				
Year:		2019	2022	2024
Equipement:				
	Quantity in Kilos:	17 834 215	70 831 730	72 076 335
Year:				
		2019	2022	2024
	Value in Yen (thousands):	357 496 190	1 279 187 859	2 176 954 763
	Number:	3 018	22 234	20 077
Products				
	Quantity in Kilos:	13 910 875 956	18 135 079 434	15 841 934 242
	Value in Yen (thousands):	246 514 800	347 573 876	312 285 107
	Number:	244 142	380 045	334 651
Japanese exports to the United States (country code 304):				
Year:		2019	2022	2024
Equipment:				
	Quantity in Kilos:	11 079 371	12 714 629	12 693 837
Year:		2019	2022	2024
	Value in Yen (thousands):	455 783 832	603 003 232	529 833 681
	Number:	4 022	6 002	5360
Products:				
	Quantity in Kilos:	5 159 742 110	3 913 603 466	3 817 541 540
	Value in Yen (thousands):	101 186 206	122 457 508	126 845 421
	Number:	322 486	331 113	392 557

Appendix 4: METI's first 23 items added to its export control list.

List of the Newly Regulated Items	
1	Equipment for manufacturing pellicles (limited to those especially designed for equipment used to manufacture integrated circuits using extreme ultraviolet).
2	Among the step and repeat method or step and scan method align and expose equipment for wafer processing using photo-optical method, the light source wavelength of which is 193 nanometers or more, and the value obtained by multiplying the exposure light source wavelength expressed in nanometers by 0.25, then dividing that value by the numerical aperture is 45 or less
3	Equipment designed for applying, depositing, heating or developing resists compounded to be used in equipment used to manufacture integrated circuits using extreme ultraviolet light
4	Equipment designed for dry etching that falls under any of the following: (hereinafter omitted)
5	Equipment designed for wet etching wherein the etch selectivity ratio of silicon germanium to silicon is 100 times or more.
6	Among equipment designed for anisotropic etching where the ratio of the depth to the etching width exceeds 30 times with respect to dielectric materials, and capable of forming shapes with dimensions with the width less than 100 nanometers, those that fall under all of the following: (hereinafter omitted)
7	Among semiconductor manufacturing equipment, film deposition equipment that falls under any of the following: (hereinafter omitted)
8	Equipment designed for forming a metal layer in a vacuum environment or in an inert gas environment of 0.01 pascals or less, and that falls under all of the following: (hereinafter omitted)
9	Equipment designed to form a metal layer in a vacuum environment or in an inert gas environment of 0.01 pascals or less, and that falls under any of the following: (hereinafter omitted)
10	Equipment designed to form a ruthenium layer using organic metallic compounds while maintaining the substrate temperature of the wafer exceeding 20 degrees centigrade and less than 500 degrees centigrade
11	Spatial atomic layer deposition devices (limited to those having a wafer support base with a rotational axes) which fall under any of the following: (hereinafter omitted)
12	Equipment for films forming at a temperature exceeding 400 degrees centigrade and less than 650 degrees centigrade or equipment for films forming by accelerating a chemical reaction with radicals generated in a space different from the space where the wafer is installed, and designed to form films containing silicon and carbon that fall under all of the following: (hereinafter omitted)
13	Equipment designed to form a multilayer reflective film for use in masks (limited to those especially designed for equipment

	used to manufacture integrated circuits using extreme ultraviolet) by ion beam deposition or physical vapor phase growth methods
14	Equipment designed for epitaxial growth of silicon (including those with carbon added) or silicon germanium (including those with carbon added) that falls under all of the following: (hereinafter omitted)
15	Equipment designed to form a plasma film on carbon hard masks with a thickness exceeding 100 nanometers and a stress of less than 450 megapascals.
16	Equipment designed to form a tungsten film (fluorine atoms less than 10 to the 19 power per cubic centimeter) by atomic layer deposition methods using plasma or chemical vapor phase growth methods
17	Equipment designed to form a low-dielectric layer with relative permittivity of less than 3.3 using plasma in a space (of less than 25 nanometers in width and more than 50 nanometers in depth) between metal interconnects so that no gap is created.
18	Annealing equipment that operates in a vacuum environment of 0.01 pascal or less and that falls under any of the following: (hereinafter omitted)
19	Equipment designed to remove polymer residues and a copper oxide film in a vacuum environment of 0.01 pascals or less, and to enable the deposition of copper
20	Equipment having a plurality of chambers or stations designed for pre-treatment of removing surface oxides by a dry process or designed for removing surface contaminants by a dry process
21	Sheet type wet cleaning apparatus having process for performing drying after surface modification of wafer
22	Mask blanks for equipment used to manufacture integrated circuits using extreme ultraviolet or equipment designed to test patterned masks for such equipment
23	Pellicles specially designed for equipment used to manufacture integrated circuits using extreme ultraviolet light

Appendix 5: Documents extracted from annual reports to conduct qualitative analysis on Japanese companies' financial returns.

