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Managing Dual-Use Technology in an Era of Great Power Competition

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Advanced technologies is the central theme of the great power competition between the United States (US) and China, which has broadened the concept of national security. Technology and national security are intertwined and the private sector has increasingly become the catalyst behind developing new technologies. For example, semiconductor chips are vital for enabling other emerging technologies, such as artificial intelligence, which in turn is expected to become increasingly important for both civilian and military applications. Here, I discuss lessons learned from the Netherlands' experience in managing its dual-use technology in an era of great power competition between the US and China. The most important lessons learned are the power of open and transparent communication with all actors involved, the adaptation of a whole-of-nation approach, and the awareness that sovereign nations have the power and ability to make their own decisions. The cooperation between the Dutch Government and a private company that designs and manufactures lithography machines essential for producing chips positively evolved and effectively contributed to pursuing both the Netherlands' economic and national security interests.

Introduction

Since the 2010s, the geopolitical environment is predominantly defined by strategic competition between the two great powers; the United States (US) and China (Jones, 2020, p. 1; S. A. Park, 2023). A central theme of the US–China rivalry, advanced technologies, has broadened the concept of national security significantly. This is the result of new technologies increasingly having a dual-use function, both military and civilian, and are therefore perceived to be potential threat multipliers to national security (Drezner, 2024; Walker-Munro, 2023). Technology and national security have always been interconnected; however, the private sector has increasingly become the catalyst behind developing new technologies, making technological development and trade less visible for governments (Okano-Heijmans et al., 2024, p. 12). Whereas governments were previously mainly involved in welfare facilities, such as healthcare, education and public transport, the national security aspect and dual-use character of many new technologies forced governments to be more involved in markets by regulating trade (Okano-Heijmans et al., 2024, p. 12).

One of the most recent and striking examples of technology that experienced state intervention, and is at the heart of US–China rivalry, is advanced semiconductor technology. Semiconductor chips are vital for enabling other emerging technologies, such as artificial intelligence, which in turn is expected to become increasingly important for military application (Allen, 2023, p. 6). Since the effects of economic measures are easier to control than the effects of military conflict, US–China competition has been increasingly characterised by geoeconomic measures. With export controls, the US aims to deny China access to critical technologies to decrease China's competitiveness with the West (Allen, 2022, pp. 1–2; Hijink, 2023a, p. 205; S. A. Park, 2023, p. 1). One of the key characteristics of the semiconductor industry is that all steps of the chip production process are owned by only a few companies (Miller, 2023, p. 315). However, none of these companies is able to operate independently, and they do not belong to a single country (Muns & Miller, 2024, p. 21). Therefore, in order to execute export control measures effectively, thereby creating a 'chokepoint' against China, it is inevitable for the US to rely on its allies (Miller, 2023, pp. 315, 329–330). One of the most important allies of the US in this matter is the Netherlands with its semiconductor company ASML[1]. ASML designs and manufactures the lithography machines that are crucial for producing chips (ASML, 2024a). This includes both deep ultraviolet (DUV) lithography machines and its more advanced successor, extreme ultraviolet (EUV) litho-

1 ASML is not an abbreviation of anything anymore but a trademark of a world-leading manufacturer of chip-making equipment.

graphy machines (ASML, 2024b; Gehrke & Ringhof, 2023, p. 14). The vital role of these lithography machines within global production processes has brought the Dutch Government to an extremely difficult position. Whereas the US is the Netherlands' most important security partner, China is one of the most important trading partners. Consequently, the Netherlands needs to constantly balance its economic and national security interests, including its relations with both countries.

This paper focuses on the lessons that can be learned from the Netherlands' experience in managing its dual-use technology in an era of great power competition between the US and China, particularly since 2018. The most important lessons learned are the power of open and transparent communication with all actors involved, the adaptation of a whole-of-nation approach, and the awareness that sovereign nations have the power and ability to make their own decisions.

First, I will provide an overview of the literature around economic statecraft. Second, I will examine the Netherlands' involvement in, and response to, trade restrictions on advanced semiconductor technology in an era of great power competition. Third, I will derive lessons from the Dutch case study, to provide insights for other countries. I conclude that the Dutch Government considered various forms of statecraft in pursuing its interests, and it effectively adopted a whole-of-nation approach. Furthermore, ASML's key position in the semiconductor industry and its in-depth technological knowledge proved to be of significant importance. I argue that, over time, the cooperation between the Dutch Government and ASML positively evolved and effectively contributed to pursuing both the Netherlands' economic and national security interests.

