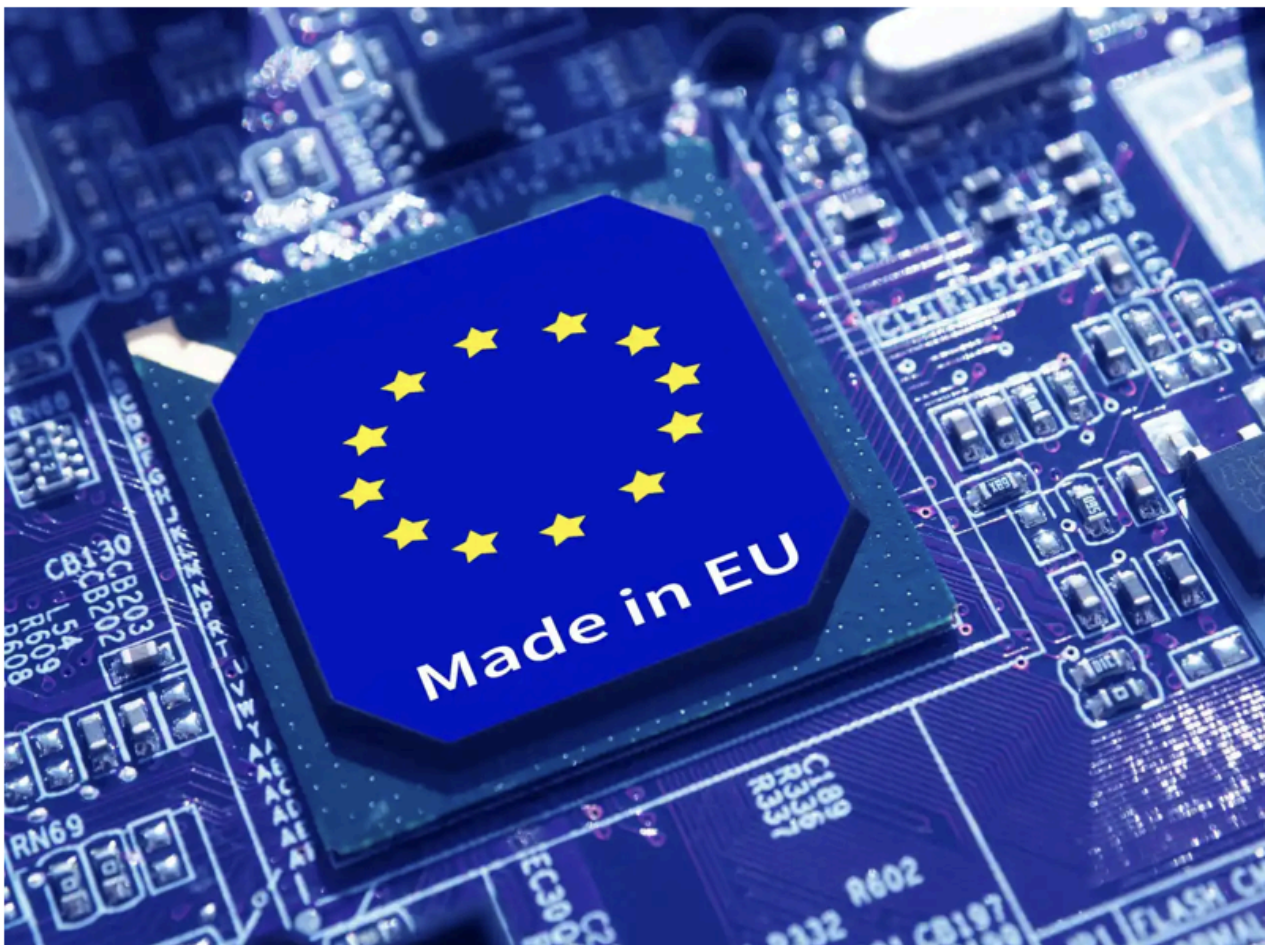


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Geopolitics of the European Chip Act - Consulting Report

Geopolitical Risk Index - May 2024



Executive summary

In 2020, global chip production soared to 1 trillion units, with the EU holding a 9% market share. Key players in the semiconductor industry include the USA, South Korea, Taiwan, Japan, and China.

Europe possesses robust R&D capabilities and a strong presence in semiconductor equipment manufacturing. However, its global market share remains low. It is heavily reliant on external suppliers which causes supply chain risks, leading to a need for strategic intervention to ensure resilience and security.

To address these issues, the European Chips Act—effective since September 2023—aims to double the EU's global market share in semiconductors to 20% by 2030 through three main pillars: supporting production, strengthening supply security, and facilitating coordination between member states and businesses.

The EU Chip Act led to a rush of investments in semiconductor projects across Europe, positioning the continent as a hub for chip production. Partnerships, funding opportunities, and reduced geopolitical risks make Europe an attractive investment destination compared to existing global leaders' unstable positions. However, challenges such as cybersecurity threats, skill shortages, and technological lag persist, necessitating ongoing efforts to strengthen competitiveness.

Overall, the EU Chips Act represents a strategic move towards strengthening the European semiconductor industry and Korean investors could benefit from it by diversifying their investments in a less risky part of the world with a thriving future.

Who we are?

We are *Geopolitics for Business*, a consulting firm specialising in geopolitical analysis based in Milan.