- Tokyo Electron:

Consolidated Eleven-year Summary

Tokyo Electron Limited and Subsidiaries
From fiscal 2014 to fiscal 2024

The amounts in this summary in millions and thousands of yen; thousands of U.S. dollars; and thousands of shares as of and for the years ended March 31, 2016 and prior are rounded to the nearest unit. Such amounts as of and for the years ended March 31, 2017 and onward are truncated at the nearest unit. Accordingly, totals for the years ended March 31, 2017 and onward do not necessarily agree with the sum of the corresponding individual amounts.

	(Thousands of U.S. dollars)	(Millions of yen)										
	2024.3	2024.3	2023.3	2022.3[6]	2021.3	2020.3	2019.3[5]	2018.3	2017.3	2016.3	2015.3	2014.3
Net sales [1]	$12,089,870	¥1,830,527	¥2,209,025	¥2,003,805	¥1,399,102	¥1,127,286	¥1,278,240	¥1,130,728	¥799,719	¥663,949	¥613,125	¥612,170
Semiconductor production equipment	—	—	2,155,206	1,943,843	1,315,200	1,060,997	1,166,781	1,055,234	749,893	613,033	576,242	478,842
FPD production equipment	—	—	53,674	59,830	83,772	66,092	111,261	75,068	49,387	44,687	32,710	28,317
PV production equipment	—	—	—	—	—	—	—	—	—	—	3,618	3,806
Electronic components and computer networks	—	—	—	—	—	—	—	—	—	—	—	100,726
Other	—	—	144	131	129	197	197	425	438	6,229	555	479
Operating income	3,013,430	456,263	617,723	599,271	320,685	237,292	310,571	281,172	155,697	116,789	88,113	32,205
Income (loss) before income taxes	3,126,868	473,439	624,856	596,698	317,038	244,626	321,508	275,242	149,116	106,467	86,828	(11,756)
Net income (loss) attributable to owners of parent	2,403,828	363,963	471,584	437,076	242,941	185,206	248,228	204,371	115,208	77,892	71,888	(19,409)
Comprehensive income (loss)	3,158,846	478,281	501,421	486,183	305,801	187,084	242,696	206,152	119,998	60,984	80,295	(10,889)
Domestic sales	1,221,734	184,982	239,937	230,368	197,566	161,812	208,796	148,760	101,122	121,808	95,046	161,631
Overseas sales	10,868,136	1,645,544	1,969,088	1,773,437	1,201,535	965,474	1,069,443	981,967	698,597	542,141	518,079	450,539
Depreciation and amortization [2]	345,682	52,339	42,927	36,727	33,843	29,107	24,323	20,619	17,872	19,257	20,878	24,888
Capital expenditures [3]	804,709	121,841	74,432	57,288	53,868	54,666	49,754	45,603	20,697	13,341	13,184	12,799
R&D expenses	1,339,893	202,873	191,196	158,256	136,648	120,268	113,980	97,103	83,800	76,287	71,350	78,664
Total assets	16,223,915	2,456,462	2,311,594	1,894,457	1,425,364	1,278,495	1,257,627	1,202,796	957,447	793,368	876,154	828,592
Total net assets	11,625,259	1,760,180	1,599,524	1,347,048	1,024,562	829,692	888,117	771,509	645,999	564,239	641,163	590,614
Number of employees		17,702	17,204	15,634	14,479	13,837	12,742	11,946	11,241	10,629	10,844	12,304
	(U.S. dollars)											(Yen)
Net income (loss) per share of common stock:												
Basic [7]	$5.18	¥783.75	¥1,007.82	¥935.95	¥520.73	¥390.19	¥504.53	¥415.16	¥234.09	¥153.70	¥133.69	(¥36.10)
Diluted [4, 7]	5.16	781.20	1,003.86	931.30	517.76	388.01	502.41	413.74	233.45	153.33	133.38	—
Net assets per share of common stock [7]	24.92	3,773.11	3,389.68	2,857.48	2,170.73	1,755.99	1,790.59	1,558.16	1,306.50	1,142.79	1,189.08	1,075.31
Cash dividends per share of common stock [7]	2.60	393.00	1,711.00	1,403.00	781.00	588.00	758.00	624.00	352.00	237.00	143.00	50.00
Number of shares outstanding (thousands) [7]		471,632	157,210	157,210	157,210	157,210	165,210	165,210	165,210	165,211	180,611	180,611
Number of shareholders		48,167	51,723	34,258	29,547	30,348	50,843	35,186	21,937	24,664	20,829	30,563
												(%)
ROE		21.8	32.3	37.2	26.5	21.8	30.1	29.0	19.1	13.0	11.8	(3.3)
Operating margin		24.9	28.0	29.9	22.9	21.0	24.3	24.9	19.5	17.6	14.4	5.3
Equity ratio		71.1	68.7	70.5	71.1	64.1	70.0	63.8	67.2	70.9	73.0	69.8
Total asset turnover (times)		0.77	1.05	1.21	1.03	0.89	1.04	1.05	0.91	0.80	0.72	0.76
	(U.S. dollars)											(Thousands of yen)
Net sales per employee	$682,966	¥103,407	¥128,401	¥128,169	¥96,629	¥81,468	¥100,317	¥94,653	¥71,143	¥62,466	¥56,540	¥49,754

