

SANEM TOPAL

THE ROLE OF DEFENSE COMPANIES IN NUCLEAR WEAPON
MODERNIZATION IN THE UNITED STATES

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THE ROLE OF DEFENSE COMPANIES IN NUCLEAR WEAPON MODERNIZATION IN THE UNITED STATES

A Master's Thesis

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Ankara
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WEAPON MODERNIZATION IN THE UNITED STATES

The Graduate School of Economics and Social Sciences of
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by

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I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in International Relations.

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ABSTRACT

THE ROLE OF DEFENSE COMPANIES IN NUCLEAR WEAPON MODERNIZATION IN THE UNITED STATES

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The United States allocates significant resources to the defense budget every year. The budget has been increasing steadily since Donald Trump's presidency, and it diverts government resources to spend the money on urgent necessities, like the health system, hunger, and education. Almost 1/3 of this budget goes to maintaining and acquiring nuclear weapons to bolster deterrence. This thesis argues that defense companies in the United States profoundly affect the procurement process for nuclear strategic delivery vehicles through lobbying. The lawmakers, whom these companies lobby in Congress, vote for bills that, in return, benefit the defense contractors. With many other components, this system is known as the military-industrial complex. This thesis aims to analyze the effect of the military-industrial complex on nuclear weapons, an aspect that is often overlooked by researchers and policymakers. Using qualitative and quantitative methods, results show a positive correlation between nuclear modernization programs and the amount of money spent on lobbying by the five biggest defense companies in the United States between 2000 – 2020.

Key Words: the military-industrial complex, United States, nuclear modernization, defense companies, defense budget

ÖZET

SAVUNMA ŞİRKETLERİNİN ABD’NİN NÜKLEER SİLAH MODERNİZASYONUNA ETKİSİ

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Amerika Birleşik Devletleri, her yıl savunma bütçesine önemli miktarda kaynak ayırmaktadır. Donald Trump'ın başkanlığından bu yana giderek artan bu bütçe, hükümet kaynaklarının sağlık sistemi, açlık ve eğitim gibi acil ihtiyaçlara harcanmasını engelliyor. Bu bütçenin neredeyse 1/3'ü caydırıcılığı güçlendirmek için nükleer silahların bakımına ve edinilmesine gitmektedir. Bu tez, Amerika Birleşik Devletleri'ndeki savunma şirketlerinin lobicilik yoluyla nükleer başlık taşıyan silahların tedarik süreci üzerinde derin etkileri olduğunu savunmaktadır. Bu şirketlerin Kongre'de lobi yaptıkları milletvekilleri, karşılığında savunma şirketlerine fayda sağlayan yasa tasarıları için oy kullanmaktadırlar. Diğer birçok bileşeniyle birlikte bu sistem, askeri-endüstriyel kompleks olarak bilinmektedir. Bu tez, askeri-endüstriyel kompleksin, araştırmacılar ve politika yapıcılar tarafından genellikle göz ardı edilen bir yönü olan nükleer silahlar üzerindeki etkisini analiz etmeyi amaçlamaktadır. Nitel ve nicel yöntemler kullanılarak elde edilen sonuçlar, nükleer modernizasyon programları ile 2000-2020 yılları arasında ABD'deki en büyük beş savunma şirketinin lobicilik için harcadığı para miktarı arasında pozitif bir korelasyon olduğunu göstermektedir.

Anahtar Sözcükler: askeri-endüstriyel kompleks, Amerika Birleşik Devletleri, nükleer modernizasyon, savunma şirketleri, savunma bütçesi

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ABBREVIATIONS

ALCM: Air-launched Cruise Missile
CBO: Congressional Budget Office
CENTCOM: Central Command
CRS: Congressional Research Office
DOD: Department of Defense
DOE: Department of Energy
EDA: European Defense Agency
FAS: Federation of American Scientists
FEC: Federal Election Commission
GBSD: Ground-based Strategic Deterrent
HASC: House Armed Services Committee
ICBM: Intercontinental Ballistic Missile
LDA: Lobbying Disclosure Act
LE: Life Extension
LRSO: Long-Range Standoff Weapon
MIC: Military-Industrial Complex
NATO: North Atlantic Treaty Organization
NDAA: National Defense Authorization Act
New START: New Strategic Arms Reduction Treaty
NNSA: National Nuclear Security Administration
NPT: Nuclear Non-Proliferation Treaty
OCO: Overseas Contingency Operations
PAC: Political Action Committee
POGO: Project on Governmental Oversight
SASC: Senate Armed Services Committee
SLBM: Submarine-launched Ballistic Missile
SSBN: Ballistic Missile Submarine
TPNW: The Treaty on the Prohibition of Nuclear Weapons
USAF: US Air Force
UTC: United Technologies Corporation
WIB: World Industries Board

Introduction

Nuclear arsenals in the world are expanding, being upgraded and refurbished constantly, and the arsenal of the United States is no exception. Nuclear weapons have been in our lives since 1945, and though the world is used to living with them, they still pose a significant danger for many. Even the mere threat of using them creates global tension. Countries aim to keep up with each other on their technological advancement regarding nuclear weapons or are in a rivalry to possess the superior edge. The United States has been working on significant improvements in nuclear warheads and strategic delivery vehicles. The pace of modernization in the US has accelerated in the last ten years, with entirely new ones expected to enter into service in the upcoming years.

Many blame the current geopolitical rivalry with Russia and China for the fast pace of modernization but often ignore the substantial domestic factors that sustain 'nuclear deterrence.' One that will be explored in this thesis is the private companies, which make enormous amounts of money over any kind of war, regardless of the tragedy that the war creates. Starting from the First World War, defense companies have been entangled with the nuclear posture of the United States and have a share in maintaining the deterrence policy that has persisted since the Cold War. The close relationship between them and government officials is known as Military-Industrial Complex (MIC). This study aims to contribute to the literature by researching the influence of MIC on nuclear weapons.

While the warhead production is under the Department of Energy (DOE) capacity, the Department of Defense (DOD) oversees strategic delivery vehicles' acquisition. In my quest to learn how the DOD chooses one or more companies for each specific weapon acquisition in a business environment where many companies are able to produce a similar level of sophistication in a weapon, my research question has been formed to find out the relationship between the lobbying spendings of the five biggest defense companies in the US and its nuclear modernization program between 2000 - 2020. I base this research on the iron triangle theory coined by Gordon Adams in 1981, which argues that the triangle in the US government is mutually beneficial between Congress members, bureaucratic groups, and special interest lobby groups. While the bureaucratic groups refer to the ministry officials who decide on the contractor, Congress eventually approves a weapon sale or acquisition. The special interest

lobby groups are the defense contractors that aim to exploit the government's dependency on military might.

It is worth exploring where this dependency on the military might come from. Since the Cold War, the US has pursued a persistent deterrence policy, intending to deter attacks from other nuclear-weapon countries and eventually create strategic stability without any wars occurring between them. Having second-strike capabilities in case of a nuclear attack has been significantly valued among US politicians, and many believe that a great power status is associated with nuclear weapon ownership and eventual military strength. The US grand strategy is referred to as primacy by Tudor A. Onea, where the international number one is taking steps to enhance its lead on the other great powers, which are, in this case, Russia and China.¹ Tudor A. Onea argues that one of the simplest ways for great power pursuing primacy in asserting its dominant position over others is to establish a strong military "whose total number equals or slightly exceeds the joint forces of the next-in-line powers." According to the Stockholm International Peace Research Institute, despite a decrease in the US military spending from 3.7 percent of its GDP to 3.5 percent, \$801 billion in US military spending amounted to 172 other countries' military spending combined in 2021.²

In this thesis, I hold the belief that military strength is one of the most outstanding capabilities that a state, a great power, can use in asserting its dominance. The other capabilities are economic performance, population, land size, employment, etc. However, the United States was not likely to be a great power without its military capabilities, also called the most powerful army in the world. These capabilities, particularly the military, carry crucial importance compared to great or rising powers' capabilities. As the defensive realist theory of International Relations posits, states are differently juxtaposed and treat each other differently based on their material capabilities.³ The role of the international system is that it acts as a constraint on the states. The anarchic feature of the structure remains but one state can degrade or enhance its capabilities.

¹ Onea, Tudor A. *The Grand Strategies of Great Powers*. 1st Edition. London: Routledge, 2020. <https://doi.org/10.4324/9781315268378>.

² "World Military Expenditure Passes \$2 Trillion for First Time." *Stockholm International Peace Research Institution*, April 25, 2022. <https://www.sipri.org/media/press-release/2022/world-military-expenditure-passes-2-trillion-first-time>.

³ Waltz, Kenneth N. "Realist Thought and Neorealist Theory." *Journal of International Affairs* 44, no. 1 (1990): 21–37. <http://www.jstor.org/stable/24357222>.

In his famous piece, *More May Be Better*, Waltz explains his structural realist perspective on the presence of nuclear weapons in detail. According to him, there are two types of changes: Change of the system and change in the system.⁴ The introduction of nuclear weapons to warfare is a revolutionary change in the system. In the anarchic, self-help system, states use nuclear weapons as a tool to maintain national security and defend themselves against potential and current threats. According to Waltz, nuclear weapons grant two types of abilities to the states that turn international politics into a more tranquil atmosphere: The ability to defend and punish. In the first one, the defensive ideal, states build so forbiddingly robust defense systems that no other state dares to initiate aggression. The second one is called deterrence. If State A attacks State B, state B will retaliate in a way that State A will suffer the consequences. Thereby, State A cannot again dare to attack State B because it is frightened by the second-strike capability of State B.

Waltz's main argument is that deterrence makes initiating a war less likely. To illustrate, he says there has been no nuclear war since World War II, as we have lived in peace for 76 years.⁵ Via deterrence, nuclear threats have become more credible and compelling since there is a possibility of being annihilated. Having nuclear competence adds to the material capabilities of a state, then, increases the relative strength of the adversary. Other states are likely to be frightened by the advanced capabilities of that state, which justifies that nuclear weapons indeed decrease the prospects for a conflict.

Building on the defense realist theory, this thesis argues that the theory does not incorporate the domestic factors into account, which also have a significant influence in deciding on a state's nuclear capabilities and foreign policy posture. Interstate relations tend to be perceived as a separate realm from domestic politics. What goes inside the bureaucratic and private actors is often neglected in the realist theory, though there have been attempts by realist IR scholars to shift the attention to domestic factors.⁶ In his "Myths of Empire: Domestic Politics and International Ambition," Jack Snyder argues that states overexpand their pursuit of security for several reasons.⁷ In one of the three reasons, he diverts attention to the parochial

⁴ Waltz, Kenneth N. "The Spread of Nuclear Weapons: More May Be Better." *The Adelphi Papers* 21, no. 171 (September 1, 1981): 1–31. <https://doi.org/10.1080/05679328108457394>.

⁵ Ibid.

⁶ Zakaria, Fareed. Review of *Realism and Domestic Politics: A Review Essay*, by Jack Snyder. *International Security* 17, no. 1 (1992): 177–98. <https://doi.org/10.2307/2539162>.

⁷ Snyder, Jack. *Myths of Empire: Domestic Politics and International Ambition*. Cornell University Press, 1991. <http://www.jstor.org/stable/10.7591/j.ctt32b48h>.

interest groups, such as the military and big corporations, and how they have a deep interest in benefiting from a state's militarist, autarkic policies that eventually define its foreign policy. Snyder holds that these private businesses "hijack the organs of government for their selfish goals. The taxpayers who foot the bill lack the organization and access to the state that would allow them to lobby successfully for their interests."⁸

This thesis will contribute to the literature on the grounds that private companies influence a great power's foreign policy in the military realm. These companies pour significant amounts of money to influence the policymakers and have a share in keeping the US nuclear weapons still present and even more improved. Congress members and bureaucratic actors tend to vote for or choose the company that contributes them more money than other competing ones. The process of MIC will be explained in the following chapters.

The rest of this study is organized as follows. In the next chapter, I will provide an analysis of the current literature on the impact of MIC on nuclear weapons by dividing the review into three parts: The views on nuclear modernization, defense procurement and lobbying. So far, the scholarly analysis on this exact topic of this thesis has not been sufficient, therefore, I focus on the main concepts that form this study. In chapter three, I will explain the main theoretical concepts such as nuclear weapon modernization, defense procurement and lobbying procedures. By presenting the motivations for modernization and its types, I will provide a generalizable analysis.

Chapter three will outline my methodology for this thesis. I aim to pursue a mixed methodology in quantitative and qualitative ways to determine the relationship between the defense companies and the US modernization program between 2000 - 2020. In the quantitative section, I aim to create a large dataset of each strategic delivery vehicle contract signed between the DOD and a defense company and the lobbying spending of the five biggest companies: Lockheed Martin, Raytheon, General Dynamics, Boeing and Northrop Grumman. I will create count variables and run correlations between two elements. I hypothesize that the more companies spend on lobbying, the more the US government will engage in modernization.

⁸ Ibid.

Chapter four will be the empirical chapter. In the qualitative section of this chapter, I will analyze the historical roots of the MIC and the current US modernization program. Here, I also aim to reveal what David Cortright calls "corruption,"⁹ the close and private ties between Congress members and defense contractors. In my quantitative section, I will discuss my correlation results. The whole discussion of my thesis will take place in the conclusion.



⁹ Cortright, David. "At the Crossroads: A Nuclear Reckoning." Presented at the Alva Myrdal Centre for Nuclear Disarmament Annual Conference, Uppsala, Sweden, June 15, 2023.

Chapter 1: Literature Review

Though the literature on the military-industrial complex is plenty, the literature on its impact on nuclear weapons in an academic way is almost non-existent. Many scholars have focused on the geopolitical rivalry and prestige as underlying reasons of nuclear modernization and haven't discussed the role of private companies sufficiently. However, defense companies in the US have existed since 1950s and established themselves as the profitable companies around the world. Though they have a role in maintaining the nuclear deterrence, only a few scholars such as Matt Korda, Lee Drutman and William Hartung, have taken them into account in their scholarly work. This thesis, on the other hand, is built upon Gordon Adam's famous book, *Politics of Defense Contracting: The Iron Triangle*, which analyzes eight biggest defense companies in the US in 1981. Gordon Adam's book is considered one of the essentials in uncovering the influence of these companies on the US defense policy.

