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Should a Nation Enact a Chips Act?

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ABSTRACT

This article examines the strategies taken by various countries, after facing the crisis of semiconductor shortage and the heat of geopolitical competition between the US and China. The post-pandemic era introduced new challenges and high-tech breakthroughs in the industry. Both the US CHIPS ACT and the EU Chips Act aim to strengthen the semiconductor supply chain resilience through generous financial support, and most of the subsidies will be invested in building up a domestic fab. Japan has also followed this paradigm, with the goal of returning to a dominant position in the global market. The UK does not plan to build a domestic fab, according to its national strategy. Instead, the UK will focus on areas in which it already has competitive strengths, such as intellectual property (IP). All these national efforts have elements in common. Geopolitics is an important consideration when counties develop their semiconductor strategies. The strategies must choose a side, and find like-minded allies to work with, in order to fully develop its set objectives.

KEYWORDS: semiconductor, chips, AI, the US Chips Act, the EU Chips Act, ARM, TSMC, Taiwan, Japan, supply chain, globalization

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Introduction. Semiconductors (specifically microchips) are used in almost every aspect of our daily lives – cars, appliances, smartphones, traffic signals, and aerospace. Semiconductor shortages began to emerge after the lockdown of COVID-19 causing a disruption of supply in the global market. The Ukraine-Russia war and flaring tensions between China and Taiwan in 2022 further aggravated the shortage. The first shortage crisis can be deemed as a driving force for the acceleration of the U.S. Chips Act, which was finalized on August 9, 2022 (White House, 2022). The second crisis further motivated the enactment of EU Chips Act, which went into force on September 21, 2023 (Trueman, 2023).

The industry has always been, more than others, led by a collaboration among governments, academics and global partnerships. Government subsidies often play a role in pushing for semiconductor industry development as the industry concerns national security, diplomacy and geopolitical interests. Realizing the importance of semiconductor manufacturing as a leading industry for the future, various Asian countries, such as Japan, Taiwan, Thailand, and Korea, offer either subsidies or tax exemption in order to encourage domestic or foreign investment in the industry [see, e.g.: (Ministry of Economy, Trade and Industry, Japan, 2021; Executive Yuan, Taiwan, 2022; Ministry of Economy and Finance of Korea, 2024; Board of Investment, Thailand, 2021)].

The analysis of problems of legal and political regulation of chips (semiconductors) and technological competition are the within the area of close interest not only of diplomats, economists and politicians (Schmidt, 2023; Krugman, 2023, P; Krach, 2022), but also of the academic commnity: Chris Miller, author of Chip War (Miller, 2022), analyzed the industry from a historian's point of view. Yasuhiko Ota, author of 2030 Geopolitics of Semiconductors, analyzed the industry from the strategic plan and supply chain management perspective (Ota, 2021). Hongwen Lin, author of the Rays from Chip Island, which is published in Taiwan (Lin, 2023). He mostly focuses on how TSMC grew to be the leading semiconductor manufacutring company in the world.

In 2022, the Bureau of Industry and Security (BIS) at the US Department of Commerce published a detailed explanation about export bans on China (Bureau of Industry and Security, 2022). In this publication, the BIS expressed concerns that China's military-civil fusion strategy seeks to eliminate barriers between its military and commercial sectors. Many "critical and emerging technologies," including artificial intelligence ("AI"), semiconductors and microelectronics (National Science and Technology Council, 2022), can be used to develop weapons of mass destruction. The concern continues as the BIS noticed that China is developing advanced AI that can pose a threat to the US national security. The BIS thus determined that the US will move away from their previous approach of maintaining relative advantage over China, and instead seek to maintain as large a lead as possible. Under this metric, some Chinese companies, although not government agencies, can be deemed so closely related to the Chinese government that they would be put on the "entity list." Export bans are applicable to these companies as well. The US has been securing cooperation and promises from its global allies, such as Netherlands and Japan, to join the export ban. This

geopolitical struggle in the industry needs to be incorporated when a country is drafting their chips act, or crafting their semiconductor policy.

