Assessing Dutch Agency within the Chip War Rivalry: The Case of ASML in a Changing Geopolitical World

Rifat Šestić

Thesis submitted for assessment with a view to obtaining the degree of Master of Arts in Transnational Governance of the European University Institute

Florence, 15 May 2023

European University Institute
School of Transnational Governance

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Student declaration to accompany the submission of written work School of Transnational Governance

I Rifat Šestić certify that I am the author of the work "Assessing Dutch Agency Within the Chip War Rivalry: The Case of ASML in a Changing Geopolitical World" have presented for examination for the Master of Arts in Transnational Governance. at the European University Institute. I also certify that this is solely my own original work, other than where I have clearly indicated, in this declaration and in the thesis, that it is the work of others.

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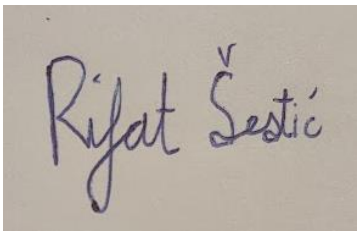

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ABSTRACT

The paper analyzes the conditions the Netherlands had to consider when it decided to restrict critical semiconductor manufacturing equipment – ASML's EUV and DUV machines- to China. This has largely been left unexplored within in the current literature. The paper therefore explores how the Netherlands is navigating the Chip War held between the United States and China. By conducting document analysis on the Dutch Ministry of Foreign Affairs' 2019 China Strategy, ASML's yearly net sales, and analyzing the change in political landscape that has gradually intensified since 2018, this paper finds that the Netherlands decided to place export restrictions on China due to geopolitical and geoeconomic strategies becoming a primary policy consideration in critical industries such as semiconductors.

Keywords: Weaponized interdependence, semiconductors, supply chains, geopolitics, governance, geoeconomics.

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Introduction

The brewing superpower rivalry between the United States and China will define the 21st century. The United States has the largest economy and the strongest military while China has the second largest economy and the largest military.[1] The unexpected element that could significantly shift the balance of power in favor to one side, semiconductors. In recent years, semiconductors, shortened to *chips*, have fallen right in between this superpower conflict. As a result, the world is seeing a new phase of globalization- securing critical supply chains. After the end of the Cold War the world became vastly more interconnected. Economic interdependence was seen as the ideal situation as it would lower the costs of products for both countries, while also reducing the risk of a potential conflict- due economic benefits outweighing the costs of going to war.[2] Now, in industries such as semiconductors, this is seen as security risk.

The theory of weaponized interdependence argues that globalization has caused certain industries to not become globalized but highly concentrated. This is because interdependencies can become asymmetric overtime, providing one state significant power over the other. Advantaged states that govern over these concentrations can exercise their power by excluding states for not complying with their demands. China was aware of its dependency on Western semiconductors and in response its aim in 2015 was to become more self-sufficient and to eventually evolve in becoming the next leader in advanced technologies. For the United States, this posed a threat to their current dominant position in the technology sector. As a result, the United States used its privileged position within the semiconductor supply to exclude China from acquiring semiconductors and semiconductor manufacturing equipment (SME) in order to stop China from advancing their technology. It did this not only by excluding China from American semiconductor products, but by threatening to exclude other countries for supplying chips and SMEs to China as well. One of the countries that was pressured was the Netherlands as within its border the most important company within the semiconductor supply chain existed, ASML Holding N.V.

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[1] "Biggest Armies in the World by Personnel 2022," Statista, accessed May 9, 2023, https://www.statista.com/statistics/264443/the-worlds-largest-armies-based-on-active-force-level/; Lowy Institute, "Military Capability Data - Lowy Institute Asia Power Index," Lowy Institute Asia Power Index 2023, accessed May 9, 2023, https://power.lowyinstitute.org/data/military-capability/.

[2] Scott L. Kastner, "Does Economic Integration Across the Taiwan Strait Make Military Conflict Less Likely?," *Journal of East Asian Studies* 6, no. 3 (December 2006): 323, https://doi.org/10.1017/S1598240800004598.

ASML holds a complete monopoly on machines- known as extreme ultraviolet lithography (EUV) machines- that are needed to print the most advanced semiconductors. Without ASML, semiconductors cannot become more efficient and powerful, making technological progress dependent on this company. As the argument within the literature stands, the United States heavily pressured the Netherlands to stop exporting its EUV machine to China and the Netherlands eventually complied in 2019. One of the threats was that the U.S. would stop providing ASML American inputs that ASML's EUV machines cannot function without. While the theory of weaponized interdependence does argue that advantaged states could work together, or through coercion, with other countries to become more effective, the current literature holds ASML's case as a given, neglecting Dutch agency and power within the debate.

As stated earlier, ASML has a complete monopoly in producing extreme ultraviolet (EUV) lithography machines, American threats to withhold critical components from ASML would therefore not only impact the Dutch economy, but the entire global economy- with most of the technological companies being based in the United States. Hence, it is highly unlikely the United States would have gone through with this threat and therefore different reasons for the Dutch were at play. Additionally, after talks with the United States, on March 8th, 2023, the Netherlands decided to also stop exporting ASML's deep ultraviolet (DUV) machines to China, an older lithography model. From 2019 to 2022, China became ASML's third largest customer as it purchased DUV machines that are equivalent to roughly 15 per cent of ASML's total net sales. Losing a large customer like China therefore raises additional question to why the Netherlands decided to comply with American demands. Therefore, the research question for the paper asks: *How is the Netherlands assessing the tradeoffs within the context of the Chip War rivalry between the United States and China?*

To answer the question, it is important to know the conditions under which the Netherlands is taking its decisions and hence the paper is divided into two chapters. The first chapter consists of a thematic and historical literature review which integrates all the relevant information needed to understand the Netherlands' position within the Chip War. The literature review is divided into distinct subchapters: the theory of weaponized interdependence, semiconductor supply chains, understanding the Chip War and how semiconductors have been weaponized, and lastly the current literature on the ASML case is explored. By explaining the relevant factors, it will

provide a grounded understanding under which the Netherlands is currently standing in. The second chapter will look at the Chip War through the eyes of the Dutch. This entails looking at the changes of perception towards China from 2018 onwards, ASML's economic growth, and geopolitical developments that have developed over the last five years (2018-2023).

Methodology

Research design

The research design of this paper will rely on primary and secondary sources. In order to acquire a comprehensive understanding on the interdisciplinary nature of the topic of interest, qualitative research methods will be applied to answer the research question. The literature review will rely on secondary sources to establish the wider relevant context. Chapter Two occasionally uses secondary sources but will largely rely on primary sources to analyze the Dutch perspective. This is because there is a scarcity of available literature on the topic. The arguments that will be developed in Chapter Two build on the knowledge that was acquired from the literature review by situating the Netherlands within the boundaries of the secondary sources.

Data Sourcing

The data collected varies on the topic hence a breakdown is provided below. The literature review will rely on secondary sources to establish the basis of the paper. Since the topic is interdisciplinary the secondary sources come from a variety of different disciplines such as international relations, economics, and technology. The sources used will include books, research papers, policy briefs, news articles, and speeches.

The Dutch Ministry of Foreign Affairs

Chapter Two utilizes document analysis on the Dutch Ministry of Foreign Affair's foreign policy paper: Netherlands-China: A new balance (Nederland-China: een nieuwe balans) (2019). This document has been chosen as it shows the Netherlands' new foreign policy strategy towards China from 2019 onwards, which coincides with the time the Netherlands became involved in the Chip War. Besides the published document, under the Government Information (Public Access) Act (Wet openbaarheid van (Wob)), the Government must disclose information on administrative processes if requested by a citizen. Therefore, two additional documents will be analyzed: Openbaar gemaakte documenten (Disclosed documents) 1-49 (134 pages) and Openbaar gemaakte documenten 50-111 (134 pages).[3] These documents show the policy process

[3] Ministerie van Buitenlandse Zaken, "2e deelbesluit Wob-verzoek Chinabeleid: Openbaar gemaakte documenten 1-49", December 23, 2021. https://www.rijksoverheid.nl/ministeries/ministerie-van-buitenlandse-zaken/documenten/wob-verzoeken/2021/12/23/2e-deelbesluit-wob-verzoek-chinabeleid; Ministerie van Buitenlandse Zaken, "2e deelbesluit Wob-verzoek Chinabeleid: Openbaar gemaakte documenten 50-111," December 23, 2021. https://www.rijksoverheid.nl/ministeries/ministerie-van-buitenlandse-zaken/documenten/wob-verzoeken/2021/12/23/2e-deelbesluit-wob-verzoek-chinabeleid

of the Netherlands-China: A new Balance. This includes e-mails, presentations, discussions, and documents. Due to Article 10 of the Wob, a significant amount of information is withheld from the public by placing a white box over sentences if it falls under national security concerns.

Additionally, for easier accessibility for the reader, the reference system for this section will follow the logic: document number | page number (a) or (b). Page number (a) refers to the first document which has disclosed files 1-49, (b) refers to the second document which has the disclosed documents 50-111.

ASML: Yearly Reports

ASML publishes a yearly report that highlights, among others, the company's main achievements, production aims and challenges, financial information such as net sales, and total EUV and DUV machines sold. Chapter Two will look at ASML's yearly reports beginning in 2014 and ending in 2022. This has been done since secondary sources provide conflicting yearly results, making it unreliable to use. Hence through independent research on the official statistics a more stable analysis can be provided. The year 2014 was selected because before 2016, ASML grouped China together in the category *"Rest of Asia"*. The 2016 report however places China as a separate country and shows the net sales per country for the years 2014, 2015, and 2016. Based on ASML's data, the author will use basic mathematical calculations to show percentages changes in net sales per year and the China's relation to total yearly net sales.

DUV in the context of a changed political landscape

This section will rely on the contextual knowledge gained from the literature review, the findings from the Chapter Two subsections, and bonds this to contemporary secondary sources such as news articles to establish a connection between the topics.

Limitations

There are several limitations to the paper. The Netherlands has kept most of the information undisclosed due to reasons of national security, meaning that the analysis relies on contextual interpretation. The information that was gained from secondary sources during the literature review acts as the basis of this contextual interpretation. The arguments will therefore aim to be within the boundaries of the secondary sources. The interdisciplinary nature of the topic means that there will always be more variables at play than what has been discussed within the paper. Further analysis on the EU's role within this context would have provided additional insight

since the Netherlands was in close contact with the EU during their 2019 China policy paper decision-making process. In relation to subchapter 2.3. South Korea, Japan, and Taiwan are not discussed due to the limited word count. Further research on their role within the Chip War debate would have provided a more complete perspective. It also would have been beneficial to the argument to apply a historical analysis on how the United States became technologically dominant and how this slowly waned due to globalization.