This chapter will provide the readers with a literature review on nuclear modernization, defense lobbying and procurement and analyze the decision-making models put forward by Graham Allison. Many studies on the areas mentioned above have been conducted qualitatively, usually employing the methods of case study and process tracing.

Starting with modernization, recent research has examined whether nuclear weapon modernization contravenes states' Nuclear Non-Proliferation Treaty (NPT) obligations. Still, assessments of the impact of lobbying on the nuclear defense policy are scant. Views on the modernization of nuclear arsenals both in the public debate and scholarly world remain divided. While some authors argue that modernization is necessary to sustain an effective deterrent, some believe it is unfair regarding the non-nuclear-weapon States, and it contradicts the NPT grand bargain – non-proliferation in exchange for disarmament.¹⁰ There are also middle-ground scholars, who believe that modernization might motivate states to see the magnitude of the threat arising from nuclear weapons, which will encourage them to pursue arms control agreements eventually.¹¹

Modernization has been in effect since nuclear weapons were invented. Yet the pace of modernization might have been slower in the past or right after the Cold War era because

¹⁰ Tannenwald, Nina. "Justice and Fairness in the Nuclear Nonproliferation Regime." *Ethics & International Affairs* 27, no. 3 (2013): 299–317. <https://doi.org/10.1017/S0892679413000221>

¹¹ Dodge, Michaela. "Nuclear Modernization: Best Bang for Our Bucks." *Strategic Studies Quarterly* 11, no. 3 (2017), p. 69. <http://www.jstor.org/stable/26271604>.

traditional drivers, like the competition between defense companies to impact policymakers and rising geopolitical tensions, had temporarily subsided. However, since Russia's invasion of Ukraine in February 2022, geopolitical tensions have surfaced again and impacted conventional arms production and procurement worldwide. The current security atmosphere shows that nuclear-weapon states aim to keep their weapons indefinitely, and there has not been any concrete step for nuclear disarmament. On the other hand, the qualitative increase of nuclear weapons has accelerated in the US and Russia. Since the NPT entered into force in 1970, the issue has become more controversial regarding whether it violates international law. However, since the NPT does not include a robust mechanism prohibiting nuclear deterrence, the non-proliferation regime does not directly rule out modernization. For many nuclear weapons abolitionists, such as Ramesh Thakur, Jane Boulden and Thomas G. Weiss, the NPT is experiencing a legitimacy crisis because it failed to create an effective mechanism to foster disarmament measures by allowing deterrence and, eventually, modernization of nuclear arsenals.¹² Instead, they contend that the UN machinery favors the five nuclear-weapon States (NWS) and legitimizes their nuclear arsenals.¹³

The NPT is far from being the centerpiece of arms control, as the imbalance between the haves and the have-nots has significantly grown and eroded its legitimacy. Hans Kristensen and Robert Norris also underline the dilemma the NPT has faced and the slowing trend of disarmament due to the emphasis that the NWS put on the continued possession of their nuclear arsenals.¹⁴ Similarly, Ray Acheson emphasizes the severe implications of the modernization programs for the disarmament clause of the NPT.¹⁵ Ray Acheson supports the view presented by Ramesh Thakur et al. and argues that international mechanisms allow the interests of the few to outweigh the others, even if the others are the majority.¹⁶

So far, the views of disarmament advocates are somewhat similar, each touching upon the irrelevance of the NPT regarding the NWS's race for nuclear superiority. John Carlson, for

¹² Thakur, Ramesh, Jane Boulden, and Thomas G. Weiss. "Can the NPT Regime Be Fixed or Should It Be Abandoned?" *Dialogue on Globalization* 40 (October 2008), p. 15. <http://library.fes.de/pdf-files/iez/global/05760.pdf>.

¹³ Ibid.

¹⁴ Kristensen, Hans M., and Robert S. Norris. "Slowing Nuclear Weapon Reductions and Endless Nuclear Weapon Modernizations: A Challenge to the NPT." *Bulletin of the Atomic Scientists* 70, no. 4 (July 1, 2014), p. 106. <https://doi.org/10.1177/0096340214540062>.

¹⁵ Acheson, Ray. "Modernization of Nuclear Weapons: Aspiring to 'Indefinite Retention'?" *Bulletin of the Atomic Scientists* 68, no. 5 (September 1, 2012), p. 89. <https://doi.org/10.1177/0096340212459038>.

¹⁶ Ibid.

instance, criticizes and accuses them of doing nothing substantial to comply with the “minimization objective”, and of not creating any specific and promising timetable for eliminating nuclear weapons.¹⁷ Instead, he argues that NWS aim to retain their nuclear weapons indefinitely and place them in their security and defense doctrines. They all ignore the ultimate goal of eliminating nuclear weapons by upgrading and improving their weapons. He then contends that the modernization programs still underline a utility value for p.¹⁸

Another group of scholars who argue that nuclear weapons should be eliminated underscore the importance of ethics, justice, and inequality in the non-proliferation regime. Scholars such as Joseph Nye and Nina Tannenwald deal with nuclear ethics and fairness issues.¹⁹ Harald Müller is also one of the experts who touched upon the rising inequality within the NPT mechanism and how this eventually leads to unfairness.²⁰ He believes that states motivated by the utility of nuclear weapons will continue to modernize and renovate them. However, this contradicts the premises of the NPT and creates a sense of feeling that the NPT has not been successful enough in pushing for disarmament.²¹ Nina Tannenwald presents a similar argument, pointing out how the implementation of the Grand Bargain, including norms, procedures and rules, all favored the nuclear-weapon states, eventually putting the nuclear order in crisis.²²

To sum, as the NPT does not have a precise mechanism prohibiting modernization, it is hard to say that the modernization of nuclear weapons violates international law. It is, on the other hand, definitely in contravention, considering that one of the three pillars of the Treaty is to pursue disarmament.

However, the authors who are against nuclear modernization sometimes ignore the security dynamics that drive states to keep their nuclear weapons and focus solely on the weapons themselves. To explain these dynamics, Jeffrey Knopf searches for an answer to what

¹⁷ Carlson, John. “Is the NPT Still Relevant? – How to Progress the NPT’s Disarmament Provisions.” *Journal for Peace and Nuclear Disarmament* 2, no. 1 (January 2, 2019), p. 103. <https://doi.org/10.1080/25751654.2019.1611187>.

¹⁸ Ibid.

¹⁹ Tannenwald, Nina. “Justice and Fairness in the Nuclear Nonproliferation Regime.” *Ethics & International Affairs* 27, no. 3 (2013): 299–317. <https://doi.org/10.1017/S0892679413000221>; Nye, Joseph. *Nuclear Ethics*. New York: The Free Press, 1988.

²⁰ Müller, Harald. “Between Power and Justice: Current Problems and Perspectives of the NPT Regime.” *Strategic Analysis* 34, no. 2 (April 1, 2010), p. 191. <https://doi.org/10.1080/09700160903542740>.

²¹ Ibid.

²² Tannenwald, “Justice and Fairness in the Nuclear Nonproliferation Regime.”, p. 306.

motivates states to modernize their arsenals. In his article elaborating on the linkage argument, he argues that the most substantial reason supporting the modernization programs is the security concern of states, especially in the regional context.²³ However, he does not endorse any argument pushing for modernization. Instead, he believes that it is reasonable to conclude that the major nuclear-weapon States' plans to keep thousands of warheads and to spend extensively on nuclear modernization do not represent a full commitment to nuclear disarmament.²⁴ He believes that even though there are security forces motivating states to improve their nuclear capabilities, this is still not a valid excuse.

Christopher Ford brings a different perspective by looking at the relationship between the cooperation to enforce nonproliferation, which all NWS are argued to be engaged in, and nuclear disarmament.²⁵ He finds no empirical correlation between these two variables, leading him to conclude that almost none of the activities aiming to curb nonproliferation by the five nuclear-weapon States have contributed to their commitment to the Article VI of the NPT.²⁶ What does it mean for the nonproliferation regime then? Thomas Doyle contends that the legitimacy crisis and the vanishing irrelevance of the NPT resulted in the subversion of the Treaty.²⁷ To him, the NWS transformed one of the regime's critical missions – disarmament – by virtually eliminating it.²⁸ This means that many countries are normatively leaving the NPT. This can only be understood because there hasn't been enough progress toward reducing and eliminating nuclear weapons worldwide. In other words, countries may leave the regime because they don't see progress toward disarmament.

Most of the research done by disarmament advocates criticize the current NPT regime for not being assertive enough in convincing nuclear-weapon states to give up their weapons. Believing that multilateral fora are not very effective for creating nuclear disarmament, the advocates need to provide a roadmap for nuclear disarmament. Similarly, they do not describe the potential conditions or security atmosphere to make disarmament possible. In the scenario

²³ Knopf, Jeffrey W. "Nuclear Disarmament and Nonproliferation: Examining the Linkage Argument." *International Security* 37, no. 3 (2012), p. 104.

²⁴ Ibid, 116.

²⁵ Ford, Christopher. "Nuclear Disarmament, Nonproliferation, and the 'Credibility Thesis.'" *Hudson Institute*, September 2009, p. 10. <https://www.files.ethz.ch/isn/108566/Nuclear%20DisarmamentCF909.pdf>.

²⁶ Ibid, 4.

²⁷ Doyle, Thomas. "A Moral Argument for the Mass Defection of Non-Nuclear-Weapon States from the Nuclear Nonproliferation Treaty Regime." *Global Governance* 23, no. 1, (2017), p. 19.

²⁸ Ibid, 24.

of complete disarmament, the research in this area also needs more possible explanations of how an armed conflict between superpowers would be shaped and solved.

Having written the arguments presented by the disarmament advocates, another side believes that nuclear modernization is an essential function of a state to sustain an effective deterrent and preserve its national security. Matthew Kroenig, an advocate of nuclear deterrence in the context of national security, has conducted significant research in this respect. He puts forward several reasons justifying modernization programs. These are sustaining security guarantees²⁹, engaging in intense competition with rivals, averting the risk of outright conflict with Russia and China, compensating for the eroding conventional advantage of the US, and preserving international stability.³⁰ He argues that the United States should continue modernizing its nuclear weapons not to generate instability and undermine its national security. Its nuclear arsenal should be able to stand against the territorial and conflictual claims of Russia and China in Eastern Europe and Asia-Pacific, respectively.³¹

Another scholar stressing the need for modernization is Michaela Dodge. Dodge puts forward three reasons: First, the nuclear triad is the best option to address unforeseen contingencies. Second, the need for nuclear weapons will persist in the future. Third, current weapons in the stockpiles are nearing the end of their service life.³² On the other hand, she believes that with the countries' extensive investment programs in their arsenals, they are able to see how the current situation is going, and they will be more willing to engage in arms control agreements with each other.³³ Russia's invasion of Ukraine might have strengthened pro-deterrence arguments. Nuclear weapons have become more visible in recent months, and advocates argue that the credible threat of nuclear retaliation keeps Russia from attacking Ukraine with nuclear weapons. While Kroenig does not stress the need for arms control to create strategic stability, Dodge emphasizes its necessity in the current security atmosphere.

As mentioned in the introduction, Kenneth Waltz is a structural realist scholar who also argued for the necessity of nuclear weapons. He contends that nuclear weapons provide stability in international politics, primarily as they provide deterrence, which makes initiating

²⁹ Kroenig, Matthew. "The Case for the US ICBM Force." *Strategic Studies Quarterly* 12, no. 3 (2018), p. 60.

³⁰ Kroenig, Matthew. "How to Approach Nuclear Modernization?" *Bulletin of the Atomic Scientists* 71, no. 3 (January 1, 2015), p. 17. <https://doi.org/10.1177/0096340215581356>.

³¹ Ibid.

³² Dodge, Michaela. "Nuclear Modernization: Best Bang for Our Bucks." *Strategic Studies Quarterly* 11, no. 3 (2017), p. 69. <http://www.jstor.org/stable/26271604>.

³³ Ibid.

a war less likely. By inflicting fear, states are deterred by the possibility of being exposed to severe amount of damage if they attack first. The ability to punish increases the cost of a nuclear war, which is why states have not engaged in a war since 1945. As he puts it, “to explain war is easier than to understand the conditions of peace.”³⁴

Therefore, the literature on modernization is divided into two. While disarmament advocates are able to generate more sophisticated arguments, pro-nuclear weapon researchers justify the existence of nuclear weapons on the ground of nuclear deterrence and evolving security environment. Disarmament advocates often lack an explanation regarding how the security challenges will be tackled to create a climate of disarmament. On the other hand, pro-deterrence scholars often seem pessimistic regarding future challenges and do not provide any solutions for achieving nuclear disarmament. Many of them hold on to the realist theory of IR, arguing that the US needs to provide security by maintaining and modernizing nuclear weapons.

The US has an internal mechanism for deciding on how and when to modernize and which weapons to modernize. When we look at this internal process of modernization, it is necessary to examine the decision-making mechanism in the government itself. However, many decision-making analyses done by researchers adopt a state-centric perspective. While analyzing decision-making on nuclear issues, studies have focused on the bureaucratic actors and mainly state leaders' rational decisions to maximize state interests. On the Cuban Missile Crisis, Graham Allison's "Essence of Decision" is a seminal study of the decision-making process regarding nuclear weapons but ignores the non-state actors. Graham Allison identifies three models in his research: Rational Actor (RAM), the Organizational Processes Model, and the Bureaucratic Politics Model.³⁵ In his RAM model, he explains that decision-makers are the key actors; they set the goals, evaluate the importance of the goals, and calculate the benefits and costs of each action. Eventually, they choose the most profitable action with the highest benefits and lowest costs. The second model he identifies, Organizational Process Model, implies that much foreign policy results from "management by muddling through." He argues that foreign policymakers usually rely on standard operation procedures (SOPs) for

³⁴ Waltz, Kenneth N. "The Spread of Nuclear Weapons: More May Be Better." *The Adelphi Papers* 21, no. 171 (September 1, 1981): 1–31. <https://doi.org/10.1080/05679328108457394>.