In the following paragraphs, we will explore the legal framework enacted by various countries in order to promote their domestic semiconductor industry. The first part analyzes the two "chips acts" of the US and the EU. The legal framework of the acts is analyzed from a comparative perspective and through a geopolitical lens. The second part compares the official semiconductor strategy published by different countries. This part is concluded with an endeavor to answer the question: whether nations should enact their own laws to further develop the industry, and how to find a pathway to succeed in this geopolitical game.

The US legislation

The US began developing its legislation in response to the semiconductor supply chain crisis during the Trump presidency. The final legislation's full name is the US CHIPS and Science Act, and CHIPS stand for Creating Helpful Incentives to Produce Semiconductors (H.R. 4346, 2022). Aiming to promote domestic semiconductor production (Krugman, 2023), this act is a combination of two bipartisan bills: the Endless Frontier Act (H. R. 2731, 2021) and the CHIPS for America Act (H.R. 7178, 2020). Both bills merged into the United States Innovation and Competition Act of 2021 (USICA) and changed the name into the CHIPS and Science Act, or "CHIPS Plus" during the legislative process. The bill was signed into law by President Joe Biden on August 9, 2022 (White House, 2022). The bill provides funding to support the domestic production of semiconductors and authorizes various programs and activities of the federal science agencies. Specifically, it authorizes approximately $280 billion in funding to boost domestic research and manufacturing of semiconductors within the US.

The Act has three major Divisions. Division A is the CHIPS Act of 2022 (where CHIPS stands for "Creating Helpful Incentives to Produce Semiconductors"); Division B is the Research and Development, Competition, and Innovation Act; and Division C is the Supreme Court Security Funding Act of 2022.

Division A

Division A has a short title of Chips Act of 2022. It has seven sections.

Sec. 101. Short title.

Sec. 102. Creating helpful incentives to produce semiconductors (CHIPS) for America fund.

Sec. 103. Semiconductor incentives.

Sec. 104. Opportunity and inclusion.

Sec. 105. Additional GAO (Government Accountability Office) reporting requirements.

Sec. 106. Appropriations for wireless supply chain innovation.

Sec. 107. Advanced manufacturing investment credit.

The main force behind Division A, which is deemed an independent Act by itself, stemmed from the efforts of Secretary of State Keith Krach during his term under Trump's presidency, to broker a $12 billion on-shoring investment by Taiwan Semiconductor Manufacturing Company, or TSMC to create a semiconductor fab in Arizona. TSMC is a Taiwan-based company mainly engaged in the provision of integrated circuit manufacturing services to secure the supply chain of advanced semiconductors (Lin, p. 47). Because of the cluster effect of the semiconductor industry, this TSMC "fab" (short for fabrication) will not only produce made-in-American advanced chips, but attract TSMC's broad ecosystem of suppliers. The predecessor of this Act is the CHIPS for America Act, mentioned above. This bipartisan bill aims to provide funding and encourage universities to develop engineering curricula focused on semiconductor manufacturing.

It should be noted that under Sec. 103, Semiconductor Incentives, during the 10-year period beginning on the date of receiving the CHIPS for America fund the awarded entity may not engage in any significant transaction or involve the material expansion of semiconductor manufacturing capacity in the People's Republic of China or any other foreign country of concern. This restriction and many others in the entire piece of legislation clearly point to geopolitical competition in the industry. It is not a hidden agenda that the legislation takes place against the background of a perceived high tech Cold War between the US and China. Since many chip manufacturers, such as TSMC, have fabs located in China (Peters, 2023, p. 1643), if the manufacturing tools need to be updated, the maintenance would be considered a significant transaction in China. It is therefore likely that Sec. 103 will become an obstacle for chip manufacturers to apply for the US government funding.

