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Analysis of the U.S.-China Semiconductor Conflict

How will the U.S.-China Chip Race Affect Europe?

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Abstract

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This thesis aims to develop an analysis of the current semiconductor conflict between the United States and China. The analysis plans to create an understanding of the current state of the conflict that will allow the researcher to create conclusions on the likely outcome of this conflict.

The first section displays an extended, comprehensive literature review, which analyses the history of U.S.- China relations, discusses the key issues relevant to the development of the conflict, and presents the legal framework upon which the industry is subject to. The review establishes the bases of the current environment of the conflict and gives insights on how the conflict will develop.

The second section covers the different research methods employed in this analysis, characterized by an interview with Spanish Air Force Colonel and geopolitical analyst, Ángel Gómez de Agreda. This qualitative research method enables the researcher to dive into the conflict, through an individual who is an expert in the subject. This section includes a summary of the main conclusions of the interview. To support and validate the results, further supplementary quantitative research approaches are applied. Furthermore, the research question directs the methodical and precise performance of the analysis.

Finally, the final section of the thesis gives detailed conclusions and a prediction on how the conflict will continue to develop, along with a set of recommendations to finalise the thesis.

Keywords: U.S., China, Chips, Geopolitics, Supply Chain

Contents

Glossary

ADIZ	Air Defense Identification Zone
AI	Artificial Intelligence
CPC	Communist Party of China
CPU	Central Processing Unit
DUV	Deep Ultraviolet
EU	European Union
EUV	Extreme Ultraviolet
ICs	Integrated Circuits
GDP	Gross Domestic Product
GPU	Graphic Processing Unit
SMIC	Semiconductor Manufacturing International Corporation
TSMC	Taiwan Semiconductor Manufacturing Company
U.S.	United States

1 Introduction

Technological innovation has become the cornerstone of modern society. The world today has shifted towards a never-ending hunt for the most cutting-edge technologies, in any field imaginable. Fruit of that desire is a common ingredient that has been the catalyst for innovation for several decades: these are semiconductor chips. These microchips or chips are the carriers of integrated circuits, or ICs, which are miniature electronic circuits consisting of various interconnected electronic components, for instance transistors, resistors, capacitors, and diodes, all fabricated on a silicon square smaller than an ant.

In 1965 the co-founder of Intel, Gordon Moore, observed that the number of transistors on a chip appeared to double every two years. This quickly assumed the status of a “law”, which appears to hold true still (Lundstrom 2023). In parallel with Moore´s Law, chips became increasingly essential, becoming the epicenter of innovation themselves. Being essential means being valuable, and in this world, being the most valuable is the path towards being the most powerful, a historical trend similar to that of gold or petroleum. Chips represent geopolitical power because they represent military power. In this manner, the United States of America, the father of semiconductor technology, established themselves as the world’s leading superpower, thanks to having the most advanced technology. Ever since the end of WWII and especially the fall of the Soviet Union, the US has lived through a period of seemingly endless power, acting as the world’s police force.

However, in recent years, this golden throne has looked increasingly more fragile. Through a mix of uncertainty and the wakening of a sleeping giant such as China, Washington feels more alarmed than ever. Is this the beginning of a new Cold War? As the clash of two global superpowers continues, new geopolitical conflicts rise on the horizon, creating more uncertainty, leaving key players such as Europe clueless.

The purpose of this thesis is to create a comprehensive analysis of the current situation of this conflict and how it could affect the European Union.

2 Literature Review

This literature review's main goal is to create a solid base of understanding of the status of this conflict, through the analysis of the available information. In this analysis, the literature review will serve as a guide, creating a timeline or a path the reader can follow. Due to the geopolitical nature of this conflict, the literature review stretches for a period of time extending to nearly 50 years in the past, which will allow the researcher to create a chain of events that will lead to the evaluation of a conclusion for this analysis.

2.1 History of US-China Relations

Following the status of U.S.-China relations is essential because they have the power to define the global system of the 21st century. For the last decades, Washington has kept close watch of the evolution of China, reluctantly assuming not only that China has the commercial potential of establishing a notable regional and worldwide presence, but that it aspires to translate that potential into a notable increase in its economic capabilities. For that reason, a common tendency throughout different U.S. administrations has been to create clear policies with the aim of obstructing the emergence of any rival willing to challenge its absolute supremacy.

The history of U.S.-China relations since 1972 is characterized by two periods. During the cold war, there was limited cooperation between the two countries, limited due to lack of trust and security concerns. Nevertheless, a historical landmark was made during February of 1972, when former President Nixon became the first American chief of state to visit the People's Republic of China. The outcome of this visit was the Shanghai Communiqué.

> The communiqué stated that both the United States and China strive for "normalization" of relations, and to expand "people-to-people contacts" and trade opportunities. (…) Early in the negotiations, recognizing that China and the U.S. held many conflicting positions, Chou En-lai proposed an unconventional format for the communiqué. The two sides basically agreed to disagree, each stating its views in separate paragraphs. On the Vietnam issue, for example, the U.S. supported Nixon's latest peace plan, while China had firm support for their Communist proposal. (Tallarida, 2010)

Regardless, one of the main issues addressed was Taiwan. Henry Kissinger, former U.S. Secretary of State, stated in his memoirs "The basic theme of the Nixon trip — and the Shanghai Communiqué — was to put off the issue of Taiwan for the future, to enable the two nations to close the gulf of twenty years and to pursue parallel policies where their interests coincided" (Tallarida 2010).

From 1972 to the end of the 1980's, the U.S. and China lived a period of limited collaboration with increasing bilateral understanding between the two, however, 1991 would mark the beginning of a more balanced and complex period. According to professor Jin Canrong, this period was characterized by the following aspects: internal factors carry greater importance when choosing between cooperation or confrontation, the development of political and economic relationships is asymmetric (while the first advance with its ups and downs, the second have greater stability), the power difference between the two has considerably decreased, and acknowledgment that the influence of their relations affects the whole Asian-Pacific region. (Canrong, 2007)

The beginning of the 21st century saw the introduction of the U.S.-China Relations Act of 2000, signed by former President Clinton in October. This agreement granted Beijing permanent normal trade relations with the United States and laid the first steppingstone in the path that allowed China to join the World Trade Organization in 2001. According to the Council on Foreign Relations, between 1980 and 2004, U.S.-China trade rose from $5 billion to $231 billion. In 2006, China surpassed Mexico as the United States' second-biggest trade partner, after Canada. (CFR, 2023)

Since joining the WTO, China's economic presence across the globe has grown extensively. In 2001, China was the sixth largest exporter of goods, at a value of $510 billion dollars. According to the International Monetary Fund, China is the largest exporter of goods in the world, at a value of $3,422 billion, reflected in Figure 1. In other words, a 671% increase since joining the WTO. Today, China is the largest trading partner for both the U.S. and the EU. In 2023, the U.S. imported $536 billion' worth of goods from China, while the European Union imported $556 billion. Today, China is the second largest economy in the world, by GDP (IMF, 2023).

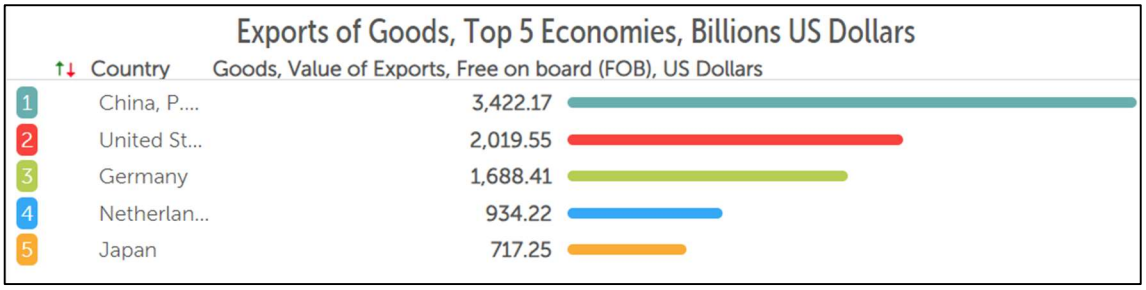

Figure 1. *Largest Exporter of Goods, Billions USD. (IMF, 2023)*

The key issue is determining if the development of China could damage the fundamental interests of the United States. China and the U.S. have been in an interdependent relationship for the last two decades. For instance, China is one the major buyers of U.S. Treasury Securities. By buying U.S. debt, China contributes to maintaining low interest rates, because the greater the demand for a country's securities bonds, the lower the interest rates this country offers. Another example is how the U.S. has benefited from importing transformed goods from China, taking advantage of China's production capabilities, and low wages.