Chapter one. The Literature Review

The literature review sets out to contextualize the Chip War by compartmentalizing the debate into relevant topics. Since the thesis topic is interdisciplinary, disentangling the main themes enables a clearer view on the debate. Subchapter 1.1 begins by explaining the theory of weaponized interdependence. Understanding this theory provides a framework in which the debate can be understood as it brings attention to the risks of global interdependencies. Subchapter 1.2 then describes semiconductor supply chains and their susceptibility to disruptions. These two factors act as the basis for understanding the Chip War. Subchapter 1.3 then explains the reasoning behind the United States starting the Chip War. It looks at the changes that occurred within Washington during the 2010s, how China was securitized, how semiconductors were weaponized through the Entity List and finally what the American Chips Act is meant to achieve. Lastly, subchapter 1.4 explains the current literature on the ASML case.

What will become evident is that there is a gap in the literature when looking at agency within the context of a country being coerced to comply to the advantaged states' needs when this country (in this case the Netherlands) holds significant power within the network as well. American motivations for starting the Chip War are clearly understood but the literature glosses over the Dutch Governments' decision to stop exporting ASML's machines to China. The literature holds the Netherlands' decision as a given, ignoring its agency and leverage. The remainder of the thesis will therefore look at the reasons for the Netherlands' decision to still side with the United States.

1.1 Weaponized interdependence

Originating from network theory, Farrell and Newman conceptualized the term 'weaponized interdependence' to explain a trend that has increasingly become more utilized by powerful states.

In its broadest conceptualization, Farrell and Newman argue that as the world became more economically intertwined it developed security risks for states who are dependent on other states.[4] This is because globalization altered the structures in which states can exercise their

[4] Henry Farrell and Abraham L Newman, "How Global Economic Networks Shape State Coercion," International Security 44, (2019): 43.

power. This used to be dominated by multilateral interstate negotiations, but increasingly states have become able to exercise their power through the rise of private actor networks.[5] When a state becomes too dependent on another state, the state that holds power over a network can coerce the dependent state to abide to its demands or risk being cut off. Hence, in recent years governments around the world came to realize that the benefits that came from globalization could now also provide vulnerabilities.[6] It was held as a given that global networks could rapidly adapt to unexpected disruptions. Now, however, it has become clear that some of these networks have become so centralized (e.g., the Internet, Visa, SWIFT, semiconductors) that there are no other alternatives. This provides the privileged state with strong coercive powers.

In theoretical terms, network theory argues that networks consist out of "nodes", which represent a specific actor or location within a network; and "ties" which are the connections between the nodes.[7] Nodes use ties to send information, resources, or other forms of influence between each other.[8] Over time, however, power imbalances develop within networks as certain nodes become more connected than other nodes due to a "rich-get-richer effect"- also known as "hubs".[9] Nodes can therefore reach a hegemonic position within a network in which other nodes can become heavily dependent on.[10] This also makes these nodes resistant to change as their hegemonic position reinforces itself since disentangling from this node would increase inefficiencies, e.g.. banks being able to use SWIFT.

Farrell and Newman therefore argue that states can exercise their power over these hegemonic nodes that are within their borders to make other dependent states comply. This can be done in two ways: the panopticon effect; and the chokepoint effect.[11] The concept of the panopticon effect entails that dependent nodes cannot avoid passing through certain hubs. This poses a security risk for the dependent states as the advantaged state in which the hub is in can collect

[5] Farrell and Newman, 44.
[6] Henry Farrell and Abraham L Newman, "Weaponized Globalization: Huawei and the Emerging Battle over 5G Networks," Global Asia, September 2019, https://www.globalasia.org/v14no3/cover/weaponized-globalization-huawei-and-the-emerging-battle-over-5g-networks_henry-farrellabraham-newman.
[7] Farrell and Newman, "How Global Economic Networks Shape State Coercion," 50.
[8] Ibid.
[9] Farrell and Newman, 45, 51.
[10] Farrell and Newman, 52.
[11] Farrell and Newman, 55.

valuable information that passes through their hubs and use it for surveillance purposes.[12] The second strategy, the chokepoint effect, occurs when privileged states can cut out or limit other states or private actors from their hub.[13] Since actors can be highly dependent on these hubs, it provides the privileged state with significant coercive power. Even the threat of being cut out acts as a powerful tool for compliance. In certain cases, as seen with semiconductors, hubs can be located in two or more jurisdictions which means that states have to work together to be more effective in coercing. [14] In short, Weaponized interdependence challenges the traditional liberal understanding of networks (e.g., mutual beneficial cooperation, reducing costs) and highlights a new trend that increasingly has been utilized by advantaged states in order to coerce (potentially) non-complying actors.

1.2. The Semiconductor industry

Before analyzing why and how the United States weaponized semiconductor supply chains this section explains the nature of semiconductor supply chains.

1.2.1 Semiconductors

Semiconductors are the backbone for technological progress, any electrical device (e.g., smartphones, microwaves, or military equipment) uses semiconductors.[15] Semiconductors, among other elements, consist out of transistors which use electrical currents to either allow (1) or cut (0) electrical signals.[16] These binary signals are expressions of electrical currents that enable semiconductors to process, remember, and convert real-world sensations into binary code.[17] The more transistors a semiconductor has, the more tasks it can complete. Additionally, to place more transistors within a semiconductor, the transistors need to be reduced in size. Currently the most advanced semiconductors have transistors that reach the nodal size of 3-nm, with expectations to commercially produce 2-nm by 2025.[18] This logic has driven technological innovation since its first conception.

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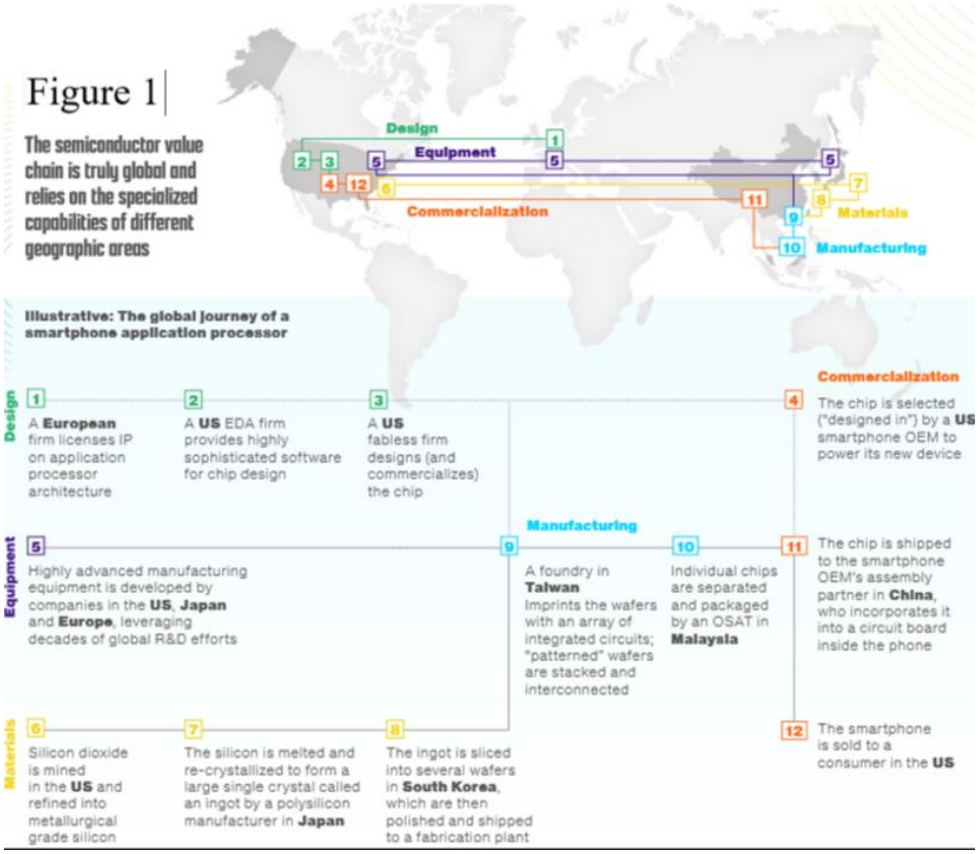
[12] Farrell and Newman, 72–73.
[13] Farrell and Newman, 55–56.
[14] Farrell and Newman, 56.
[15] Ideal Power, "What Is a Semiconductor and How Is It Used?," *Ideal Power Inc. (IPWR)* (blog), January 28, 2022, https://www.idealpower.com/what-is-a-semiconductor/.
[16] Chris Miller, *Chip War: The Fight for the World's Most Critical Technology* (New York: Simon & Schuster, 2022), xix.
[17] Miller, xx.
[18] Majeed Ahmad, "TSMC Approaching 1 Nm with 2D Materials Breakthrough," *EDN* (blog), November 3, 2022, https://www.edn.com/tsmc-approaching-1-nm-with-2d-materials-breakthrough/.

1.2.2 Semiconductor Supply Chains

Semiconductors rely on globalized networks, a single semiconductor crosses the border an estimated 70 times before reaching its final stage.[19] This is because the semiconductor supply chain consists of specialized companies that all focus on adding one particular input to the final product.[20] As the Atlantic Council Issue Brief points out, the main reason for this multinational ecosystem is to cut costs and to optimize output since it is impossible for one company, or one country, to do the entire process by itself and remain at the technological forefront.[21] The SIA/BCG Report illustrates in Figure 1 the semiconductor supply chain.



Source: SIA/BCG Report April 2021, 27. Author added the label Figure 1

[19] Center for Security and Emerging Technology et al., "The Semiconductor Supply Chain: Assessing National Competitiveness" (Center for Security and Emerging Technology, January 2021), 5. https://doi.org/10.51593/20190016.
[20] BCG and SIA et al. "Strengthening the Global Semiconductor Value Chain" (Boston Consulting Group and Semiconductor Industry Association, April 2021), 8.
[21] Jeremy Mark and Dexter Tiff Roberts, "United States-China Semiconductor Standoff: A Supply Chain Under Stress" (Atlantic Council, March 2023), 6. https://www.atlanticcouncil.org/wp-content/uploads/2023/03/US-China-Semiconductor-Standoff.pdf.

Table 1: Value added per segment and market share per country (CSET January 2021, 8). Author added the label Table 1

Table 1	Segment Value add	Market shares						
		U.S.	S. Korea	Japan	Taiwan	Europe	China	Other
EDA	1.5%	96%	<1%	3%	0%	0%	<1%	0%
Core IP	0.9%	52%	0%	0%	1%	43%	2%	2%
Wafers	2.5%	0%	10%	56%	16%	14%	4%	0%
Fab tools	14.9%	44%	2%	29%	<1%	23%	1%	1%
ATP tools	2.4%	23%	9%	44%	3%	6%	9%	7%
Design	29.8%	47%	19%	10%	6%	10%	5%	3%
Fab	38.4%	33%	22%	10%	19%	8%	7%	1%
ATP	9.6%	28%	13%	7%	29%	5%	14%	4%
Total value add		39%	16%	14%	12%	11%	6%	2%

Figure 2: Largest semiconductor supplying companies (2019).