2. Economic statecraft and the pursuit of national interests

Globalisation has made the world increasingly interconnected and its political system more multistate-focused. The interconnectedness has changed the dynamics between states and the nexus between their national interests. As a result, states need to holistically consider many different interests and measures, including diplomatic, economic and military (Hirschman, 1945, p. 13). This paper argues that, in the light of great power competition between the US and China, states have increasingly utilised measures known as economic statecraft, rather than military measures. Both economic statecraft and geoeconomics are based on the idea that not military competition but economics will be fundamental to power competition (Luttwak, 1990, pp. 21–22). The distinction between the two concepts can be made as follows; whereas geoeconomics, like geopolitics, studies the system, economic statecraft focuses on a state's foreign policy (Aggarwal & Kenney, 2023, p. 9; Lee, 2024). Consequently, one concept cannot be studied without the other. Blackwill and Harris provide one encompassing definition for the two concepts:

> The use of economic instruments to promote and defend national interests, and to produce beneficial geopolitical results; and the effects of other nations' economic actions on a country's geopolitical goals (Blackwill & Harris, 2017, p. 20).

The reference to 'geopolitical goals' is particularly interesting from an international relations perspective because it emphasises that economic statecraft is part of a broader concept: grand strategy (Wigell et al., 2019, p. 90). Paul Kennedy states that:

> The crux of grand strategy lies [...] in the capacity of the nation's leaders to bring together all of the elements, both military and nonmilitary, for the preservation and enhancement of the nation's long-term [...] best interests (P. Kennedy, 1991, p. 5).

Clausewitz studied these 'elements' from a military perspective, arguing that 'war is simply a continuation of political intercourse, with the addition of other means' (Clausewitz, 1832/2008, p. 605). This applies to all forms of statecraft, including economic statecraft (Baldwin, 2020, pp. 65–66). They should be studied in conjunction with others forms of statecraft (that is, DIME – Diplomacy, Information, Military, and Economic) and as elements of a nation's overarching grand strategy, rather than as isolated elements with their own goals (Baldwin, 2020, pp. 65–66; Early & Preble, 2021, p. 371). A state's ability to apply these forms of statecraft largely determines its manoeuvrability in the international political domain, and its effectiveness in achieving its national objectives.

Even though both grand strategy and economic statecraft are often considered as concepts for major powers, they are in practice employed by all states. However, larger powers generally have more capabilities at their disposal to conduct their economic statecraft (Farrell & Newman, 2019, p. 54). Consequently, this influences the power dynamics within the international political system, in which larger and smaller powers manoeuvre and interact with each other. This includes the pressure that states can exert on others to pursue their national interests.

3. Economic statecraft and great power competition

Globalisation has made states become increasingly involved in the international political economy. States participate in international trade as buyer or seller, or both. In doing so, states can influence and target the trade of other states, for example by continuing or blocking their export or import. Hirschman argued that sovereign states have this ability because they control their own borders and population. He argues that, even though the sender state will also bear the consequences of the economic measures it takes, it is generally capable of shaping the conditions to make sure that the target state will be worse off (Hirschman, 1945, pp. 15–16).

Consequently, states increasingly utilise the tools of economic statecraft. Early and Preble provide a broad, conceptual framework to understand how decision-makers apply economic statecraft in various contexts to pursue their country's national interests (Early & Preble, 2021, p. 371).

Most relevant and applicable in the context of great power competition is the objective of 'balancing', which aims to hinder other states' ability to become the dominant actor in their exchange with other states. Considered from a realist's perspective, this means that if great powers are not able to dictate the circumstances themselves, they will aim to balance the allocation of power between other great powers and themselves. States have a variety of balancing measures at their disposal, including the establishment of partnerships with other nations, and the execution of policies that aim to decrease or diminish another great power's strength (Early & Preble, 2021, p. 378). An example of these policies are strategic trade policies, which great powers use to bolster their own alliances while at the same time restraining adversaries from gaining more power. For instance, states can enhance their allies' power by providing them access to strategic technologies. In contrast, export controls can hinder the transfer of strategic goods to adversaries, such as specific raw materials or advanced technologies (Fuhrmann, 2008, p. 634).