Under Sec. 104, Opportunity and inclusion, the Chips Act of 2022 authorizes the Secretary of Commerce to assign personnel to lead activities according to the Act, and the personnel shall increase participation of and outreach to economically disadvantaged individuals, minority-owned businesses, veteran-owned businesses, and women-owned businesses. This "inclusion" feature here and many other in the entire piece of legislation specified the inclusive character in the US science field, which is an issue generally not seen anywhere else in the counterpart semiconductor legislation of other countries.

Division B

Division B has a short title of Research and Development, Competition, and Innovation Act. It has seven Titles. Under some of the Titles, there are several Subtitles. For example, the longest Title VI, the Miscellaneous Science and Technology Provisions, has 16 Subtitles (from Subtitle A to Subtitle P), ranging from supporting early-career researchers to steel upgrading partnerships and emission reduction. Below is a brief outline of Division B:

Title I – Department of Energy Science for the Future

Title II – National Institute of Standards and Technology for the Future

Subtitle A – Authorization of Appropriations

Subtitle B – Measurement Research

Subtitle C – General Activities

Subtitle D – Hollings Manufacturing Extension Partnership

Subtitle E – Manufacturing USA Program

Title III – National Science Foundation for the Future

Subtitle A – Preliminary Matters

Subtitle B – STEM Education

Subtitle C – Broadening Participation

Subtitle D – NSF Research Security

Subtitle E – Fundamental Research

Subtitle F – Research Infrastructure

Subtitle G – Directorate for Technology, Innovation, and Partnerships

Subtitle H – Administrative Amendments

Title IV – Bioeconomy Research and Development

Title V – Broadening Participation in Science

Subtitle A--STEM Opportunities

Subtitle B--Rural STEM Education Research

Subtitle C--MSI STEM Achievement

Subtitle D--Combating Sexual Harassment in Science

Title VI – Miscellaneous Science and Technology Provisions

Subtitle A--Supporting Early-career Researchers

Subtitle B--National Science and Technology Strategy

Subtitle C--Regional Innovation

Subtitle D--Research Security

Subtitle E--Coastal and Ocean Acidification Research and Innovation

Subtitle F--Interagency Working Group

Subtitle G--Quantum Networking and Communications

Subtitle H--Blockchain Specialist

Subtitle I--Partnerships for Energy Security and Innovation

Subtitle J--Energizing Technology Transfer

PART 1--National Clean Energy Technology Transfer Programs

PART 2--Supporting Technology Development at the National Laboratories

PART 3--Department of Energy Modernization

Subtitle K--Micro Act

Subtitle L--National Nuclear University Research Infrastructure Reinvestment

Subtitle M--Steel Upgrading Partnerships and Emissions Reduction

Subtitle N--Applied Laboratories Infrastructure Restoration and Modernization

Subtitle O--Department of Energy Research, Development, and Demonstration Activities

Subtitle P--Fission for the Future

Title VII – National Aeronautics and Space Administration Authorization Act

Subtitle A—Exploration

Subtitle B—Science

Subtitle C—Aeronautics

Subtitle D—Space Technology

Subtitle E—STEM Engagement

Subtitle F—Miscellaneous

In Division B, the word semiconductor appears five times, three times in the context of National Semiconductor Technology Center, once as one of the definitions of microelectronics and once as the key technology focus area (Title VI, Subtitle F, Sec. 10387 – Challenges and Focus Areas). As indicated above, the Division covers energy science, education, bioeconomy, minority groups' participation in science, even sexual harassment issues are included in the provisions. On one hand, it is remarkable that the US Congress considered many aspects that contribute to the development of the semiconductor industry. On the other hand, it might raise concerns from the general public that the federal government is creating yet another overboard, wasteful, and lobbyist-driven programs.