Goal of the report:

It's to give advice to Korean investors specialising in semiconductors and other advanced technologies, who are considering diversifying their portfolio to Europe in light of the European Chips Act and increasing geopolitical tension in Taiwan and between China-US.



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Introduction

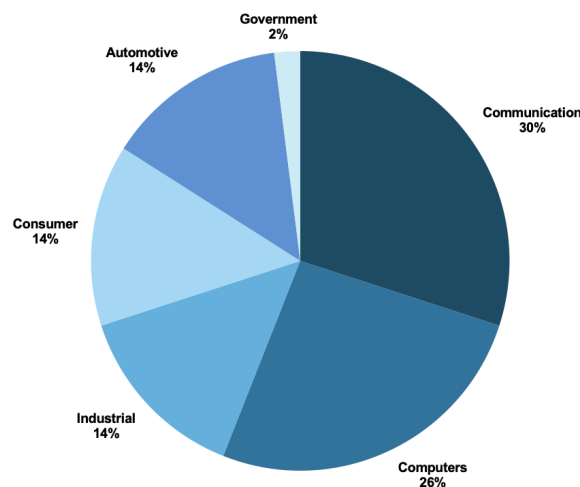
The semiconductor industry is increasingly affected by geopolitical risk worldwide, making it relevant for companies in the global value chain to reconsider their investments. The growing rivalry between states creates risk at home and abroad for companies in the sector, but the numerous policy programs offered by different governments also present a valuable opportunity for investors and companies to diversify. One of the most recent is the European Chips Act, which seeks to increase Europe's market share in the semiconductor industry to ensure the continent's supply and security.

This report will focus on the European Chips Act and whether it presents a valuable opportunity for investors wanting to diversify their portfolio to new markets in the semiconductor industry. Firstly, it will present an overview of the current global market situation and then explore the current situation in Europe. Secondly, it will deep dive into the European Chips Act and underline the most important parts. Thirdly, the current impact of the regulation will be analysed with a brief comparison with other government policy programs. Lastly, the risks and opportunities of the regulation will be explored.

What are semiconductors and chips?

Today, semiconductors serve as a fundamental component of contemporary electronics. Their introduction has transformed the electronics landscape, enabling the development of compact, swift, and highly efficient devices. These semiconductors, also called chips, are indispensable in modern technology and are the cornerstone of electronic elements. These chips undertake the critical tasks of storing, processing, and transmitting data and information within such devices. Entities, whether companies or countries equipped with the know-how to extract semiconductor materials and produce chips, stand poised to secure a leading edge on the global stage today and for the foreseeable future.

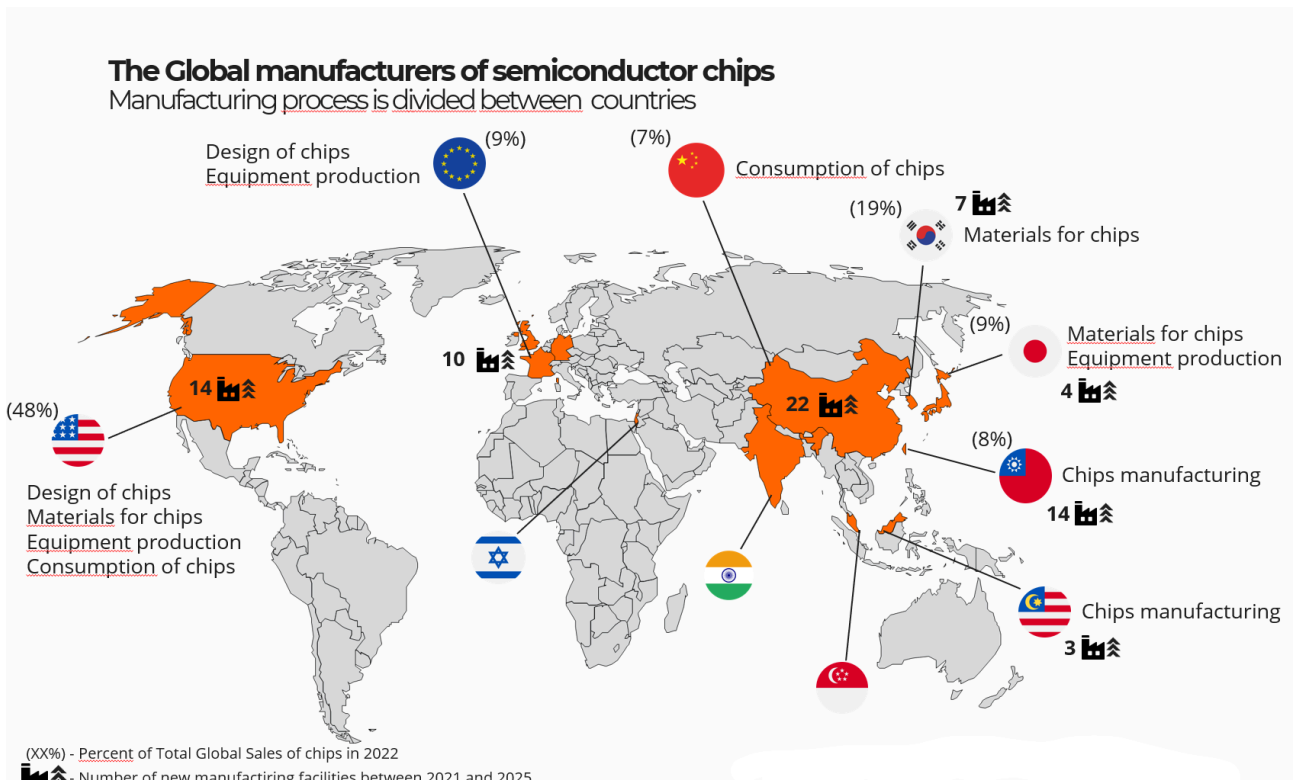
Share of global demand for semiconductor chips by industries



(World Semiconductor Trade Statistics, 2024)

What is the Global market situation?