Within any relationship, there are red lines that are not meant to be crossed, and for the U.S. those red lines are known as 'strategic sectors'. A strategic sector refers to an industry or area of the economy that is considered critical for national security, economic stability, or the overall well-being of a country. For instance, in 2005 the Chinese state owned CNOOC (Chinese National Offshore Oil Corporation) sent an acquisition bid for UNOCAL (Union Oil Company of

California). This operation faced strong opposition from members of the U.S. Congress, and before it got the chance to be vetoed, CNOOC withdrew its bid amidst the great controversy. UNOCAL ended up becoming a subsidiary of Chevron Corporation, an American company. Another example, key to this analysis, was the Huawei case. In 2017, former President Donald Trump launched a trade war against the Chinese semiconductor industry, that continued throughout his mandate. The boiling point was reached during May 2019, when the Trump administration signed an executive order on “securing information and communications technology and the supply chain”. In summary, the U.S. government added Huawei into an “Entity List”, a sort of blacklist of companies that are restricted from engaging in any business with U.S. companies. Huawei was the fastest growing smartphone manufacturer in the world, closing in on Samsung as the most profitable. This U.S. ban on Huawei is similar to the actions taken on ZTE, another Chinese tech company, in 2018. Overall, the Huawei case was a big blow in an unfolding U.S. and China trade war, where the key player has already been set, semiconductor chips.

2.2 Cold War II

History proves that technology plays a key role in power transitions. Robert Gilpin (1970) stated that major advances in technology allow nations to rise to political pre-eminence, though over time technological knowhow and ‘inventiveness’ diffuse to other countries. Through this statement, Gilpin was able to summarize the Cold War, the geopolitical conflict between the United States and the Soviet Union, in 20 words. After the Manhattan Project was finished, the issue for the United States was how can we limit the access of this technology to our enemies? From there, the Cuban Missile Crisis, the Berlin blockade, the Space Race and multiple proxy wars and revolutions across the globe followed. Overall, 45 years of political instability, tension and fear shadowed a world already in ruins.

Unlike nuclear weapons, semiconductor chips are not new technology. In fact, according to economic historian Chris Miller (2022) the perfecting of chip design

was the deciding factor in the U.S. defeating the Soviet Union, by rendering the Russian arsenal of weapons obsolete. The establishment of this key technology kept growing through the years, to the point where a shift in industry tendencies could be identified. During the cold war, the semiconductor producing firms relied on demand of their products from U.S. defense and military to keep afloat. Today, by contrast, the defense sectors are dependent on the chip industry to maintain their strategic capabilities. As the United States emerged victorious from the Cold War and unchallenged by other nations, they continued to build on this technology.

2.2.1 China: A New Challenge

There are significant reasons behind the idea of China becoming the United States' new nemesis and worrying ones as well. However, it is essential to understand that China is not the Soviet Union. During the Cold War, both the U.S. and the Soviet Union carried their respective ideologies, democracy versus communism, as their flag and thus attracted similar allies. Even if China is a communist nation, it knows that imposing ideology will get them nowhere. According to Baños (2022) China wants to establish dominance through these three instruments: technology, economy, and leadership.

> China has been able to attract countries through its economic alliances. For instance, in Africa, at the beginning of the 21st century, the large majority of the 54 countries supported Taiwan in its conflict with China. Today, only Swaziland supports Taiwan, the rest support Mainland China, it has done so through economic agreements. Another example, in Barbados, by giving them economic aid it has taken part in Barbados establishing a republic and abandoning the Commonwealth. In South America, China is taking huge advantage of the resources there, copper from Chile, petroleum from Venezuela for example. (Baños, 2022)

Professor Baños references China's strategy of foreign direct investment as a way of establishing political ties while largely contributing to increase their GDP. This idea is also backed by Xulio Rios, head of the Observatory of Chinese Policy in Spain. According to Rios (2007), China attempts to build a positive image in

the world, that transcends that of the attraction capabilities of its culture. It uses commerce and investment to benefit from the rejection provoked by U.S. unilateralism in great parts of the world. China's penetration into the South American and African markets is the most notable, however their investments in Europe are largely underrated. "China acquisitioned domestic electrical companies and banks in Portugal, also the Port of Sines in Lisbon. In Greece it acquisitioned the Port of Piraeus, the most important Mediterranean-Oriental port… definitely strategic positions, key to sustain their trade with Africa and South America" (Baños, 2022). As the world's leading producer of goods, China hungers for raw materials. In Figure 2, the five main exports to China from South America are outlined, acknowledging key products such as crude oil, copper, iron, and soya.

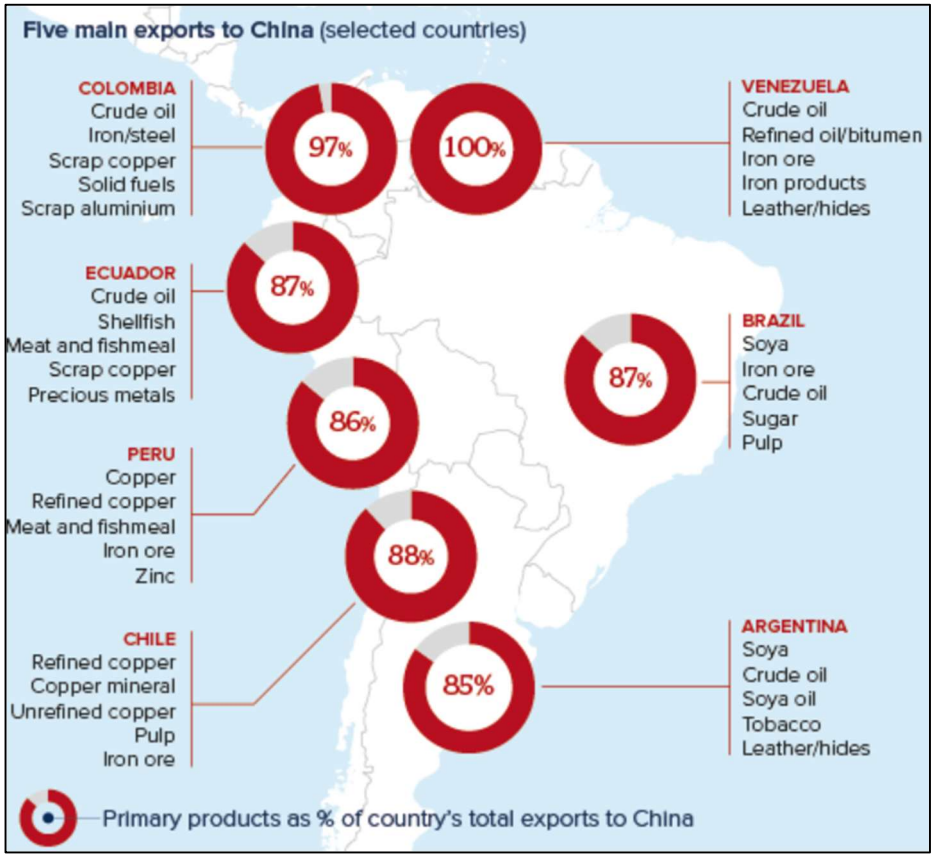

Figure 2. *South America's Five Main Exports to China (DailyBrief, 2023)*

China is governed by the Communist Party of China (CPC). The party's influence extends into various aspects of society, including control over the media,

education, and its legal system. The Chinese political system exhibits authoritarian traits, it maintains control over political dissent and freedom of speech, however it allows economic liberalization and cultural openness. Since 2012, the general secretary of the CPC and president of China is Xi Jinping. Upon taking power, Xi Jinping has cultivated an image of strength and stability, presenting himself as a decisive leader committed to realizing the "Chinese Dream" of national rejuvenation.

One of Xi Jinping's priorities was the centralization of decision making. He has done so by concentrating authority in his own hands and reducing the influence of other party organs and factions. This involved strengthening the role of the Central Committee and the General Office of the CPC Central Committee, which oversees day-to-day operations and policy implementation. According to Baños (2022) from the last Central Committee Summit where the members were named, now more than 40% of the members were experts in STEM. Education is at the center of Chinese leadership, and the strengthening of the nation. Where Chinese students left to study at the best engineering faculties in the world, today 20 out of the 50 best engineering schools are in China. There is significant progress in Chinese higher education, Baños (2022) states that 22% of the scientific articles and theses come from China.

The previous economic and leadership goals all orbit around the same goal, possessing the most advanced technology. Even if China still has ground to make up for, its technological growth is unparalleled. For instance, in the year 2000, China accounted for 1% of the patents presented to the World Intellectual Property Office. In the year 2023, China accounted for 46.8% of the patents presented, nearly half of the patents of the whole world. China is also taking advantage of riding the wave of innovation. According to Atlantic Council (2023) the country increased by 70% its exports of battery electric vehicles, reaching $34 billion, with Europe accounting for 40% of those exports. However, China realized its greatest vulnerability, semiconductor dependence. In 2021, China imported $433 billion worth of chips, exceeding the amount spent on oil. China thought that being the largest supplier of silicon tablets to TSMC, the largest

producer of semiconductor chips in the world, it would have guaranteed supply of these chips. However, the COVID-19 pandemic proved them wrong.

2.3 Standout Points of the Conflict

The environment surrounding this conflict is complex, as this is a battle fought in many battlefields, it is essential to pick out certain sectors critical to the development of this conflict. This section focuses on structuring the most important parts to this conflict, ranging from the weaponization of supply chains to a closer look at specific key technologies.