The application of strategic trade policies has increased since the 2010s. This has led to an increase in market intervention by governments, pursuing their national interests (Lim, 2019, pp. 31–32). The increased state intervention in markets is the result of three global developments: the existence of great power competition; the expansion of populist political campaigns, which generally oppose international, regulated trade regimes; and economic policy domains which have become increasingly securitised, because they are progressively seen as interconnected to domestic security affairs. Examples of these domains are 'trade, technology and education' (Ferguson et al., 2023, pp. 1156–1157).

The interaction between these developments, and the subsequent increase of state intervention in markets increased the interdependence and securitisation of trade. This has particularly been the case for the connection between advanced technologies and national security, so-called 'technonationalism'. Whereas previously 'industrial policy [was] oriented toward developmentalism, [it has now shifted] to security-oriented geoeconomics' (S. A. Park, 2023, p. 3). Simultaneously, the concept of Global Value Chains (GVCs) has increasingly been considered to be of strategic importance to national security (S. A. Park, 2023, p. 3). GVCs comprise all production steps necessary for the production of goods or services, in which each step adds value to the product, and with two or more steps performed in different nations (Antràs, 2020, p. 553). Furthermore, the focus of technonationalism has shifted from single, sovereign states to cooperation between multiple states, with shared GVCs with alliance partners and like-minded countries. This approach has been stimulated by the 2010s geopolitical environment, which proved it to be both impossible and impractical for a single nation to monopolise an entire GVC (S. A. Park, 2023, p. 3).

As a solution, states use various techniques to gain access to foreign strategic goods. Kennedy and Lim distinguish three options: 'making', 'transacting' and 'taking' (A. B. Kennedy & Lim, 2018, p. 556). First, 'making' involves the provision of state assistance to domestic companies in developing new products, for example, by financial aid or by safeguarding them from overseas competitors (A. B. Kennedy & Lim, 2018, p. 556). Second, 'transacting' is about trading with international companies, for which cooperation of those companies is essential. This pathway includes the procurement of foreign technologies and investments in foreign manufacturers that own the desired technologies. 'Transacting' is most effective when combined with domestic innovation endeavours (A. B. Kennedy & Lim, 2018, p. 557). Third, 'taking' encompasses gaining access to foreign technologies without transactional methods, which is generally seen between more and less technologically developed countries. This includes the gathering of open-source information and information from international authorities, and taking 'intellectual property' without prior consent (for example, espionage and theft) (A. B. Kennedy & Lim, 2018, p. 557). All three pathways are focused on the cross-border exchange of intellectual property and technologies, and they heavily rely on the cooperation between governments and companies. Since the 2010s, this has significantly changed the interaction and interdependence between governments and firms.

4. Collaborate to balance economic and national security interests

The shift in technonationalism has increased the cooperation between states and technology manufacturers. Governments and firms have always been mutually dependent for security, employment and tax purposes, however, today's highly technological economy and geopolitical environment have made states become more reliant on the in-depth technological knowledge of domestic firms. This has significantly increased these firms' role and influence in foreign relations (Babic et al., 2017, p. 22; Babić et al., 2022, p. 6; S. A. Park, 2023, p. 3). Consequently, this has increased the need to balance the interests of all actors involved. The nexus between security and economic interests, but also between other domestic and international forces that are in play, often results in opposing interests and inevitable trade-offs (Luttwak, 1990, p. 17; Vihma, 2018, p. 4). These trade-offs are directly related to the difficult choices governments and firms are facing in collectively balancing their economic and security interests.