³⁵ Allison, Graham. *Essence of Decision: Explaining Cuban Missile Crisis*. Boston: Little, Brown and Company, 1971, p. 5.

most decisions. The government consists of loosely allied organizations with leaders sitting on top of this conglomerate.³⁶ The government's response to a crisis or a situation where a decision is necessary reflects the independent output of those organizations. The last model is also known as the Government Politics Model, which holds that the decisions result from the bargaining process among various governmental agencies with divergent interests in the decision outcome.³⁷ Unlike the first model, there is no unitary actor but many players focusing on diverse international issues. This model explains the diversion from the ideal rational decision scenario by underscoring the political bargaining and maneuvering behind the curtain.³⁸

What is important for this thesis is that Graham Allison only includes players within the governmental machinery in decision-making. Though his book was written in 1971, many defense companies already existed and started establishing departmental bodies to build closer ties with policymakers. There needs to be more research considering outside factors in the process. Çağlar Kurç and Sibel Oktay bring a new perspective by examining the impact of defense firms on armament cooperation and governmental decisions. Though they only focus on policies involving conventional weapons, they argue that many theories in International Relations use a state-centric view, assume actors' interests as given, and develop decision-making mechanisms that only focus on the state. Instead, defense firms also play a significant role in the global economic landscape, where government officials make procurement decisions.³⁹

The way defense companies play a role in decision-making is through the Military-Industrial Complex. This complex functions through several methods of lobbying. Companies lobby legislative actors and bureaucrats to showcase and sell their products by building closer ties with the regulatory bodies. There is rich literature focusing on the impact of lobbying on defense policy. Though it is primarily in the conventional domain, it gives us a glimpse of how lobbying takes place in the nuclear weapons field. In this respect, Jordi Calvo Rufanges explains the military-industry triad: Defense economics, the military-industrial complex and

³⁶ Ibid, 67.

³⁷ Ibid, 145.

³⁸ Ibid, 148.

³⁹ Kurç, Çağlar, and Sibel Oktay. "Taking Production Relations Seriously: The Role of Defence Firms in Armaments Cooperation." *European Security* 27, no. 4 (October 2, 2018), p. 469. <https://doi.org/10.1080/09662839.2018.1520699>.

the military-economic cycle.⁴⁰ He argues that military lobbies participate in defense economics via the military-economic cycle. The work of the lobbies is to get results; for this purpose, they aim to persuade parliamentarians, policymakers, and anyone in law-making. Scholars have attempted to define lobbying in their own way, but eventually leading one general definition: building ties with governmental officials. Douglas Schuler, Kathleen Rehbein, and Roxy D. Cramer define lobbying as a political strategy “to reduce uncertainty driven by the regulatory environment and receive favorable treatment.”⁴¹ Uncertainty is generated from the competitive atmosphere driven by government bodies, such as the Air Force. Jim Hyung Kim notes that what is essential about successful lobbying is to be regarded as trustworthy with an insider status in the government.⁴²

Lee Drutman’s study provides a comprehensive overview of the growth and critical points of corporate lobbying. In a supporting argument to Jim Hyung Kim and Douglas Schuler et al., he explains what it takes to be a lobbyist. According to him, lobbying is a serious business that requires considerable money and time to monitor government agencies, research policies, and convince policymakers that a group's position is correct.⁴³ Yan Zhang and Li Haiyang also argue that lobbyists should work on building solid ties with the political and regulatory bodies to increase their likelihood of being informed about future opportunities.⁴⁴ Lobbying is not a new phenomenon, though. Lee Drutman analyzes the history of corporate lobbying, starting from the 1950s and 1960s. However, he characterizes the lobbying of those times as “not particularly influential.” The political awakening of corporate lobbying came about in the 1970s, and the political expansion and entrenchment began to be shaped in the 1990s.⁴⁵ Many companies started opening their Washington and Brussels offices. Lawyers represented the largest companies with external relations departments between the 1970s and 1990s, as

⁴⁰ Jordi Calvo Rufanges, “The Arms Industry Lobby in Europe.” *American Behavioral Scientist* 60, no. 3 (March 2016), p. 307. <https://doi.org/10.1177/0002764215613406>.

⁴¹ Schuler, Douglas A., Kathleen Rehbein, and Roxy D. Cramer. “Pursuing Strategic Advantage through Political Means: A Multivariate Approach.” *The Academy of Management Journal* 45, no. 4 (2002), p. 660. <https://doi.org/10.2307/3069303>.

⁴² Hyung Kim, Jin. “Is Your Playing Field Uneveled? U.S. Defense Contracts and Foreign Firm Lobbying.” *Strategic Management Journal*, August 12, 2019, p. 1913. <https://doi.org/10.1002/smj.3061>.

⁴³ Drutman, Lee. *The Business of America Is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*, 2015.

⁴⁴ Zhang, Yan, and Haiyang Li. “Innovation Search of New Ventures in a Technology Cluster: The Role of Ties with Service Intermediaries.” *Strategic Management Journal* 31, no. 1, p. 93. (September 2009). <https://doi.org/10.1002/smj.806>.

⁴⁵ Drutman, Lee. “The Growth of Corporate Lobbying.” In *The Business of America Is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*. Oxford: Oxford University Press, 2015, p. 3.

they were believed to have better persuasion skills.⁴⁶ The most important reason for this time frame is the US involvement in several wars, such as the two world wars, the Korean War and Vietnam War, and the high political tension with the Soviet Union during the Cold War. As the two countries increased the size of their conventional and nuclear arsenals to secure themselves through deterrence, private defense companies started taking advantage of this military dependence. They realized that their chances to sell more weapons and expand their industry could grow fast if they engaged with governmental actors and gained an insider view. Gordon Adams' study on the Iron Triangle explains the fast pace of defense company activity in the 1970s. He studies the intentions of eight major defense firms in their Political Action Committee (PAC) contributions.⁴⁷ He examines the impact of PAC spending at the Federal level. According to him, the foundation of the PACs is an integral part of lobbying and campaign raising. As Lee Drutman explains, between 1976 and 1978, eight defense giants (Boeing, General Dynamics, Grumman, Lockheed Martin, McDonnell Douglas, Northrop, Rockwell, and United Tech.) formed their PACs. These formations are still essential for the companies' lobbying posture and government affairs strategy. The primary aim of the people in these committees is not to buy votes but access. John Gardner says that "a politician's vote can be corruptly influenced by other routes than campaign giving."⁴⁸

Matt Korda points out the rising trend since PACs first emerged: The revolving door.⁴⁹ Revolving door is a very effective way of lobbying that has existed since 1980s. According to him, lobbyists alternately occupied regulatory or oversight positions in government and corporate positions in the private sector. The practice of government officials leaving public service to work for companies they regulate has become common, especially in the United States. The revolving door means government officials improperly favor a company in awarding contracts and managing federal programs.⁵⁰ Matt Korda's research also provides numerical values regarding the development of lobbying as a corporate field. He writes that \$350 million has been contributed to the election campaigns since the 1990s. About 1000

⁴⁶ Ibid, 7.

⁴⁷ Adams, Gordon, 1941-. *The Politics of Defense Contracting: The Iron Triangle / Gordon Adams ; [Charts, Lillian Bogeinsky]*. Accessed from <https://nla.gov.au/nla.cat-vn375870>. New Brunswick, [N.J.]: Transaction Books, 1982, p. 110.

⁴⁸ Gardner, John W. "Forward." In *Campaign Money: Reform and Reality in the States*. New York, NY: Free Press, 1976.

⁴⁹ Korda, Matt. "Influence of the Defense Industry on US National Security Strategy." *Russia Matters*, November 12, 2021. <https://russiamatters.org/analysis/influence-defense-industry-us-national-security-strategy>.

⁵⁰ Ibid.

lobbyists are registered yearly with the US Government, which is growing fast.⁵¹ The literature on the revolving door is very scarce, especially on the nuclear weapon issues.

Why do defense companies invest so much money and hire so many employees to work in lobbying? What are the factors that trigger them to be politically active?⁵² Researchers elaborated on the motivations of companies to lobby governments. Micky Tripathi argues that the enormous defense budget of a government is the most critical driver behind companies' lobbying.⁵³ When companies know the budget amount, they tend to befriend the politicians and increase their external relations budget. On the other hand, when the defense budget is relatively small, companies do not risk entering the competition, as their chance of being awarded the contract decreases.⁵⁴ Ellis Aizenberg and Marcel Hanegraaff propose a similar argument.⁵⁵ Their research suggests that the increased government size leads to the increased access of corporations to the political system. Unlike large governments, small settings have few separate regulatory bodies to lobby.

However, companies lobby for various purposes in particular branches of a government, such as different ministries, departments, and commissions.⁵⁶ When there is a contract to be awarded, companies lobby to achieve what is best for their company rather than what is best for the public or the government. Lee Drutman lists several reasons why companies lobby. To him, the top reasons are the need to improve the ability to compete in governmental machinery, sustain ongoing relationships with the policymakers, and the government being a direct purchaser of the company's products.⁵⁷ Another significant reason is the competition among the firms. When a company is lobbying the government, others who produce similar systems feel obligated to engage in the competition and present their products to supersede each other.⁵⁸ Often, if the amount of the contract is enormous or if the weapon system to be

⁵¹ Ibid.

⁵² Selling, Niels. "What to Lobby on? Explaining Why Large American Firms Lobby on the Same or Different Issues." *Business and Politics* 22, no. 3 (2020), p. 450. <https://doi.org/10.1017/bap.2019.24>.

⁵³ Tripathi, Micky. "PAC Contributions and Defense Contracting." *Business and Politics* 2, no. 1 (2000), p. 54. <https://doi.org/10.2202/1469-3569.1003>.

⁵⁴ Ibid.

⁵⁵ Aizenberg, Ellis, and Marcel Hanegraaff. "Is Politics under Increasing Corporate Sway? A Longitudinal Study on the Drivers of Corporate Access." *West European Politics* 43, no. 1 (January 2, 2020), p. 187. <https://doi.org/10.1080/01402382.2019.1603849>.

⁵⁶ Ibid.

⁵⁷ Drutman, Lee. "How and Why Corporations Lobby." In *The Business of America Is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*. Oxford: Oxford University Press, 2015, p. 10.

⁵⁸ Ibid.

contracted would make the company gain prestige, companies also feel obligated to lobby and compete with other contractors.

Briefly, companies strive to be politically active in the competition and build closer ties with decision-making bodies. In the European context, Jordi Calvo Rufanges writes four essential ways they use for lobbying.⁵⁹ When companies want to lobby directly, the first step is establishing a working office in the same city as the policymakers, such as Brussels and Washington, D.C. He gives the example of the Swedish company SAAB having an office in Brussels next to the European Commission.⁶⁰ His second proposed way is to fund student clubs, think tanks, NGOs, and forums so they promote the increase of national defense budgets and their products through conferences, reports, papers, and debates. Kjolv Egeland and Benoit Pelopidas's study on think tank funding supports Jordi Calvo Rufanges' argument. According to their research, institutions that support the current nuclear order 'enjoy funding, political support, and policy relevance.' The 'stakeholder funding' has real effects on intellectual freedom, which many think tanks claim independent and objective.⁶¹

Third way for Jordi Calvo Rufanges is that defense firms attend export panels, where lobbyists try to gain recognition and influence by extending their networks. Lastly, Jordi Calvo Rufanges believes military lobby pressure results in a concrete government body where firms can continue lobbying through official channels. The most prominent example of this is the establishment of the European Defense Agency (EDA).⁶²

Lee Drutman adds two more ways to Jordi Calvo Rufanges's points: Entering coalitions with other organizations and producing a legislative strategy. The first one means that companies join forces with other groups with similar interests or goals. These groups can have a stronger voice and more influence by working together. Another way is to produce a legislative strategy, which means that they create a plan for how they will advocate for their interests and shape the laws and regulations governing their industry. This strategy can help them to be

⁵⁹ Rufanges, Jordi Calvo. "The Arms Industry Lobby in Europe." *American Behavioral Scientist* 60, no. 3 (March 2016), p. 314. <https://doi.org/10.1177/0002764215613406>.

⁶⁰ Ibid, 315.

⁶¹ Egeland, Kjolv, and Benoit Pelopidas. "No such thing as a free donation? Research funding and conflicts of interest in nuclear weapons policy analysis." *International Relations*, (2022). Accessed June 20, 2023. <https://doi.org/10.1177/00471178221140000>.

⁶² Ibid, 317.

more effective in their lobbying efforts.⁶³ Lobbyists also try to influence policymakers to support their interests by assisting them with writing new laws or regulations. This can make the lobbyists appear helpful because they have inside knowledge of the issues and can offer valuable insights to the policymakers. However, it can also be seen as problematic because it blurs the line between the interests of the lobbyists and the public interest. They talk to media agencies and monitor the developments closely. They often try to persuade members of Congress who have not yet made up their minds on a particular issue. These “undecided” members may be more receptive to the lobbyists’ arguments and more likely to be swayed by their efforts. Lobbyists may also focus their attention on these members because their votes could be crucial in determining the outcome of a particular legislative proposal. By engaging with these members and persuading them to support their position, lobbyists can increase their chances of success.