2.3.1 Semiconductor Supply Chains

Policymakers and government officials have given their full attention to the semiconductor industry and its supply chain. It is no surprise, given that the majority of the formerly mentioned policies have one sole objective, safeguarding supply chains. Chip manufacturing is a highly specialized and globally integrated industry. It creates significant global interdependencies and requires significant investments to provide output at the various phases of production. This put into perspective, a single chip potentially traverses 70 international borders before it reaches the consumer, a journey which involves nearly 500 discrete stages inside the supply chain. No single country or company has the capacity to execute all roles of the supply chain.

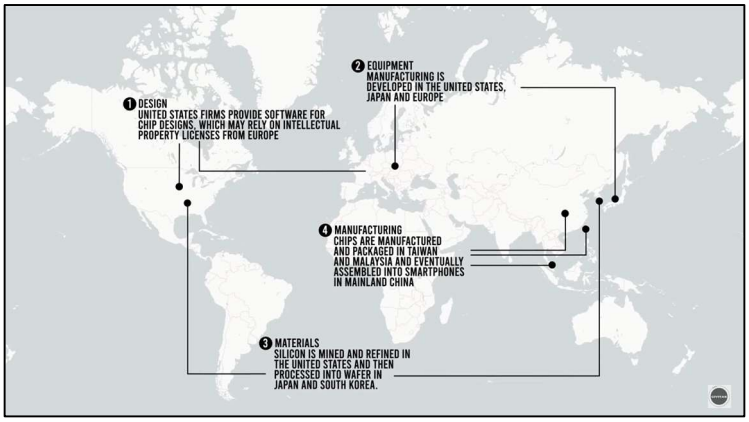

Figure 3 *Example of Semiconductor Supply Chain (Civitas, 2023)*

The inevitable vulnerability surrounding the semiconductor supply chain lies within the geographical dispersion of the materials and the manufacturing facilities. Even though this offers some advantages, it also exposes the supply chain to potential bottlenecks in logistics and production. The factors that contribute the most in threatening the semiconductor supply chain are: geopolitical tensions, economic sanctions, natural disasters and unprecedented events, such as a pandemic.

2.3.2 Weaponization of Supply Chains

The battlefield upon which the 'Chip War' is being fought is no other than the industry's supply chain. Politicians have been playing with different tools to hurt their adversaries' interests. As formerly mentioned, the conflict regarding chips can date back to when the Trump administration threw the first punch at China, with the famous Huawei Case. Since then, as the world's largest economies continue to escalate nationalist industrial policies, the resulting regulatory barriers, import and export laws, and sanctions have effectively led to the weaponization of supply networks.

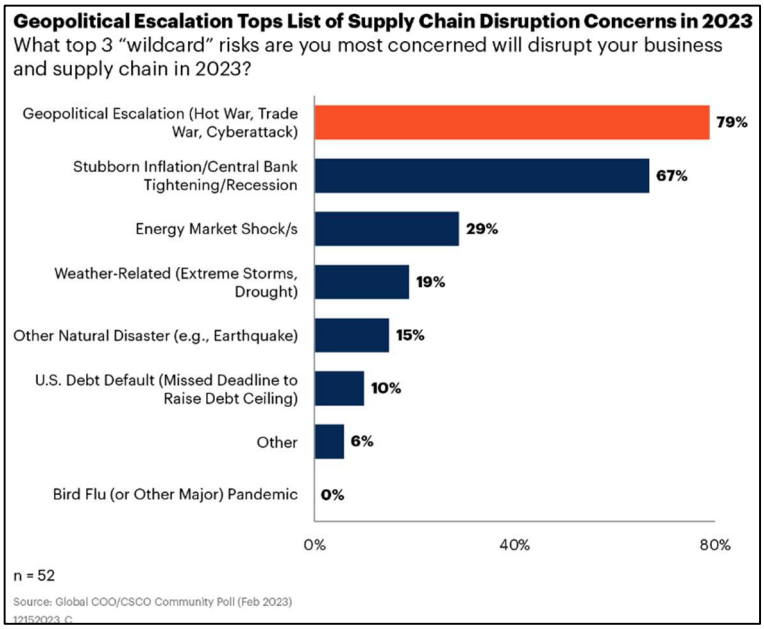

Figure 4 *Survey on Largest Concerns on Supply Chain Disruptions (Aronow, 2023)*

Chen and Evers (2023) argue that private companies have produced cars, computers, satellites, ships, and other goods across several nations throughout the past century, creating intricate networks of economic interdependence amongst previously independent governments. States are now using trade, banking, manufacturing, and investment policies as economic weapons in their power struggles, waging "wars without gun smoke," because of the creation of these supply chains. The understanding of the use of these economic weapons is essential in understanding modern power transitions. It is a well-established historical trend that when a great power faces the possibility of displacement by a rising state, these large powers will inevitably shift into an offensive role, due to rising tension, impatience, and fear.

A major factor in successfully executing such tactics are business-state relations. In doing so, states establish policies that will incentivize business within their jurisdiction or control, to act in accordance to a nation’s geopolitical interests or objectives. When home businesses support their nation’s goals, it becomes easier for the state to issue sanctions or raise tariffs on competing nations. This economic coercion between business and state all falls under economic statecraft. This theory has been proven in practice looking at the U.S. and its semiconductor industry, relative to the intensified trade war between the U.S. and China.

Lin et al. (2022) conducted a national survey, in which the majority of the U.S. manufacturing and technology sector opposed a trade war with China since it weakened a large range of business functions, such as finance, sales and R&D. Chip designers such as Qualcomm earned nearly $11 billion in revenue from selling to Huawei alone. The absence of this revenue stream meant businesses would have to reduce their R&D spending and find it difficult to compete with overseas rivals that were not subject to the same constraints. According to Stangel (2019) several chipmakers such as Intel, the face of the U.S. semiconductor industry, lobbied against the sanctions and continued selling to Huawei. The problem was evident: Businesses' overarching desire for financial gain and interest in preserving international supply networks appeared to conflict

with American concerns over safeguarding technological security and competitiveness.

The conflicting interests between the U.S. semiconductor industry and the U.S. government clearly reduced the effectiveness of sanctions against Chinese companies. Mozur and Kang (2019) argue that during the first sanctions under the Trump administration, companies such as Micron and Intel bypassed the ban by using third parties in Taiwan and Japan to export their chip designs, software, and equipment. These would flow into dummy companies that were not on the Entity List, for instance, since the ban on Huawei, Yamada (2019) states that Synopsys increased by 80% their sales in China to non-Huawei companies. Under Biden the issue would continue. The 2022 ban on exports of chipmaking equipment, supercomputer components, and supporting materials used to fabricate highly advanced semiconductors revived the tensions between industry and government. Companies claimed that they would lose market share to direct competitors such as South Korea or Japan. Biden has set an objective of total cooperation with the nations in the Pacific, with the Japanese Prime Minister Kishida visiting Washington in April 2024, with China as the main topic of discussion. However, even if Biden can get his Asian allies to follow American guidelines, getting the private businesses of those nations to move in that same direction will prove a challenge.

On the other side of the table, China has responded to the U.S. in an equally disruptive manner. Umbach (2024) states that in retaliation for U.S. sanctions, China has considered new restrictions on its rare earth exports. It controls 80 percent of the worldwide refining capacity for these minerals, which are essential for high-tech weaponry as well as batteries, screens, and many other high-tech products. In this case, China imposed export controls on gallium and germanium, two key minerals to produce semiconductors. China is also using other tactics, directly targeting specific companies. For instance, in 2023 China announced that U.S. Micron Technology had “failed its security review”, thus restricted Chinese companies of key domestic infrastructure from purchasing Micron products. This scenario could be compared to the Huawei ban, justified over espionage matters.

Apart from responding to U.S. sanctions, China has also prioritized being one-step in front of their competitors' actions. Shivakumar et al. (2024) point out how Chinese chipmakers have been buying up semiconductor production equipment from Japan and the Netherlands at a rapid pace, using the extended period of time before export restrictions from those nations go into full force. Chinese companies are also able to purchase American chip equipment thanks to exemptions from U.S. regulations.

Overall, China and the U.S. are giving their best effort to disentangle one another from a supply chain unconsciously built between the two nations. As both nations claim to have fueled one another's technological capabilities, it will prove to be a difficult task to end this battle with a single victor. There seems to be common ground for both acknowledging the complexity of the matters; however, they are handing out simple sanctions, that mostly have no effect.

2.3.3 ASML and TSMC

One of the worries amongst politicians about the semiconductor supply chain is that it is dependent on key links to survive. This is the case of the EUV lithography machines manufactured by a Dutch company, ASML. Currently, ASML has a monopoly on the fabrication of the most advanced type of lithography equipment needed to make every single advanced chip, a machine that costs $200 million. The machines themselves are made up of six modules, each manufactured at a different plant and then shipped to the Netherlands, where they are assembled for testing. Then they are disassembled and shipped to their customers, TSMC, Intel, Samsung, Micron, and SK Hynix, where the first three account for 89,7% of their sales. Before EUV, chipmakers could choose from three companies for their photolithography tools, ASML, Nikon and Canon. Both Nikon and Canon are competitors in DUV, but there is no one able to compete with ASML in EUV technology. Experts say it could take decades for any company to rival ASML, the reason being the company's know-how and their tech built on exclusive deals with nearly 800 suppliers (CNBC, 2023).