This had broadened the perception of security, which in turn has made GVCs, particularly those of advanced technologies, become a more central element in state-firm cooperation. These GVCs can be utilised strategically to pursue national interests (S. A. Park, 2023, p. 3). One way to strategically utilise a GVC is by creating a 'chokepoint effect', which denies adversaries access to certain technologies (Miller, 2023, pp. 327–328). In doing so, states have the ability to coerce adversaries (Hirschman, 1945, pp. 14–15). However, chokepoints have limitations and disadvantages. They are generally most effective when executed by one or only a few states (Miller, 2023, pp. 329–330). Even though single actors can be very influential in a certain GVC, they hardly ever possess enough power to fully dominate all steps, which underpins the importance of alliances (Miller,

2023, p. 315). Furthermore, the control over domestic technologies not only puts states in a central role in the creation of chokepoints, it also exposes them to pressure from international actors (Okano-Heijmans et al., 2024, p. 10). The increased cooperation between governments and firms, as well as the advantages and disadvantages of playing a critical role in a GVC, serves as the transition into the next section: the case study of the Netherlands' semiconductor industry, and the Dutch role in and response to contemporary great power competition.

5. The Netherlands' semiconductor industry

5.1. The Netherlands as 'middle power', and early export control measures

More than 80 years ago, during World War II, the overall trend in Dutch political thinking was that international cooperation, in the form of an Atlantic pact with permanent support from the US, would be the best guarantee for national security (Hellema, 2010, p. 114). Combined with increased European integration, this would be beneficial for both international political relations and economic cooperation in Europe (Hellema, 2010, pp. 124–125). Eelco van Kleffens, Dutch Foreign Minister throughout World War II, declared the Netherlands to be a 'middle power', and nowadays it is still considered an established 'middle power' (Hellema, 2010, pp. 114–115; Oosterveld & Torossian, 2019). Middle powers can be defined as states that have both the interests and sufficient capacity to collaborate harmoniously with other states to build and strengthen 'institutions for the governance of the global commons' (Robertson, 2017, pp. 366–367). As a middle power, 'the Netherlands has an interest in ensuring the continuation of the liberal-democratic world order' (Oosterveld & Torossian, 2019). In 2019, Mark Rutte, the then Dutch Prime Minister and now Secretary-General of NATO, addressed an audience at Australia's Lowy Institute and said:

> For middle powers like Australia and the Netherlands, working together is the best way to influence and shape international debate. As middle powers, we must act in concert if we want to make sure our voices are heard (Doherty, 2019).

An example of collaboration to influence and orchestrate the international political system, is the 1995 Wassenaar Arrangement, in which both the Netherlands and Australia participate. The Wassenaar Arrangement was the first agreement under which participating nations regulate export controls over items and technologies mentioned on the so-called 'List of Dual-Use Goods and Technologies and the Munitions List'. This list includes semiconductor technology (Hijink, 2023a, p. 191; Wassenaar Arrangement Secretariat, 2019). However, in an era of great power competition, the Wassenaar Arrangement is not considered fit for purpose. It was initially established with a focus on tangible items, such as nuclear weapons. Furthermore, the Arrangement's decision-making philosophy is based on consensus, which lacks the agility and flexibility now that Russia has created a stalemate, and new technologies evolve rapidly (Allen & Benson, 2023, p. 10; Okano-Heijmans et al., 2024, pp. 3, 16). Therefore, the Wassenaar Arrangement is not seen as a useful mechanism to hinder China's technological capabilities in a timely manner, which would allow China to bridge the technological gap with the West.

5.2. The start of increased Dutch involvement

Today's geopolitical environment and the rapidness in which new technologies emerge ask for responsive measures. Consequently, due to the Wassenaar Arrangement's rigidity the US felt compelled to develop additional trade restrictions on semiconductor technology (Hijink, 2023a, p. 203; Miller, 2023, pp. 327–328). When the Dutch Government granted the export licence to ASML for selling its EUV machines to China in 2018, the US was able to convince the Netherlands to revoke that licence. Subsequently, the EUV machine was added to the Wassenaar Arrangement's list for dual-use technologies (Gehrke & Ringhof, 2023, p. 14; Van der Lugt, 2024; Wassenaar Arrangement Secretariat, 2023). Nevertheless, as standard procedure when a more advanced technology has been developed (that is, EUV), the DUV lithography machine was taken off the list in 2014 (Hijink, 2023a, p. 202). To frustrate China's technological development even further, the US attempted to get ASML's DUV machine back on the list (NOS, 2023). However, export controls are a national affair, which significantly increased the Dutch Government's involvement in the US–China technology war (Okano-Heijmans et al., 2024, p. 8). As a result, the US was forced to rely on the Netherlands to effectively conduct their desired, additional export control measures, and thereby create a chokepoint against China (S. Park, 2023, p. 10). Therefore, the US started a diplomatic mission, largely focused on the Netherlands and Japan, with the aim to gather the support of the most important actors in the semiconductor industry (Mead, 2024).