Lastly, Lee Drutman also writes that the average lobbying expenditure of a large firm, like Lockheed Martin, is around \$1,000,000, which can cover the above-mentioned ways. The revolving door concept also proves to be an effective way to lobby. As Matt Korda explained, it entails people moving back and forth between government jobs and jobs in the private sector, which can be an effective way for companies to influence policymakers without directly lobbying themselves. Instead of working for the company, individuals work for the government for a while and then return to the private sector, using their connections and knowledge to benefit their former employers. This situation can create the appearance that they are acting in the state's interests rather than the company, even though their true loyalty lies with the private sector. This is problematic because it creates conflicts of interest and erodes public trust in the government. Matt Korda argues that the person occupying the position in the government is usually a former employee of a particular firm.⁶⁴ Yet, Matt Korda’s main point is that defense procurement and national security should not be left to business deals reached behind closed doors but instead be transparent and go through democratic processes.⁶⁵ Though there are laws in the United States by which companies have to report the amount of money they use for lobbying and indicate lobbying purposes, personal relationships often have a more considerable impact on the decision-making process.

⁶³ Drutman, “How and Why Corporations Lobby,” p. 9.

⁶⁴ Korda, “Influence of the Defense Industry on US National Security Strategy.”

⁶⁵ Ibid.

To sum up, while the literature is rich on nuclear disarmament and pro-deterrence arguments, much research on the lobbying activities of defense companies lies in the conventional domain. Still, they provide a clue of their applicability in the nuclear weapons field. The defense procurement literature, likewise, is also heavily focused on conventional weapons. Therefore, this research will contribute to the literature by analyzing the relationship between defense companies and nuclear weapon modernization in the most recent era (2000-2020). The next chapter will focus on the conceptualization of the main components of this research.



Chapter 2: Theory

This chapter provides theoretical definitions of the main concepts under three headings: Nuclear modernization, defense procurement, and defense companies and lobbying. I explain the conceptual definition of modernization and discuss states' motivations. This thesis argues that there are four motivations, and lobbying is one of them. After outlining the types of modernization programs, I also explain the defense procurement process that takes place in a similar way in most countries. Lastly, I discuss ways and aims of lobbying.

I. Nuclear Modernization

Nuclear modernization refers to upgrades to existing nuclear warheads, their delivery vehicles, or the platforms that carry them, such as airplanes or submarines. The modernization can involve modifications to existing stock, building replacements, or an increase in overall numbers. In states with long-established nuclear weapon programs and existing systems nearing the end of their service lives, modernization takes on a different form compared to states at an earlier stage of development. The common element across all modernization programs is that they are all expected to deliver an increase in the nuclear capabilities of the possessor state in some way, such as increased range, destructive power, or survivability. There have been joint efforts by states to prevent the pace of modernization or eliminate nuclear weapons. The steps require all states to participate equally in that goal, especially those with nuclear weapons or who wish to have them.

1. The Motivations for Nuclear Modernization

States are motivated by several reasons to modernize their nuclear weapons by expanding their arsenal and improving their weapons' quality. I identified four explanations for nuclear modernization: The security model, prestige model, technological determinism, and lobbying model. Provided that a state has nuclear weapons, these four factors motivate it to modernize its nuclear weapons and accelerate the modernization process. Nuclear modernization is a technological process. In other words, it concerns replacing existing technologies with new ones, qualitatively or/or quantitatively. Since technology cannot be removed from the picture, technological determinism appears as the default explanation for nuclear modernization.

Technological determinism is the belief that technology drives social change and shapes human behavior rather than the other way around. In the context of nuclear modernization, technological determinism plays a role in shaping how countries think about and approach upgrading and modernizing their nuclear weapons. Technological advances can make nuclear weapons more sophisticated, precise, and lethal, which may lead countries to believe that they must modernize their nuclear arsenal to maintain their military superiority or deter potential adversaries. Moreover, the development and deployment of new technologies can create a sense of urgency or competition among countries, which can further drive nuclear modernization efforts.

The belief in technological determinism can also shape the discourse and policy debates surrounding nuclear modernization. For example, proponents of modernization may argue that it is necessary to keep up with technological advancements and maintain a credible nuclear deterrent. In contrast, opponents may argue that modernization is too expensive or could create a dangerous arms race. Technological determinism can be a powerful force that shapes how countries think about and pursue nuclear modernization, and it can have significant implications for global security and stability.

Technological determinism suggests that states seek to keep pace with the latest technological developments to maintain their strategic capabilities and ensure their security. Every weapon type, including nuclear warheads and delivery vehicles, has a specific life cycle and must be renewed or replaced after a certain period of time. They must be checked and updated regularly to maintain their shelf life. If the weapon completing the life cycle is replaced with a new one, the old one enters the retirement process and is then dismantled.

Countries that have the capacity to build a hydrogen bomb need to possess uranium or plutonium as well as two other isotopes of hydrogen, called deuterium and tritium. While uranium has a relatively longer life span, plutonium and tritium aging constitutes a vital matter for the nuclear-weapon states to ensure safe and reliable deterrent. Plutonium isotopes vary, and each is fissionable, which means the atom's nucleus splits apart if struck by a neutron.⁶⁶ Each isotope has a specific life cycle, meaning they decay over time. A plutonium pit, a spherical shell of plutonium, is a critical component of a nuclear warhead today. Pits need to be checked and occasionally replaced, depending on the circumstances.

⁶⁶ "Plutonium." World Nuclear Association, April 2021. <https://world-nuclear.org/information-library/nuclear-fuel-cycle/fuel-recycling/plutonium.aspx>.

Modernization of nuclear weapons combines reusing existing plutonium pits and producing new ones.

Strategic delivery vehicles also have a specific life span. Once a state acquires a missile, it must be maintained; eventually, it will be replaced, modernized, or eliminated. Several factors come into play in missiles and other delivery vehicles, such as submarines' life span.

Companies must be able to produce plenty to cover the needs of the states. First, all missiles and rockets need a propellant to be fired. The propellant is affected by temperature, humidity, chemical decomposition, static storage, poor-quality ingredients, incorrect ratios, and mixing. While air-to-air and surface-to-air missiles have a homogenous propellant, chemical explosive compounds, ballistic missiles have a heterogenous propellant. Their level of resistance to humidity and temperature may differ. Since states' territory can cover various climates, strategic delivery vehicles must be stored well. However, it is hard to prevent damage when they move due to environmental conditions.⁶⁷

Secondly, some treaties require unsafe or relatively old missiles to be eliminated. The life span of the missile can be extended by adding more quality ingredients used in the propellant and changing the propellant power completely. Another factor is the physical damage a missile gets if used in a war. This means that it has to be replaced, amended or abolished, which completes the life span of that missile. Nevertheless, the rate at which states modernize their nuclear arsenals is not constant over time, which indicates that factors other than technology come into play.

Furthermore, countries may also upgrade or modernize their nuclear weapons in response to security threats, an argument that is at the center of the security model. When two or more countries compete for power or influence in a particular region or over a specific issue, they believe it necessary to modernize their nuclear weapons to maintain or increase their military might and deter potential rivals or adversaries. This can create a situation of an arms race, where one country's modernization efforts may trigger similar efforts from other countries in a vicious cycle of competition and escalation. However, countries sometimes fail to react to

⁶⁷ Tincher, Douglas. "Myanmar Nonproliferation Dialogue: Missile Safety & Operability Considerations." Savannah River National Laboratory, NNSA, December 2014. https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/attachments/141204_TincherPresentation.pdf.

potential challengers or choose to modernize their arsenals when no security threats are on the horizon.

Nuclear modernization can happen not only for strategic reasons but also for prestige reasons. In other words, a country may see modernizing its nuclear weapons as a way to enhance its international status, reputation, or prestige rather than just for military purposes. This could be particularly true for countries that see nuclear weapons as a symbol of power and prestige in the global arena. However, modernizing nuclear weapons for prestige reasons can also create tensions and instability, as it may trigger arms races and fuel rivalries among countries.

One of the factors is the political activities of the private companies. When considering the lifespan of missiles within the framework of technological determinism, lobbying can still play a significant role in the modernization process in several ways. Defense companies engaging in lobbying efforts can advocate for increased funding and budget allocation towards research, development, and acquisition of advanced missile systems. By leveraging their influence and relationships with policymakers, defense companies can shape the priorities and preferences within the defense establishment, potentially favoring the adoption of newer missile technologies. Moreover, they can gain a competitive advantage in the modernization process. By advocating for specific missile technologies or emphasizing their capabilities in the areas that need modernization, they can position themselves favorably in the competitive defense market. The lobbying factor will be explained and analyzed in detail in the empirical chapter of this thesis.

i. Types of Nuclear Modernization Programs

The modernization of a nuclear arsenal takes place to deliver an increase in the overall capabilities by increased range, destructive power and/or survivability. When a nuclear weapon has completed its life cycle, it needs to be renewed with the same or a better one. I identified five types of nuclear weapon modernization. The first is to replace the weapon with the exact one, with no added qualities, provided that the existing features meet the possessor's defense requirements. The second one is the replacement with a completely new weapon type, by improving its every aspect and introducing a new kind of weapon by retiring the old one. This usually occurs with emerging technologies that better adapt and meet the defense

challenges by eventually diminishing the usefulness of the old technologies. For example, a country may opt to use a drone instead of an aging helicopter.

The third way is to add specific improvements to the same weapon system, such as increasing its range or speed. Modernization can also occur by extending a weapon's life span, where the qualities of the weapon system are considered sufficient for global challenges. This usually takes place with submarine-launched ballistic missiles (SLBMs). Lastly, a state can increase the overall numbers in its stockpile by adding the same type of weapon to its arsenal. The next part will explain how weapon acquisition for modernization works inside the governmental machinery.

2. Defense Procurement

Defense procurement and weapon modernization are closely related concepts in the context of military operations. Defense procurement refers to the process of purchasing goods and services for the military, which includes everything from ammunition to vehicles to technology systems. On the other hand, weapon modernization refers to upgrading and modernizing existing military equipment and technology. The relationship between defense procurement and weapon modernization is that defense procurement often includes acquiring new equipment and technology intended to replace or augment existing equipment. This new equipment is typically designed to be more advanced, efficient, and effective than the equipment it replaces. The defense procurement conceptualization in this part will be on the strategic delivery vehicles that carry nuclear warheads.

Defense procurement may also involve purchasing components and systems that can be used to upgrade existing equipment and make it more modern and practical. For example, a country may purchase advanced sensors or targeting systems that can be installed on existing tanks or aircraft, improving their capabilities and extending their service life. When a country is facing budget constraints, it becomes even more critical to carefully prioritize and manage the defense procurement process in order to ensure that the military has access to the necessary equipment and resources to defend the country. Many factors depend on the country's financial capacity, the geopolitical situation, the state of war or the possibility of war, geography, and human ability to produce and employ the procured weapon. The critical

questions are, how do states decide what to procure, which company to procure from, when to procure and how much of the budget should they allocate for a specific procurement?

First, a state needs to decide what to buy. Governments need to decide on which weapons system they want to procure in an environment that is way open to change and tends to evolve. Secondly, the decision maker must consider what will happen in ten or twenty years. Though there is unpredictability in arms procurement regarding the future, risks and technical hurdles must be regarded, as well as the production process of a particular weapons system. Timing is another factor a state needs to consider. The procuring state should consider when a weapon system will be delivered and how long it can be used. For that reason, many states invest in products that are convenient to use for long times and serviceable against the threats that may occur in the future.

The fourth factor is the procurement pathway. This involves different types of decision-making because a state can either buy from foreign companies or domestic ones, provided that it has defense industries. If it secures a weapon system from a foreign state, the state may decide which company it will procure from. Defense companies also considerably impact this decision; this will be analyzed later in this study. Lastly, how to buy is another factor states must pay attention to. This is because there are two ways: One is to buy an existing product off-the-shelf - direct procurement – while the other is developing a new weapons system by a company. Direct procurement is likely quicker than developing a new technology indigenously due to technological unknowns.

Regarding nuclear weapons and technology, Gheorghe lines six pathways in acquiring them.⁶⁸ A state looking to develop a nuclear weapons capacity has six options. It can first develop the required materials and technology on its own, domestically. The second option is multinational cooperation, in which numerous nations work together to develop a certain nuclear technology. Third, since the country has access to the nuclear market, also known as nuclear trade, it can buy these components and technologies from other countries. Fourth, states might use smuggling networks. Finally, a state may take over a defeated enemy's nuclear plants. Lastly, by providing resources, technology, or both that can be utilized in a

⁶⁸ Gheorghe, Eliza. "Proliferation and the Logic of the Nuclear Market." *International Security* 43, no. 4 (April 1, 2019): 88–127. https://doi.org/10.1162/isec_a_00344.

weapon program, international organizations established to support nations in expanding their civilian nuclear programs may unintentionally assist those interested in proliferation.

The decision for arms procurement includes critical tradeoffs and is directly related to the state's security in terms of military posture, doctrine, international arms transfer, the politics of the company, the production phase, etc.⁶⁹ It has a direct implication on military power and effectiveness. At the outset, the defense procurement process works like a machine in a smooth and methodological way. There is an internal mechanism for this type of procurement. First, the military requirement must be defined, and the government must validate the need for that weapons system.⁷⁰ The government must approve the procurement and announce funding for it. Therefore, the authorities must create an official statement of the requirement. The procurement agency must decide the strategy (development or off-the-shelf). The government opens the procurement to request proposals from defense companies. In the bid solicitation process, some kind of competition among the companies that produce a weapon system that meets the conditions of the government is expected. After the negotiations with the selected firm, a contract is awarded to it, and the administration of the contract to purchase the piece of equipment is finalized. Lastly, the product is delivered or started to be developed.⁷¹

Nonetheless, some argue that, in reality, different factors come into play. States determine their goals in their military strategies and the decision-making on arms procurement, and tensions occur regarding those goals. The first goal is that governments prefer state-of-the-art military systems to not look inferior to their adversaries.⁷² Second, they are concerned about the supply's security and would want no hassle during the process. Thirdly, they take the indirect national impacts of the procurement into account. For instance, they pay attention to how the budget allocation will affect the overall economy, contribute to the general industry, and create employment benefits for the state. Lastly, states consider whether the weapon to be bought will be worth its money and lead to domestic backlash or support from the population and other government bodies. This is because most of the time, a state buys its weapons from another state, then the price has to be paid while factoring in the exchange rate. Yet, if the

⁶⁹ Oudot, Jean-Michel. "Performance and Risks in the Defense Procurement Sector." *Journal of Public Policy* 30, no. 2 (2010), pp. 203. doi:10.1017/S0143814X10000073.