In 2020, global chip production reached 1 trillion units. Only 9% of them represent the EU's share of the global chip market. A limited number of countries are the main players in the semiconductor chip manufacturing process. The USA accounts for 48% of the total turnover, serving both as the main designer and consumer of chips. South Korea, contributing 19% of total turnover, and Taiwan, contributing 9% of total turnover, are the primary manufacturers of cutting-edge chips. Japan, representing 9% of total turnover, mainly produces the most advanced manufacturing equipment. There are also other notable players, such as China, which is striving to increase its own production to reduce its dependence on Taiwan and South Korea, as well as India and Singapore (World Semiconductor Trade Statistics, 2024).



Source: Made by authors

There is a growing trend among governments to try to increase the number of factories in their own country to ensure strategic autonomy and meet their countries' future demands. As China aims to catch up with Taiwan and South Korea, it is establishing as many factories as possible to meet its enormous domestic demand and advance the technology for creating cutting-edge chips. The Chinese government is striving to build the largest number of factories between 2021 and 2025 compared to any other country, with a total of 22 planned. As the primary manufacturer, Taiwan aims to meet global demand and thus plans to increase production capacity by constructing 21 new chip plants within that period. The USA and Europe initially prioritise meeting their own demand and are planning to construct 14 and 10 factories, respectively. Similarly, Japan (7 factories), South Korea (4 factories), and Southeast Asia (3 factories) are following the trend (Van Wieringen, K., 2022).

What is Europe's current situation in the chip market?

Europe boasts numerous strengths and some weaknesses within the semiconductor value chain. The semiconductor sector is distinguished by its intense research and development (R&D) activity, with leading companies reinvesting over 15% of their revenues into research for next-generation technologies. The EU houses world-leading research and technology organisations and companies, along with numerous universities and research institutes spread throughout the Union. These institutions are at the forefront of developing techniques for producing some of the world's most advanced chips. Furthermore, Europe holds a strong position regarding the materials and equipment necessary for operating large chip manufacturing plants, with many companies playing crucial roles along the value chain. A good example is Dutch ASML, which manufactures extreme ultraviolet (EUV) lithography machines that are essential in producing the most powerful and advanced chips.

However, despite these strengths, Europe's overall global semiconductor production market share is less than 9%, and it heavily relies on suppliers from third countries, notably China and Taiwan, and more broadly, East Asia. In the event of a severe disruption to the global supply chain, there is a risk that European industrial sectors could face shortages, potentially bringing European industries and the economy to a standstill. The Chip shortage that arose due to the COVID-19 pandemic became a large bottleneck for European industry, thus showing the potential direct impact that disruptions can have on the European market (Attinasi et al., 2021). As Digital Transformation accelerates and permeates every aspect of society, the demand for chips in industrial settings is expected to rise, presenting new market opportunities and also new risks for European businesses (European Commission, 2023).

The European Chip Act - Deep dive

To address the growing demand and small market share, the European Commission proposed the European Chips Act in February 2022. The regulation officially entered into force on 21 September 2023. It has a two-fold objective: (1) to reduce semiconductor shortage and ensure the resilience of supply chains and (2) to reduce external dependencies by strengthening Europe's technological leadership and ensuring the EU's technological sovereignty (European Commission, 2022).

*"With the entry into force today of the European Chips Act, Europe takes a **decisive step forward in determining its own destiny**. Investment is already happening, coupled with considerable public funding and a robust regulatory framework. We are becoming an industrial powerhouse in the markets of the future – **capable of supplying ourselves and the world with both mature and advanced semiconductors**. Semiconductors that are essential building blocks of the technologies that will shape our future, our industry, and our defence base"*



- Thierry Breton, Commissioner for Internal Market (2023)

Specifically, the European Chips Act will reinforce and build up the EU's semiconductor ecosystem to manufacture advanced chips, ensure supply chain resilience, and reduce external dependencies (European Commission, 2023). This will enable Europe to meet its digital decade target of doubling its global market share in semiconductors to 20% by 2030 and to produce the most cutting-edge and next-generation semiconductors (European Chips Act, Art. 4 (1)). A more detailed list of the operational objectives can be found in **Appendix 1**.

The Regulation should result in additional public and private investments of more than €15 billion. This comes on top of existing programmes like Horizon Europe, the EU's primary funding initiative for research and innovation with a budget of €9.5 billion, Digital Europe programmes, which seek to strengthen Europe's digital competitiveness and resilience, and announced support by member states (European Commission, 2023). Thus, more than €43 billion of policy-driven investment will support the Chips Act until 2030, broadly matched by long-term private investment (European Commission, 2023). Nevertheless, it's worth noting that the Regulation does not increase the already existing EU budget but is based on already existing funding being earmarked to fulfil the Chips Act.