This has brought the Dutch Government to an extremely difficult position, in which it needs to balance its economic and national security interests. Whereas the US is the Netherlands' most important security partner, China is one of its most important trading partners, especially when it comes to semiconductor technology (CBS, 2023; Van der Veere, 2024, p. 12). At first, the Dutch Government, supported by neighbouring countries Germany and Belgium, was unwilling to obey the US request to put the DUV machine back on the list. The government agreed with ASML that it had already made enough concessions by adding the EUV machine to the list, which inherently impacted its trade relationship with China. Nevertheless, the US consideration to implement the 'foreign direct product rule' was enough to pressure the Netherlands to come up with national trade restrictions, parallel to the Wassenaar Arrangement. The foreign direct product rule would significantly control and potentially limit the Netherlands' sovereign decision making when it comes to exporting products that contain foreign technology. Whereas the US was previously only involved if a machine contained more than 25 percent US technology, the enforcement of this rule would block the trade of products that contain any US technology, which is the case for ASML's semiconductor machines (Eitel, 2024;

Hawkins et al., 2024). Consequently, ASML and the Dutch Government would no longer control the export of national semiconductor technologies, inherently changing the power balance between the Netherlands and the US. Eventually, the Dutch Government gave in, and made its first explicit move concerning this matter towards the US (Hijink, 2023a, pp. 202–203).

In the following years, the US pressure remained present and became more explicitly aimed at China, and the export control measures on semiconductor technology were tightened even further. In October 2022, when the Biden administration declared additional export restrictions to strengthen the chokepoint against China, the semiconductor industry became further constrained (Allen, 2022, p. 1, 2023, pp. 6–7). However, even though the Dutch Government had announced additional trade restrictions from the national level, there were still machines being sold to China (Muns & Miller, 2024, pp. 21–22). Although these were not the advanced EUV machines, the US decided to further tighten export controls in October 2023. Again, the Netherlands announced its respective additional restrictions, which broadly aligned with those of the US (Okano-Heijmans et al., 2024, p. 3). Although not officially stated, it appears evident that the Netherlands' decisions are driven by the threat of enforcing the 'foreign direct product rule' by the US. Speculations about the enforcement of the rule have significantly influenced ASML's market value in recent years (Eitel, 2024; Hawkins et al., 2024). However, this time the Dutch Government formulated three strategic objectives:

- preventing a situation in which Dutch goods contribute to undesirable end use, such as military deployment or weapons of mass destruction
- preventing undesirable long-term strategic dependencies
- preserving the Netherlands' technological leadership position (Ministry of Foreign Affairs, 2023; Okano-Heijmans et al., 2024, pp. 14–15).

The combination of these objectives shows the integration and execution of various forms of statecraft (DIME) by the Dutch Government. For example, the Dutch Government's condition was that the global shortage of chips would not further increase as a consequence of the trade restrictions (Hijink, 2023a, p. 203). Even though controlling the export of critical, dual-use semiconductor technology is considered vital from a security perspective, so is maintaining an adequately functioning semiconductor GVC (Muns & Miller, 2024, p. 23). Ultimately, as mentioned before, the semiconductor's GVC is highly interconnected and interdependent (Miller, 2023, p. 315; Muns & Miller, 2024, p. 21). Furthermore, the government's close relationship with ASML shows the holistic approach to the trade restrictions on semiconductor technology, even though trade restrictions come with undesirable trade-offs. The relationship is also one of reliance because, in line with the shift towards technonationalism, the Dutch Government strongly relies on ASML's in-depth technological knowledge and its position as a major player in the international political economy. An example is ASML's role in preparing Dutch political leaders for international meetings concerning geopolitics and trade, which includes visits of then Dutch Prime Minister Rutte to the US and China to meet with Presidents Biden and Xi Jinping (NOS, 2024c; Tweebeeke, 2023; Woo & Cao, 2024). In addition, ASML's former CEO, together with the CEOs of the other key players in the semiconductor GVC, personally attended meetings with the US President (Hijink, 2023a, p. 225; NRC, 2024).