Rank	Company	Headquarters Location	Operating Model	2019 Forecasted Sales (billions)	Main Business Segments
1	Intel	United States	IDM	$69.8	Microprocessors, logic, non-volatile memory, and FPGAs for computers, servers, and other electronic equipment
2	Samsung	South Korea	IDM	$55.6	Memory and logic
3	TSMC	Taiwan	Foundry	$34.5	Contract foundry
4	SK Hynix	South Korea	IDM	$22.9	Memory mainly
5	Micron	United States	IDM	$19.9	Memory and logic
6	Broadcom	United States	Fabless	$17.7	Integrated circuits
7	Qualcomm	United States	Fabless	$14.3	Chips for wireless modems and other phone-related devices mainly
8	Texas Instruments	United States	IDM	$13.5	Analog and logic devices for the automotive industry and other industrial applications
9	Kioxia (formerly Toshiba)	Japan	IDM	$11.3	Memory mainly
10	Nvidia	United States	Fabless	$10.5	GPUs and SoCs

Source: CRS Report October 2020, 50.

Figure 2 highlights the largest semiconductor supplying companies in 2019. The United States holds six out of the ten positions. America's dominant position within this list is due to their historical role in creating the semiconductor industry. However, with manufacturing costs being lower in the Asian countries: South Korea, Taiwan, and Japan taken a larger role within the supply chain over the last couple of decades.

With the United States adding a total value of 39%, the United States holds a dominant position throughout the production process. Table 1 highlights that China's strongest position is in assembly, testing, and packaging (ATP). South Korea, Japan, and Taiwan dominate the manufacturing process (Fab, ATP, Wafers). Lastly, Europe holds a strong position in creating semiconductor manufacturing equipment.[22]

1.2.3. Supply chain susceptibility

The semiconductor industry has therefore created a highly complex and efficient supply chain to cut costs and push innovation by actors specializing in one specific aspect. However, this has created problem: global semiconductor supply chains are not globalized but monopolized, allowing for chokepoints along the supply chain. As the McKinsey & Company points out, the industry rests upon a winner-take-all dynamic which means that if a competitor has a slight edge over the rest, it will capture the majority of industry revenue.[23] This has resulted in the semiconductor industry being dominated by a handful of companies that hold an irreplaceable position within the supply chain. The SIA/BCG report identified 50 points within the overall supply chain where a single region supplies 65% or more of the total global supply.[24] This makes semiconductors highly susceptible to being weaponized. Disruption through geopolitical or even seismic activity (e.g., earthquake) in these highly concentrated geographic regions would therefore critically disrupt the global economy.[25] However, the report looked at regions, not

[22] Center for Security and Emerging Technology et al., "The Semiconductor Supply Chain," 8.
[23] McKinsey & Company, "Semiconductor Design and Manufacturing: Achieving Leading-Edge Capabilities", (McKinsey & Company August 20, 2020). https://www.mckinsey.com/industries/industrials-and-electronics/our-insights/semiconductor-design-and-manufacturing-achieving-leading-edge-capabilities#/.
[24] BCG and SIA, "Strengthening," 39.
[25] BCG and SIA, "Strengthening," 40; McKinsey & Company, "Semiconductor."

individual companies, that have a near monopoly in certain segments, below are several chokepoint examples:

EDA, the software that is used to design semiconductors, is highly monopolized. 85% of semiconductors rely on software that comes from just three (American) companies, Cadence, Synopsy, and Mentor.[26]

Taiwan Semiconductor Manufacturing Company (TSMC) produces 92% of all the world's most advanced semiconductors (Atlantic Council). TSMC acts as a foundry company, which means that it does not design semiconductors, but it manufactures the chips that were designed by fabless[27] companies such as Apple, Google, Huawei's (HiSilicon), Broadcom, Qualcomm and Nvidia.[28] If TSMC is affected by disruption these companies would not be able to release their newest products.

TSMC relies on ASML's EUV lithography machines to manufacture semiconductors that have transistors below 7 nanometers, giving ASML a 100% global market share in EUV lithography machines.[29]

In short, without the effects of globalization, technological advancement would not be in the place it is today. Semiconductors act as the backbone for technological progress and rely on vastly complex networks that require global cooperation in order to continuously push the boundaries of science. However, the industry's obsession with efficiency resulted in the supply chains becoming highly prone to disruptions as only a few companies produce the vast majority of advanced semiconductors.

[26] Miller, *Chip War*, 315; BCG and SIA, "Strengthening," 41.
[27] The company does not own a factory but designs semiconductors.
[28] Thomas J. Shattuck, "Stuck in the Middle: Taiwan's Semiconductor Industry, the U.S.-China Tech Fight, and Cross-Strait Stability," *Orbis* 65, no. 1 (2021): 104. https://doi.org/10.1016/j.orbis.2020.11.005; Adam Segal, "Huawei, 5G, and Weaponized Interdependence," *Brookings Institution Press.*, 2021, 160; Seamus Grimes and Debin Du, "China's Emerging Role in the Global Semiconductor Value Chain," *Telecommunications Policy* 46, no. 2 (March 2022): 4, https://doi.org/10.1016/j.telpol.2020.101959.
[29] BCG and SIA, "Strengthening," 41; McKinsey & Company, "Semiconductor,"; Noah Barkin, "EXPORT CONTROLS AND THE US-CHINA TECH WAR," *MERICS*, March 2020, 8.

1.3. Understanding the Chip War.

Semiconductor supply chains developed under the logic of cutting costs as much as possible, slowly globalizing and being dominated by a few companies. However, during the half point of the 2010s a fundamental change of perception occurred within Washington that is in line with the theory of weaponized interdependence. Within a short period of time, the United States went from promoting globalization and economic interdependence towards interpreting interdependence as a potential security risk. The reason for this was China's ambition to become a technological superpower. What becomes evident is that the Chip War is inherently about the United States not wanting to lose its position as the current dominant power over the technological hubs. This is for two reasons: China leading the 5G race would shift the hub to China making the United States prone to the panopticon and chokepoint effect; and the economic benefits 5G is expected to generate. As a result, the United States used the power it wielded over the semiconductor industry to stop China from technologically advancing.

1.3.1 American Change in Foreign Policy

Friis and Lysne argue that American concerns regarding Chinese telecoms were already present in 2010, but this was disregarded due to the general Western Post-Cold War strategy which believed that authoritarian regimes would open up and democratize if they were included within the liberal international order, e.g., China's accession to the World Trade Organization.[30] Miller adds on this by arguing that the dominant believe within Washington during the post-Cold War era was that expanding trade and supply chain connections with China would foster peace.[31] Instead of focusing on geopolitical power, globalization would bring a win-win situation in which both countries prosper economically. This narrative changed however once Trump got elected. His lack of commitment to upholding the liberal international order meant that the administrations' practices were bolder towards China than before.[32]

Andrew Small, in his book "the Rupture", explains the US' and EU's gradual change in perception towards China. Around 2016, China went from being seen as a potential partner to being seen as a rival.[33] Small however argues that this change of perception occurred before

[30] Karsten Friis and Olav Lysne, "Huawei, 5G and Security: Technological Limitations and Political Responses," *Development and Change* 52, no. 5 (2021): 1177, https://doi.org/10.1111/dech.12680.
[31] Miller, Chip War: The Fight for the World's Most Critical Technology, 188–89.
[32] Friis and Lysne, "Huawei, 5G and Security," 1178; Segal, "Huawei, 5G, and Weaponized Interdependence," 150.
[33] Andrew Small, *The Rupture: China and the Global Race for the Future* (London: Hurst & Company, 2022), 31.

Trump, under the Obama administration.[34] According to Gentile et al., this began to take shape in 2014 already. [35]This is a step away from the general consensus on how the relationship between China and the United States went sour, but it adds levels of nuance that are insightful in order to understand the change in perception the United States went through. According to Small, the change in perception was due to the "Third Offset" project. Coined by Obama's deputy secretary of defense Robert Work, the logic behind the Third Offset was that America's military dominance and deterrence relied on technological innovation, not on scale.[36] The First and Second Offset were the inventions of the nuclear bomb and America's ability to outcompete the USSR technologically by upgrading their precision guided missiles with digital microprocessors and information technologies.[37] The Third Offset therefore aimed to bring attention to the fact that Russia and China were increasingly catching up to America's technological superiority, and therefore there was a need to innovate. The problem however was that the earlier *Offset's* depended on government-led research and development while now their advantage would depend on the commercial sector, which China could also access.[38] Global technological networks have played a critical role in speeding up technological innovation, but it also meant that any competitor could easily access and attempt to mimic these innovations, slowly closing the technological gap with the United States. The Third Offset eventually never came to fruition, but its ethos impacted Washington's future policy making: more attention was now being placed on questioning how to exclude China from accessing the most advanced technology in a globalized world. National security officials now came to the realization that economic, technological and military competition were all interconnected with each other, and the traditional Post-Cold War strategies were ineffective.[39] As a result, the conditions within the U.S. government were right once Trump got elected to enact more aggressively towards China.

[34] Small, 32.
[35] Gian Gentile et al., *A History of the Third Offset, 2014-2018* (RAND Corporation, 2021), 1–3, https://doi.org/10.7249/RRA454-1.
[36] Small, *The Rupture*, 32–33.
[37] Small, 33; Miller, *Chip War: The Fight for the World's Most Critical Technology*, 158–59, 287.
[38] Small, *The Rupture*, 34.
[39] Small, 37.

1.3.2 Huawei and 5G

Small's contribution to the debate showcases how the United States came to the realization that interconnectivity could pose problems. As this mindset settled itself within Washington, the catalyst for the Chip War was Huawei's 5G technology.

The importance of 5G within this conflict is due to the economic benefits that are expected to arise from it. The 'Internet of Things' (IoT) is expected to become reality through 5G as it permits more and faster information sharing than 4G. This means that more *things* will be connected and communicating with each other through sensors and actuators.[40] This is expected to alter society as these interactions will be applied, among others, in manufacturing, transportation, and healthcare- eventually creating the Fourth Industrial Revolution.[41] The expected sales that are generated by 5G are expected to be $12.5 trillion dollars by the year 2030.[42] The problem arose however when it became evident that Huawei was leading the race for 5G dominance. Huawei and another Chinese company, ZTE, owned 40 percent of the global 5G infrastructure by 2019.[43] For the United States Government this was problematic.