The Regulation also reflects increasing political support in the Union to reduce their reliance on other countries, especially China, for semiconductors. By strengthening and building up an independent value chain for semiconductors in Europe, the EU can decrease its dependence on China and Taiwan (European Commission, 2023). This follows the overarching EU policy of de-risking from China and increasing the Union's strategic autonomy and self-sufficiency in an increasingly geopolitical world (CEPA, 2023). The European Chips Act is an effort to create a future where the EU can produce state-of-the-art chips domestically on a large scale and reduce the risk of another country weaponizing semiconductors against the Union. Thus ensuring the EU's strategic autonomy.

What are the three main pillars of the EU Chip Act?

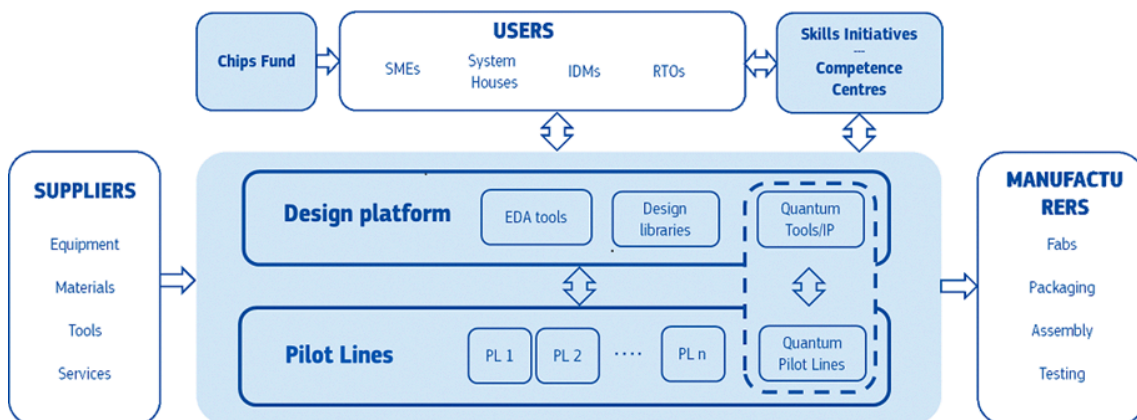
The Regulation can be broken down into three main pillars: (1) the Chips for Europe Initiative, (2) the framework to ensure the security of supply and resilience and (3) the creation of a European Semiconductor board. The three pillars all seek to address different objectives as will be explained in detail below:

1. Chips for Europe initiative

The first pillar is the "Chips for Europe Initiative", which aims to bridge the gap between research, innovation, and industrial activities by supporting the whole ecosystem of manufacturing chips, from funding to stimulating cooperation. It will do this by supporting large-scale technological capacity building and innovation throughout the Union and enabling the development and deployment of cutting-edge, next-generation semiconductor and quantum technologies (European Commission, 2022). The initiative will be supported by €3.3 billion of EU funds, which is expected to be matched by funds from Member States (European Commission, 2023).

According to Art. 4, the initiative has five operational objectives:

1. Setting up a Virtual Design Platform to be made available across the Union, integrating a wide range of design facilities in an open and accessible way (European Chips Act, Art. 4(2)(a)). This will stimulate wide cooperation between key actors and reinforce Europe's Chip Design Capacity, enabling the development and deployment of cutting-edge and next-generation semiconductor technologies.
2. Enhancing existing and developing new advanced pilot lines for process development, testing, experimentation, and small-scale production (European Chips Act, Art. 4(2)(b)). This will serve as a platform enabling experimentation and development to bridge the gap from lab to factory.
3. Building capacities to accelerate the development of cutting-edge Quantum chips and associated semiconductor technologies that will be needed for the future generation of information processing components (European Chips Act, Art. 4(2)(c)).
4. Address the skills shortage in the EU labour market by supporting education, training, skilling and reskilling initiatives (European Chips Act, Art. 4(2)(d)). It will establish a network of competence centres across the Union to increase the availability of internships and apprenticeships and raise students' awareness of the opportunities in the field. Additionally, it will provide access to technical expertise and experimentation in the area of semiconductors to help companies, particularly SMEs, gain access to and improve design capabilities and developing skills.
5. It will establish Chip Funds to facilitate access to debt financing and equity, particularly for start-ups, scale-ups, SMEs, and small mid-caps (European Chips Act, Art. 4(2)(e)). This is essential in this capital-intensive sector, where financing remains a key hurdle.



(Source: European Commission, 2024)

2. Framework to ensure the security of supply and resilience

The second pillar is the creation of a framework to ensure the security of supply and resilience of the Union's semiconductor sector. It aims to incentivise public and private investments in manufacturing facilities for chipmakers and their suppliers to address the missing capital necessary to grow a vibrant chips industry in the Union and ensure the security of the supply of chips (European Commission, 2023).

The framework creates a status scheme which can be awarded to manufacturing facilities and design centres. Specifically, new or substantially upgraded semiconductor manufacturing facilities will qualify for the status of Integrated production facility (IPF) or Open EU Foundry (OEF) (European Chips Act, Art. 13(3)). These facilities will benefit from a streamlined approach to administrative applications and priority access to pilot lines (EU Chips Act, Art. 18). Similarly, first-of-a-kind facilities can also benefit from state aid, even though they qualify as IPF or OEF. Furthermore, design centres in the Union can be awarded the label of "design centre of excellence" if they significantly enhance the Union's capabilities in innovative chip design through their service offerings or the development, promotion and strengthening of design skills and capabilities (European Chips Act, Art. 17). This will raise their status in the industry and make them more attractive for private financing.