5.3. The Netherlands sets its boundaries

To this day, China's access to semiconductor technology is still one of the most important topics between the US and the Netherlands. Export control measures will likely be updated continuously, and the impact of these updates will depend on the development of both the chip market and China's capabilities (Muns & Miller, 2024, p. 22). However, this does not mean that the Netherlands will keep following the US export control measures. In 2023–2024, the US continued to exercise the coercive effect of the 'foreign direct product rule' (Eitel, 2024; Hawkins et al., 2024; Kasteleijn, 2023c). Furthermore, the US has tried to persuade the Dutch Government to terminate ASML's service contracts for machines that have been sold to China in previous years. These measures would severely limit China's capabilities, and potentially, depending on the type of machine, shut down factories in weeks or months (Hijink, 2024; Kasteleijn, 2023c). In September 2024, the Dutch Government announced that 'from now on, companies will have to apply for an authorisation when exporting this type of advanced manufacturing equipment' (Klever, 2024). In doing so, the Dutch Government will maintain full responsibility over the export control measures, which includes servicing contracts and export licences of machines that contain US technology. This means that export, both of machines and service contracts, outside of the European Union (EU) is not completely banned, but will be considered by the Dutch Government on a case-by-case basis (Klever, 2024; Sterling, 2024b). So, even though the Dutch measures broadly align with those of the US, the Dutch Government's announcement shows that it maintains control over its own political and economic decision-making process. In doing so, the Dutch Government stays loyal to its historical approach towards foreign trade, which seeks to promote transparency and open trade (Ministry of Foreign Affairs, 2022).

Nevertheless, it is unlikely that the Dutch Government's decisions in this matter will drift far away from the US, and future decisions will still come with trade-offs. Ultimately, the US remains an important security partner to the Netherlands, and the Dutch Government is well aware of the significance and dual-use character of semiconductor technology. Therefore, this technology needs to be monitored and controlled accordingly. In 2023, outgoing Prime Minister Rutte stated that we should collectively think about 'how … we ensure that we, as the Western world, remain safe, and how [we can] maintain our technological advantage. That is also in the interest of the Netherlands' (Tweebeeke, 2023).

5.4. The alignment between the Dutch Government and ASML

The interests of the Netherlands, however, are not homogenous. Interests differ per actor, even domestically. The collaboration between the Dutch Government and ASML does not necessarily mean that they are fully aligned on the export control measures on ASML's semiconductors, or the impact on the industry at large. Both former CEO of ASML Peter Wennink and current CEO Christophe Fouquet have openly expressed their criticism about the trade restrictions on semiconductor technology. Fouquet explicitly questioned the motives of the US for their export control measures against China, arguing that the restrictions have increasingly become economically motivated. He stated that saying 'that this is about national security is getting harder and harder' (Sterling, 2024a). In an interview in September 2023, Wennink also expressed his reservations. He argued that Western protectionism might be a trigger for deglobalisation, which eventually will encourage countries such as China to become more innovative themselves. Protectionism will put efficiency under pressure, which in the longer term will cause rising costs and inflation. Wennink argues that 'we must be careful, we cannot afford to fall behind' (Wennink, 2023). In that same interview, he calls for a whole-of-nation approach, in which the Dutch Government, its industry and its universities must act collectively to protect the Netherlands' welfare, provide adequate education and healthcare, and enhance its security; both physically and digitally. Wennink argues that the government should be facilitating this, and that firms and universities should contribute by investing in infrastructure and knowledge building (Wennink, 2023). Cooperation between all actors involved would benefit the collective pursuit of the national interests.