1.3.3 The Chip War.

Friis and Lysne look at Huawei's 5G case through the lens of securitization theory which states that: "an issue is given sufficient saliency to win the assent of the audience, which enables those who are authorized to handle the issue to use whatever means they deem appropriate" [44]. The securitization of Huawei's 5G acted as a window of opportunity for the United States to act upon their broader policy in confronting and containing China's plans to dominate the advance technologies industries.[45] According to the United States, China would use Huawei – for example through the 2017 Chinese Intelligence Law which required companies in China to hand over

[40] "What Is IoT: The Internet of Things Explained," McKinsey, last modified August 17, 2022, https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-the-internet-of-things.
[41] Tim Rühlig and Maja Björk, "What to Make of the Huawei Debate? 5G Network Security and Technology Dependency in Europe —," 2020, 4; "What Is the Internet of Things, and How Does It Work?," *IBM Blog*, November 17, 2016, https://www.ibm.com/blog/what-is-the-iot/; Sue Halpern, "The Terrifying Potential of 5G Technology," *The New Yorker*, April 26, 2019, 2, https://www.newyorker.com/news/annals-of-communications/the-terrifying-potential-of-the-5g-network.
[42] McKinsey, "What is."
[43] Segal, "Huawei," 150.
[44] Friis and Lysne, "Huawei, 5G and Security," 1176.
[45] Friis and Lysne, 1179.

information if asked by Chinese intelligence services- for espionage and sabotage.[46] Hence, the U.S. Government's effectiveness on securitizing Huawei rests on the claim that China could use Huawei to enable the panopticon and chokepoint effect. The claim entails that if American 5G infrastructure was using technology coming from China, China could collect information flowing through these hubs [47]. With 5G expected to revolutionize society, the implications rise exponentially. With more *things* sharing data through 5G networks, the more information can be collected or disrupted by China. [48]

As a response, on May 15th, 2019, President Trump issued an Executive Order which blocked American companies from using information and communications technology from entities the United States considered a national security threat.[49] This was directed at Huawei which was now unable to sell products that used information and communications technology within the United States. On May 16th, 2019, the US Commerce Department's Bureau of Industry and Security (BIS) placed Huawei and 68 affiliates on the Entity List.[50] The 2019 Entity List meant that American companies would need to acquire a license from the government to provide goods and services to specific entities- in this case Huawei and its affiliates.[51] Entities placed on the list are believed to be (potentially) involved in activities that are contrary to national security or foreign policy interests of the United States.[52] Huawei could now no longer use American produced

[46] Friis and Lysne, 1175; Rühlig and Björk, "What to Make of the Huawei Debate? 5G Network Security and Technology Dependency in Europe," 9.
[47] Nigel Inkster, "The Huawei Affair and China's Technology Ambitions," *Survival* 61, no. 1 (January 2, 2019): 109, https://doi.org/10.1080/00396338.2019.1568041.
[48] Segal, "Huawei, 5G, and Weaponized Interdependence," 155; Small, *The Rupture*, 18; Friis and Lysne, "Huawei, 5G and Security," 1177–78.
[49] Emily Stewart, "The US Government's Battle with Chinese Telecom Giant Huawei, Explained," Vox, December 11, 2018, https://www.vox.com/technology/2018/12/11/18134440/huawei-executive-order-entity-list-china-trump; Eric Geller, "Trump Signs Order Setting Stage to Ban Huawei from U.S.," POLITICO, May 15, 2019, https://www.politico.com/story/2019/05/15/trump-ban-huawei-us-1042046.
[50] Chad Bown, "How the United States Marched the Semiconductor Industry into Its Trade War With China," *East Asian Economic Review* 24, no. 4 (December 2020): 377; White & Case LLP, "US Designates Huawei to Entity List, Issues Temporary General License," (White & Case LLP, May 23, 2019) https://www.whitecase.com/insight-alert/us-designates-huawei-entity-list-issues-temporary-general-license.
[51] Bown, "How the United States Marched the Semiconductor Industry into Its Trade War With China," 377–78; "The Drama Around Huawei: Can U.S. Companies Do Business with the Chinese Chipmaker?" Insights, last modified July 16, 2019, https://www.hklaw.com/es/insights/publications/2019/07/the-drama-around-huawei-can-us-companies-do-business.
[52] "US Government Restricts Certain Exports to Huawei and Affiliates by Adding It to Entity List While Permitting Temporary Narrow Exceptions," Mayer Brown, May 22, 2019,) https://www.mayerbrown.com/en/perspectives-events/publications/2019/05/us-government-restricts-certain-exports-to-huawei-and-affiliates-by-adding-it-to-entity-list-while-permitting-temporary-narrow-exceptions.

software or hardware.[53] This included EDA, the monopolized software needed for designing semiconductors, and American semiconductors.[54]

The Executive Order was for national security reasons, but more importantly, the Entity List was about limiting China's ability to catch up technologically to the United States. Placing Huawei on the Entity List had far larger implications than the Executive Order since it crippled Huawei's ability to acquire American semiconductors and EDA which are needed for 5G infrastructure manufacturing. As section 1.2 explained, only a few companies in the world can produce the most cutting-edge technology needed to create advanced semiconductors. Being unable to have access to these companies makes it impossible to stay at the technological forefront. Hence, the chokepoint effect was used.

Miller agrees on this as he stated that United States officials were less worried about 5G security reasons but more about Huawei's overall technological advancement that would come to the expense of the United States.[55] The global semiconductor network would increasingly rely more on China since China will use the most advanced semiconductors for their products. With 5G expected to significantly change society, Huawei's dominance would make them resilient to change once its network becomes the norm.[56] More *nodes* will attach themselves to China if China is able to provide high-tech technologies. Placing Huawei on the entity list therefore limits its ability to create more advanced technological products.

Juxtaposing the initial claim that Huawei's 5G infrastructure posed national security risks and hence Huawei should be banned. To developments that have occurred since. The continuation of updating the Entity List while adding more Chinese firms, it shows how the real aim was to bring down all of China's technological advancement ambitions. According to Segal, Bown, and Fuller the first wave of restrictions had to be updated since Huawei could still acquire chips that were produced by companies such as TSMC due to a loophole.[57] Frustrated with their shortcomings the United States decided to utilize its chokepoints effects lower on the supply chain. In May

[53] Douglas B. Fuller, "Weaponizing Interdependence & Global Value Chains: US Export Controls on Huawei," preprint (Politics and International Relations, September 13, 2022), 12, https://doi.org/10.33774/apsa-2022-2fc8w.
[54] Fuller, 12–13.
[55] Miller, *Chip War*, 314.
[56] Farrell and Newman, "Weaponized Globalization."
[57] Segal, "Huawei," 151; Bown, "How the United States," 378; Fuller, "Weaponizing Interdependence," 13–14.

2020, and then again in August 2020, the United States updated the Entity List.[58] This time, as Bown argues, the new controls were created to coerce foreign companies to stop selling semiconductors and SMEs to Huawei and affiliates.[59] The controls provided foreign suppliers a choice: stop selling to Chinese companies on the Entity List and maintain access to American made tools needed for semiconductor manufacturing, or continue to provide to China and become unable to use American tools.[60] Under this *de minimis* rule, foreign companies that used 25%> American technology in their semiconductor manufacturing process would now need to acquire a license if they sold their products to Chinese firms on the Entity List.[61] As section 1.2.2 shows, American dominance along the supply chain- especially in software, design, and IP- made it practically impossible for both China and foreign companies to find an alternative that would keep them at the cutting edge of technology. Hence, companies such as TSMC were forced to stop exporting their products to China. On October 7th, 2022, the Entity List was updated again, this version was even more restrictive. Firms using American semiconductor manufacturing equipment in China that would enable China to manufacture logic chips under 16 nanometers or lower, DRAM chips 18nm or lower; or NAND 128 layers or higher, have to acquire a license.[62] To stop China's ambitions, the United States has continuously used its hegemonic position within the technological hub to use the chokepoint effect not only on China, but it also potentially on other countries to comply to their commands or risk getting excluded as well.

1.3.4. Made In China 2025

The reason the focused shifted away from Huawei and towards completely cutting off China from advancing technologically was due to the Chinese initiative that was announced in 2015 Made in China 2025. As Friis and Lysne argued, Huawei was securitized so that the United States could enact on their bigger policy aim, containing China's technological rise. For the United States, Made in China 2025 signaled a direct challenge to their position as technological

[58] Segal, "Huawei," 160; Shattuck, "Stuck in the Middle," 107.
[59] Bown, "How the United States Marched the Semiconductor Industry into Its Trade War With China," 379.
[60] Ibid.
[61] Mathilde Velliet, "Convince and Coerce: U.S Interference in Technology Exchanges Between Its Allies and China," *Étude de l'Ifri*, February 2022, 23; Shattuck, "Stuck in the Middle," 107; Segal, "Huawei, 5G, and Weaponized Interdependence," 160.
[62] Gregory C Allen and Emily Benson, "Clues to the U.S.-Dutch- Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight," *Center for Strategic & International Studies*, March 2023, 5.

leaders.[63] Made in China 2025's goal is to produce more high-end products and reduce foreign technological dependencies. These include manufacturing more advanced semiconductors and higher-end semiconductor manufacturing equipment (SME's).[64] Through heavy state funding and subsidies China aims is to produce 70% of its own semiconductors to fuel China's domestic semiconductor demand by 2025. With China being the largest importer of semiconductors- $378 billion worth in semiconductors in 2020, and $430 billion in 2021- moving up the supply chain would give China a dominating position over the semiconductor industry.[65] This therefore posed a problem for economies such as the US, Japan, Taiwan, and South Korea that hold a competitive position within these sectors and want to maintain the status quo.[66]

1.3.5 The CHIPS and Science Act

America's decision to cut out China however also brought the realization that the United States had semiconductor supply chain risks of their own. Over the years, the semiconductor industry significantly shifted towards East Asia, which now totaled 75 percent of global production.[67] In the year 1990, the United States manufactured 37 percent of the semiconductors globally, today only 12 percent.[68] As a response, to reduce these dependencies while maintaining the hub, President Biden's CHIPS and Science Act passed US Congress on August 2022. [69] The Act will