⁷⁰ Ibid, 205.

⁷¹ Ibid.

⁷² Ibid, 211.

weapon is produced indigenously, the cost will also decrease due to the lack of overseas transportation.⁷³

According to Colin Gray, defense procurement has four corners: policy, strategy, acquisition, and technology.⁷⁴ These four issue areas have distinctive functions, though they may seem to overlap in practice. A good practice, therefore, is the balance of four corners, where they support each other. Policy decides what should be achieved. The strategy adopted by a country will determine how it defines the ultimate goal. In other words, a government's strategy will influence how it determines what is necessary to achieve security and what types of defense procurement are required to achieve that goal.

While technology is about a country's capabilities, the acquisition part provides the weapon system and the ways a country can acquire them. If the policy is unclear, strategic guidance for weapon acquisition becomes guesswork because planners will not know what to accomplish. Policy goals will not be achieved if the strategy is missing or incompetent, and the weapons acquisition process will lack authoritative direction. If the weapons acquisition process is inefficient, then what should be the attainable policy goals and sensible strategy will be vitiated by a lack of ready and suitable weaponry. In addition, the country's technology base will not be exploited anywhere near its optimum potential. If a government neglects or makes unwise investment decisions concerning its technological base, the resulting weapons acquisition process will lack the necessary technological qualities to effectively support the country's military strategy and policy in a timely manner. Therefore, a state needs to be aware of its technological base. It would be unwise if a state attempts to procure a weapon if it is not ready or has no knowledge base.⁷⁵

The next part will focus on the role that defense companies play during the process of defense procurement.

3. Defense Companies and Lobbying

Defense procurement is a business that requires a lot of consideration. It is rife with problems between weapon manufacturers and government agencies. Though the legislative dictates the

⁷³ Rogerson, William P. "Chapter 12 Incentive Models of the Defense Procurement Process." In *Handbook of Defense Economics*, 1, pp. 309–46. Elsevier, 1995. [https://doi.org/10.1016/S1574-0013\(05\)80014-6](https://doi.org/10.1016/S1574-0013(05)80014-6)

⁷⁴ Baylis, John, James Wirtz, Eliot Cohen and Colin Gray. "Strategy in the Contemporary World." (Oxford University Press, 2003): "Technology and Warfare", pp. 121-136.

⁷⁵ Ibid.

decision to procure in a country, in many states, the executive (the ministry of defense) mainly carries out the process and decides on what to procure after being lobbied.⁷⁶ For technological innovation and weapon development, the officers rely on defense companies. Though the companies are the other side that the government signs contracts with, they may have an enormous influence on the decision-making process of arms procurement. There is no doubt that they would want states to modernize their arsenals, develop new systems, refurbish the existing ones, and improve the capabilities, such as increasing the range of a missile and adding new ones to the existing stockpile. This is because companies make enormous gains from only one weapon system. Since they are to make a profit as much as possible, in the bid solicitation phase I outlined above, they are in stark competition with others who can produce the same weapons system. To prevail over the others and be awarded the contract, they resort to various strategies; the most known is lobbying the government.

In this part of the study, I will explain the lobbying strategies of the major defense firms. The first action that companies take is to establish a departmental body in which the government affairs and connections can be controlled. Gordon Adams refers to this as the "Political Action Committees."⁷⁷ The lobbyists, the activities, the recipients, and the budget to be allocated are decided in these committees, while some companies call this establishment by different names, like the corporate governance department.⁷⁸ Due to wars, military interventions, and security tensions, many corporate action committees are formed upon the defense industry ballooning.⁷⁹ These committees help companies establish and consolidate the relationship between the congressional and industrial sides.⁸⁰ Within these committees, Jordi Calvo Rufanges notes that there are four effective ways that lobbyists commonly resort to influencing government agencies' decisions and promoting their products.⁸¹ The first is

⁷⁶ Jonathan M. Karpoff, D. Scott Lee, and Valaria P. Vondra, "Defense Procurement Fraud, Penalties, and Contractor Influence," *Journal of Political Economy* 107, no. 4 (1999), pp. 809–42, <https://doi.org/10.1086/250080>

⁷⁷ Gordon Adams 1941-, *The Politics of Defense Contracting: The Iron Triangle* / Gordon Adams; [Charts, Lillian Bogensky], p. 116. <https://nla.gov.au/nla.cat-vn375870> (New Brunswick, [N.J.]: Transaction Books, 1982).

⁷⁸ Leadership and Corporate Governance: Political Disclosures. Lockheed Martin. <https://www.lockheedmartin.com/en-us/who-we-are/leadership-governance/board-of-directors/political-disclosures.html>.

⁷⁹ Adams, *The Politics of Defense Contracting: The Iron Triangle*, p. 116.

⁸⁰ Ibid.

⁸¹ Jordi Calvo Rufanges, "The Arms Industry Lobby in Europe." *American Behavioral Scientist* 60, no. 3 (March 2016), pp. 305–20. <https://doi.org/10.1177/0002764215613406>.

establishing offices in the cities where legislative activities occur, like the capital cities, to build closer relationships with government officials.

The second way is to participate in export panels, conferences, and forums to gain recognition, build connections with government officials, and advertise their products.⁸² Events like this provide a platform for defense companies to showcase their products and services to potential customers, including government agencies and military organizations. Weapons manufacturers can network with potential clients, demonstrate their capabilities, and build relationships that may lead to future contracts. However, attending conferences and exhibitions alone is unlikely to guarantee a contract. Defense companies still need to demonstrate that their products and services meet the needs and requirements of the customer and that they can deliver on time, on budget, and with high quality. In addition, defense companies may need to go through a competitive bidding process or demonstrate that they offer unique or innovative solutions that set them apart from their competitors.

Thirdly, defense companies can fund the related activities of research associations, think tanks, and projects focusing on defense and security. The fact that think tanks can significantly influence public policy is open to being exploited by defense companies. They aim to impose their interests and preferences in their publications and put forward their solutions via think tanks, which are primarily led on the basis of intellectual independence.⁸³ Likewise, another way could be lobbyists who serve as visiting fellows to the think tanks and use their research to push for their companies' liking.

Fourthly, defense firms can push for an association for the defense industry to establish closer relations with the government. While defense companies send their employees to obtain knowledge with an insider status from the government and bend their decisions to their liking, they also have to report their annual lobbying activities to the government to provide full transparency in many cases.

Perhaps the most efficient way for a company to get a weapon contract is to employ one of the former government officials. A former government official, mainly in the ministry of

⁸² Raytheon Technologies CEO to present at Barclays Industrial Select Conference. <https://www.rtx.com/news/news-center/2021/02/09/raytheon-technologies-ceo-to-present-at-barclays-industrial-select-conference>

⁸³ Egeland, Kjølsv, and Benoît Pelopidas. "No Such Thing as a Free Donation? Research Funding and Conflicts of Interest in Nuclear Weapons Policy Analysis." *International Relations* 1, no. 23 (December 22, 2022). <https://doi.org/10.1177/00471178221140000>.

defense, has a strong insight into the internal acquisition, operation, and audit process. The person can guide the company to follow in several footsteps, making it more prominent than the other companies bidding for a contract. The government agency can also employ a former lobbyist if that person follows governmental ethics rules. This process is called the revolving door. In other words, lobbyists alternately occupy regulatory or oversight positions in government and corporate positions in the private sector. Former lobbyists working in the ministry of defense may facilitate the contracting process for their former employer and significantly, also improperly, favor a company while awarding or managing programs. Sometimes, governments impose a waiting period of one or two years for employees to start working in a defense company after leaving the government. By setting a waiting period, the government seeks to limit the influence that former government employees may have on the procurement process and maintain the public's trust in the integrity of the procurement system.

The most direct way of lobbying is to contribute money to members of parliament or congress, as they approve most defense acquisitions in the end. Contributions usually take place during decision-making processes on a significant law, such as foreign weapon sales, internal purchases, defense budget, number of forces deployed in other countries, or simply during elections. A lawmaker can vote in favor of a law supporting a weapon sale from a specific company, for instance, if that lawmaker receives contributions from the company. Similarly, a parliamentarian can sponsor a bill promoting a company's foreign sales. With the practices mentioned above, this cycle is simply a part of the military-industrial complex, which I will explain in detail in my results chapter.

The military-industrial complex entails relationships between defense contractors and members of the parliament, whereby the parliament approves a sale in exchange for financial contributions. Therefore, the money goes back to the company in even twentyfold what the company paid in the first place. This cycle has continued for the last seven decades in many countries and intensified with the emergence of significant weapon companies. While contributions from defense companies to lawmakers are legal, rules and regulations govern these contributions to ensure transparency and accountability. They must be disclosed publicly, and there are limits on how much an individual or organization can contribute to a candidate's campaign.

In many countries, it is illegal for defense companies to make direct contributions to the ministry of defense officials, as this would be considered a bribe and a violation of ethics rules. However, defense companies may also use lobbying to influence defense officials and decision-making processes. Lobbyists hired by defense companies may meet with officials to discuss their products or services, provide information and analysis, and advocate for policies that benefit the company. Lobbyists may also work to shape the language of legislation or regulations to favor their clients. In most cases, the ministry of defense officials internally approves acquisitions for their military. However, the parliament is the central body that determines the need for acquisition. Ministry officials conduct meetings with parliament members for a condition of another weapon acquisition. Then, the parliament includes this in the defense budget and passes it for the president or prime minister's approval. Then, the ministry of defense is granted permission to publish a call for a contract announcement for a specific weapon and open the process for bidding.

Similarly, a member of the parliament may sponsor a bill on how crucial it is to acquire a specific weapon from a particular company and lists several convincing reasons. Those who receive contributions from that company tend to vote in favor of the bill. After the bill is approved, the ministry of defense publishes the contract announcement for that weapon and calls for bidding. This process often happens smoothly.

To sum up, weapon modernization, defense procurement and lobbying are all interrelated concepts. These concepts work together, and one impacts another. As mentioned earlier, their mutual relationship directs us to the Iron Triangle concept proposed by Gordon Adams, which focuses on the ties between parliamentarians, bureaucrats and private actors which relatively conduct the above-mentioned activities.

To find the relationship between modernization and defense firms, the next chapter will outline the methodology and research design used in this thesis.

Chapter 3: Methodology and Research Design

This thesis explores the relationship between nuclear modernization and defense lobbying in the United States. My hypothesis is that the more defense companies spend on lobbying, the more likely the government will engage in nuclear modernization. This study contributes to the literature on the relationship between lobbying and government contracting, particularly in the context of nuclear modernization. My timeline in this thesis is between 2000 – 2020. First, I identify the defense companies whose lobbying activities I will analyze. These companies are Lockheed Martin, Raytheon, General Dynamics, Northrop Grumman, and Boeing. They lobby the most among other US defense companies in the Top 100 list of Stockholm International Peace Research Institute (SIPRI) published by 2021.⁸⁴ They are preferred because they can produce the most sophisticated and complex defense systems required to sustain US national security, mainly the strategic delivery vehicles to carry nuclear warheads.

This thesis employs both qualitative and quantitative methods. In the first qualitative part, I collect information and data mainly on the military-industrial complex in the United States, US nuclear modernization, and defense lobbying in the country. My primary resources for the military-industrial complex are scholarly articles, briefings, historical speech records, and official government reports. During this process, it is necessary to know the nuclear arsenal of the United States to track which weapon systems are being or were modernized. I create a list of the US's current nuclear weapon inventory that consists of nuclear warheads and strategic delivery vehicles. To make this list, I use the official data from Department of Defense websites, World Nuclear Forces of SIPRI Yearbooks, Federation of American Scientists sources, Military Balance yearbooks published annually by the International Institute of Strategic Studies, Nuclear Posture Reviews that are published in the DoD and press releases and official announcements.

US Nuclear Forces (Current) ⁸⁵					Main Contractor ⁸⁶
5,244 warheads	1,770 deployed		1,938 reserved	1,536 awaiting dismantlement	

⁸⁴ Alexandra Marksteiner et al., “The SIPRI Top 100 Arms-Producing and Military Services Companies, 2020” (Stockholm International Peace Research Institute, December 2021), <https://doi.org/10.55163/WDQZ7897>.

⁸⁵ Data on the current nuclear forces is retrieved from the Federation of American Scientists, Nuclear Notebook publications and US Department of Defense website.

⁸⁶ Data on the defense contractors for each weapon type is retrieved from the Major Defense Acquisitions Programs publications of the US Department of Defense.