1. From fiscal 2015, Electronic components and computer networks were excluded because Tokyo Electron Device Limited, a former consolidated subsidiary, became an equity method affiliate. Photovoltaic panel (PV) production equipment has been included in Other from fiscal 2016. FPD production equipment has been included in Other from fiscal 2024.
2. Depreciation and amortization does not include amortization and loss on impairment of goodwill.
3. Capital expenditures only represent the gross increase in property, plant and equipment.
4. Dilution is not assumed for the year ended March 31, 2014.
5. From fiscal 2019, the Company applied "Partial Amendments to Accounting Standard for Tax Effect Accounting" (Statement No. 28, revised on February 16, 2018) released by the ASBJ.
6. From fiscal 2022, the Company applies "Accounting Standard for Revenue Recognition" (ASBJ Statement No. 29, March 31, 2020). Each number from the period ended March 31, 2022 includes the effects of the new standards.
7. The Company implemented a 3-for-1 common stock split on April 1, 2023. Net income (loss) per share of common stock - basic, net income per share of common stock - diluted and net assets per share of common stock are calculated on the assumption that stock split was implemented at the beginning of fiscal 2014. Dividends per share and the number of shares outstanding for the fiscal years ended March 31, 2014, through March 31, 2023, represent the amount of dividends and number of shares before the stock split.

- Renesas:

Summary of Consolidated Financial Results for the Fiscal Years Ended December 31, 2024 and 2023 (Non-GAAP basis)

		Year ended December 31, 2023 (Jan 1 – Dec 31, 2023)	Year ended December 31, 2024 (Jan 1 – Dec 31, 2024)	Increase (Decrease)	
		Billion yen	Billion yen	Billion yen	% Change
Non-GAAP revenue		1,469.7	1,348.5	(121.2)	(8.2%)
	Automotive	660.4	702.8	42.4	6.4%
	Industrial/Infrastructure/IoT	799.3	636.8	(162.6)	(20.3%)
Non-GAAP gross profit		837.4	756.3	(81.2)	(9.7%)
Non-GAAP gross margin		57.0%	56.1%	(0.9pt)	---
	Automotive	348.5	367.8	19.3	5.5%
		52.8%	52.3%	(0.4pt)	---
	Industrial/Infrastructure/IoT	585.5	385.8	(99.7)	(20.5%)
		60.7%	60.6%	(0.1pt)	---
Non-GAAP operating profit		501.6	397.9	(103.7)	(20.7%)
Non-GAAP operating margin		34.1%	29.5%	(4.6pts)	---
	Automotive	229.4	222.5	(6.9)	(3.0%)
		34.7%	31.7%	(3.1pts)	---
	Industrial/Infrastructure/IoT	268.4	173.4	(95.0)	(35.4%)
		33.6%	27.2%	(6.3pts)	---
		Yen	Yen	Yen	
Exchange rate (USD)		140	151	11	-
Exchange rate (EUR)		151	164	13	-

(Note) 1. For details on the above, please refer to "Note 6. Business Segments" in the Financial Section.
2. Exchange rates are the average of each month's rates used for the conversion of revenues and expenses.