Division C

Division C is the Supreme Court Security Funding Act of 2022. It concerns supplemental appropriations to the Supreme Court of the United States. It has three Titles. Division C has nothing to do with high tech or semiconductor industry. It is a common practice to include unrelated sections into legislation by the US Congress. Provisions or budget items not related to the subject matter are voted by the members of the Congress as a leverage or negotiated compromise in order to have the entire piece of legislation pass.

Title I – Department of Justice United States Marshals Service

Title II – The Judiciary Supreme Courts of the United States

Title III – General Provisions

The EU Chips Act

The EU took a similar legislative route to the US by having a separate, designated piece of legislation for the semiconductor industry. The establishment of the EU semiconductor industry can be traced back to as early as the 1950's. The EU has maintained a steady share of 10% of the microchip production of the global market for the past few decades. In 2013, the EU launched a major project aiming to double this share to 20% by 2020. Due to the lack of cutting-edge fabs, however, the EU has continued this

10% market share with a trend of producing mostly for the automobile sector. In 2022, the EU launched a new Chip Act; this time aiming for a market share of 30% by 2030.

This ambitious goal is backed by public and private investment of more than € 43 billion to provide all the necessary tools for the industry. According to the Act, more than two-thirds of this money is designated for building new, leading-edge chip-fabrication plants, or mega fabs. The rest of the Act includes providing subsidies to various supply chains for the industry, ranging from design capacity to the healthcare market sector.

The Act is based on a three-pillar structure, which is clearly explained by the European Parliamentary Research Service in their legislation briefing (European Parliamentary Research Service, 2022). Pillar 1 aims to bolster large-scale technological capacity building and innovation in the EU semiconductor ecosystem. Pillar 2 intends to improve the security of the EU's supply chain. Pillar 3 proposes to set up a monitoring and crisis response mechanism. The following is the layout of each article in the EU Chips Act.

Chapter I

Chapter I contains the general provisions that explain the subject matter and general objectives (Article I), and includes the necessary definitions for a layperson to grasp how the semiconductor industry works (Article 2). For example, the provision explains what "back-end" means, whereas in the US Chips Act, the term back-end never appears, though the components of the back-end processes, including packaging, assembly and testing of the semiconductor, are individually discussed.

Chapter II

Chapter II resembles the CHIPS for America Act since it has a similar title name: Chips For Europe Initiative. The largest distinction between this chapter from the US Chips Act is that the EU Chips act allows the establishment of various European Chips Infrastructure Consortiums (ECIC), a legal entity affiliated with the EU, to implement actions funded under the initiative. In the US, no new government agency is established under the Chips Act of 2022, but instead, many existing offices of the government, including the US Department of Commerce, were assigned tasks to implement the policies. More than one ECIC can be established. The layout of Chapter II is as follows.

Article 3 – Establishment of the Initiative

Article 4 – Objectives of the Initiative

Article 5 – Content of the Initiative

Article 6 – Synergies with Union programs

Article 7 – European Chips Infrastructure Consortiums (ECIC)

Article 8 – Liability of ECIC

Article 9 – Applicable Law and Jurisdiction of the ECIC

Article 10 – Winding-up of the ECIC

Article 11 – European Network of Competence Centers in Semiconductors

Article 12 – Implementation

Chapter III

Chapter III reflects the structure under Pillar 2 and focuses on securing an uninterrupted supply of semiconductors and building a strong resilience into the supply chain. It lists two major types of semiconductor manufacturing models. The "integrated production facilities" (Article 13) and foundry model, which is referred to as "open foundries" in the provision (Article 14). Integrated production facilities, such as Intel and Samsung, manufacture chips in a model where the facilities cover both upstream and downstream demands. Integrated production facilities are also referred to as integrated device manufacturers, as Intel's main products are central processing units (CPU) and chipsets. An example of this integration is Intel's integrated circuit (IC) design section, which delivers specifications to Intel's manufacturing sector, rather than outsourcing. The manufacturing sector, after the chips are fabricated, sends the chips to be tested at Intel's own testing and packaging sector. This business model tended to fail to "capture the momentum primarily due to its pursuit of chip designing and manfucaturing , resulting in inefficent outome." (Miller, 2022, p. 236)

The foundry-only model, the most famous one being TSMC, only focuses on the manufacturing sector. Open foundries work with fabless companies to produce semiconductor chips. This has been TSMC's primary model since the 1980's. Since TSMC manufactures 92% of the most advanced chips worldwide, this foundry-only model has proven empirically to be better able to cater to the needs of end customers. Below is the layout of Chapter III, security of supply and resilience.