ASML has been among those companies in the spotlight regarding the trade war between the U.S. and China. The Dutch government imposed regulations in 2019 to stop ASML from exporting its EUV machines to China. These limitations were a reaction to global concerns about the possible harmful uses of this technology, including China's growing military might and the advancement of AI that may be exploited for cyberattacks. ASML can only sell their less potent DUV equipment to China as a result of this embargo. Later, it became apparent that China could create 5nm chips with those DUV's. Consequently, the United States demanded that the Dutch government impose more export restrictions on ASML technology, this time pertaining to the sale of DUV devices as well. (Register, 2023)

Figure 5. *ASML Share Price Last Five Years (ASML, 2024)*

On the other side of the world, the small island of Taiwan hosts TSMC, the largest manufacturer of chips in the world. The story of TSMC is the story of its founder and the "bet" of a whole nation, Morris Chang. Born in China, Chang completed a doctorate in electrical engineering from Stanford and MIT. He worked for 25 years for Texas Instruments in advanced semiconductor design and manufacturing. Like Chang, there were other Chinese/Taiwanese nationals studying at the best universities of the U.S., specializing in all the fields relevant to innovation. According to Cheng (2019), during the 80's, the Taiwanese government lured them back to Taiwan, with the goal of creating a "Taiwanese Silicon Valley". Thousands of engineers returned to Taiwan to launch startups to help build the semiconductor industry in Taiwan. Thanks to his experience, Morris Chang knew American chipmakers hated the huge investments they made in manufacturing fabs. His idea was that, instead of initiating a competition with the

U.S. and meet the same fate as Japan in their tech race, it would be beneficial to become the U.S. primary ally by solving their problem. The company would solely focus on the manufacturing of chips, no design or device manufacturing, only microchips. Thus, Taiwan Semiconductor Manufacturing Company was born.

Today, TSMC is the largest semiconductor manufacturing company on the planet, and second in terms of sales, behind Samsung. TSMC manufactures 3nm chips, the most advanced microchips to date. Shilov (2024) states that TSMC's top ten customers accounted for 91% of net revenue last year, up from 82% in 2022. Apple is TSMC's largest client, as it accounted for 25% of their 2023 net revenue, as they paid them $17.52 billion. Nvidia, a company which has seen exponential growth thanks to their AI technology, is TSMC's second largest client, accounting for nearly 12% of their net revenue. Other companies include AMD, Qualcomm, MediaTek, Broadcom, Sony and interestingly, Intel. TSMC is the player every country wants on their team, they are currently on a fast-growing expansion, as depicted on Figure 6. On the other hand, TSMC is always followed by the geopolitical uncertainties revolving Taiwan, the U.S. and China.

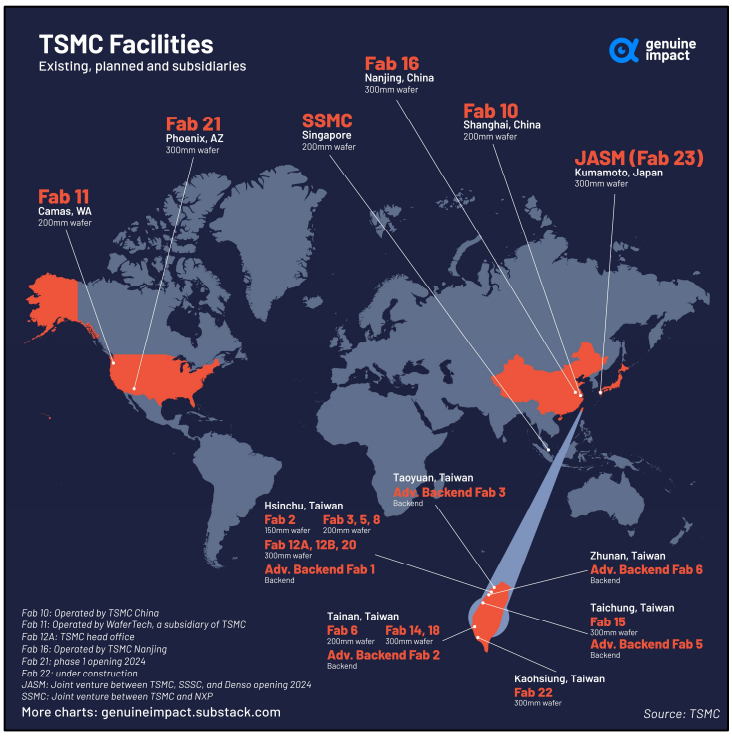

Figure 6. *TSMC Existing and Planned Facilities (Genuine Impact, 2023)*

2.3.4 Taiwan and China

For decades, the issue of Taiwan has proven to be difficult for China. Beijing claims that there is only “One China”, and that Taiwan is part of it. However, the island sees itself as independent, and with the help of the U.S. it has been able to fend off any advances or intimidation tactics from the mainland. For instance, in the summer of 1995 China sent troops to the province of Fujian, next to the Strait of Taiwan, and began running missile tests and combat exercises, in an intent to intimidate Taiwan. That same year, Taiwan was having their first free elections. However, the U.S. under the Clinton administration sent the largest show of military force in Asia since the Vietnam war to the Strait of Taiwan, as response to China. This strategy worked and China would end up backing off from Taiwan. Fast-forward to today and there is a whole different story.

Chinese military presence in the Strait of Taiwan has become routine. The favorite way that China constantly disturbs Taiwan is by violating Taiwan’s air defense identification zone, or ADIZ. Any aircraft entering a nation’s ADIZ unidentified is considered a potential danger. Researcher Gerald Brown at the Foreign Policy Research Institute has been gathering and analyzing the PLA aircraft violations of Taiwan’s ADIZ since 2018. The researcher identifies up to 35 different types of aircraft, with bombers and reconnaissance aircraft being the most common type. The Taiwanese Ministry of National Defense offers updates on this information from 2022 forward, when the passings became more and more evident as seen on the figure below.

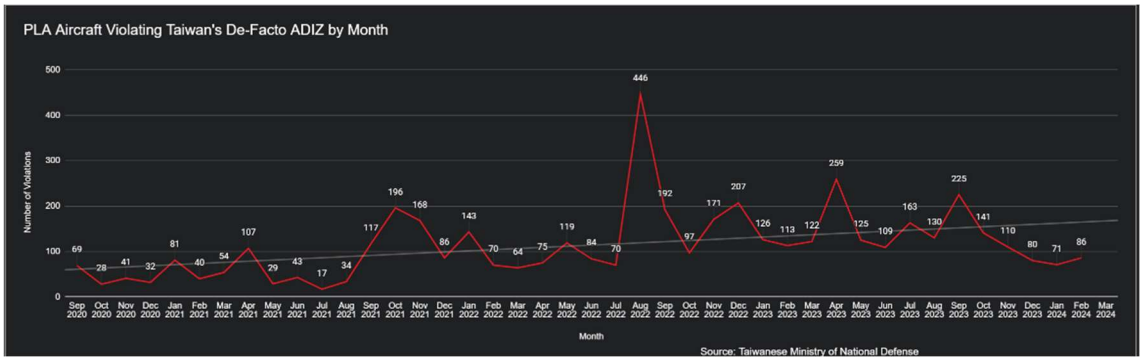

Figure 7. *PLA Aircraft Violations of Taiwan’s De-Facto ADIZ (Brown, 2024)*

Apart from the daily air incursions, the Taiwan Coast Guard is reporting daily presence of Chinese vessels patrolling around the islands of Kinmen, controlled by Taiwan, but hug the coast of China. The Taiwan Ministry of National Defense states that Beijing is increasing their military presence in the area. China currently has the largest navy on the planet, accounting for 730 military vessels. As a response, the U.S. and Western allies have increased "freedom of navigation" crossings of both the Taiwan Strait and the disputed South China Sea to reinforce that both are international waterways, angering Beijing.

Amidst the rising tensions, there is an omnipresent question in debates around this subject: is a Chinese invasion of Taiwan a real possibility? Some arguments by analysts signal recent Chinese economic problems as a possible trigger, or that Chinese leader Xi Jinping is just tired of waiting for unification, with the governing party of Taiwan, the DDP, being against the proposition. The truth is that no one knows Xi’s true priorities. However, an invasion or naval blockade is hardly a compelling proposition for Xi’s government. Given the near certainty of U.S. and Japanese military backing, Beijing does not possess the level of supremacy necessary to ensure a successful invasion, despite China's massive arsenal of modern war boats, combat aircraft, and missiles. Beyond just getting enough troops and supplies across the Strait, China would also have to worry about navigating through a minefield of drones, missiles, submarines, U.S., and Taiwanese ships. Millions of people, particularly the Chinese, would be at risk of losing their livelihoods in the event of an open military confrontation that disrupts economic activity. Xi's rule would be in jeopardy due to the ensuing societal unrest. Although it would be less dangerous, a Chinese blockade of Taiwan would have numerous drawbacks. The government of Taiwan may decide to oppose. Beijing's move may encourage further international collaboration against China, and China may face protracted sanctions. Additionally, the U.S. would have sufficient time to send reinforcements into the area to support Taiwan. These scenarios do not consider support of Chinese allies such as Russia, which is already involved in a war of its own (Roy, 2024).