Hitashi:

10-Year Financial Data

Annual Securities Report | Information for Shareholders and Investors (Financial Information)

million yen

For the year: IFRS	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Revenues	9,774,930	10,034,305	9,162,264	9,368,614	9,480,619	8,767,263	8,729,196	10,264,602	10,881,150	**9,728,716**
Adjusted operating income	641,325	634,869	587,309	714,630	754,976	661,883	495,180	738,236	748,144	**755,816**
Adjusted EBITA	—	—	—	—	—	—	609,107	855,380	884,606	**918,184**
EBIT	534,059	531,003	475,182	644,257	513,906	183,614	850,287	850,951	845,632	**857,942**
EBITDA	—	—	—	—	885,318	619,001	1,343,067	1,392,840	1,373,468	**1,310,702**
Net income attributable to Hitachi, Ltd. stockholders	217,482	172,155	231,261	362,988	222,546	87,596	501,613	583,470	649,124	**589,896**
Earnings per share attributable to Hitachi, Ltd. stockholders, basic (yen)	45.04	35.65	47.90	375.93	230.47	90.71	519.29	603.75	684.55	**634.57**
Net cash provided by operating activities	451,825	812,226	629,582	727,168	610,025	560,920	793,128	729,943	827,045	**956,612**
Net cash used in investing activities	(612,545)	(730,799)	(337,955)	(474,328)	(162,872)	(525,826)	(458,840)	(1,048,866)	151,063	**(131,543)**
Net cash provided by (used in) financing activities	233,206	(26,467)	(209,536)	(321,454)	(320,426)	2,837	(184,838)	202,739	(1,142,966)	**(1,024,907)**
Core free cash flows	(176,448)	113,371	100,215	283,593	136,079	135,441	419,848	290,082	416,460	**571,467**
Core free cash flows per share, basic (CFPS) (yen)	(36.54)	23.48	20.75	293.70	140.92	140.25	434.64	300.16	439.19	**614.74**
Capital investment (Tangible fixed assets and investment property)	431,201	528,551	377,545	374,901	414,798	399,643	359,897	388,747	349,756	**315,891**
Depreciation (Tangible fixed assets and investment property)	350,783	366,547	302,757	265,413	271,682	342,450	345,201	382,922	358,412	**280,306**
R&D expenditures	334,814	333,730	323,963	332,920	323,145	293,799	293,571	317,383	316,280	**290,145**
Total assets	12,433,727	12,551,005	9,663,917	10,106,603	9,626,592	9,930,081	11,852,853	13,887,502	12,501,414	**12,221,284**
Property, plant and equipment	2,472,497	2,500,226	1,998,411	2,124,827	1,956,685	2,165,311	2,408,887	2,478,901	1,700,471	**1,221,842**
Total Hitachi, Ltd. stockholders' equity	2,942,281	2,735,078	2,967,085	3,278,024	3,262,603	3,159,986	3,525,502	4,341,836	4,942,854	**5,703,705**
Interest-bearing debt	3,557,356	3,604,455	1,176,603	1,050,294	1,004,771	1,485,042	2,397,356	3,126,712	2,213,348	**1,180,022**
Adjusted EBITA margin	—	—	—	—	—	—	7.0	8.3	8.1	**9.4**
Return on invested capital (ROIC)	—	—	—	—	8.5	9.4	6.4	7.7	7.6	**8.7**
Return on equity (ROE)	7.8	6.1	8.1	11.6	6.8	2.7	15.0	14.8	14.0	**11.1**
Return on assets (ROA)	2.9	2.4	3.0	5.0	3.3	1.3	4.8	5.2	5.3	**5.1**
D/E ratio (Including non-controlling interests) (times)	0.83	0.87	0.29	0.23	0.23	0.35	0.54	0.58	0.41	**0.20**
Total Hitachi, Ltd. stockholders' equity ratio	23.7	21.8	30.7	32.4	33.9	31.8	29.7	31.3	39.5	**46.7**
Total shareholder return (million yen)	57,944	57,939	62,764	72,416	86,905	91,792	101,517	120,905	336,593	**266,805**
including share buybacks (million yen)	0	0	0	0	0	0	0	0	199,999	**99,999**
Dividend per share (yen)	12.0	12.0	13.0	75.0	90.0	95.0	105	125	145	**180**
Dividend payout ratio	26.6	33.7	27.1	20.0	39.1	104.8	20.2	20.7	21.0	**28.3**

Notes:1. Adjusted operating income is presented as revenues less selling, general and administrative expenses, as well as cost of sales.
2. Adjusted EBITA = Adjusted operating income + Acquisition-related amortization + Share of profits (losses) of investments accounted for using the equity method.
3. "Core free cash flows" are net cash provided by operating activities minus capital expenditures.
4. On October 1, 2018, the Company completed the share consolidation of every five shares into one share for its common stock. Basic earnings per share attributable to Hitachi, Ltd. stockholders, basic core free cash flows per share, and dividend per share are calculated on the assumption that the Company conducted this consolidation at the beginning of the previous fiscal year.
5. On July 1, 2024, the Company executed a 5-for-1 split of its common stock.
6. ROA (Return on assets) = Net income / Total assets (Average between the end of current fiscal year and the end of previous fiscal year) × 100

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