<u>Land Based Missiles</u>	Number	Year Deployed	Warhead carried	Number of total warheads	
ICBMs					
LGM-30G Minuteman III	400				Boeing
Mk-12A	200 launcher	1979	1–3 W78 x 335 kt (MIRV)	600	
Mk-12A SERV	200 launcher	2006	1 W87 300 kt	200	
<u>Sea-Based Missiles</u>					
Ohio-Class Ballistic Submarines (SSBNs), to be replaced by Columbia-Class	14 - each carries up to 20 SLBMs				
Columbia-Class SSBN to be built	2: SSBN 826 - SSBN 827				General Dynamics
UGM-133A Trident II D5 / D5LE (SLBM)	14 - 280 (total)				Lockheed Martin
Mk-4A (deployed in 2008)		2008	1–8 W76-1 x 90 kt (MIRV)	1,511	
Mk-4A (deployed in 2019)		2019	1–2 W76-2 x 8 kt (MIRV) ^j	25	
Mk-5		1990	1–8 W88 x 455 kt (MIRV)	384	
<u>Air-Based Missiles - Strategic</u>					
B-52H Stratofortress	87/46	1961	ALCM/W80-1 x 5–150	500	Boeing
B-2 Spirit, to be replaced by B-21	20 - 20	1994	B61-7 x 10–360/-11 x 400 /// B83-1 x low-1,200	288	Northrop Grumman
	Total 107 - 66				
B61-12 , B61-3, -4	100				Boeing
Air-launched cruise missile (ALCM), to be replaced by Long-Range Standoff Weapon (LRSO)					Raytheon
<u>Non-Strategic</u>					
F-15E, to be replaced by F-35 DCA	80	1979			Boeing, Lockheed Martin
F-16C/D	70	1979			General Dynamics, variants produced by Lockheed Martin, as well
F-16MLU (NATO)	40				General Dynamics, variants produced by

					Lockheed Martin, as well
PA-200 (NATO)	40				Lockheed Martin
Retired, awaiting dismantlement				1,536	

Table 1: US Nuclear Forces 1

In order to analyze the defense budgeting process in the United States, Congressional Research Service's Annual Defense Primers are my primary source. I also refer to scholarly articles on defense lawmaking, particularly from the Federation of American Scientists (FAS). In my next step, to track the companies' lobbying records, I use data from the US-based NGO, OpenSecrets. To provide empirics on lobbying on Congress members and revolving door, Federal Election Commission discloses all Congress members served in any term, if they received any money from any company. I use filters for these five companies to obtain tangible examples. For revolving door, Project on Government Oversight (POGO), a US NGO, provides data on former government officials who later sought employment in defense companies. Similarly, top defense companies' boards of governors tend to be retired civil servants that served in the Department of Defense, Department of Energy, or Congress. I refer to company websites to collect data on current employees and search for their backgrounds.

In my second step, I aim to show the correlation between nuclear modernization and lobbying spending and test my hypothesis. For this purpose, I collect data on the nuclear weapon modernization programs in the United States for this 20-year period from open sources. My primary sources are Congressional Research Service's Appropriations and Authorization publications for each fiscal year for defense. These primers provide detailed information regarding the amount spent on modernization programs and the type of programs. However, they do not provide information on the contracted company. Then, I refer to the Department of Defense's annual Major Defense Acquisition Programs publications to collect information regarding the contracted companies. Through these publications, I obtain information on primary and secondary contractors for a specific weapon modernization. The primary contractor is the main contractor responsible for the overall management and execution of the weapon system. This includes coordinating with the government agency procuring the defense system, managing subcontractors, ensuring compliance with regulations, and

delivering the final product to the customer. The primary contractor is typically the company that wins the bid for the contract.

Secondary contractors are companies or organizations that provide specialized services or components for a defense project. The government agency may hire secondary contractors to perform specific tasks or provide specific components needed for the project. A secondary contractor may be responsible for developing a specific subsystem or providing technical expertise in a particular area, such as the engine. In some instances, I double-check the amount and contractors via the Contracts website of the Department of Defense⁸⁷ and often the reputable news outlets on the Pentagon and defense, such as Roll Call and Defense News.

Upon collecting data on the modernization programs between 2000 – 2020, I also collect data on the lobbying spending for these five companies between the specified years. As the data on the House of Representatives and Senate websites are limited to 2010 - 2020, I obtain data via a non-governmental organization, OpenSecrets, the premier open-source data provider on money in politics in the United States. After I create my datasets on the modernization programs and lobbying spending, my aim is to check the relationship between the two by running correlations on R. My dependent variable is nuclear modernization, and my independent variable is lobbying.

To be able to run my correlations, I create count variables for each of the major five companies based on the modernization contracts they were awarded each year. For instance, if Lockheed Martin was awarded five contracts in 2011, my count variable for Lockheed Martin is 5. The number of contracts on weapon systems for companies can fluctuate yearly due to the intense competition between companies. To test my hypothesis, I run correlations between five companies' lobbying spending and the number of contracts awarded between these years. To strengthen my results, I sum up the amount of money received in the contracts that these five companies were awarded each year. I run correlations between the contracts amounts and the money spent on lobbying.

The next chapter will discuss the results in three separate sections. The first section will focus on the qualitative findings, including the historical evolution of the military-industrial complex, nuclear modernization, and lobbying activities of major defense companies. The

⁸⁷ “Contracts.” U.S. Department of Defense, n.d. <https://www.defense.gov/News/Contracts/>.

second quantitative section will provide and discuss the correlation results. In the last part, I will provide empirical data on the other explanations of modernization, which are security and prestige reasons and technological determinism.



Chapter 4: Empirics

The theoretical framework has been discussed in the theory section. Since this thesis examines the nuclear modernization program and defense companies in the United States, this section will address relevant empirics qualitatively and quantitatively. In this chapter, I will discuss the results of my analysis.

I. Qualitative Findings

1. Historical Background

The main concept in this thesis is the military-industrial complex in the United States. It is important to address its historical roots and how the complex has maintained and even increased its impact on the American political environment over the years. Former US president Dwight Eisenhower warned in early 1961 that "an immense military establishment and a large arms industry" had emerged as a hidden hand in US politics.⁸⁸ Outgoing President Eisenhower first coined the term military-industrial complex in his famous farewell speech. For Eisenhower, after the world wars and Korean War, the US was compelled to create a permanent armaments industry of vast proportions.⁸⁹ At that time, the massive arms industry was a new experience for the government. However, Eisenhower points out that the complex soon had gained a "misplaced power" where it could direct the government to pursue war purposes. The government must be aware of the "grave consequences" of such an immense arms industry.⁹⁰ However, this seems to have failed in the US. In April 2022, Stockholm International Peace Research Institute wrote, "World military expenditure passes \$2 trillion

⁸⁸ "It is what Eisenhower described as the 'misplaced power' of the military-industrial complex, power that makes public opposition and even thousands of dead soldiers, immaterial. War may be hell for some, but it is heaven for others in a war-dependent economy," Jonathan Turley, a professor of Public Interest Law at George Washington University said in his opinion piece to Al Jazeera.

⁸⁹ "President Dwight D. Eisenhower's Farewell Address (1961)." National Archives, January 17, 1961. <https://www.archives.gov/milestone-documents/president-dwight-d-eisenhowers-farewell-address>.

⁹⁰ Ibid.

for the first time”. Despite the decrease in the US military spending from 3.7 percent of its GDP to 3.5 percent, \$801 billion in US military spending amounted to other 172 countries’ military spending combined in 2021.⁹¹ William Pfaff argues that the United States “is a state owned by its army.”⁹²

Eisenhower’s definition has become one of the renowned definitions of the military-industrial complex. While many scholars take his definition as a starting point in analyzing the complex, some have come up with new definitions as new requirements arise in US national security. In its simplest form, the complex is the close relationship between the government and defense contractors. This relationship is mutually reinforcing. Defense contractors contribute significant amounts of money to government officials, especially lawmakers in Congress, DoD, and Army officials. In turn, lawmakers vote on contracts favoring the acquisition or sale of a weapon produced by defense contractors. As a result, both sides make money. As mentioned above, defense contractors do much more than make direct monetary contributions to lawmakers; think tanks and even universities are part of the military-industrial complex in the United States.

Defense companies have a significant interest in the size of the defense budget. A larger budget means more business opportunities for them. To this end, defense companies often lobby the government to increase defense spending. They also use their political influence to shape defense policy and strategy to align with their business interests. In some cases, defense companies donate to political campaigns to ensure their interests are represented in

⁹¹ “World Military Expenditure Passes \$2 Trillion for First Time.” *Stockholm International Peace Research Institution*, April 25, 2022. <https://www.sipri.org/media/press-release/2022/world-military-expenditure-passes-2-trillion-first-time>.

⁹²Pfaff, William, "Manufacturing Insecurity," *Foreign Affairs*, November/December 2010, <http://www.foreignaffairs.com/articles/66869/william-pfaff/manufacturing-insecurity>.

government decision-making. The result of the complex is that the taxpayer pays for the military budget, even in peacetime.

The military-industrial complex (MIC) has been formed as a constellation of several institutions. Military procurement takes place mainly through private contractors during peacetime. This contains many actors that are profiteering from the flow of defense funds generated by the state and taxpayers. Military officers, lawmakers, procurement officials, and defense companies are the most prominent groups involved. For Nester, even scientists, soldiers, shopkeepers, factory workers, and stockholders are part of this institution if they hold a common interest in keeping defense spending as high as possible. When an acquisition is approved, these actors benefit from that.

The second institution is the revolving door; it is a crucial enabler of this cycle. For example, former U.S. Secretary of Defense Mark Esper was a former lobbyist at Raytheon.⁹³ This follows the “preparedness ethos,” which means the existence of a threat, even during peacetime. Many private contractors have pushed the American public to believe that a threat is emerging or existing to American national security and that America should always be prepared for war. Due to US involvement in wars around the globe, the “threat card” is proving useful in convincing lawmakers and taxpayers to support enormous expenditures on the military.

This cycle has existed and functioned somewhat smoothly, on alarming levels, since the Second World War, when the “threat card” originated and persisted on great levels during the Cold War. While Bruce Brunton argues that MIC dates its origins no earlier than WWII,⁹⁴ the

⁹³ Libowitz, Jordan, and Linnaea Honl-Stuenkel. “Mark Esper, Former Raytheon Weapons Lobbyist, Is in Charge of the Pentagon.” *Citizens for Ethics*, January 13, 2020. <https://www.citizensforethics.org/reports-investigations/crew-investigations/mark-esper-raytheon-weapons-lobbyist/>.

⁹⁴ Brunton, Bruce G. “Institutional Origins of the Military-Industrial Complex.” *Journal of Economic Issues* 22, no. 2 (1988): p. 599. <http://www.jstor.org/stable/4226018>.

complex had started to develop with the First World War.⁹⁵ For William Nester, during WWI, the US had to mobilize and send over 1.5 million personnel to Europe and was under pressure to increase its military capacity there, which stimulated the creation of such a complex. In 1917, the War Industries Board (WIB) was founded to discuss the weapon capabilities that the US lacked. The board had evolved into different bodies, named as national security council or national weapon industry board. As a part of the government, the WIB played a significant role in the development of the military-industrial complex. After World War I, the government and the military realized the importance of having a strong defense industry to support their needs. This led to closer ties between the government, the military, and the defense industry.

On the other hand, Nester argues that until WWII, the US public did not trust the military but perceived it as a threat to their political liberties.⁹⁶ After WWII, the Department of Defense was created, and the level of defense spending reached unprecedented numbers with the Korean War.⁹⁷ During the two World Wars and the Korean War, major defense companies established themselves as legitimate and vital players in the defense industry. The government relied heavily on defense companies to produce weapons, equipment, and other supplies for the military. This led to the growth of the defense industry and the emergence of major defense companies. The fact that these companies were able to consistently provide the military with the necessary resources to fight these wars gave them a sense of legitimacy and credibility. They were seen as essential contributors to the war effort and the defense of the country. This persistent legitimacy meant that even after the wars ended, these companies remained important players in the defense industry, and their relationships with the

⁹⁵ Nester, William R. "Weapons and Spaceships: The Military-Industrial Complex." In *American Industrial Policy: Free or Managed Markets?*, edited by William R. Nester, p. 137. London: Palgrave Macmillan UK, 1997. https://doi.org/10.1007/978-1-349-25568-9_5.

⁹⁶ Ibid.

⁹⁷ Brunton, p. 600.

government and military remained strong. The beliefs that there was a “constant threat”, and that the US could go to war anytime were exploited by defense contractors. The defense industry and government spending on weapons boomed, and public opinion had changed significantly, being more acceptant of the view that the future was to invest in American weapon capabilities to deter and overcome threats to national security.

Another institution of the MIC emerged during this time: State support of the strategic arms industry. The US government believed that a strong base of defense firms with production capability should be supported and maintained constantly to satisfy wartime demand if war emerged.⁹⁸ During the Cold War, the threat proposition by defense companies reached record levels due to the intense security competition with the Soviet Union. With George Kennan’s warning that containment could be a military rather than a socioeconomic strategy, Nester argues that the US had become increasingly entangled in defense issues.⁹⁹ Between 1951 and 1953, military spending quadrupled from \$11.9 billion to \$47.7 billion. Though Eisenhower pursued a cautious policy in military spending and decreased it by around 10 percent, John Kennedy and Lyndon Johnson abandoned his prudent defense policies. They significantly invested in US nuclear and conventional forces. These actions were also motivated by the rapidly developing nuclear capabilities of the Soviet Union and China. Eventually, the military-industrial complex succeeded in increasing the size of the defense budget; by 1987, the defense budget had grown from \$64.9 billion in 1946 to \$714.6 billion.

Though the Cold War ended, and the “Soviet threat” was destroyed, global terrorism has been used as a “threat card” since the attacks of 9/11. The US government’s reaction to the attacks of September 11 caused a dramatic increase in DoD funding and revenues for weapon manufacturers. Defense companies have become the largest beneficiaries of the surge in

⁹⁸ Brunton, p. 601.

⁹⁹ Nester, p. 152.

military spending brought about by the threat of terrorism. Hartung writes that since the beginning of the war in Afghanistan, military spending has amounted to more than 14 trillion dollars, and one-third to one-half went to defense companies.¹⁰⁰ In a report it published, the Stimson Center revealed that during the post-9/11 surge in defense spending, the Army took advantage of the political environment to modernize its armored vehicles by purchasing entirely new ones.¹⁰¹ A USA Today poll showed that 60 percent of the American population worry that “costs of the war in Afghanistan and Iraq will make it more difficult for the government to address domestic priorities.”¹⁰² According to the Costs of War Project by Brown University, substantial military spending during the wars in Iraq and Afghanistan benefited only the interests of an elite group that used the projection of US power to justify an immense military establishment and expansion of military spending. The project shows that over 929,000 people died in the Global War on Terror, while the price tag was over 8 trillion dollars.¹⁰³

Known as “war profiteering,” the wars in the Middle East have proved that no political-economic complex has been as powerful as the military-industrial complex in the United States. The institutions/actors’ interests lay solely in protecting their salaries and controlling massive amounts of money, even during peacetime. It is no surprise that the growing influence of defense companies has resulted in an increasing militarization of American society.¹⁰⁴ When taxpayers pay for the military budget, one-quarter to one-third of this budget goes to five defense giants: Boeing, Lockheed Martin, Raytheon, General Dynamics, and

¹⁰⁰ Hartung, William. “Profits of War: Corporate Beneficiaries of the Post-9/11 Pentagon Spending Surge.” *Center for International Policy*, September 13, 2021, p. 1.
https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Profits%20of%20War_Hartung_Costs%20of%20War_Sept%2013%2C%202021.pdf.