[63] Xiangning Wu, "Technology, Power, and Uncontrolled Great Power Strategic Competition between China and the United States," *China International Strategy Review* 2, no. 1 (June 2020): 105, https://doi.org/10.1007/s42533-020-00040-0.
[64] Wu, "Technology," 100–105; 112.
[65] Sarah Ravi, "Taking Stock of China's Semiconductor Industry," 2021, 1; Mark and Roberts, "United States-China Semiconductor Standoff: A Supply Chain Under Stress," March 2023, 7.
[66] Michaela D Platzer, John F Sargent Jr, and Karen M Sutter, "Semiconductors: U.S. Industry, Global Competition, and Federal Policy," *Global Competition*, October 26, 2020, 27–29; John VerWey, "Chinese Semiconductor Industrial Policy: Past and Present," *Journal of International Commerce and Economics*, July 2019, 15.; Jost Wubbeke, Mirjam Meissner, Max J. Zenglein, Jacqueline Ives, Bjorn Conrad, "Made in China 2025: the making of a high-tech superpower and consequences for industrial countries," Merics no 2, (December 2016): 12.
[67] "The Impact of the CHIPS and Science Act of 2022," OEM Magazine, January 30, 2023, https://www.oemmagazine.org/business/business-management/article/22684109/the-impact-of-the-chips-and-science-act-of-2022.
[68] PricewaterhouseCoopers, "The CHIPS Act: What It Means for the Semiconductor Ecosystem," PwC, accessed May 14, 2023, https://www.pwc.com/us/en/library/chips-act.html; Michael A. Peters, "Semiconductors, Geopolitics and Technological Rivalry: The US CHIPS & Science Act, 2022," August 2022, 1, https://www.tandfonline.com/doi/epdf/10.1080/00131857.2022.2124914?needAccess=true&role=button.
[69] Jeremy Mark and Dexter Tiff Roberts, "United States-China Semiconductor Standoff: A Supply Chain Under Stress" (Atlantic Council, March 2023): 1, https://www.atlanticcouncil.org/wp-content/uploads/2023/03/US-China-Semiconductor-Standoff.pdf.

invest $52.7 billion in manufacturing, R&D, and workforce development for advanced semiconductors, and an additionally $24 billion will be allocated to chip production tax credits.[70] The Act signals the consolidation of the American Government's aim to maintain its technological dominance while not allowing China to catch-up. This rhetoric can be found in National Security Advisor Jake Sullivan speech September 16, 2022. He stated that the United States is moving away from the longstanding premise of maintaining a relative advantage over competitors in key technologies. The original approach was to stay a couple of generations ahead, now "given the foundational nature of certain technologies, such as advanced logic and memory chips, we must maintain as large of a lead as possible".[71] To do this, the US aims to prevent China's ability to progress technologically. Under the Act, any semiconductor company (US or foreign) that receives federal financial assistance from the Act is prohibited to be involved in transactions that could enable the material expansion of China's semiconductor manufacturing capacity for a period of 10 years without the approval from the Department of Commerce.[72]

1.4. ASML within the context of the Chip War

The final section of the literature review introduces the Dutch company ASML and places it within the Chip War debate. Within the context of weaponized interdependence, ASML is the most effective chokepoint throughout the semiconductor supply chain. However, the reason the Netherlands decided to comply to American demands remains largely unexplored.

1.4.1 ASML: Global Monopoly

ASML holds a complete monopoly in creating extreme ultraviolet (EUV) lithography machines and a 94.5 percent share on the most advanced (ArFi) deep ultraviolet (DUV) lithography

[70] "The CHIPS and Science Act: What Is It and What Is in It? | McKinsey," October 4, 2022, https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-chips-and-science-act-heres-whats-in-it; Peters, "Semiconductors, Geopolitics and Technological Rivalry," 1.
[71] Jake Sullivan, "Remarks by National Security Advisor Jake Sullivan at the Special Competitive Studies Project Global Emerging Technologies Summit," September 16, 2022, the White House. https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-security-advisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/
[72] Yadong Luo and Ari Van Assche, "The Rise of Techno-Geopolitical Uncertainty: Implications of the United States CHIPS and Science Act," *Journal of International Business Studies*, (April 1, 2023: 4, https://doi.org/10.1057/s41267-023-00620-3.

machines.[73] The importance lithography holds within the industry makes ASML the most important company in the advanced semiconductor supply chain. Lithography machines use light to etch features on a silicon wafer which then allows a semiconductor to have smaller transistors.[74] As mentioned in section 1.2.1 technological innovation rests upon fitting as many transistors within a semiconductor as possible. To do this, smaller light wavelengths need to be used to etch silicon wafers. Before ASML managed to figure out EUV, DUV light was used, which has wavelengths 14 times longer than extreme ultraviolet.[75]

To assemble an EUV machine, the company had to build a network of more than 5000 suppliers that all provide specialized inputs.[76] ASML then sells the majority of these EUV machines for $150 million apiece to Intel, Samsung, TSMC.[77] The supply chain and the science needed to develop EUV is so complex that it is the only company in the world that can produce the machines needed to print transistors that are now less than 3 nanometers.[78] None of the companies that are shown on Figure 2 would be able to produce the most advanced semiconductors without using ASML's EUV machines. While EUV lithography was already theorized in the early 1990s, it was thought to be impossible to use for mass production.[79] With technological advancement relying on being able to create ever smaller transistors, DUV lithography would at some point reach its limit. Hence companies such as TSMC and Intel invested billions of dollars into ASML to develop EUV machinery.[80] This makes ASML's

[73] Robert Castellano, "ASML: My Top Semiconductor Processing Equipment Company Pick (NASDAQ: ASML) | Seeking Alpha," January 27, 2020, https://seekingalpha.com/article/4319159-asml-top-semiconductor-processing-equipment-company-pick; Center for Security and Emerging Technology et al., "The Semiconductor Supply Chain," 32.
[74] Mehal Reuben Das, "The Semiconductor Monopoly: How One Dutch Company Has a Stranglehold over the Global Chip Industry," Firstpost, January 23, 2023, https://www.firstpost.com/world/asml-holdings-dutch-company-that-has-monopoly-over-global-semiconductor-industry-12030422.html; Miller, *Chip War*, 226.
[75] "All about Light and Lasers in Lithography," accessed May 1, 2023, https://www.asml.com/en/technology/lithography-principles/light-and-lasers.
[76] "Responsible Supply Chain - Ethical Sourcing," ASML, accessed May 6, 2023, https://www.asml.com/en/company/sustainability/responsible-supply-chain.
[77] Castellano, "ASML"; Will Knight, "The $150 Million Machine Keeping Moore's Law Alive," *Wired*, accessed May 7, 2023, https://www.wired.com/story/asml-extreme-ultraviolet-lithography-chips-moores-law/; Toby Sterling, "Intel Orders ASML System for Well over $340 Mln in Quest for Chipmaking Edge," *Reuters*, January 19, 2022, sec. Technology, https://www.reuters.com/technology/intel-orders-asml-machine-still-drawing-board-chipmakers-look-an-edge-2022-01-19/.
[78] "ASML EUV Lithography Systems," accessed May 6, 2023, https://www.asml.com/en/products/euv-lithography-systems.
[79] Miller, *Chip War: The Fight for the World's Most Critical Technology*, 183–84.
[80] Miller, 186, 231-233.

position within the supply chain irreplaceable. For China to advance technologically, it needs EUV machines. This is precisely the reason the Trump Administration sought to block the sale.

1.4.2 American Coercion: The case of EUV and DUV

EUV

According to Reuters, Nikkei Asia was the first to report that SMIC, the leading Chinese chip manufacturer, was facing delays regarding its EUV order on November 6, 2019.[81] Nikkei reported that ASML's EUV was subject to the Wassenaar Arrangement but had a license to sell to China which expired and ASML was waiting for a new license.[82] The Wassenaar arrangement- which the United States and the Netherlands are members of- is a multinational export control protocol for advanced technologies that could be used for dual-use purposes, meaning goods that can be used for civilian and military purposes.[83] Nikkei Asia already reported on May 15th, 2018, that SMIC ordered the ASML EUV machine.[84] However, the 2018 report mentions that an ASML spokesperson stated that their EUV machines face no restrictions according to the Wassenaar Agreement and they are allowed to export to China.[85] Hence between May 15, 2018, and November 6th, 2019, a change occurred which hindered ASML's ability to export EUV machines to China.

According to the literature, the answer lays in the Trump Administration heavily pressuring the Dutch Government to block the sale.[86] This was done because ASML did not fit under the 25%

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[81] Chang Ting-Fang and Lauly Li, "Exclusive: ASML Chip Tool Delivery to China Delayed amid US Ire," Nikkei Asia, November 6, 2019, https://asia.nikkei.com/Economy/Trade-war/Exclusive-ASML-chip-tool-delivery-to-China-delayed-amid-US-ire.
[82] Ibid.
[83] Center for Security and Emerging Technology and Saif M. Khan, "U.S. Semiconductor Exports to China: Current Policies and Trends" (Center for Security and Emerging Technology, October 2020), 7, https://doi.org/10.51593/20200039.
[84] Chang Ting-Fang, "Chinese Chipmaker Takes on TSMC and Intel with Cutting-Edge Tool," Nikkei Asia, May 15, 2018, https://asia.nikkei.com/Business/Companies/Chinese-chip-maker-invests-in-next-gen-tool-to-close-gaps-with-Intel-TSMC-Samsung.
[85] Ibid.
[86] Alexandra Alper, Toby Sterling, and Stephen Nellis, "Trump Administration Pressed Dutch Hard to Cancel China Chip-Equipment Sale: Sources," *Reuters*, January 6, 2020, sec. Technology News, https://www.reuters.com/article/us-asml-holding-usa-china-insight-idUSKBN1Z50HN; Saif M Khan and Carrick Flynn, "Maintaining China's Dependence on Democracies for Advanced Computer Chips," *GLOBAL CHINA*, (April 2020): 14; Velliet, "Convince and Coerce: U.S Interference in Technology Exchanges Between Its Allies and China," 26; Barkin, "EXPORT CONTROLS AND THE US-CHINA TECH WAR," 8; "Netherlands and the US Agree on Export Restriction of ASML Chip Machines | NL Times," accessed May 14, 2023, https://nltimes.nl/2023/01/28/netherlands-us-agree-export-restriction-asml-chip-machines.

de minimis rule- allowing ASML to export to China [87]. Not being able to leverage the Entity List's chokepoint effect, the United States resorted to heavy diplomatic pressure (diplomatic, commercial, and informational) to coerce the Netherlands. For one, the deputy national security advisor Charles Kupperman threatened the Netherlands that it could stop supplying American components- a light source, provided by Cymer, an American subsidiary of ASML- that EUV machines need for it to function.[88]Additionally, Washington also provided the Dutch Prime Minister, Mark Rutte, a classified report on the dangers that could arise if China acquired ASML's machines.[89] After the negotiations the Dutch Government never renewed ASML's EUV export licenses for China.[90]

However, what becomes evident when analyzing the literature on the EUV case is that the majority of the articles and reports rely on one news article written by Reuters on the January 6th, 2020. This is mostly due to the United States and the Netherlands keeping most information undisclosed.[91] This means that there is still a lack of clarity on why the Netherland's decided to comply especially given that these machines cost a $150 million per unit and China has a growing technological market. Furthermore, leaning on what has been explained throughout the literature review, ASML's position is irreplaceable. The threat of not exporting Cymer's light source to ASML would immobilize ASML's EUV production but also the entire global advanced semiconductor supply chain- including American companies.