There are two geopolitical concepts of relevance to this subject that are essential to understand: the first island chain and the silicon shield. China's strategic interests are strongly tied to the concept of the first island chain, a term used to refer to a series of islands including Japanese archipelago, Taiwan, the Philippines, and Malaysia. The significance of this concept for China has both historical and contemporary perspectives. Historically, the chain has been a crucial maritime boundary, marking China's frontline defense against naval invasions. Recently, the importance of this chain has grown due to two formerly mentioned factors, the expansion of Chinese naval capabilities and the country's great ambitions in the Indo-Pacific region. From a military viewpoint, control in the first island chain allows China to project power into the pacific challenging major powers such as the U.S. and securing vital sea lanes for trade, this is particularly crucial for China as its economy is heavily reliant on maritime routes.

Furthermore, the first island chain encompasses several geopolitical hotspots apart from Taiwan. China's ever-growing presence in the Pacific has been a topic of worry amongst international governments. In 2013, China began creating artificial islands in the South China Sea, and it currently has 20 outposts in the Paracel Islands and 7 in the Spratly Islands, adding 3000 acres of land to China. China is currently in legal disputes at the International Court of Law in The Hague with the Philippines and Vietnam over the claims of those waters. U.S. Indo-Pacific Commander Admiral John C. Aquilino (2022) stated that at least three of the several islands China created in the disputed South China Sea are now fully armed, with fighter jets, laser and jamming devices, and anti-ship and anti-aircraft missile systems. Apart from this, in a series of images published by the Asian Maritime Transparency Initiative, there is presence of Chinese naval vessels and even on Woody Island, the image of a Shenyang J11 fighter. According to Anh (2020) when China first announced military exercises in the region, no vessel would be allowed entranced to islands in that region, even if they were not Chinese occupied islands.

Figure 8. *Shenyang J11 Fighter on Woody Island (RFA, 2020)*

A major concept that has grown throughout time has been Taiwan's "silicon shield". The silicon shield theory holds that semiconductor chips offer Taiwan a double layer of protection against any hostilities from China. First, China itself remains heavily dependent on Taiwanese foundries for their chips. China has struggled to create a competitive chip manufacturing base, despite a burgeoning ecosystem of world-class technology design firms (including Baidu and Alibaba) and a major government program promoting domestic manufacture. Peace and stability across the Taiwan Strait will continue to be crucial to Beijing's economic development goals unless Chinese companies discover a substitute for Taiwanese suppliers. Secondly, the large dependence by the U.S. and the EU. The need for advanced chips has made the protection of Taiwan and the semiconductor industry supply chain a vital aspect of American foreign policy. This was made apparent during the visit of Nancy Pelosi to Taiwan, in 2022. During her visit she met with TSMC executives and Taiwan government officials where she reassured the position of the U.S. in expanding on what was the Taiwan Relations Act of 1982, which includes the sale of weapons for self-defense and the ability to come to Taiwan's defense. This heavily annoyed Beijing, which sees a further alienated Taipei moving closer and closer to Washington.

2.4 Relevant Semiconductor Policy

“The future isn’t a gift; it is an achievement”. This phrase by Robert Kennedy serves as a reminder that to guarantee the future of a nation, steps must be taken in the present. This section of the thesis aims to gather and interpret the relevant policies that national governments and international bodies have voted on in the previous years, concerning semiconductor chips. This will help establish an understanding of the current legal environment, and the actions that nations are undertaking to ensure their technological competitiveness for the future.

2.4.1 Made in China 2025

In 2015, China announced “Made in China 2025”, a 10-year plan to turn China into a high-end manufacturer, thus staying competitive in a changing global, address rising labor costs and repairing the reputation of “Made in China”, which became associated with low-cost, poor-quality products. Innovation and technology are at the center of this industrial strategy. China highlighted its semiconductor industry as the heart of its plan because advances in chip technology will lead to breakthroughs in other sectors, handing an advantage to whoever has the cutting-edge chips.

The MIC 2025 pledged $180 billion to boost its semiconductor chip manufacturing industry, through the National IC Fund. According to research by McKinsey & Co. (2015) the goal of this policy is to have China increase its self-sufficiency rate for integrated circuits to 40 percent by 2020 and to 70 percent by 2025. While the definition of self-sufficiency is unclear and there are no guarantees of hitting policy objectives, these targets clearly indicate that the government has ambitious aspirations.

In fact, according to the Global Times (2022) Xiang Ligang, director-general of the Beijing-based Information Consumption Alliance stated that self-sufficiency in chip production has surged from around 5 percent in 2018 to 17 percent in 2022 and is expected to have hit 30 percent in 2023. From this data we can derive that in fact MIC 2025 was too ambitious in its objective. However, it is true that there

is substantial progress in lowering China's dependency on foreign imports, even if it is just efforts. China imported 479.5 billion ICs in 2023, down 10.8% compared with 2022. The import value dropped 15.4% to $349.4 billion, according to the General Administration of Customs.

Research conducted by Wübbek et al. (2016) states that China is expected to fail to build a broad-based, fiercely competitive industry of tech suppliers for smart manufacturing within the allotted time, but it will succeed in achieving other goals. Specifically, it is unlikely to succeed in catalyzing a widespread, economy-wide industrial upgrading of Chinese manufacturers within the next ten years. It's highly likely that China will be successful in cultivating a select, strong national champion group among tech suppliers and manufacturers. This notion could prove to be partially correct, by looking at the impact of the MIC 2025 in China's "national champions". This term refers to companies such as: Huawei, SMIC, HiSilicon, Alibaba, Xiaomi or Tencent, among others.

Since the announcement of MIC2025, China has seen a rapid high-tech sector growth, embodied primarily in Huawei. According to IPlytics, a German patent database company, China had 34.02 per cent of the standards and necessary applications for 5G communications as of March 2018. Out of all the standards and applications, Huawei owns 15.05%. This was larger than the total patents by the United States, which accounted to about 14%, the large majority from Qualcomm, of the developed 5G technologies globally. Figure 9 below represents the difference between 4G and 5G patents per country as of 2022.

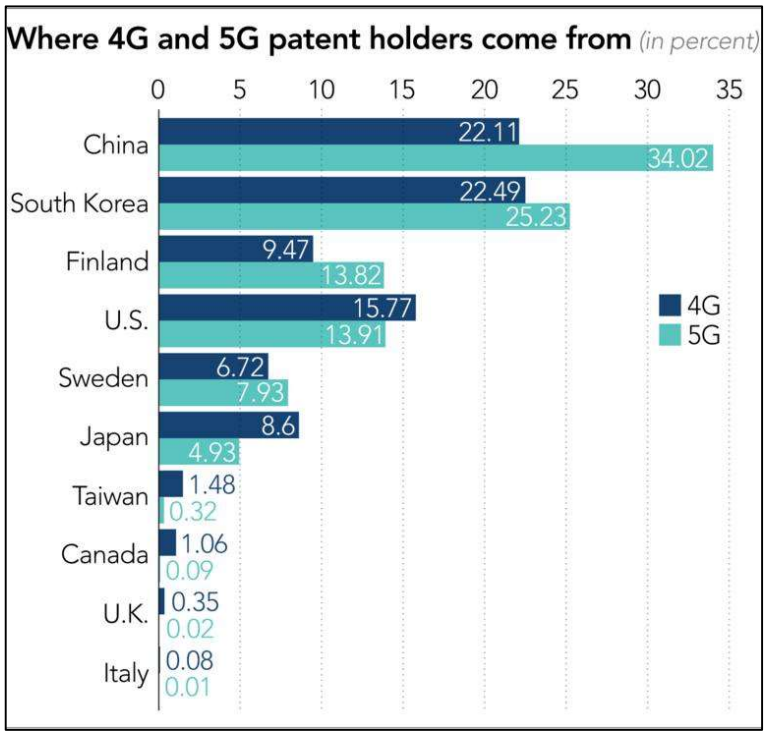

Figure 9. *4G and 5G Patent Holders per Country (Nikkei Asia, 2019)*

After the Trump administration's sanctions on Huawei, restricting Huawei's access to U.S. semiconductor technology, especially chips, chip design software, and chipmaking equipment, thus cutting it off from 5G technology, the company had to reinvent itself. On the 29th of August 2023, the company launched the new Mate60Pro smartphone, the first Huawei phone without Google. The new Huawei mobile phones' application processor unit features an integrated 5G modem. The chip was designed by Huawei's HiSilicon subsidiary and manufactured by SMIC. According to Liu (2023) Beijing's strategy to promote the chip industry is undergoing a significant overhaul because of tightening U.S. regulations on access to advanced technology. As a result, a few of its most successful semiconductor companies are receiving better access to subsidies and more influence over state-backed research. The Mate60Pro is a result of this shift in policy. The phone's advanced 7nm chip by SMIC raises questions on the effectiveness of U.S. technology export controls to Huawei, and to other Chinese companies.