Another central part of the framework is ensuring the security of supply. To do this, the framework allows the Commission to directly instruct businesses to prioritise a list of crisis-relevant products called "priority orders" (European Chips Act, Art. 26). This will be done in consultation with the European Semiconductor Board.

3. The European Semiconductor Board

The third pillar is the creation of the European Semiconductor Board, which will serve as a coordination mechanism between the Member States and the Commission (European Chips Act, Art. 28-30). This will ensure the mapping and monitoring of the Union's semiconductor value chain, as well as preventing and responding to semiconductor crises with ad-hoc emergency measures (European Chips Act, Art. 19-20). This then works in coordination with pillar two to ensure the security of the supply of chips to the European market. For example, it includes a semiconductor alert system set up as a first step on 18 April 2023, which allows any stakeholder to report semiconductor supply chain disruption.

To conclude, the European Chips Act proves the political willingness of member states to invest in the semiconductor industry to ensure the Union's supply and strategic autonomy. The Regulation tries to address the whole semiconductor ecosystem to support the development of a strong chip value chain within Europe and lessen its reliance on third countries.

Consequences of the policy program

After the European Chips Act entered into force, there has been a rush of investments into the European semiconductor industry. There is evidence of large amounts of capital being redirected to semiconductor projects around Europe for the next ten years. In addition, we see the development of new cooperations with leading semiconductor companies establishing themselves

in the continent like Saxony and the development of different industry organisations to strengthen the effect of the Chips Act. It's important for businesses to bear in mind that the EU is not the only Government establishing initiatives to attract companies as we see a tendency towards competition between states around the world.

Multiple new investments in Europe

There is already evidence that the Chips Act has successfully attracted new investments. Before the Chips Act was introduced, the EU heavily relied on external suppliers for semiconductors and had low manufacturing abilities. The Chips Act has the specific goal of doubling the EU's global market of advanced chips to 20% by 2030. As mentioned before, the three pillars of the EU Chips Act have a strong and articulated financial structure and try to attract both EU and non-EU investors to achieve this goal.

The strongest evidence of the Chips Act succeeding in attracting investment can be found in Saxony, Germany. The region's success in attracting new investments has given them the nickname "The Silicon Saxony". The Taiwanese company TSMC (Taiwan Semiconductor Manufacturing Company) have decided to invest €3,5 bln for the construction of a microchip production factory in Dresden in cooperation with two German companies, Bosch and Infineon Tech ag (Politico, 2023). The strong support from both the EU and the German government has been key to attracting the Taiwanese giant to the region (Politico, 2023). Intel is also working to expand its investment in Europe by sponsoring two microchip construction buildings in Magdeburg.

Furthermore, there is proof that already existing European companies are also benefiting from the European Chips Act. The EU has a clear market advantage in R&D and manufacturing of equipment in comparison to other countries. A good example is ASML, a Dutch firm with a market value of €335bn, which is the sole global supplier of lithographic equipment that is key to producing the most advanced chips (The Economist, 2024). Only Nvidia, an American chip designer, and TSMC are worth more (The Economist, 2024). However, the increasing China-US rivalry has made it difficult for them as they are receiving increasing pressure from the US to stop exporting to their biggest market, China. The European Chips Act helps offset the loss of the Chinese market by creating a new wave of investments that create new demands (Sloan, 2024). Other European manufacturing companies like Infineon, NXP and STMicroelectronics are also optimistic. They benefit from the rush of new capital available. For example, STMicroelectronics has been given a €600 mln loan from EIB, which has enabled them to make big investments in Grenoble and Catania (STMicroelectronics, 2022). We also have seen that the Dutch Nxp semiconductors will invest more than €10 bln (Politico, 2023). Thus, European companies have been optimistic about being able to sufficiently meet the European industries' demand (Gurrini, 2023)

Alliances to consolidate the EU Chips Act

There is also evidence of the European Chips Act succeeding in fostering collaboration between organisations and countries to foster and promote joint projects and facilitate innovation. A good example is the ESRA, the European Semiconductor Regions Alliance, launched on the 7th of September, 2023. It started with 13 regions from 9 member states and now includes 27 regions from 12 member states (European Committee of the Regions, 2023). The Alliance is an

industry-state collaboration between the European Committee of the Regions and the Free State of Saxony, a registered industry association of nearly 300 companies in the microelectronics and related sectors in Saxony. The Alliance has been fundamental to attracting capital from the private and public sectors to finance the different phases of the production chain in Saxony. The Alliance aims to identify and help remove the obstacles to the industry's strategic development by supporting collaboration between the industry and European lawmakers, but also sharing knowledge, best practices and innovation and fostering collaboration between regions and companies. Thereby developing strong and resilient integrated value chains in the semiconductor industry (European Committee of the Regions, 2023).

Global Competition: introduction of geopolitical risks

There is a clear trend worldwide today that governments are trying to attract private semiconductor companies and build their supply chains. The EU is not alone in wanting to build a thriving semiconductor industry; every developed country has published different policy programs trying to create or strengthen its own. This increasing competition between the states in the industry makes it important for businesses and investors operating in the sector to understand the geopolitical risks it creates and take advantage of the opportunities.