¹⁰¹ Hartung, p. 16.

¹⁰² Dunlap, Charles J. “The Military-Industrial Complex.” *Daedalus* 140, no. 3 (2011): p. 140.
<http://www.jstor.org/stable/23047354>.

¹⁰³ “Summary of Findings”, Costs of War, Watson Institute International and Public Affairs, Brown University.
<https://watson.brown.edu/costsofwar/papers/summary>

¹⁰⁴ Hartung, p. 1.

Northrop Grumman. These five contractors received over 286 billion dollars in contracts in 2019 and 2020 fiscal years alone.¹⁰⁵ Over the last 20 years, along with the global terrorism card, China has been cited constantly by the defense companies to justify selling more weapons to the US government. The US has significantly modernized its nuclear weapons, space force, and conventional arms to counter a potential “threat” from China and has spent more than 1.5 trillion dollars over the last three decades.

With Russia’s invasion of Ukraine, the “Russia threat” has been invoked by defense companies to consolidate military aid under the name of “political support.” Though the US government sends significant military equipment to Ukraine in its defense against Russia and shows solidarity, the defense companies have gained the most from the invasion. Kone puts that war profiteering is not a new concept, “the wars have always been fought at least in part for economic gains.”¹⁰⁶ It is no surprise that Raytheon has contributed to more than 30 lawmakers in Congress who have voted on Ukraine aid.¹⁰⁷ In his interview with Harvard Business Review, Raytheon CEO Gregory Hayes argues that China and Russia are ahead of US capabilities regarding hypersonic missiles. The US needs to invest more in Raytheon to curb any threat directed by them.¹⁰⁸ Furthermore, he claims that Raytheon has been helping the US government in “its fight for democracy” in Ukraine. The military-industrial complex, an elite shaping US foreign policy, is the only beneficiary of this war in Ukraine, as in the case of any war.

To conclude this section, the military-industrial complex has proved very successful by taking advantage of fragile security environment since the Cold War. The perception that the complex has created on the American society has made them extremely profitable. Every time the possibility of an intense security competition with another great power occurs, defense

¹⁰⁵ Ibid, p. 4.

¹⁰⁶ Kone, Aminata M. 2013. The Military-Industrial Complex in the United States: Evolution and Expansion from World War II to the War on Terror. *Inquiries Journal/Student Pulse* 5 (08), <http://www.inquiriesjournal.com/a?id=749>

¹⁰⁷ Hall, Madison. “One of the Largest Defense Contractors in the Nation Donated to Nearly 150 Members of Congress as They Debated Ukraine Military Aid.” *Business Insider*, n.d. <https://www.businessinsider.com/defense-contractor-lockheed-martin-spending-congress-contributions-campaign-2022-5>.

¹⁰⁸ Harvard Business Review. “Raytheon CEO Gregory Hayes: How Ukraine Has Highlighted Gaps in US Defense Technologies,” March 25, 2022. <https://hbr.org/2022/03/raytheon-ceo-gregory-hayes-how-ukraine-has-highlighted-gaps-in-us-defense-technologies>.

companies are ready to benefit from the dynamics. As the great powers are associated with nuclear weapons, these companies played an important role in putting forward reasons for why the US should maintain a strong nuclear deterrence posture, even though they are businesses, not political actors. The US army is referred as the most powerful army in the world, with its nuclear weapons known as the most sophisticated ones. It has done significant improvements on its nuclear arsenal in the last 10 years by investing money in completely new nuclear weapons, rather than life-extending or upgrading features. The next section will first provide an overview of modernization programs of nuclear-weapon states, and then will focus on US modernization.

2. Nuclear Modernization

In this thesis, I will explore the military-industrial complex on nuclear modernization. Therefore, it is necessary to provide insights into empirics regarding modernization. To begin with, there are nine nuclear weapon holders in the world: The United States, the United Kingdom, France, Russia, China, India, Pakistan, Israel and North Korea. All nine constantly engage in nuclear weapon modernization to keep their weapons renovated and meet the developments of other countries. However, only five are considered officially nuclear-weapon States under international law: The Nuclear Non-Proliferation Treaty (NPT). The NPT was signed in 1968 to try and reduce the threat from nuclear weapons by limiting the number of states that possess them and compelling possessor countries to pursue disarmament. It entered into force in 1970 and is among the most widely adopted and respected international treaties with 191 States parties. Article 6 of the NPT requires all NWS members to engage in disarmament efforts in good faith. Nonetheless, though five nuclear-weapon States indicate that they are committed to disarmament, there is a significant lack of progress by them toward that goal.

Today, the number of nuclear weapons in total in the world amounts to 13,080, which is a relatively small number compared to the Cold War peak of 70,300.¹⁰⁹ Russian Federation and the United States own around 90% of this total number. While the United States currently has 5,550 nuclear warheads, only 1,357 are actively deployed in order to follow the limitations of the New START Treaty. On the other hand, China has a relatively small nuclear arsenal with

¹⁰⁹ Davenport, Kelsey, Daryl G. Kimball, and Kingston Reif. "Nuclear Weapons: Who Has What at a Glance." *Arms Control Association*, January 2022. <https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat>

nearly 350 nuclear weapons. Still, the US intelligence estimates that this number will be doubled by 2030 with China's recent rapid modernization plans.¹¹⁰ Overall, the question of whether modernization is permitted by the NPT and the agreements at subsequent Review Conferences is contested.

On the other hand, The Treaty on Prohibition of Nuclear Weapons (TPNW) entered into force very recently (22 January 2021) and differs from the NPT in several ways. It is the first treaty that completely bans nuclear weapons, as well as nuclear weapon modernization. However, the international participation in the Treaty is significantly lower than the NPT. This is because the nuclear-weapon States and those in a nuclear alliance, such as the North Atlantic Treaty Organization (NATO), are not willing to give up their nuclear weapons or security assurances due to geopolitical tensions. As of 29 March 2023, the TPNW has 68 state parties, while 27 further states have signed but not yet ratified. Most of the States Parties are small states from Africa and Latin America that have no prospects of acquiring nuclear weapons from other countries or don't have the technological capacity to do so.

i. Nuclear Modernization Program of the United States

The United States has 5,244 nuclear warheads, with 1,770 of them currently deployed; 1,938 are in storage in case of a need, and 1,536 are awaiting retirement or have already retired.¹¹¹ Of the 1,770 deployed ones, 1,370 are deployed on ballistic missiles and 300 at strategic bomber bases in the country. The remaining 100 warheads are deployed at the US bases in Europe: Germany, Italy, Netherlands, Belgium, and Turkey. The US has undergone a significant modernization program of its nuclear triad since the mid-2010s. According to the Congressional Budget Office, the modernization will cost \$634 billion for 2021-2030. Almost two-thirds of those costs are to be incurred by the Department of Defense, while the rest goes to the Department of Energy for the production and improvement of warheads.¹¹²

¹¹⁰ Wallach, Omri. "Which Countries Have the Most Nuclear Weapons?" *Visual Capitalist*, September 30, 2021. <https://www.visualcapitalist.com/which-countries-have-the-most-nuclear-weapons/>.

¹¹¹ Kristensen, Hans M., and Matt Korda. "United States Nuclear Weapons, 2023." *Bulletin of the Atomic Scientists* 79, no. 1 (January 2, 2023): 28–52. <https://doi.org/10.1080/00963402.2022.2156686>.

¹¹² "Projected Costs of U.S. Nuclear Forces, 2021 to 2030." Congressional Budget Office, May 2021. <https://www.cbo.gov/publication/57240>.

United States Nuclear Modernization ¹¹³				
Weapon Type	Program	Number	Fiscal Year Request	Contractor ¹¹⁴
Land-based Weapons				
Ground-Based Strategic Deterrent (GBSD) / LGM-35A Sentinel	New	659	\$13.3 billion - engineering and manufacturing	Northrop Grumman
W87-1	Improvement		\$14.8 billion	NNSA
Mk-21	Replacement with upgrade ¹¹⁵	More than 693	\$138 million	Lockheed Martin to integrate Mk-21 to GBSD
Sea-Based Weapons				
Columbia-class SSBN	New	12	\$112 billion	General Dynamics
Trident II D5 SLBM	Improvement		\$1.2 billion	Lockheed Martin
W88	Life extension		\$257 million	NNSA
W93	New		\$52 million	NNSA
Air-Based Weapons				
B-21 Strategic Bomber	New (to gradually replace the B-1B and B-2 bombers during the 2030s)	At least 145	\$203 billion (\$550 million per plane)	Northrop Grumman
Long Range Standoff Weapon (LRSO) ¹¹⁶	New	1000	\$2 billion	Raytheon
	To integrate the future long-range standoff capability onto the B-52 Hs		\$250 million	Boeing
B61-12 Gravity Bomb	Improvement	480	\$45.4 million	Boeing
W80-4	Life extension		\$1 billion	NNSA
F-35A	New			Lockheed Martin

¹¹³ Data on the current nuclear modernization is retrieved from the Federation of American Scientists, Nuclear Notebook publications and US Department of Defense website.

¹¹⁴ Data on the defense contractors for each weapon type is retrieved from the Major Defense Acquisitions Programs publications of the US Department of Defense.

¹¹⁵ Upgrades to the Mk21 re-entry vehicles' arming, fuzing, and firing component.

¹¹⁶ The long-range standoff missile will be integrated on both the B-52 H and new B-21 bombers. Warhead production is scheduled from 2025 to 2031.

Table 1: Nuclear Modernization Program of the United States

The United States has been expanding the ground leg of its nuclear triad with significant amounts of money. The Department of Defense has opted to buy an entire new generation of ICBMs, which is known as Ground-Based Strategic Deterrent (GBSD) but then officially named as LGM-35A Sentinel ICBM. The US Air Force plans to deploy 20 new ICBMs with legacy reentry vehicles and warheads in FY2029. The Mk21 reentry vehicles, which carry W87 warheads, are also being upgraded to their arming, firing, and fuzing unit. This upgrade is expected to cost nearly a billion dollars. On the other hand, Northrop Grumman has been awarded \$13.3 billion to complete the new ICBMs' manufacturing and engineering development stage. The US Air Force plans to buy 659 Sentinel; 400 will be deployed, and the rest will be stored. According to Korda, 659 Sentinel is expected to cost between \$93.1 and \$95.8 billion.¹¹⁷

These costs do not include the modernization of the warhead to be mounted on the reentry vehicle – the W87-1. This upgrade is also expected to cost up to \$14.8 billion. For Mk21 to be integrated into the new ICBMs, Lockheed Martin Corp. was awarded \$138 billion in 2019. Sentinel is expected to have a greater range than the Minuteman III ICBMs, and it will be able to carry up to two warheads. The US has three ICBM bases: F.E. Warren in Wyoming, Malmstrom in Montana, and Minot in North Dakota. Before the new Sentinels are deployed, the Air Force plans to modernize the launch facilities and 8 of the 15 missile alert facilities in three bases. According to the Congressional Budget Office, acquiring and maintaining the new ICBMs would cost around \$82 billion over 2021-2030.¹¹⁸

The sea leg of the nuclear triad is also being modernized. The United States currently owns 14 Ohio-class submarines (SSBN) that are planned to be deployed until 2027 and potentially retire. This is because their life span is coming to an end, and as in the case of the new ICBM, the US Navy also opted to buy a new generation of SSBNs, known as Columbia-class submarines. The \$112 billion contract has been awarded to General Dynamics. The Navy plans to acquire 12 Columbia-class SSBNs, projected to be operational by the end of 2020s when the Ohio-class SSBNs begin retiring. The new submarines will be quieter than the former ones because they will use an electric-drive propulsion train instead of louder,

¹¹⁷ Kristensen, Hans M., and Matt Korda. "United States Nuclear Weapons, 2023." *Bulletin of the Atomic Scientists* 79, no. 1 (January 2, 2023): 28–52. <https://doi.org/10.1080/00963402.2022.2156686>.

¹¹⁸ "Projected Costs of U.S. Nuclear Forces, 2021 to 2030." Congressional Budget Office, May 2021. <https://www.cbo.gov/publication/57240>.

mechanical gears. The Navy has not had experience with electric-drive propulsion train engines before; therefore, delays are expected in the submarines' production timeline.¹¹⁹ However, the first Columbia-class SSBN patrol is scheduled for 2031.¹²⁰

Each Ohio-class submarine can carry up to 20 Trident II D5 submarine-launched ballistic missiles (SLBM). Since 2017, the Trident II D5 has been going through a life extension program known as Trident II D5LE (LE stands for Life Extension). D5LE missiles are equipped with Mk6 guidance systems to increase accuracy. Each missile also carries a Mk4A reentry system with three types of warheads: W76-1, W76-2, and W88. While W76-1 is expected to retire soon, the Navy plans to acquire a new warhead, W93, to supplement the rest. Moreover, the Navy is projected to acquire additional 109 Trident II D5 missiles soon, which was announced in 2021. Lockheed Martin produces the Trident missiles. Each missile can carry up to eight warheads.