2.4.2 The CHIPS and Science Act

Since the publication of MIC2025, concern about China's growth in chip manufacturing has spread around the world. In this section of the analysis, the focus is on the CHIPS and Science Act of 2022, the return of the United States to industrial policy. This new piece of legislation by the Biden administration offers $53 billion in direct investment plus a separate tax incentive programme, to reinvigorate the U.S. semiconductor manufacturing industry. According to the White House (2022) the package is made up of $39 billion in manufacturing incentives, including $2 billion for the legacy chips used in automobiles and defense systems, $13.2 billion in R&D and workforce development, and $500 million to provide for international information communications technology security and semiconductor supply chain activities. One of the main objectives of the CHIPS Act is to bring the fabs, the multi-million factories where chips are made, onto American soil.

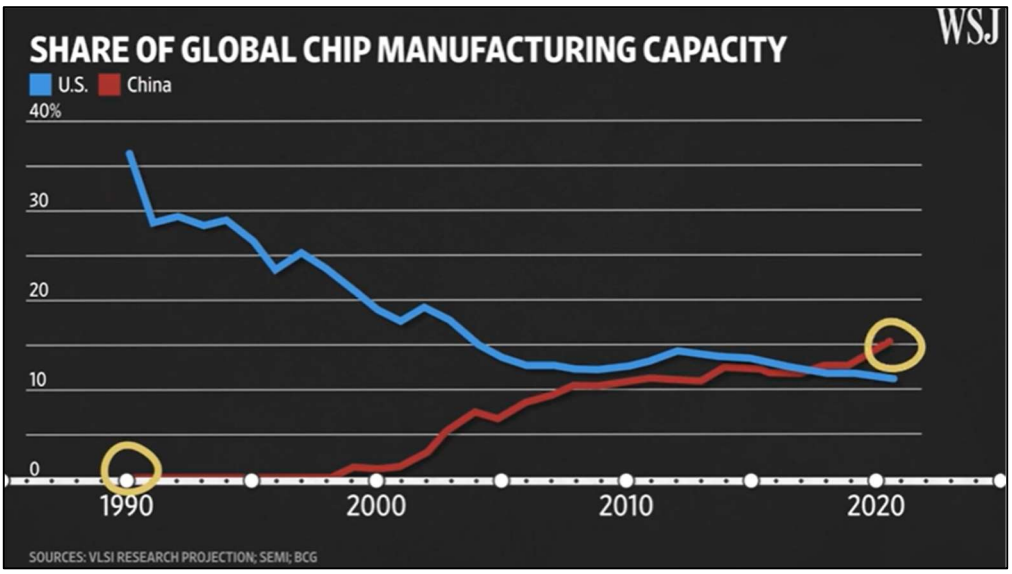

Figure 10. China vs U.S. *Share of Chip Manufacturing Capacity. (WSJ, 2023)*

Those against the passing of this law accuse it of picking winners instead of letting the free market decide which companies succeed, same as the MIC2025. Critics also tie this law together to previous failed government handpicked projects. For instance, in 2017 Taiwan's Foxconn Tech. promised to build a flat

panel display factory in Wisconsin; however, five years after former President Trump's announcement, the factory remains unbuilt. Another famous case was Solyndra back in 2010, when former President Barack Obama announced the creation of solar panel factory which would create 1000 jobs. In 2011, the company went bankrupt after it defaulted on $535 million in federal loans. However, there are requirements, not too strict, to be eligible for receiving grants.

> The bill requires recipients to demonstrate significant worker and community investments, including opportunities for small businesses and disadvantaged communities, ensuring semiconductor incentives support equitable economic growth and development. These funds also come with strong guardrails, ensuring that recipients do not build certain facilities in China and other countries of concern, and preventing companies from using taxpayer funds for stock buybacks and shareholder dividends. (The White House, 2022)

The quantifiability of these objectives seems the most difficult task of all. Even so, there are companies that have instantly reacted to the passing of this law. A $40 billion investment in memory chip manufacturing was announced by Micron, with the potential to generate up to 40,000 new employment in manufacturing and construction. Over the next ten years, the U.S. market share of memory chip manufacture might rise from less than 2 percent to up to 10 percent thanks to this investment alone. As an additional illustration, GlobalFoundries and Qualcomm have announced a new collaboration that includes a $4.2 billion chip manufacturing expansion of GlobalFoundries' upstate New York location. (The White House, 2022)

Among the most notable investments triggered by this CHIPS Act we find Intel and TSMC. Both companies have been dumping millions of dollars into the creation of new fabs in the United States. Phoenix, Arizona has become a major hub in the US semiconductor manufacturing industry. According to Leggate (2024) Intel has started its $20 billion project of two new fabs, Fab 52 and 62, to add to their already four semiconductor fabs in its Ocotillo Campus in Arizona. TSMC, the largest chip US chip provider currently has two fabs in Phoenix and will build a third fab after the U.S. Department of Commerce and TSMC Arizona announced up to $6.6 billion in direct funding under the CHIPS and Science Act.

This third fab brings TSMC's total U.S. investment to more than $65 billion and will create approximately 6,000 fixed jobs. (U.S. Dept. of Commerce, 2024)

> TSMC Arizona's first fab is on track to begin production leveraging 4nm technology in first half of 2025. The second fab will produce the world's most advanced 2nm process technology with next-generation nanosheet transistors in addition to the previously announced 3nm technology, with production beginning in 2028. The third fab will produce chips using 2nm or more advanced processes, with production beginning by the end of the decade. (TSMC, 2024)

Even if the United States wants to separate from the narrative that the CHIPS Act is essentially the same as the MIC2025 plan for semiconductor self-sufficiency, the measures are extensively similar. On the other hand, the U.S. partnership with TSMC gives them an upper hand, mixing the design capabilities of American companies such as Nvidia or Apple and the advanced manufacturing expertise of the Taiwanese giant. However, as well as the MIC2025, it all comes down to the effectiveness of these policies, and the result of how Washington implements the CHIPS Act will not be measurable for years to come, and keeping in mind, the US is up for presidential elections in November 2024.

2.4.3 The European Chips Act

Amongst the most damaged during the semiconductor shortage of 2021 we find the European Union, particularly the automotive industry, an industry at the core of the EU's economy. Following the steps of the Americans, on the 21st of September 2023, the European Chips Act effectively came into force. The European Chips Act is part of a larger initiative titled "Chips for Europe", an investment plan which will at least span to 2030. According to the European Commission (2023) the plan has 5 main objectives:

1. Strengthen Europe's research and technology leadership towards advanced chips.

2. Increase production capacity to 20% of the global market by 2030.

3. Build and reinforce capacity to innovate in the design, manufacturing and packaging of advanced chips.

4. Develop an in-depth understanding of the global semiconductor supply chains.

5. Address the skills shortage, attract new talent and support the emergence of a skilled workforce.

In total, more than €43 billion of policy-driven investment will support the Chips Act until 2030, which will be broadly matched by long-term private investment, so it says. The European Chips Act is arguably the EU's most ambitious plan to launch long-term industrial policy to shore up its economic power and compete with rivals like the U.S. and China. However, the European Union faces similar challenges to the U.S., not least that it is not especially good at implementing industrial policy. Back in 2013, the European Commission announced a microchips plan with the aim of doubling its production of chips, which completely failed. Another dilemma facing the EU is that it has not secured an operative mega fab. The EU has pushed for one of the semiconductor industry’s big three manufacturers, TSMC, Samsung and Intel to set up a cutting-edge chips factory that produces the latest generations of chips (smaller than 5nm). (European Commission, 2023)

> TSMC hasn’t come out with any announcements for European investments. It said over the summer that it was in preliminary talks to set up shop in Germany, but has in past months mainly announced confirmed investments in Arizona ($12 billion), Japan ($7 billion), and China ($2.8 billion). TSMC is the big fish. The Taiwanese giant is seen as dominant in the business of manufacturing high-end chips on demand for other companies like Apple, MediaTek, Qualcomm, Nvidia and others — mainly for smartphones. (Cerulus and Poasner, 2022)

Opposite to TSMC, the EU has successfully closed a deal with Intel, who will spend $33 billion in two fabs in Magdeburg, Germany. Heine et al. (2023) state that Berlin agreed a subsidies up to one third of the investment, around $10 billion. The facility will enter operation starting in 2028. Germany has become Intel’s European hub, however the company has already doubled down,

announcing further, though smaller, investments in countries such as Poland and France.

The legislative piece also faces criticism as it can be easily outspent by its rivals. Commissioner Thierry Breton announced that the EU will eventually match the U.S. subsidies, and that both blocs will avoid entering a subsidy race, these pledges however seem unreal considering that the EU has 27 member states, which makes it difficult to manage who receives what. Overall, the efficiency of this legislation is heavily questioned, and it doesn't aim to solve any of the problems that industries such as the automotive or telecommunications in Europe are currently facing.

2.4.4 Indo-Pacific Legislation

This final section of the analysis of relevant legislation dives into an overview of the specific efforts of India, Japan, and South Korea, three key players in this conflict due to their roles in the semiconductor industry and their geographic proximity to China.