Geopolitical competition introduces risks






Semiconductors are increasingly viewed as a symbol of economic strength and technological superiority. As mentioned previously, chips are an essential component in most technologies today, making states dependent on the few companies that manufacture them today. This dependency, viewed as cost-effective and natural in a globalised world, is now viewed as a potential security risk (Salvioli, L, 2023). Controlling semiconductors is essential for any government wanting to preserve its technological advantage and increase its strategic autonomy (Salvioli, L, 2023; Vasquez, 2023). Thus, it is important for businesses operating in the semiconductor sector to consider the increasing geopolitical risk at home and abroad that this new geoeconomic competition creates.

The best example is the possible significant geopolitical risk for those considering investments in China's semiconductor sector. The Chinese government's ambitious investment of \$150bn over the last decade to bolster its semiconductor capabilities and reduce reliance on external suppliers can be viewed as a valuable opportunity for foreign investors (Hufbauer & Hogan, 2022). As the world's manufacturing hub, China holds substantial market potential for semiconductor products, integral to a wide array of global merchandise. Thus, the Chinese semiconductor industry is an attractive market for foreign investors. However, heightened geopolitical tensions, particularly between China and Western nations, introduce great risks for foreign investors. Following the Trump Presidency, the US imposed stringent export controls on critical technologies in the semiconductor supply chain (Hufbauer & Hogan, 2022), effectively obstructing their transfer to Chinese businesses. Other key players in the global supply chain, such as Japan and the Netherlands, have adopted similar measures (CEPA, 2023). Despite China's efforts to bridge the technology gap, evidenced by its success in reaching the 7nm milestone, the intensified geopolitical competition underscores the risks inherent in investing in its semiconductor industry (Liu, 2024). With several countries implementing policy programs to attract semiconductor investments, diversifying into alternative markets appears less risky. This is especially true since most major markets like the US, South Korea and Japan have concurrently imposed restrictions on operations in China and technology

transfers to the country as part of their policy programs (Kim, 2023; Nohara, 2024). For instance, the US's Chips subsidy program mandates beneficiaries to refrain from expanding semiconductor manufacturing in China or other countries of concern for a decade (Hufbauer & Hogan, 2022). However, the EU is a notable exception. The EU Chips Act does not introduce restrictions related to China but aims to achieve strategic autonomy. Thus, the EU has less geopolitical risk as it does not take such a hard stance on China.

EU Chips Act vs the others

With many different governments trying to attract investments, comparing the European Chips Act with other policy programs allows us to explore the strengths and weaknesses of European regulation. The main differences that will be briefly explored are policy towards third countries, funding, intended benefactor and skill shortage. In **Appendix 2**, a more detailed comparison between a select amount of countries can be found. Firstly, they differ in their policy towards third countries. It has already been mentioned that the European Chips Act differs because it does not restrict or introduce EU-level export controls towards third countries compared to other governments like the US or Japan (CEPA, 2023). Rather, the EU policy focuses on building partnerships with like-minded countries. However, some member states, such as the Netherlands, have unilaterally introduced measures. Building partnerships and alliances with like-minded countries is also a common feature of all the programs. A good example is the [Japan-EU collaboration](#) or “[Chip 4 Alliance](#)” between the United States, Japan, South Korea, and Taiwan. Nevertheless, the EU program also enables investments and trade with China's major chip market.

					
Funding	€ 43 Bn (existing funds)	\$54 Bn grants+ \$24bn for 25% tax credit	Tax reduction depending on size ⁽²⁾	\$66,75Bn & 33% of capital cost subsidised	Tax incentive ⁽¹⁾
Determination for funding	<ul style="list-style-type: none"> First-of-a-kind facilities Projects funding gap 	No restrictions and apply widely	<ul style="list-style-type: none"> Both foreign & domestic companies Focus on national high-tech industrial complex 	Focus on Rapidus	<ul style="list-style-type: none"> Thresholds on expenses Lead technological innovation
Relation w/third countries	Build partnerships	Restriction to expand production to China	Export restrictions	Export barrier to China	Approval for overseas investments
Skill shortage	Establish competence centre	\$200m for CHIPS for America Workforce	University grant (₩ 54Bn) to nurture talent	Establish LTC w/ training program	Semiconductor training school

Source: Made by authors based on Lee, Lee, Lee & Seo (2023), METI (2022), Shivakumar, S., Wessner, C. & Howell, T. (2023), Welch, N. (2024)

Secondly, the funding mechanisms differ among policy programs. While the East Asian countries and Taiwan have focused on tax incentives with specific tax reductions across the sector, the EU has grant-based and targeted funding for first-of-a-kind facilities and SMEs (Welch, 2024). The US \$77bn funding mechanism mixes grants and tax incentives (Hufbauer & Hogan, 2022). Thus, the

EU's policy program is more limited as a grant but more specifically targeted, making it potentially easier to identify the benefactors with clear criteria.

Thirdly, the countries differ in addressing the notable skill shortages in the sector. The EU stands out for not having earmarked funding but rather focusing on creating competence centres without any specific budget. The US, South Korea, and Japan have earmarked funding to create specific training programs that follow the highly successful Taiwanese training schools' example (Welch, 2024).

Lastly, the most beneficial benefactor differs from East Asian countries that focus on leveraging existing businesses rather than attracting new ones, like the EU and the US. For example, the Japanese government created Rapidus, a consortium of Japanese companies that have received the largest funding and established cooperation with the government-supported R&D Centre for Advanced Chip Research (METI, 2022). The European Chips Act focus on attracting new business to the continent and supporting the creation of SMEs.