However, in the early days of trade restrictions on Dutch semiconductor technology, there was hardly any collective approach, or at least not an openly observable approach. This caused divergence, and ultimately tensions between the Netherlands' political and industrial interests. Even though ASML is decades ahead of its competitors, and the demand for chips will likely increase in the future, the trade restrictions will anyhow impact the company's growth, its ability to innovate and potentially its competitiveness in the long run. As a result of the trade restrictions on its most advanced machines, the number of machines ASML sells will decline (Muns & Miller, 2024, p. 23). It was inevitable that the interaction and relationship between the Dutch Government and ASML would become somewhat rigid. To illustrate the situation in March 2024, Wennink said that 'there is a significant gap between what the business community thinks is necessary, and what parliament thinks is necessary' (NOS, 2024a). This had made ASML's leadership question the suitability of the Dutch business climate. Next to the recurring trade restrictions, there had been changes in tax benefits for expats, and the political climate towards immigration has gradually changed. With approximately 40 percent of its employees working in the Netherlands coming from abroad, these developments are unfavourable for ASML (Hijink, 2023b; Kasteleijn & Schallenberg, 2024; NOS, 2024b). Consequently, it might push ASML to move to a less restrictive country.

However, according to Wennink, in 2024 the then outgoing Dutch Cabinet (that is, 'Cabinet Rutte-IV') proved to be more receptive than parliament with regards to what is needed to maintain the Netherlands' technological advantage. For example, Cabinet Rutte-IV had initiated the so-called 'Operation Beethoven' to organise the harmonious cooperation between industry, local residents and national and international politics to prevent companies such as ASML shifting their investments to other countries (BNR Nieuws, 2024; NOS, 2024b; NRC, 2024). In doing so, the Dutch Government conducted the strategy of 'making' to assist ASML in maintaining its competitive advantage, while at the same time keeping an important technology in Dutch hands. In July 2024, when a new Cabinet had only just been sworn in, a letter was sent by interest group ChipNL, in which more than 30 Dutch chip-related companies are represented. Their main request to the government was, after its assistance to ASML, to invest even more in the broader Dutch chip industry (Kasteleijn, 2024).

5.5. Recent developments and future challenges

The initiatives to strengthen the relationship between the Dutch Government and ASML, and the more recent developments with regard to ChipNL, significantly challenge the balancing act between the Dutch economic and national security interests. When the Dutch Government decided to tighten the trade restrictions again in September 2024, the then Dutch Minister for Foreign Trade and Development, Reinette Klever, stated that she 'made this decision for reasons of security [because] technological advances have given rise to increased security risks associated with the export [of semiconductor technology], especially in the current geopolitical context' (Klever, 2024). Other than the US, the Dutch Government does not focus solely on China, calling its measures 'country neutral' (Kasteleijn, 2023a, 2023b; Okano-Heijmans et al., 2024, p. 3; Woo & Cao, 2024). It seeks a more nuanced approach to maintain the Dutch economic relationship with China; especially since China's minerals are critical to many GVCs, including the semiconductor GVC, and China has announced export restrictions to indicate its displeasure and demonstrate its power (Baskaran, 2024; Nurmamat, 2024; Reuters, 2023). However, the Dutch Government has not been consistent in its 'country neutral' approach. In its National Security Strategy, it mentions China directly after Russia and argues that both countries are 'challenging the existing international order' (Ministry of Justice and Security, 2023, p. 13). As an example, reports have shown that China and Iran have managed to gain possession of chips, including chips that were made with Dutch machines. Some of these chips have been used in Iranian drones and other military equipment, which later have been used by Russia in its war against Ukraine. Even though the involved chip companies complied with the export control regulations, these chips have been smuggled or were stolen from other machines (NOS, 2022; Sietsma & Houthuijs, 2023). This clearly shows

the dual-use applicability of semiconductor technology, and that regulations have loopholes that enable other states to conduct a strategy of 'taking' to gain access to this advanced technology. This significantly contributes to the US and Dutch justifications for continuously tightening the trade regulations.

To counter these hostile actions and maintain security, while simultaneously pursuing an open trade environment, the Netherlands seeks cooperation with like-minded countries. Next to the Netherlands' bilateral partnership with the US, it largely focuses on the EU (Okano-Heijmans et al., 2024, p. 1). Together with other EU members, the Netherlands aims to strengthen the EU's strategic autonomy, which can be defined as 'the capacity of the EU to act autonomously … in strategically important policy areas' (Van der Veere, 2024, p. 27). However, even though the European market is largely self-sufficient, like the US market, this pursuit for strategic autonomy might have the perverse effect of 'reshoring' steps of the GVC back into the European theatre. Consequently, what Wennink warned about, this might result in deglobalisation, risking a decrease in efficiency and an increase in prices. Ultimately, this undermines the competitiveness of the Western world. Hence, the promise of the Dutch Cabinet in 2024 to execute the export control measures 'in a careful and targeted manner … to minimise the disruption to global trade flows and value chains' (Klever, 2024), while simultaneously weighing 'the economic interests of ASML … against other risks' (Reuters, 2024). Without knowing exactly how significantly the trade restrictions will limit the wrongful use of semiconductor technologies, as well as the impact on the Dutch economic and national security interests, the Dutch Government's approach does show that various elements of statecraft are taken into consideration.