Beginning with South Korea, their National Assembly passed the "K-Chips Act" or commonly known as the Tax Preferential Control Act, on March 30th, 2023. This act is an effort by South Korea looking to boost its domestic semiconductor industry by providing tax breaks to investments in the semiconductor and other "national strategic technologies" industries. Unlike other countries, South Korea is not dumping billions of dollars into their chip manufacturing companies, this is reasonable. South Korea is home to Samsung, one the largest tech companies in the world. South Korea's semiconductor industry first made a name for itself through memory chips. Korea manufactures a staggering 44% of these chips that computers use for internal storage. Beyond these logic chips, South Korea only accounts for 5% of discrete and analog chips, which manufacturers of cars and energy infrastructure need, and it contributes a negligible amount to core chip IP and design software. Samsung and SK Hynix account for nearly all of the chip production in the country, and both companies design and manufacture chips.

Thus, most of the production is for internal purposes. Though Samsung offers foundry services to manufacture chips, large chip designers such as Apple prefer to partner up with pure foundry companies, such as TSMC. (Pan, 2023)

According to Kang (2023) South Korea's tax rate on semiconductor investment is more competitive than that of most of its competitors because of the "K-Chips Act." The tax credit increases to 25–30% for facility investments and to 30–50% for research and development expenses. This contrasts with credits of 5% and 25% for facility investments made in the US and Taiwan, respectively. Taiwan offers a 25% credit for R&D expenditure, the US offers a 20% credit, while Japan offers a 6-12% credit. However, in order to be eligible for this tax break, companies must fall under these categories: 15nm or lower design and manufacturing technology; System on Chip foundries manufacturing at less than 7nm and vehicle, power, and energy efficiency improvement chip designs and manufacturing technology. The high bar set by the government means that only a few companies apart from Samsung and SK Hynix will be able to benefit from this law.

Japan today aligns with the United States in its efforts to keep China away from the most advanced technology, and in reintroducing industrial policy to boost its chip making capabilities. According to Mellow (2023) during the 1980’s Japan accounted for nearly half of the world’s chips, in the present only around 10%. Postwar Japan used to limit foreign investment and didn’t allow much foreign-owned manufacturing facilities to operate in the country. Today, Japan is focusing its chip strategy on foreign relations.

In 2021, Japan’s Ministry of Economy, Trade and Industry announced the roadmap regarding the nation’s chip industry. It outlined the formation of a partnership with the United States, embodied in the “Basic Principles on Semiconductor Cooperation”, which focused on strengthening the chip supply chain. The second stage of the roadmap is the creation of the LSTC, a government subsidized R&D center for advanced chip research, their partnership with the U.S. is key to bring 2nm chips to this center. The third stage is the

establishment of new bases of chip manufacturing. The Japanese government encouraged TSMC to form a joint venture with Sony and Denso, which now also includes Toyota, leading to the creation of Japan Advanced Semiconductor Manufacturing (JASM).

> TSMC's majority-owned manufacturing subsidiary in Kumamoto Prefecture, Japan, to build a second fab, which is scheduled to begin operation by the end of the 2027 calendar year. Toyota will also take a minority stake. Together with JASM's first fab, which is scheduled to begin operation in 2024, the overall investment in JASM will exceed US$20 billion with strong support from the Japanese government. JASM's Kumamoto site is expected to offer a total production capacity of more than 100,000 12-inch wafers per month starting from 40, 22/28, 12/16 and 6/7 nanometer process technologies. (TSMC, 2024)

The final stage is subsidizing domestic chip manufacturing. Shivamukar et al. (2023) state that the Japanese government will cover up to one-third of the capital expenses paid by both domestic and foreign producers to create specific kinds of semiconductor devices. As TSMC announced in its official statement, the government will play a large part in the funding of its new fab. Overall, Japan has created a cemented strategy which seems to be aiding its objective of beginning to regain terrain as a major semiconductor manufacturer; however their growth will be very much limited to third parties.

Finally, India also shares great ambitions regarding its chip manufacturing industry. In 2021, the government of Prime Minister Modi unveiled the India Semiconductor Mission or ISM. With additional incentives for establishing peripheral infrastructure within industrial clusters, the central government's offer of 50% capital support to new entrants in semiconductor sectors such as, fabrication, assembly, test, and photonics has sparked considerable interest worldwide.

For instance, partnerships between Tata Electronics, an Indian chip company, and Taiwan's PSMC, not to be mistaken with TSMC, for a greenfield venture. Micron established an assembly facility in Gujarat. Also, the Indian Electronics and Semiconductor Association and Netherlands Innovation Network published

a joint report titled “Indo-Dutch Semiconductor Opportunities,” glancing at the possibilities of partnerships in semiconductor manufacturing in the future. Evidently, India is attracting business beyond only subsidizing domestic and foreign investment. The largest issue India has is that it lacks the design talent. Seemingly headed in the right direction, India must continue courting high-tech investors and foster an atmosphere that is supportive of research and development if it is to fulfill its ambition of becoming a major participant in the global semiconductor value chain. (Mishra, 2024)

3 Methodology

3.1 Research Question

In order to arrive at a conclusion regarding the impact of the semiconductor dispute between China and the United States on Europe, the research aims to provide a current analysis of the issue. To do this, a comprehensive and in-depth investigation will be conducted to pinpoint the critical environmental elements that could influence the resolution of this dispute.. Thus, the research question is as follows:

How are the actions undertaken by China and the United States regarding semiconductor supremacy affecting the European Union?

The answer to this question demands a prediction by the researcher. In doing so, this answer requires a well-founded strategic analysis of the semiconductor current environment, the relevant legal policies pushed by major players, the geopolitical ambitions and historical relevance of this conflict throughout time. Once a sufficient analysis is completed, the necessary foundations have been set that will allow an arguably correct prediction to be made.

3.2 Quantitative Research

In this research, quantitative analysis has been employed to evaluate how this conflict between China and the U.S. has evolved in recent years. A variety of online sources have been used to collect data, for instance the International Monetary Fund, Center for Strategic and International Studies, various Ministries of National Defense, among others.

The collected data includes important information such as economic indicators which demonstrates China's growth into a major superpower, and how China's financial growth has allowed it to expand its presence in the global scene. By contrast, the information collected on the U.S. and the EU on their decaying presence in several key parts of the supply chain of the semiconductor industry prove the relevancy of the issue at stake. In general, all the relevant literature has been synthesized to better evaluate the current situation of this conflict and help make an informed prediction of the outcome.

It is important to acknowledge that the data for this analysis faces a significant limitation, a challenge that the researched is forced to overcome. This issue is subjectivity. Neutrality is impossible, objectivity is attainable. All researchers have opinions, attitudes, assumptions, and biases, but the challenge is to rise above them by testing them and being prepared to change view based on evidence. For instance, it is likely that newspapers or authors from a U.S. background tend to be keener on the threat that China is to the world as a whole, whereas Chinese sources may have more inconsistent data when it comes to the growth of their chip industry.

3.3 Qualitative Research

The foundation of qualitative research is the gathering of unstructured data through projective methodologies, focus groups, and interviews. This type of research is used to develop ideas, comprehend the intricacy of social phenomena, and investigate participant perspectives and experiences. In this

case, an interview has been the chosen method of qualitative research. Individuals can explain in their own words how they perceive and comprehend the world around them during interviews. In interviews, individuals engage in a seemingly casual social exchange through the exchange of questions and answers. (Knott et al., 2022)

As part of the qualitative research methodology, an online interview was conducted on the 10th of April 2024, with Ángel Gómez de Agreda, a Spanish Air Force Colonel serving as the Defense Attaché in Seoul, South Korea and a geopolitical analyst. Thanks to a source who gave the researcher the details needed to get in touch with the interviewee, the researcher was able to set up the interview. The interview was conducted in Spanish and the questions were later translated by the researcher to English, which can be found in Appendix 1. The interview lasted for an hour and was divided into sections beginning with the context of the conflict, an in depth look at China and the U.S., and finished with a discussion of the possible outcomes of the conflict. The objective of this section is to provide the major conclusions resulting from that interview.

The first issue at hand was the denomination of this conflict as a cold war. Gómez de Agreda claims that it has its similarities but mainly pointed out how the U.S. recovered the contention strategy from its conflict with the Soviet Union. Amongst the differences, he claimed that the world is not as divided as it was during the Cold War, there is more of a grey zone than a blue against red.

On the issue of the relevant legal policy, present in this analysis, Gómez de Agreda points out that these policies are more destructive than constructive, meaning that those policies are more oriented in distorting markets for one's benefit instead of creating a more efficient market. Overall, these measures are creating larger competition specially between big tech companies, which in turn harm the chip environment. He also addressed the part that politics play in legal policy, mentioning how Japan completely aligned with the U.S. against China, where as the EU only partially because they have their own plans for strategic autonomy. Gómez de Agreda exemplified this through the rivalry of Airbus and

Boeing, they both could be cooperating or targeting different sectors, where in fact they both receive subsidies from their own sides and try to outgrow their rival.

Regarding the supply chain, Gómez de Agreda makes an interesting point regarding the means of distribution as the largest vulnerability, compared to the manufacturing. He assures that in this aspect, China has the bigger advantage as it is the epicenter of Euro-Asian trade, where as the U.S. is greatly dependent on maritime trade. He mentioned the recent Baltimore Bridge incident, along with other disruptions in transport of goods such as the Evergreen in Suez or the Shanghai container issue during the pandemic, as incredibly damaging to the world economy. Overall, the objective of interiorising production of chips is heavily focused on the logistics aspect.