To summarise, there are notable differences between the policy programs introduced worldwide. The European Chips Act stands out by being more targeted, less restrictive on exports to third countries and focusing on attracting new private companies and supporting SMEs. However, it faces limitations in addressing skill shortages and has comparatively limited funding compared to other policy programs.

Risks and opportunities

Looking at the present semiconductor situation in Europe and the current and potential effect of the European Chip Act, some opportunities and risks can be identified for those considering investing in the growing European semiconductor industry.

Opportunities

Creation of Partnerships

The European Chip Act facilitates inter-company collaborations with EU-based businesses specialising in semiconductor industries. Hence, investing in Europe presents outstanding opportunities for market share expansion and joint ventures with European R&D companies to create innovative solutions tailored to the needs of specific industries. Through these partnerships, the European Chip Act also provides an opportunity to reach new client segments and diversify investment risk in a stable economic zone with a predictable regulatory framework.

Enhanced supply chain resilience

Investing in EU-based businesses presents an opportunity to have a local and reliable supply of cutting-edge semiconductor components, thereby decreasing the dependence on non-EU suppliers and avoiding supply chain disruption within the union.

Funding opportunities

The European Chip Act offers funding opportunities for semiconductor manufacturing projects across the European continent through the European Investment Bank (EIB) and Chips Funds. The EIB, Chips Fund and EU member states encourage investment in Europe and offer the opportunity to access capital for R&D investments and acquire cutting-edge machinery and technology through subsidies and low-interest loans. These incentives minimise capital costs while providing risk-adjusted opportunities for investment in Europe. Additionally, the targeted funding by the Union makes it easier to gain an overview of the companies that will benefit from the Chips Act and are likely to be successful compared to the US Chips Act, which is less targeted.

Lower geopolitical risk in Europe

In the face of US-China tensions, the European Chip Act presents a safe investment opportunity. The EU's cooperative strategy fosters stability even while the US-China competition affects semiconductor markets. The European Chip Act reduces geopolitical risks, with fewer barriers to market access and multilateral moves that allow the creation of ties directly with the businesses involved, in contrast to the US's unilateral moves, which attract semiconductor investment.

Risks

Security threats

The security of semiconductor devices in Europe currently faces risks caused by growing cyber security attacks at the chip level. These risks threaten the protection of intellectual property and the manipulation of the supply chain, generating challenges for businesses in the European semiconductor industry. In addition, the EU offers less protection against IP leakage in comparison to South Korea and Taiwan, which view semiconductor technologies as security assets.

Skill shortage

The European semiconductor industry faces severe challenges in terms of skills deficits and in attracting young talents. These shortcomings in the workforce may hinder the industry's innovative capacity, making it less competitive on a global scale. The EU talent shortages may render it less attractive for investment, as other countries are making significant investments to strengthen their talent pool. For example, Japan has invested in the creation of an IBM-supported R&D centre with specific training programs.

Technological Lag

The EU chip industry encounters hurdles in adapting to the fast-growing technological advancements and innovations of chips around the world, which renders it less competitive in the global market. It is behind the most advanced players, like the US and Taiwan, in manufacturing the most cutting-edge chips. Nevertheless, it is world-leading in certain specialised equipment and parts of the value chain.

Conclusion and recommendations

Europe's semiconductor industry's key strengths are R&D, technology organisations with top universities, and manufacturing specialised equipment. However, its global market share of chips remains below 9%, and it heavily relies on suppliers from China and Taiwan. The European Chips Act aims to address this by doubling the EU's global market share in semiconductors to 20% by 2030 through strategic investments and reducing external dependencies.

The European Chips Act, effective from September 2023, focuses on reducing semiconductor shortages, enhancing technological leadership, and ensuring supply chain resilience. It allocates funds for initiatives like the "Chips for Europe" initiative, designed to bridge research and industrial activities, and establishes frameworks for security of supply and resilience. Additionally, it creates the European Semiconductor Board for coordination and crisis response. Thus, the Act reflects large political support in the European Union for strengthening their semiconductor industry.

The European Chips Act has attracted investments in semiconductor projects within Europe, aiming to position the EU as a global leader in chip production. Partnerships, funding opportunities, and reduced geopolitical risks make investing in the EU semiconductor market appealing. However, challenges such as cybersecurity threats, skill shortages, and technological lag remain, necessitating continuous efforts to strengthen the industry's competitiveness.

Investing in the EU semiconductor market presents opportunities for market expansion, supply chain resilience, and funding access. However, security threats, geopolitical risks, skill shortages, and technological lag challenge the industry's growth and competitiveness, requiring concerted efforts to address them effectively.

Overall, the EU Chips Act signals a strategic move towards bolstering Europe's semiconductor industry. Still, its success hinges on addressing underlying risks and seizing emerging opportunities in the global semiconductor market. Despite the risks, Geopolitics Consulting Company recommends that Korean investors take the opportunity to enter into the European market. This move can help mitigate geopolitical risks in the Asian region, and the anticipated high future demand for semiconductor chips is expected to yield significant returns.