6. Lesson learned

Various lessons and considerations for decision making can be drawn from the Netherlands' experience in managing its semiconductor technology in an era of great power competition.

First, as a middle power, the Netherlands shows the importance of open and transparent communication with all actors involved, as well as the awareness of its position in the geopolitical system. Throughout the discussions around trade regulations, the Netherlands had close contact with both great powers and with like-minded countries in similar positions, such as Japan. So far, these interactions involved different forms of statecraft (DIME) and were generally open and transparent, which aligns with the Dutch strategy for foreign trade.

Second, the Dutch experience shows the importance of a whole-of-nation approach, especially when the challenges at hand impact a variety of actors. The Dutch Government's decisions show that it values the alliance with the US as its most important security partner. However, the Dutch political position evolved over time and increasingly demonstrated the importance of cooperation with the domestic industry, which corresponds with the global shift in technonationalism. Furthermore, the Dutch Government's 'making' strategy does not only seek to be beneficial to ASML but to the whole country, and most tangible to ASML's direct region.

Third, and most important, the Dutch Government's approach demonstrates that sovereign nations, regardless of their size, have the power and ability to make their own decisions. Even though states have to engage in a global political system that has become increasingly interconnected and multistate-focused, they still have control over and responsibility for their own borders and population.

The lessons learned from the Dutch semiconductor case can provide useful insights for countries that find themselves in a similar position. An example is Australia, whose lithium industry more recently got exposed to US intervention. Australia heavily relies on China for processing its lithium, and now the US has announced it will potentially terminate US subsidies on lithium that has been processed in China, or by a company that is partly owned by China. Like the Netherlands, Australia is a middle power that is now forced into a position in which it has to choose between the US and China, respectively its most important security partner and one of its most important trading partners. Consequently, Australia's lithium industry will likely be securitised. Therefore, the years of experience of both the Dutch Government and ASML, as well as the Dutch Government's market intervention, can provide insights to countries such as Australia when managing emerging trade challenges.

This paper specifically focused on a middle power's experience with trade restrictions on its advanced semiconductor technology, which went along with considerable pressure in an era of great power competition. Whereas some conditions, forms of economic statecraft and experiences might be similar to other countries and their industries, some may not.

7. Conclusion

This paper has focused on the lessons that can be learned from the Netherlands' experience in managing its dual-use, semiconductor technology in an era of great power competition. It discussed the efforts and challenges of the Netherlands, as a middle power, in balancing its economic and national security interests. Based on the case study, this paper concludes that the Dutch Government considered various forms of statecraft in pursuing its interests, and it effectively adopted a whole-of-nation approach. In line with the global shift in technonationalism, ASML, as the Netherlands' most important firm in the semiconductor GVC, proved to be of significant importance. Despite the impact of the enforced export control measures on its operations, it was able to use its in-depth technological knowledge and key position for both domestic and international interests. Over time, the cooperation between the Dutch Government and ASML positively evolved and effectively contributed to pursuing both the Netherlands' economic and national security interests.

The case study shows important lessons for middle powers in managing their economic and national security interests. It demonstrates that an open and transparent pol-

icy, combined with communication with all actors involved, forms the basis when confronted with conflicting interests and difficult choices. Furthermore, it shows the importance of alliances and partnerships from both an economic and a security perspective, and that it is not in the interest of a middle power to specifically target other states. Another lesson is that even though long-term protectionism can contribute to deglobalisation and a decrease in innovation, it is in a state's economic interest to support its own industry. Lastly, sovereign states should remember that they have the power and ability to make their own decisions, regardless of their relative size.

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