Article 13 – Integrated Production Facilities

Article 14 – Open EU Foundries

Article 15 – Application for Status as Integrated Production Facility or Open EU Foundry

Article 16 – Public Interests and Public Support

Article 17 – Design Centers of Excellence

Article 18 – Fast-tracking of Permit-granting Procedures

Chapter IV

Chapter IV reflects the Pillar 3 structure and aims to prevent a shortage crisis from happening within the EU, as well as responding to any such crisis at a consolidated, EU level. The chapter is titled Monitoring and Crisis Response, a topic not covered by the US Chips Act. In the event of supply crises, the EU Commission has the authority to implement three types of emergency measures: gathering information from companies, asking companies to accept and prioritize orders of crisis-relevant products, and making common purchasing on behalf of Member States (Article 25, 26, 27). This chapter received the most negative comments from the EU advisory committees and stakeholders. For example, the European Committee of the Regions (CoR) held that the crisis response mechanism could discourage investment. The European Semiconductor Industry Association (ESIA) asserted that these measures would not prevent supply disruptions, and the chapter should be revised entirely. Chapter IV has three sections.

Section 1 – Monitoring

Article 19 – Strategic Mapping of the Union's Semiconductor Sector

Article 20 – Monitoring and Participation

Article 21 – Key Market Actors

Section 2 – Alerts and the Activation of the Crisis Stage

Article 22 – Alerts and Prevention Action

Article 23 – Activation of the Crisis Stage

Section 3 – Shortage Response

Article 24 – Emergency Toolbox

Article 25 – Information Gathering

Article 26 – Priority-rated Orders

Article 27 – Common Purchasing

Chapter V

Chapter V's title is Governance. Its first section covers the establishment and operation of the European Semiconductor Board. The Board's mandate is to advise the EU Commission on issues ranging from EU semiconductor initiatives, crisis stage tools, and international cooperation matters. The US Chips Act does not designate a specific governance agency for these semiconductor issues; it instead assigns various advisory boards to provide recommendations for government agencies. Section 2 of this chapter mandates that each member state designate one or a few national competent authorities to carry out the tasks in this act and serve as a contact point. This is another feature that is not included in the US Chips Act. The US Chips Act does not specify that each state have a responsible contact authority. Since the US Chips Act does not create a specific advisory board or governance agency at the federal level, it is natural that there is no such designation at the state level.

Section 1 – European Semiconductor Board

Article 28 – Establishment and Tasks of the European Semiconductor Board

Article 29 – Structure of the European Semiconductor Board

Article 30 – Operation of the European Semiconductor Board

Section 2 – National Competent Authorities

Article 31 – Designation of National Competent Authorities and Single Points of Contact

Chapter VI

Chapter VI, Confidentiality and Penalties, reflects the strong tendency towards protecting individual privacy within the EU. Under the EU Chips Act, national competent authorities and/or ECIC will have access to the business secrets of a company, either through the company's application for funding or through monitoring in the case of a shortage crisis. In the US Chips Act, there are similar protections (Section 103, Section 10375). The EU Commission also imposes penalties for supplying incorrect information to the competent authority. Below is the layout of this chapter.