DUV

On March 8th, 2023, the Netherlands announced it would also stop providing DUV export licenses to China. The export controls occurred after the Dutch Prime Minister negotiated with President Biden in January 2023. The official reason for banning DUV machines, according to Foreign Trade Minister Liesje Schreinemacher was because DUV machines could produce

[87] Velliet, "Convince and Coerce: U.S Interference in Technology Exchanges Between Its Allies and China," 26.
[88] Ibid.; Center for Security and Emerging Technology et al., "China's Progress in Semiconductor Manufacturing Equipment", Center for Security and Emerging Technology, (March 2021): 23, https://doi.org/10.51593/20190018.
[89] Velliet, "Convince and Coerce: U.S Interference in Technology Exchanges Between Its Allies and China," 26.
[90] Alper, Sterling, and Nellis, "Trump Administration Pressed Dutch Hard to Cancel China Chip-Equipment Sale."
[91] Alper, Sterling, and Nellis; NOS, "'Deal VS en Nederland over beperken export ASML-chipmachines naar China,'" January 27, 2023, https://nos.nl/artikel/2461517-deal-vs-en-nederland-over-beperken-export-asml-chipmachines-naar-china.

semiconductors that could be used for military purposes.[92] However according to Politico and Allen and Benson DUV-machines do not fall under the Wassenaar Agreement. As a result, the Netherlands proposed to include it within the Agreement in the future.[93] Similar to the EUV case, there is a lack of clarity on why this occurred. Considering that (1) ASML was selling DUV machines to China up until that point (2) 14% of ASML's 2022 revenue came from China's DUV imports, making it the third largest customer of ASML, and (3) DUV machines do not fall under the Wassenaar Agreement which means they were not seen as dual-use before the restrictions, the sudden motive to place restrictions on China seems to not be grounded on constructive reasons.[94]

Conclusion

The United States used it hegemonic position within the semiconductor supply chain to coerce countries to comply with its demands or face being cut out. In fear of Chinese technological catch-up, the United States's goal is to completely exclude China from the semiconductor supply chain. Without access to the most advanced tools, China cannot complete its Made in China 2025 objective. Farrell and Newman argue that the chokepoint effect can be used, and amplified, when collaborating with allies.[95] Advantaged countries can use other countries as a proxy to further their coercion on a certain country it seeks to penalize. However, as the ASML case shows, the conditions under which this occurs are not analyzed within the theory. Rather it holds this as given neglecting agency from the country that, in this case, wields significant power over a hub. If the US stops exporting Cymer light sources to ASML for not complying with American demands, technological innovation would go to a halt globally and everyone would lose out. The aim of the thesis is therefore to look at why the Netherlands still decided to side with the United States over China.

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[92] SHOICHIRO TAGUCHI and Maya SHIMIZU, "Netherlands to Tighten Export Controls of Chip Equipment: Minister," Nikkei Asia, March 17, 2023, https://asia.nikkei.com/Editor-s-Picks/Interview/Netherlands-to-tighten-export-controls-of-chip-equipment-minister.

[93] "The Dutch Get Ensnared in US-China Chips Fight," *POLITICO* (blog), January 5, 2023, https://www.politico.eu/article/the-netherlands-united-states-china-chips-machines-fight/; Allen and Benson, "Clues to the U.S.-Dutch- Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight," 9–10.

[94] Toby Sterling, "ASML Beats Earnings Forecasts, Sees 2023 Growth amid China Worries," *Reuters*, January 25, 2023, sec. Technology, https://www.reuters.com/technology/asml-reports-net-profit-198-billion-q4-sees-25-sales-growth-2023-2023-01-25/; Anna Gross, "ASML Chief Calls for 'Sensible' Chip Export Controls from Dutch Government," *Financial Times*, January 25, 2023, sec. ASML Holding NV, https://www.ft.com/content/efbf11d7-7d2a-4998-82fa-405c66ff127a.

[95] Farrell and Newman, "Weaponized Globalization," 56.

Chapter Two Analysis on the Netherlands' position within the Chip War.

As Chapter One illustrated, the Netherlands got entangled within a wider geopolitical rivalry due to owning a critical company within the semiconductor supply chain. However, the reasons that led to the Netherlands siding with the United States are not clearly explored and the current narrative argues that it was due to American coercion. To find out why the Netherlands put export controls on EUV and DUV machines, three different factors will be considered. The first subchapter looks at Dutch foreign policy change towards China. This will be done by looking at the Dutch Ministry of Foreign Affairs (MoFA) Foreign policy paper Netherlands-China: a new balance, and by analyzing disclosed documents that were circulated during the creation of this new policy. It will be shown that the Netherlands was already skeptical towards China and aligning itself with the United States before the EUV ban occurred. This made the decision to place export controls on EUV machines less coercive than is argued. Secondly, ASML's yearly reports will be analyzed to showcase that the tradeoff of losing China as an EUV customer was not as problematic when considering multiple factors that were at play. In addition, this will also bring to light that the DUV case was not an economic consideration but a geopolitical one. Hence the final section looks at the geopolitical landscape that occurred after the EUV ban in 2019.

2.1 Netherlands-China: a new balance.

2.1.1 Content analysis on the Ministry's foreign policy paper

On May 15th, 2019, the Dutch Ministry of Foreign Affairs announced its new foreign policy strategy "Netherlands-China: a new balance" (*Nederland-China: een nieuwe balans).* Often just referred to as the *China Strategy*, the core of this policy memorandum is that the Netherlands has to protect its own economy from Chinese interference e.g., cyberespionage, disruption, and unwanted technology transfer. The motto that upholds the new strategy is: Open where possible, protective where necessary (Open waar het kan, beschermend waar het moet').[96] In other words,

[96] Ministerie van Buitenlandse Zaken, *Nederland-China: een nieuwe balans*, May 15, 2019, 92, https://www.rijksoverheid.nl/documenten/rapporten/2019/05/15/nederland-china-een-nieuwe-balans

the Netherlands wants to maintain economic relations with China but will assess the risk that could arise with this relationship.

The policy paper acknowledges that the Netherlands was naïve towards China's ambitions. In 2013, when the Netherlands established bilateral partnership agreements with China, their hope was that China would integrate within the current international order.[97] Now however it became evident that there was a need for a constructive assessment on security concerns stemming from China's economic presence. Similar to the American rhetoric, the new strategy calls for the reduction of strategic dependency risks, maintaining specialized knowledge and information on vital processes e.g., semiconductors and lithography, and keeping in mind dual use technologies.[98] It states that the aim of Made in China 2025 is to dominate the technological revolution especially in Artificial Intelligence, 5G, quantum technologies, and semiconductors/lithography. It calls out China for profiting from Western openness by acquiring Western knowledge and technologies, while keeping its own model closed off.[99] In relation to the United States, it reemphasizes that the United States is an important ally, militarily, economically, and ideologically, and that the Netherlands will create a "*Chinataskforce"* which streamlines information on Chinese developments with American networks.[100]

The rhetoric presented within this new strategy is geopolitically and technologically oriented and continuously sides with the United States while aiming to reduce Chinese dependency risks. The paper therefore indicates that the Netherlands already assessed the tradeoffs between the United States and China at least six months before it was reported that China was facing delays regarding receiving its first EUV machine.[101] The Netherlands decided that it is in their best interest to maintain their close relationship with the United States, and this made their decision to stop exporting EUV machines significantly less asymmetric than the current literature argues. When placing a timeline on the process of creating the China Strategy however reveals that this development occurred before what has currently been argued.

[97] Ministerie van Buitenlandse Zaken, Nederland-China, 8.
[98] Ministerie van Buitenlandse Zaken, Nederland-China, 26, 28, 41,43.
[99] Ministerie van Buitenlandse Zaken, Nederland-China, 14.
[100] Ministerie van Buitenlandse Zaken, Nederland-China, 14, 97.
[101] Ting-Fang and Li, "Exclusive: ASML Chip Tool Delivery to China Delayed amid US Ire."

2.1.2 Document Analysis on the Netherlands-China: a new balance

As declared in the *Methodology* section, this section analyzes documents that came from the Dutch Ministry of Foreign Affairs' process to develop the "Netherlands-China: a new balance" strategy. Through document analysis, a timeline can be constructed to show revealing nuances.

Timeline between conceptualization of Netherlands-China: a new balance' and the first report on EUV machine delay:

- March 9th, 2018: MoFA creates the first document which states the need for a new China Strategy. Mentions the Ministry held a discussion in relation to Chinese influence on Dutch cybersecurity, economic security, and EU and trans-Atlantic level. Plan to hold a large discussion on the topic on the 22nd of May 2018 (154644|1-2a).
- May 15th, 2018: Nikkei Asia reports that the Chinese foundry SMIC ordered an EUV machine.
- May 22nd, 2018: MoFa holds 'Big China Discussion' and sets policy goals (*Groot China Overleg*) (154656|10a).
  - homogenize politics with economics analysis on the topics since there are large differences between the ministries. (154656|12a)
  - The Netherlands needs a new policy against Made in China 2025 (154656|15-16a; 154657|20a)
  - In relation to the China Strategy, the Netherlands should cooperate with likeminded partners like the EU, U.S., Australia, and Japan (154657|20a).
- December 10, 2018: MoFA concludes their initial research findings: more attention should be given to economic security and influence in relation to China (154701|46a)
- January 10th, 2019: the Netherlands would benefit from creating an economic coalition with Japan, South Korea, Australia, India and the United Kingdom (165238|124b).
- January 14th, 2019: E-mail states that the primary goal of the *China Strategy* is economics, safety and military reasons are secondary. Additionally mentions that the only way China could be contained is to work with the United States. (165238|123b)
- January 29th, 2019: "workshop Critical Technology in Washington (*Workshop kritische technologie in Washington*) (165207|76b).
- January 30th, 2019: IMH holds a session on trade conflict China-US (154700 |43b)
- February 19th - March 1st: First Draft send to Dutch Embassy in Washington and DWH (154736|124b).
- May 15th, 2019: *Netherlands-China: a new balance* is made public.
- May 20th, 2019: Ministry of Foreign Affairs analyzes the reactions from Dutch political parties regarding *China Strategy*:
  - Consensus from the political left and right is that the Netherlands should act more concrete and firmer towards China, current document too 'China friendly' (154823|33b).
  - Political parties from both sides are disappointed that Huawei's 5G question has been left unexplored. Although documents mention that Economic Safety (Taskforce Economische Veiligheid) conducted a risk analysis on 5G telecom weaknesses during the first half of 2019 (154825|38b).
- July 18, 2019: Prime Minister Rutte visits the White House to discuss strengthening economic and security cooperation (US Embassy 2019). Reuters reports Rutte received threats from Deputy NSA Kupperman and was shown classified information regarding EUV's dual-use capabilities (Reuters 6 January 2020).
- November 6th, 2019: Nikkei Asia reports EUV delay for SMIC.