An important section of the interview was dedicated to the Indo-Pacific region and Taiwan. Gómez de Agreda argued that a Chinese invasion of Taiwan was an impossibility, at least for the foreseeable future. His reasoning was based on that China does not have the sufficient resources to do so, and that they would only gain an island, as they would lose the know how of TSMC for instance. He claims Taiwan is more of a symbol and a hotspot that could trigger China. Regarding South Korea, Gómez de Agreda claims that the country along with Samsung was facing a huge dilemma. Samsung accounts for more than 20% of the country's GDP. Samsung was tempted to take over as a major chip partner to China, but the U.S. quickly pulled the rug with sanctions. The company sold 90% less semiconductors in 2023, and the U.S. will continue to block South Korea on providing advanced tech to China.

A key section of the interview was focused on the major players in this conflict, China and the U.S. Regarding the issues facing the U.S., Gómez de Agreda states that the U.S.'s major problem is internal, referring to the political polarization and the loss of identity it has faced in recent years. He states that there is a large class and political rupture which has made it difficult to mobilize public opinion. These internal issues have led it to lose attraction and is less favoured by other countries than before. In respect to how foreign conflicts such

as wars in Ukraine and the Middle East, he mentioned that China and Russia are opening as much battlefronts as possible to maintain the U.S. at bay; however the effect these have on the semiconductor chip are close to none.

During the interview, there was a discussion about the role of Europe. Regarding the current chip industry, Gómez de Agreda states that, unless there are important shifts in the notions of chipmaking, Europe will continue to be amongst the most dependent, and sees their efforts to lift its chipmaking industry as powerless. This is all in terms of economic capability, he exemplified that Nvidia's market capitalization is twice the GDP of Spain. He claims that Europe is better off focusing on specific niches critical to the supply chain of the whole industry, mentioning the case of ASML.

As a conclusion, the researcher asked the interviewee on his thoughts of a possible outcome to this conflict. Gómez de Agreda stated that this conflict will continue to evolve in the future, and the U.S. continues to have an edge over China but that has clearly decreased. About a possible ending, he mentions two: a stagnation in China's growth like what happened to Japan or given the moment that China gains technological superiority over the U.S., and the U.S. can't block that growth through industrial means, Gómez de Agreda hints at the U.S. reverting to its military as a means of contention.

This interview was very beneficial to the data collection process and adheres to the qualitative research approach, which aims to get participants' profound and in-depth information. This interview has been complemented by information obtained from interviews to other specialists conducted by third parties, to compare points of view.

4 Conclusion and Recommendations

This research concerning the status of the semiconductor conflict between China and the U.S. represents an image of the current state of international relations between major superpowers. It is essential to understand the dynamic

environment of this conflict and that predictions must be made when referring to an outcome of the conflict. The analysis conducted during the course of this investigation has led to the following results:

Regarding the **European Union**: the EU is facing an inevitable dilemma; it needs to respond to U.S. actions with clarity while admitting that knowledge and state-of-the-art technology are European public goods and vital for future growth and competitiveness. It must not allow the concept of strategic autonomy to lose its meaning as it is not solely dependent on technological war but also on the involvement of other actors in the provision of vital raw resources. Furthermore, the EU adds to its list of issues the implementation of an optimistic piece of industrial policy to its 27 member states. This will prove to be an impossible task, taking into account the financial aid that countries in the EU receive in response to necessity and objectives. If the industrial policy was to be applied only a few would benefit, for instance Germany and France. Countries which in turn have been opposing EU laws and objectives such as Hungary would be completely excluded from participating in this process.

Nevertheless, the EU is way beyond its depth. Apart from the economic capabilities unmatchable to those of big tech companies combined with the state in the U.S. or China, the EU faces policy issues and conflicts of interest amongst the rising tensions. Ursula von der Leyen has pushed green transition and decarbonization as the major objective in her last campaign. Currently the EU is 98% dependent on China for access to rare metals that are crucial for key technologies, especially electric vehicle batteries, which are monopolized by China. Europe cannot follow the U.S. into an all-out trade war with China since it will become the biggest loser. However, the EU cannot risk aiding China or not following the U.S. into a “tech blockade” of China, since it risks losing a major ally in the U.S., which is currently the largest arms provider of Ukraine, a country wanting to enter the EU and NATO.

Regarding the **U.S. and China**: The reality is that the center of worry amongst both countries, especially the U.S., is the application of these new technologies

for the military. The U.S. is right in that it has fueled China's growth in technological capabilities, this is completely normal since China mastered in applying the economic landscape the U.S. had set, for its advantage. The conclusion in this aspect is that the U.S. will eventually fail in preventing American chip-design to end in China. The best example is Huawei´s MatePro with the 7nm SMIC chip. Depriving Chinese chipmakers of core technologies will only drive them further into Beijing's arms. Because the restrictions could end up failing, the U.S. will in turn follow China into a spending frenzy in aids to the semiconductor industry through the CHIPS Act. In favor of the U.S., it has all its tools for maintaining its edge in the defense sectors, and the appliance of the new technologies within its reach. The latest most advanced example is artificial intelligence. Nvidia is currently the most important AI chips designer, and Israel, a U.S. ally, currently has different AI programs called "Alchemist," "Gospel" and "Depth of Wisdom," which were developed and are used during the fighting with Hamas. The U.S. can benefit from the knowhow and continue expanding gaining an advantage on China.

Finally, regarding **globalization**: The actions undertaken by China, the U.S. and Europe are all motivated by geoeconomics. As the major semiconductor markets have viewed the vulnerabilities in the supply of chips as a matter of national security, countries started constructing walls. The U.S. which has been the greatest exporter of free market and free trade for decades is the prime example. First Trump and then Biden, the U.S. is imposing tariffs on Chinese imports, increasing scrutiny on foreign investment, banning American companies from engaging in trade with China and subsidizing them to keep their shop in the U.S. This has created a tsunami wave effect of deglobalization. India is paying companies to keep the production of key goods within their borders, Japan is paying companies such as Nissan or Mitsubishi to bring production back to the mainland, Australia for instance is using taxpayer money to establish mineral processing facilities within their borders and finally, European countries are investing government money in protecting homegrown industries, such as energy, automation and agriculture.

This has proven a frightening reality: the theory that a more economically entangled world would become more peaceful is turning into the exact opposite, into weapons. The same way Putin decided to close the pipeline, Xi Jinping could decide to use rare minerals as leverage. It becomes difficult not to compare this to the 1930's where the rise of economic crisis' around the world led countries to promote protectionism, which led to unrest, which culminated in a second world war. However, the world has evolved, and through innovation we are more connected than ever. Thus, it is when times of uncertainty come that the strongest systems shall be tested.

Finally, as a conclusion to this analysis, certain recommendations or opportunities have been identified:

Regarding Europe, even if it shall remain completely dependent on foreign chipmakers, it can take advantage of specific niches critical for the semiconductor industry. According to Miller (2023) Europe's largest role in the industry is in the production of specialized chemicals and machine tools. ASML is only the face of the European chip industry. For instance, in an obscure but essential subset of wafer bonding tools, the Austrian company EV Group holds a near-monopoly. Germany's Bruker, SUSS MicroTech, and Vistech manufacture various chip-making machinery, and Linde and BASF hold a significant market share in the supply of chemicals used in chip production. Many of these companies themselves make up an important part of ASML's supply chain.

European firms have irreplaceable capabilities, this is why they can play an important role in shaping the future of the semiconductor industry. Apart from the European Chips Act, policymakers should shift the focus to start-ups, by providing them with the necessary funding to continue innovating and incentivizing growth. It has been proven that the correct mix of innovation and experience can change the way an industry works, ASML is the living proof of it.

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Appendix

1. What are the main reasons behind the U.S. and China “Chip War”? Do you agree defining it as a new “Cold War”?

2. How has China’s growth in recent years contributed to the evolution of this conflict?

3. What role does Taiwan play in this conflict?

4. Recently we´ve seen a rise in tensions in the Strait of Taiwan, do you believe in the possibility of a Chinese invasion of Taiwan, or maybe a naval blockade?

5. How is this conflict being lived in South Korea, and what role does the country play?

6. The U.S. has always had a technological advantage respective to China but it has decreased in recent times, do you agree with this statement?

7. What tools is the U.S. using to deprive China of access to the latest technology? Is this strategy sustainable in the long term?

8. Do you believe the conflicts in Ukraine and Israel pose a threat in the U.S. conflict with China?

9. What is your opinion on the industrial policy launched both in the U.S. and China to achieve self-sufficiency in this industry?

10. Soon there will be elections in the U.S., how do you believe the outcome of this election will have an impact on the future of this conflict?

11. What is Europe’s role in this conflict?

12. What are your thoughts on Europe's effort to reintroduce industrial policy through the European Chips Act?

13. What capabilities does Europe have in the semiconductor industry, in contrast to other countries?

14. To conclude, what impact will the conflict between China and the U.S. have on the European Union?