Article 32 – Treatment of Confidential Information

Article 33 – Penalties

Article 34 – Limitation Period for the Imposition of Penalties

Article 35 – Limitation Period for the Enforcement of Penalties

Article 36 – Right to be Heard for the Imposition of Penalties

Chapter VII

Chapter VII specifies the regulatory authority of the Commission regarding semiconductor matters. Within the Commission, the EU Chips Act assigns a committee (the Semiconductor Committee) to assist the Commission to carry out the tasks according to the Act (Article 38). The Semiconductor Committee is not an independent legal entity as an ECIC (Article 7), which by itself can carry out activities funded by the Chips for Europe Initiative. Nor is the committee in the position of an advisory board like European Semiconductor Board (Article 28), whose ordinary meetings are held, at a minimum, once a year.

Article 37 – Exercise of the Delegation

Article 38 – Committee Procedure

Chapter VIII

Chapter VIII contains not only the final provisions, but very important amendments to Article 4 and Article 9. The Amendments add an additional specific objective and specify the amount of funding allocated for each objective. Below is the list of funding for each objective (European Parliament, 2023).

Article 39 – Amendments to Regulation (EU) 2021/694

(a) EUR 2,019,914,000 for Specific Objective 1 – High Performance Computing;
(b) EUR 1,663,956,000 for Specific Objective 2 – Artificial Intelligence;
(c) EUR 1,399,566,000 for Specific Objective 3 – Cybersecurity and Trust;
(d) EUR 507,347,000 for Specific Objective 4 – Advanced Digital Skills;
(e) EUR 1,002,217,000 for Specific Objective 5 – Deployment and Best Use of Digital Capacities and Interoperability;
(f) EUR 1,575,000,000 for Specific Objective 6 – Semiconductors.

Article 40 – Evaluation and Review

Article 41 – Entry into Force

Subsequent to the Articles, there are four Annexes that indicate the most updated technologies in the industry, and how these technologies can be integrated or developed. Among these updated technologies specified in the Act, heterogeneous systems and silicon photonics are deemed by industry experts to be the next breakthrough technologies that will change the manufacturing process of semiconductors for their cost-reducing and energy-efficient benefits (Huffman, 2022; Crawford, 2023).

Domestic Subsidies without a Chips Act – the case of UK and Japan

Since semiconductors are used in almost every aspect of the manufacturing industry, the shortage crisis during COVID had a strong impact on countries which rely on manufacturing exports. Most of these countries do not enact a designated legislation in the manner of the US or the EU, but instead map out a semiconductor strategy based on their exiting legal framework to attract foreign business partners (Ota, 2021, p. 256). Below are a few examples of national strategies that aim to strengthen a country's existing semiconductor industry.

UK

The UK announced its National Semiconductor Strategy on May 19, 2023 (Secretary of State for Science, Innovation and Technology of United Kingdom, 2023). From the foreword of the policy paper, the Secretary of State for Science, Innovation and Technology of the UK made it clear that the UK will take a different approach from other countries that are pursuing the expansion of large-scale silicon manufacturing. Instead, the national strategy will focus on the items in which the UK already has competitive strengths, such as compound semiconductors (where chiplets are combined to become new chips), research and design (R&D), intellectual property (IP), and chip design. The UK government plans to invest up to £200 million into the semiconductor sector over the years 2023-25, and up to £1 billion in the next decade. A new UK Semiconductor Advisory Panel will also be established.

Three goals are published by this strategy: growing the domestic sector, mitigating the risk of supply chain disruptions, and protecting national security. Critical sectors that are protected against supply chain disruption include healthcare, defense, telecoms, and critical national infrastructure. In order to protect the UK against supply chain disruptions, this part of the strategy openly recognizes that the geopolitical and economic center of gravity is moving eastward towards the Indo-Pacific. Therefore, the UK has approved the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and will focus their Asia Pacific Digital Trade Network, a joint Department for Science, Innovation and Technology and Department for Business and Trade initiative, in Taiwan. In order to protect the UK against security risks arising from semiconductor technologies, the UK has already put in place the National Security and Investment Act 2021 (Act of Parliament, 2021), which gives the government greater powers to intervene in acquisitions and investments by foreign entities (Desai, 2021). Export controls are also in place. Below is an outline of activities taken to achieve these goals.