As already shown above, the China Strategy was published on the 15th of May (2019) six months before the EUV ban. However, document analysis shows that as early as May 22nd, 2018, the Ministry called for a change in policy towards *Made in China 2025* and to cooperate with likeminded partners. Between May and December 2018, a clear vision was formed within the Ministry that economic insecurity in relation to China is problematic.
January 2019 therefore starts to focus on geopolitics and geoeconomics and the Ministry starts looking more towards what the United States has to offer. The January 10, e-mail mentions the need to create an economic coalition with Japan and South Korea, key actors in the technology industry. The January 14 email emphasizes the need to work together with the United States to stop Chinese hegemony and that the China Strategy is inherently about economics, with security being secondary. While it cannot be confirmed by the information provided that the United States got involved during this period, the Ministry does start focusing on the United States. On January 29, a workshop is held in Washington about critical technologies. On January 30th, 2019, the Directorate of International Market Regulation and Trade Policy (IMH) holds an event on the US-China trade war. This department specializes in looking at export controls (Ministry of Foreign Affairs Intro one). Between February 19th and March 1st, the *Committee on Defense, and International Affairs* (CDIA) receives the first draft of the China Strategy and sends this information- in relation to the Netherlands' position towards the United States- to the Dutch Ambassy in Washington and the Western Hemisphere Department (DWH) the Ministry's subdivision which coordinates policy matters with relevant actors in that region.[102]

Building on the knowledge gained from the paper so far and juxtaposing this to the documents analyzed, it shows that topics such as economic insecurity towards China, reducing unwanted technological transfer, 5G weaknesses, and (technological) geoeconomic coalition building with partners was already on the Dutch agenda well before SMIC's EUV case was published in November 2019. According to the literature review, the general consensus is that the United States heavily coerced the Netherlands to stop exporting EUV machines, and the Netherlands eventually complied due to factors such as the Cymer threat and Prime Minister Rutte received confidential American information which led to his decision to not renew ASML's export license. This is not to argue that these factors did not play a role in the Dutch's decision. Instead,

[102] Ministerie van Buitenlandse Zaken, *Introductiedossier Buitenlandse Zaken*, December 2021, 25. https://open.overheid.nl/documenten/ronl-52ced3d2-7dac-41ec-a7e1-67678d1f60e5/pdf

by combining what was found through document analysis and analyzing the final outcome of the China Strategy it shows that the Netherlands already wanted to maintain its specialized knowledge and information on semiconductors and lithography, reduce its strategic dependencies on China, was aware of the consequences of Made in China 2025, and sought to consolidate its relationship with the United States.[103] Convincing the Netherlands to stop exporting EUV machines did not rely on heavy American coercion, the Netherlands was already for the most part aligned with America's foreign policy changes. In both governments, geoeconomic and geopolitical considerations took a primary role in foreign policy. Under the new motto "*open where possible, protective where necessary"* the decision to place export restrictions on China did not require much convincing. Applying an economic angle on the EUV case adds another element to the Dutch's decision.

2.2 Economic considerations in relation to the ASML case

By analyzing ASML's relationship with China and the United States as lithography machines customers. Additional tradeoff considerations will be brought to light. Since the Dutch export restrictions happened years apart EUV (2019) & DUV (2023) the two sections will be separated. What becomes evident is that the tradeoff of losing China as an EUV customer was not problematic. However, when looking at the DUV case it seems to defy economic logic. Hence subsection 2.3 will consider the DUV case more in depth.

[103] Ministerie van Buitenlandse Zaken, Nederland-China 14, 41, 92.

Table 4: ASML yearly net sales & total ASML lithography units sold per year 2014-2022.[104]

The author compiled the information by analyzing ASML Annual Report Documents 2016, 2017, 2018, 2019, 2020, 2022.

Year	Net Sales (€, in billion)	DUV Sales per unit (ArFi, ArF dry, KrF, i-line)	EUV Sales per unit	Net sales from China (€, in billion) + ranking	Net Sales United States (€, in billion) + ranking
2014	EUR 5.9bn (+13.5%)	131	5	EUR 0.40bn (5th)	EUR 1.9bn (1st)
2015	EUR 6.3bn (+6.8%)	168	1	EUR 0.54bn (5th)	EUR 1.2bn (3rd)
2016	EUR 6.8bn (+7.9%)	153	4	EUR 0.78bn (4th)	EUR 1.1bn (3rd)
2017	EUR 9.2bn (+35.3%)	186	11	EUR 0.92bn (5th)	EUR 1.41bn (3rd)
2018	EUR 10.9bn (+19%)	206	18	EUR 1.84bn (4th)	EUR 1.96bn (3rd)
2019	EUR 11.8bn (+8.3%)[105]	203	26	EUR 1.38bn (4th)	EUR 1.98bn (3rd)
2020	EUR 14.0bn (+18.6%)	227	31	EUR 2.32bn (3rd)	EUR 1.66bn (4th)
2021	EUR 18.6bn (+32.9%)	267	42	EUR 2.74bn (3rd)	EUR 1.58bn (4th)

[104] ASML, *2016 ASML Integrated Report*, Veldhoven: The Netherlands. ASML Holding N.V., (2016): 1-72.https://www.asml.com/en/investors/annual-report/2016 ; ASML, *2017 Integrated Report based on IFRS*, Veldhoven: The Netherlands. ASML Holding N.V., (2017): 1-204. https://www.asml.com/en/investors/annual-report/2017; ASML, *2018 Integrated Report based on IFRS*, Veldhoven: The Netherlands, ASML Holding N.V., (2018): 1-220. https://www.asml.com/en/investors/annual-report/2018 ; ASML, *2019 Integrated Report Based on IFRS*, Veldhoven: The Netherlands, ASML Holding N.V., (2019):1-239. https://www.asml.com/en/investors/annual-report/2019 ASML, *2020 Integrated Report based on IFRS.* Velhoven: The Netherlands, ASML Holding N.V., (2020): 1-259. https://www.asml.com/en/investors/annual-report/2020 ; ASML, *2022 Annual Report based on IFRS*, Veldhoven: The Netherlands, ASML Holding N.V., (2022): 1-326. https://www.asml.com/en/investors/annual-report/2022

[105] According to ASML 2019 saw net sales go down due to the Memory sector having a global market reconfiguration as demand for memory chips was low. ASML, *2019 Integrated Report*, 64, 73, 148.

2022	EUR 21.2bn (+14%)	305	40	EUR 2.91bn (3rd)	EUR 1.99bn (4th)

2.2.1 EUV

ASML saw remarkable growth in its company's net sales after it was able to commercially introduce EUV machine in 2017.[106] ASML became the only company in the world that could provide the machines needed to create smaller transistors. In the highly competitive winner-takes-all industry, not having an EUV machine meant for semiconductor manufacturers that they would fall behind in the race to stay at the cutting-edge of technology.[107] As anticipated, demand for EUV machines therefore kept rising as it became the new norm for the largest manufacturers to use (notably TSCM, Samsung, and Intel).

Based on this understanding, the table shows that even without selling EUV machines to China, ASML's was still seeing record net sales every year. Selling 11 EUV machines 2017, 18 in 2018, and 26 in 2019. Given the data and the context related to the expected monopolist position ASML would achieve if it could commercialize its EUV machines, excluding China was not problematic as the largest semiconductor manufacturing companies would continue buying EUV machines. In 2018, ASML's three largest customers, TSMC, Intel, and Samsung accounted for 58.8% of the total yearly net sales, in 2019 this reached 77.2%.[108] Overall demand only increased as the 2022 Annual Report mentions that demand has exceeded supply.[109] For 2023, demand still exceeds supply, and the company has backlogs worth over €40 billion.[110] Additionally, China only became a big customer in 2018 when ASML's net sales from China doubled within a year. This increase in spending coincides with the period in which Made in China 2025 began. Before the 2016 Annual report, China was not mentioned on the list of biggest customers, it was instead grouped as being part of "Rest of Asia", signaling its weak relationship with ASML. Hence, when the Netherlands was assessing the tradeoffs in 2018 and 2019, losing out on one customer that was Chinese was not a huge loss. In the short and medium term, with ASML having more

[106] 2*017 Integrated Report based on IFRS*, Veldhoven, ASML Holding N.V, 2017, 6. https://www.asml.com/en/investors/annual-report/2017
[107] K. E. D. Global, "Samsung to Ramp up EUV Scanners to Take on Foundry Leader TSMC," KED Global, accessed May 13, 2023, https://www.kedglobal.com/foundry-competition/newsView/ked202103150012.
[108] 2*019 Integrated Report based on IFRS*, Veldhoven, ASML Holding N.V, 2019, 147. https://www.asml.com/en/investors/annual-report/2019
[109] 2*022 Annual Report based on IFRS*, Veldhoven, ASML Holding N.V, 2022, 168. https://www.asml.com/en/investors/annual-report/2022
[110] Sterling, "ASML Beats Earnings Forecasts, Sees 2023 Growth amid China Worries."

demand than supply, not selling EUV machines to China has shown to not be a problem for ASML.

2.2.2. DUV.

The EUV case shows that China's exclusion would not be a problem for ASML's economic success. However, applying a traditional economic lens on the 2023 DUV exports restrictions proves to be less sensible. After 2019, China became a key customer of ASML's DUV machines since those were not affected by restrictions and are still beneficial for their goal of technologic advancement. In 2020, China increased its purchases by an additional billion euros on DUV machines, surpassing the United States in total net sales. This total increased to 2.74bn in 2021 (14.73% total ASML net sales), and 2.91bn in 2022 (13.73% total ASML net sales), spending almost a billion more euros than the United States' 2022 net sales (1.99bn). Since the EUV ban, China started purchasing more DUV machines, becoming the third largest customer of EUV. Therefore, unlike the EUV case, the argument that the economic tradeoffs of excluding China were not a problem do not hold up as almost 15% of ASML's total revenue came from China from 2019-2022. Additionally, as mentioned in the literature review, DUV machines do not fall under the Wassenaar agreement. Hence, different factors played a role in this decision which will be discussed in the upcoming section.