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Appendix

Appendix 1: Operational objectives of the EU Chips Act

- 1) Building up advanced design capacities for integrated semiconductor technologies through build up and maintaining a virtual design platform, extend the design capabilities by fostering innovative developments and enlarge the semiconductor ecosystem by integrating the vertical market sectors like health and defense.
- 2) Enhancing existing and developing new advanced pilot lines across the Union to enable development and deployment of cutting-edge semiconductor technologies and next-generation semiconductor technologies.
 - a) Specifically strengthen capabilities in next-generation chip production technologies and manufacturing equipment, by integrating research and innovation activities and preparing the development of future technology node
 - b) support innovation at a large scale through access to new or existing pilot lines for experimentation, test, process control, final device reliability and validation of new design concepts integrating key functionalities;
 - c) provide support to integrated production facilities and open EU foundries through preferential access to the new pilot lines, as well as ensure access on fair terms to new pilot lines for a wide range of users of the Union semiconductor ecosystem
- 3) Building advanced technology and engineering capacities for accelerating the innovative development of cutting-edge quantum chips and associated semiconductor technologies through development of innovative design libraries for quantum chips, facilities for testing and validating advanced quantum chips.
- 4) Establishing a network of competence centres across the Union by enhancing existing or creating new facilities
 - a) strengthen capacities and offer a wide range of expertise to the stakeholders, including end-user start-ups and SMEs, facilitating access to and the effective use of the capacities and facilities
 - b) address the knowledge and skills shortage and mismatch by attracting, mobilizing and retaining new talent on research, design and production and supporting the emergence of a suitably skilled workforce in science, technology, engineering and mathematics (STEM) subjects
- 5) Undertaking activities, to be described collectively as 'Chips Fund' activities, to facilitate access to debt financing and equity, including by providing clear guidance, in particular for start-ups, scale-ups, SMEs and small mid-caps in the semiconductor value chain, through a blending facility under the InvestEU Fund and via the European Innovation Council.

- a) improve the leverage effect of the Union budget spending and achieving a higher multiplier effect in terms of attracting private-sector financing;
- b) provide support to companies facing difficulties in accessing finance, and address the need to underpin the economic resilience throughout the Union and the Member States;
- c) Accelerate and improve accessibility to investment in the field of chip design, semiconductor manufacturing and integration technologies, and leverage funding from both the public and the private sectors, while increasing the security of supply and the resilience of the semiconductor ecosystem for the whole semiconductor value chain.

Appendix 2: Other key countries' policy programs

	EU	Korea	US	Japan	Taiwan
Funding	<p>Grants: 43 billion euros in private and public investments until 2030</p> <p>(Existing funding steered towards)</p>	<p>Tax Reduction for investment (depending on the size of the company and the size of the investment)</p> <p>Ex: for big companies, it's 15%, for medium and small companies it's 25%</p>	<p>\$53 billion grants + 24 billion in 25% tax credit</p> <p>(fresh funding+ tax incentive)</p>	<p>\$26.7 billion earmarked, but with private expected to reach \$ 66,75 billion</p> <p>One-third of the capital cost is subsidised.</p>	<p>Main tool tax incentive</p> <ul style="list-style-type: none"> - 25% tax reduction on R&D expenditure or 30% of their annual income tax and - 5% deduction on CAPEX for new machinery used in advanced processes - Companies that license their IP to foreign customers can deduct 200% of their R&D expenditure or revenue from IP sold abroad
Determination of funding	<p>Exclusive funding of first-of-a-kind facilities</p> <p>Targeted funding based on the project's funding gap to stimulate manufacturing investments in Europe</p>	<p>Applies equally to domestic and foreign-invested companies.</p> <p>Creation of national high-tech industrial complexes</p>	<p>No restriction of funding for 1st, 2nd, 3rd or 4th-of-a-kind facilities</p> <p>The tax credit is applicable widely to the purchase, construction, manufacture or utilisation of equipment or property integral to the operation</p>	<p>Funding for designated semiconductor devices (including power devices, microcontrollers, and analogue devices), equipment, materials, and raw materials.</p> <p>Focus on Rapidus, a consortium of Japanese companies</p>	<p>Thresholds on R&D expenses (at least \$193bn), R&D intensity (at least 6%) and CAPEX for the advanced process (at least \$321bn)</p> <p>Needs to lead to technological innovation in Taiwan and occupy a key position in the international supply chain</p>
Intervention in the event of a crisis	<p>Can order manufacturer to prioritise in the case of shortage and possible export licence</p>		<p>The US Defence Act allows the primacy of orders and contracts by the US President.</p>	<p>Prioritise domestic shipment at times of global shortage</p>	

Relations with third countries	Build “balanced semiconductor partnerships with like-minded countries	Semiconductor technology has been identified as security assets, so the export of it must have permission from the government.	Build partnerships with like-minded countries. Must agree not to expand semiconductor manufacturing in China or any other “countries of concern” for a period of 10 years.	Build partnerships with like-minded countries and have already reduced export barriers for like-minded countries. Export barriers to China	Build partnerships, especially bilateral collaborations through TSMC. Corporations intending to make overseas investments are obliged to secure approval or report to the central competent authority, contingent upon the scale of the investment.
Skill shortage measure and technological capability	Establish competence centres	Education Ministry has given select universities a total grant of 54 billion won to nurture semiconductor talent.	200 million dollars of the budget is designated for the CHIPS for America Workforce and Education Fund. 11 billion R&D program to prompt research	Establishment of LSTC, a government-supported R&D centre for advanced Chip research with its own training program. Supported by IBM	25% tax reduction focus on R&D Existing semiconductor training schools