Grow the Domestic Sector

Research and Development – enhance financial support for academic and commercial R&D

Infrastructure – improve access to prototyping and piloting facilities and chip design tools and IP

Skills and Talent – support industry-led learning and welcome international talent

Supply Chain Disruption

Preparing Economic Sectors – publish semiconductor resilience guidance and establish a government-industry forum

Protect Critical Sectors: Domestic Action – undertake a crisis planning exercise and work closely with the UK's defense industry

Protect Critical Sectors: International Cooperation – strengthen the existing bilateral relationships with allies and like-minded governments

Security Risk

Protect UK Assets – impose conditions on investments into the UK semiconductor sector and implement export controls for military end-use in an embargoed destination

Improve Cyber Security – collaborate with ARM (a major UK IP design company) and support the future growth of the Digital Security by Design program. (Secretary of State for Science, Innovation and Technology of United Kingdom, 2023)

Japan

Japan previously dominated the semiconductor industry in the 1980's. At the beginning of the 21st century, Japan still had a roughly 30% share of world semiconductor market. Japan's major electronic companies, such as Sony, Toshiba, or Panasonic, have always adopted an integrated production model. This business model tends to ensure consistent quality of the production, but lacks the efficiency to easily change manufacturing processes in order to catch up with fast-changing trends in the industry. By 2020, Japanese market share in the semiconductor industry dropped to 10%. In 2021, the Japanese government published a Strategy for Semiconductors and the Digital Industry (Ministry of Economy, Trade and Industry of Japan, 2021). The cabinet also finalized a subsidy amount of up to EUR 21,000 million to support the development of the industry. Specifically, the Japanese government promised to invest in a TSMC fab in Kumamoto, Kyushu, Japan, and in a new chip company named Rapidus together with Sony, Toyota and IBM (European Parliamentary Research Service, 2022). This company aims to start producing next generation chips (under 2 nm) in the second half of the decade. Export bans on semiconductor manufacturing tools were later put in place through Japan's foreign exchange laws. Through "cross-sectional efforts," Japan is attempting to re-establish itself as a dominant player in the industry.

Japan has carefully taken the current geopolitical conflict into consideration when formulating its semiconductor policy. After the pandemic, many companies began to consider de-risking from China and moving their production lines to other countries in Asia. Among these Asian countries, Japan has the strongest background of material and tools for semiconductor manufacturing. For the US, Japan is one of

the only "friend shore" Asian country, along with Taiwan and South Korea, to have an advanced chip foundry to be built domestically (Schmidt, p. 41). This is partially due to Japan's status as a strong ally of the US, and the fact that the manufactured advanced chips are unlikely to be used for military purposes, since Japan is constitutionally unable to have a military. Although Thailand, Malysia and India are all interested in investing and building chip foundries (Kleinhans, p. 17), and their cost of labor, land, water and electricity capacity are more competitive than Japan, Japan is still considered a top option in this geopolitical game.

Conclusion. There are many common elements among the "Chips Act" of the US and the EU, as well as the semiconductor strategies published by the UK and Japan. Whether a country needs a separate Chips Act is secondary to factors such as subsidy amounts, protection of national security, and global cooperation, in the crafting of a country's national semiconductor policy. A similar argument can be made concerning the importance of establishing a semiconductor foundry. Although foundries do hold a pivotal position in the semiconductor industry, a country's supply of human capital, natural resources and high-tech infrastructure are all crucial elements to success in this geopolitical competition. Any country that has a solid infrastructure and the ambition to break into or continue to stay ahead in the industry should begin by re-examining its existing industry to determine which components need development, and planning out long-term goals, with a focus on international relationships and geopolitical issues.

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