2.3 DUV in the context of a changed political landscape.

The reasons for the DUV ban is due to the changes that occurred in the global political landscape since the Chip War began. The ethos that drove globalization- global free trade increases economic efficiency and is mutually beneficial to both parties- was now replaced with geoeconomic and geostrategic planning in industries deemed critical to protect. In the case of the EUV ban, the Ministry's motto *Open where possible, protective where necessary* had to be considered with ASML economic profits. But the DUV case shows that short-term economic benefits from China were not a primary interest anymore. Instead, long-term economic and geopolitical considerations became more important. Similar to Huawei's 5G case in the United States, securitization strategies were used on the DUV case by the Netherlands as a way to realize their larger policy interests. The *China Strategy* and the literature review showed the beginning of this change in perception for the Netherlands and the United States but five years

later this awareness consolidated. This also occurred within the EU. They created the European Chips Act and started to coordinate its ambitions with that of the US through EU-US Trade and Technology Council. These developments highlight the formation of a more cohesive transatlantic geostrategic approach to secure semiconductor supply chains. Within this context, it shines a light on the Netherland's decision to placed export restrictions on ASML's DUV machines.

Directly influenced by the American Chips Act, the European Chips Act, worth €43bn, aims to reduce critical dependencies on semiconductors by strengthening the EU's semiconductor and SME manufacturing capabilities and double its global market share to 20 percent by 2030. [111] More importantly, as Ursula von der Leyden stated in her final remark during her February 8th, 2022, speech: "[The Chips Act] *is about the supply chains. It should be clear that no country – and even no continent – can be entirely self-sufficient. This is impossible…Europe will build partnerships on chips with like-minded partners, for example the United States or for example Japan. It is about balanced interdependencies, and it is about reliability*.[112] In other words, the Act is not only about the EU wanting to become a more critical technological player, it also strategically considered its most important partners to enable this. This shows the changed political and economic landscape within the continent. The Netherlands has been involved in the European Chips Act since its initial proposal in September 2021.[113] In October 2021, the Netherlands provided the European Commission with a preliminary non-paper that included Dutch considerations on the proposal, showing its commitment to placing security considerations over purely economic considerations. It highlighted Dutch support for the proposal, the importance of transatlantic cooperation in the semiconductor industry, the importance of the EU-US Trade and Technology Council (TTC), and the need to avoid one-sided dependencies.[114] The TTC, established in June 2021, aims to enhance cooperation between the EU and the United

[111] "Commission Welcomes Agreement on the European Chips Act," Text, European Commission - European Commission, April 18, 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2045.
[112] "Statement by the President on the European Chips Act," Text, European Commission - European Commission, accessed February 8, 2023, https://ec.europa.eu/commission/presscorner/detail/en/statement_22_866.
[113] Ministerie van Buitenlandse Zaken , "Fiche 1- Europese Chips Act," February 8, 2022, 5-6 https://www.rijksoverheid.nl/ministeries/ministerie-van-buitenlandse-zaken/documenten/publicaties/2022/02/08/fiche-1-europese-chips-act.
[114] Ministerie van Buitenlandse Zaken, Preliminary Netherlands' input for proposed 'European Chips Act," October 11, 2021, 1-2.

States and strengthen their technological and industrial leadership by for example sharing information to make semiconductor supply chains more resilient.[115] These initiatives show that it is not just a bilateral semiconductor security synergy between the U.S. and the Netherlands, but with the EU as well.

This rhetoric can also be noted when looking at documents from the Ministry of Foreign Affairs that discuss the DUV ban. On the 8th of November 2022, Foreign Trade Minister Schreinemacher in the name of the Ministry of Foreign Affairs, answered questions that came from the Dutch House of Representatives in relations to the potential impact the October 2022 U.S. Entity list update could have on the Netherlands. A question was raised regarding the economic implications Netherlands could face if it would place export restrictions on DUV machines. As a response, Schreinemacher argued that restrictions are considered on a case-by-case basis and that within this changing international context, DUV machines play a key role in maintaining technological leadership and therefore besides security reasons, geopolitics and long-term economic considerations are also evaluated.[116] Furthermore, she argues that DUV machines hold strategic value due to the globalized nature of semiconductor supply chains and therefore geopolitical considerations need to be taken into account, including working together with like-minded partners and being in line with the EU's Open strategic Autonomy.[117]. Lastly, Schreinemacher adds that the Netherlands is regularly in contact with the European Commission in relation to future export controls and it is actively pursuing a united action plan in relation to the export controls. On the 11th of April 2023, in relation to the DUV export restriction that occurred on the 8th of March 2023. Schreinemacher also argued that the Netherlands continuously maintains strong communication ties with countries that hold an important position

[115] "EU-US Trade and Technology Council: Modest Progress in a Challenging Context," Epthinktank, February 10, 2023, https://epthinktank.eu/2023/02/10/eu-us-trade-and-technology-council-modest-progress-in-a-challenging-context/; Julian Ringhof, "Setting the Tone: The Value of the EU-US Trade and Technology Council," ECFR, December 9, 2022, https://ecfr.eu/article/setting-the-tone-the-value-of-the-eu-us-trade-and-technology-council/; The White House, "Remarks by National Security Advisor Jake Sullivan at the Special Competitive Studies Project Global Emerging Technologies Summit," The White House, September 16, 2022, https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-security-advisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/.

[116] Ministerie van Buitenlandse Zaken, *Antwoorden op Kamervragen over Amerikaanse beperkingen op export chips en machines naar china*, November 8 2022, 2. https://open.overheid.nl/documenten/ronl-e044979cb7ef5b663133ae2e1d0cc058b5c386e4/pdf

[117] Ministerie van Buitenlandse Zaken, "Antwoorden," 3.

within the semiconductor supply chain (U.S., Japan, South Korea, and EU members)[118]. The Ministry's 2019 motto "Open where possible, protective where necessary" could be applied to all of these countries when it comes to semiconductors. The consolidation of this new perception therefore omits short-term Chinese economic benefits in return for maintaining the status quo between the long time leaders within the semiconductor supply chain.

Lastly, given the geoeconomic restructuring of semiconductor supply chains, the American and European Chips act will also bring new opportunities for ASML. These large projects have created the goal to create more semiconductor factories in the United States and EU to reduce dependency risks. Since there are only a handful of companies that use EUV machines and there is information on these companies building new foundries, ASML will be preoccupied with supplying these companies in the future. In the United States Intel announced that it is currently building four new advanced foundries ($40bn); TSMC two foundries ($40bn); Samsung one fab ($17bn); Micron 1 fab ($15bn).[119] In the EU, Intel plans to build one fab in Germany ($17bn), and TSMC is discussing building a fab in Germany as well ($11bn). Lastly, given the recency of these developments, future research should inspect whether EUV machines within these new manufacturing facilities count as receiving funding from the American Chips Act as this would legally restrict ASML for doing business with China for 10 years.

[118]Ministerie van Buitenlandse Zaken, "Antwoorden op Kamervragen over samenwerking Japan en Zuid-Korea bij halfgeleiders," April 11, 2023, 2.

[119] "Intel Breaks Ground on Two New Leading-Edge Chip Factories in Arizona," Intel, last modified September 24, 2021, https://www.intel.com/content/www/us/en/newsroom/news/intel-breaks-ground-two-new-leading-edge-chip-factories-arizona.html; James Leggate, "Intel Ohio Fab Breaks Ground, Leading Chip Plant Project Wave," Engineering News-Record," September 12, 2022, https://www.enr.com/articles/54776-intel-ohio-fab-breaks-ground-leading-chip-plant-project-wave; Jane Lee, David Shepardson, and Jane Lee, "TSMC Sees $10 Bln in Annual Revenue from Arizona Chip Plants," *Reuters*, December 6, 2022, sec. U.S. Markets, https://www.reuters.com/markets/us/tsmc-expects-10-billion-annual-revenue-arizona-fabs-2022-12-06/; "Samsung to Ramp up EUV Scanners to Take on Foundry Leader TSMC - KED Global," accessed May 15, 2023, https://www.kedglobal.com/foundry-competition/newsView/ked202103150012; Anton Shilov, "Micron Breaks Ground on Its $15 Billion EUV DRAM Fab in the U.S.," accessed May 15, 2023, https://www.anandtech.com/show/17573/micron-breaks-ground-on-its-15-billion-euv-dram-fab-in-the-us; Sterling, "Intel Orders ASML System for Well over $340 Mln in Quest for Chipmaking Edge."

Conclusion

Global economic interdependencies have now become a site of potential weakness in industries such as semiconductors. Weaponized Interdependence correctly identifies that global interdependencies have been utilized by the United States to cut out China from becoming the next technological superpower. There are two reasons for this: security risks in relation to the chokepoint and panopticon effect, and more importantly, economics profits expected to arise from the Fourth Industrial Revolution- making it a game about staying at the top. By securitizing Huawei's 5G as a national security risk, it enabled the United States to enact its bigger ambition- not allowing China to catch up technologically. As a result, the United States exercised its power over its technological hubs to exclude China from technologically advancing. It was able to do this through the Entity List, not only forcing China to comply but eventually the entire world. As powerful as America's chokepoint capabilities are, to reach its maximum potential, working with other countries that reigned over critical chokepoints was critical. For that reason, the United States looked at ASML a monopoly within the semiconductor supply chain. However, current literature on what caused the Netherlands to comply to American demands have shown to be unclear. For the EUV case, chokepoint threats from the United States towards the Netherlands were deemed illogical. The DUV case reasons seemed even more dubious as ASML exported these machines for four years to China after the EUV restrictions occurred, making China the largest customer of the company.

Therefore, the aim of the research was to find out the tradeoffs the Netherlands considered when eventually deciding to place export restrictions on China. This was done in three different ways. The first section looked at the rhetoric found within the *Netherlands-China: A new balance* paper. Additionally, through document analysis on the process of creating the new foreign policy stance it was shown that the Netherlands increasingly became more wary of China, months before it was reported that an EUV machine shipment to China was facing delays. This showed that it was not American coercion during a visit to the White House in July 2019 that forced the Netherlands to stop exporting its machines. Instead, the Netherlands was already well aware of Chinese technological security risks well before what is currently established, even showing ties with Washington in January 2019. Secondly, by looking at ASML's yearly reports, it shows that cutting China off from EUV machines was not a damaging tradeoff since the company was seeing record growth every year due to its EUV monopoly. Placing EUV sales within the context

of the expected changes the Internet of Things will bring, it adds another layer to why demand has been so high. However, under the same economic logic, the March 2023 DUV export controls revealed that other considerations were at play as the economic tradeoffs in losing China were much higher than the EUV case. The answer was that now reducing global semiconductor dependency risks and not letting China catch up technologically have come to the front of political and economy policy considerations in Netherlands, United States, and the EU. This explains the DUV case, the new geopolitical and geoeconomic consideration on global economic supply chains became normalized within governments who desired long-term economic security over short-term economic profit.

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