The United States has been significantly upgrading its nuclear triad's air leg. The US Air Force (USAF) has bombers, nuclear weapons, and warheads in the air leg. Bombers drop nuclear weapons that carry warheads. Currently, USAF has a fleet of 20 B-2A bombers, all nuclear-capable, and 87 B-52H Stratofortress bombers, 46 nuclear-capable. There are also B-1B bombers, but they are not nuclear-capable. Each B-2 bomber can carry up to 16 nuclear weapons, which are B61-7, B61-11, and B83-1 gravity bombs. Each B-52H carries up to 20 Air-Launched Cruise Missiles (ALCM), known as AGM-86B. The US Air Force is estimated to have 788 nuclear weapons, 300 deployed, and the rest is in storage bases.

The US Air Force has been upgrading existing bombers' nuclear command and control capabilities. This includes modifying the Global Aircrew Strategic Network Terminal, a “high-altitude, electromagnetic, pulse-hardened network of the fixed and mobile nuclear command-and-control terminal.” The first terminal was delivered in January 2022. Secondly, the US Air Force has also been replacing existing terminals with MILSTAR military satellite constellation, which the US Space Force operates. This replacement increases the quality of protected high-data-rate communication for both conventional and nuclear forces.

¹¹⁹ Kristensen, Hans M., and Matt Korda. “United States Nuclear Weapons, 2023.” *Bulletin of the Atomic Scientists* 79, no. 1 (January 2, 2023): 28–52. <https://doi.org/10.1080/00963402.2022.2156686>.

¹²⁰ Ibid.

The US Air Force is projected to acquire 480 new B61-12 nuclear weapons developed by Boeing for \$45.4 billion. New bombs will gradually replace all existing nuclear weapons by the 2030s. The cruise missile AGM-86B is also being replaced by AGM-181, known as the Long-Range Standoff Weapon, developed by Raytheon. The old AGM-86B has been in the inventory since the 1970s and went through several life extension programs. The US Air Force believes it may be unable to handle another life extension; therefore, it opted for entirely new ones with more extended range and stealth technology. AGM-181 will carry the W80-4 warhead, a refurbished version of W80-1.

The Department of Energy's NNSA is also producing W80-4. B-52H will carry the AGM-181. The US Air Force awarded Boeing \$250 million to integrate AGM-181 into the B-52Hs. Lastly, in the air leg, Northrop Grumman is manufacturing at least 100 new B-21 Raider heavy bombers for \$203 billion for the 30-year operational process. They are expected to enter into service mid-2020s one by one and replace B-1B and B-2 eventually.

The remaining category is the non-strategic – tactical - nuclear weapons of the United States. The United States has only one tactical nuclear weapon, the B61-12 gravity bomb, with two versions, B61-3 and B61-4. The US is estimated to have 200 in total; 100 of those are stored in the US bases in Europe, and the rest are held to be used when needed. They have yielded varying from 0.3 kilotons to 170.¹²¹ Belgium and Netherlands use F-16 aircraft as heavy bombers to drop B61-12; however, they are acquiring F-35A from Lockheed Martin. Italy and Germany use PA-200 Tornado aircraft but will also acquire F-35A soon. Aside from Turkey, four countries are assigned active nuclear assignments. Turkey has been using F-16 aircrafts until 2010 and was also in the process of getting F-35A. However, the Trump administration removed Turkey from the process when the Turkish government purchased S-400 air defense systems from Russia. Recently, Turkey has been given the green light from the US for the acquisition of F-16 aircrafts and modernization kits.

In addition to the aircrafts the host countries use, the United States has upgraded the bombs and weapon storage systems. The Department of Energy has started the modernization process on the new B61-12 nuclear bomb and is projected to complete it by 2026. These weapons will have more accuracy and better standoff capability and yield up to 50 kilotons. In 2020, F-15E tested to operate the B61-12 bomb and became the 1st aircraft to do so. F-35 also

¹²¹ Kristensen, Hans M., and Matt Korda. "United States Nuclear Weapons, 2023." *Bulletin of the Atomic Scientists* 79, no. 1 (January 2, 2023): 28–52. <https://doi.org/10.1080/00963402.2022.2156686>.

tested the bomb successfully in October 2021. The bomb, when completed, will also be integrated into B-2 heavy bomber, F-16, and PA-200 aircrafts.

3. Defense Budgeting in the United States

The defense budget is a crucial element of this thesis, as the weapon acquisition decisions first take place in the US defense budget, which is a sign of approval by Congress. The defense budgets are usually among the categories that receive the highest federal budget. In 2015, Stockholm International Peace Research Institute (SIPRI) estimated that global military expenditure in 2015 was \$1676 billion. Such high amounts raise concerns about the potential civilian uses of the resources, also known as “opportunity cost.”¹²² This issue has become more salient with the pandemic in 2020. Many argue that the United States cannot afford the military-industrial complex anymore, as there are more pressing social needs. With the budget the United States allocated solely for defense - \$801 billion - investments in the healthcare systems could have been made, and healthcare services could have been improved. Though the United States relies heavily on the military for national security strategy, climate change, economic inequality, global health challenges and many are non-military.¹²³

High military expenditure often diverts resources from other pressing areas. In the current geopolitical atmosphere, it is no doubt that having a strong military indicates strength; it symbolizes readiness and creates deterrence against adversaries. It is widely accepted that the US has the most powerful military in the world, and it is not an easy business to maintain a nuclear arsenal of more than five thousand warheads. However, the opportunity cost arising from the defense budget is often criticized, as it balloons, it may leave voids for domestic priorities. This cost tends to be ignored in light of geopolitical rivalries.

i. Components of the Defense Budget

In this section, I will briefly introduce the defense budget's components in the US. A defense budget in any country usually includes similar things: salaries for military personnel, social

¹²² Perlo-Freeman, Sam. “The Opportunity Cost of World Military Spending.” *Stockholm International Peace Research Institution*, April 5, 2016. <https://www.sipri.org/commentary/blog/2016/opportunity-cost-world-military-spending>.

¹²³ “Sustainable Defense: More Security Less Spending.” Sustainable Defense Task Force. Washington D.C.: Center for International Policy, June 2019. p. 3. <https://comw.org/pda/fulltext/1906%20SustainableDefenseTaskForce%20report.pdf>.

security expenses, military equipment procurement, and operations and maintenance. The whole defense budget in the US is regulated by the National Defense Authorization Act (NDAA). NDAA is not specific to the Department of Defense but includes some expenses from the Department of Energy (DoE) and other defense-related activities. Therefore, the defense and Department of Defense budgets are separate elements. In the NDAA, the Pentagon budget takes up to 95 percent. For example, the defense budget passed by the Senate for 2023 is \$857.9 billion. DoD's budget is \$816.7, and DoE's budget is \$30.3 billion, leaving \$10.6 billion for other defense-related activities. An example of a defense-related activity can be the funding for a trip of university students to the Pentagon building or funding for research.

The defense budget is allocated to the army, navy, air force, marine corps, space force, and strategic forces (nuclear forces) within the DoD. The budget also consistently includes assistance and support to US allies, such as Taiwan, Israel and South Korea. The budget consists of salaries to the military personnel in the US or abroad, operations and maintenance, procurement, research, development, testing and evaluation, military construction, family housing, and revolving and management of funds. Separately, the budget includes Overseas Contingency Operations (OCO) to fund military operations abroad, such as in Iraq and Afghanistan in the 2000s years and the bases that the United States still owns in those countries.

Within the Department of Energy, the defense budget covers the cost of nuclear warhead production, such as plutonium processing and uranium enrichment, the maintenance of nuclear reactors, warhead design, pit production and salaries of employees at the National Nuclear Security Administration (NNSA). NNSA has several laboratories nationwide that maintain the stockpile of nuclear warheads.

The following section will address the defense companies and their lobbying activities empirically. I will begin by providing brief information about the companies I research in this thesis and then explain their lobbying activities, mainly in the US Congress: House and Senate Armed Services Committees. This section will also address the legal requirements of lobbying in the US.

4. Defense Companies and Lobbying

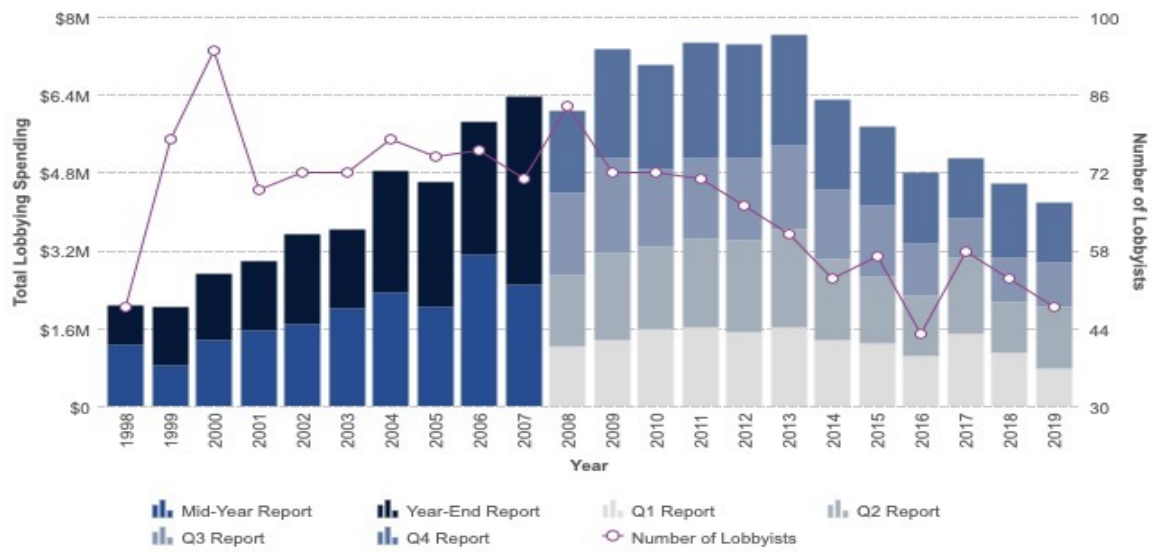
i. Defense Companies

Lobbying occurs in every aspect of political life and is not limited to defense. The pharmaceutical companies that impact people's health contribute millions of dollars every year to members of Congress, with the goal of passing bills that favor their businesses. In the defense industry, lobbying is driven by those who argue that a strong military is the greatest sign that a country is powerful. Therefore, both companies and policymakers in this line of thought push for a more robust military and more weapons by creating new images of "threat" in public with an aim to justify the revolving money. Eventually, the citizens are liable to pay for the high defense budgets through taxation.

An independent NGO working on this topic in the United States, OpenSecrets, claims that lobbying is a \$3 billion industry.¹²⁴ In other words, the practice of lobbying, which involves attempting to influence government decisions by advocating for particular policies or interests, generates approximately \$3 billion in revenue annually. A lobbyist makes ten times more money than a member of Congress. Unsurprisingly, many retiring government officials secure themselves a position in a company the government had previously contracted.

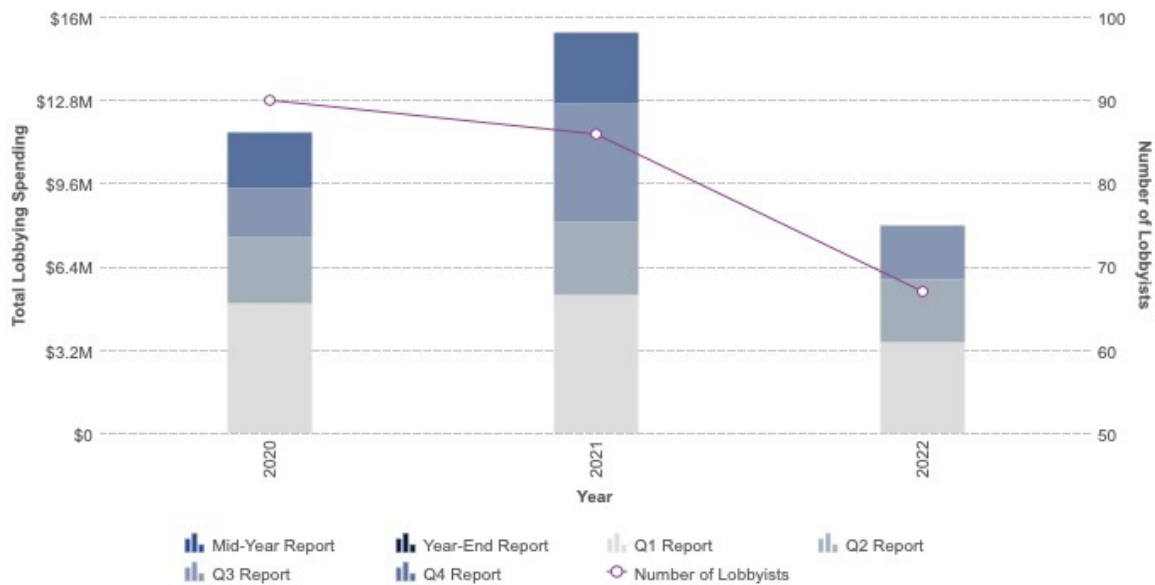
Every year, defense companies spend millions of dollars in the expectation of a profitable contract with the government. The companies analyzed in this thesis are Lockheed Martin, Boeing, Northrop Grumman, General Dynamics and Raytheon. For instance, Raytheon Technologies spent \$8,020,000 for lobbying in 2022 and \$15,390,000 in 2021. In 2020, it merged with United Technologies Corporation (UTC), and the company name changed from Raytheon Co. to Raytheon Technologies. While Raytheon Technologies spent \$11,480,000 for lobbying in 2021, this amount was significantly lower in 2019 (\$4,203,000) before the merger with UTC. Raytheon's primary focus is missile and weapons systems production for aircraft and naval vessels.

¹²⁴ Giorno, Taylor. "Federal Lobbying Topped \$3 Billion through Third Quarter for the First Time Ever." *Open Secrets*, October 26, 2022. <https://www.opensecrets.org/news/2022/10/federal-lobbying-topped-3-billion-through-third-quarter-for-the-first-time-ever/>.



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Figure 1: Lobbying by Raytheon Co (source: Open Secrets)



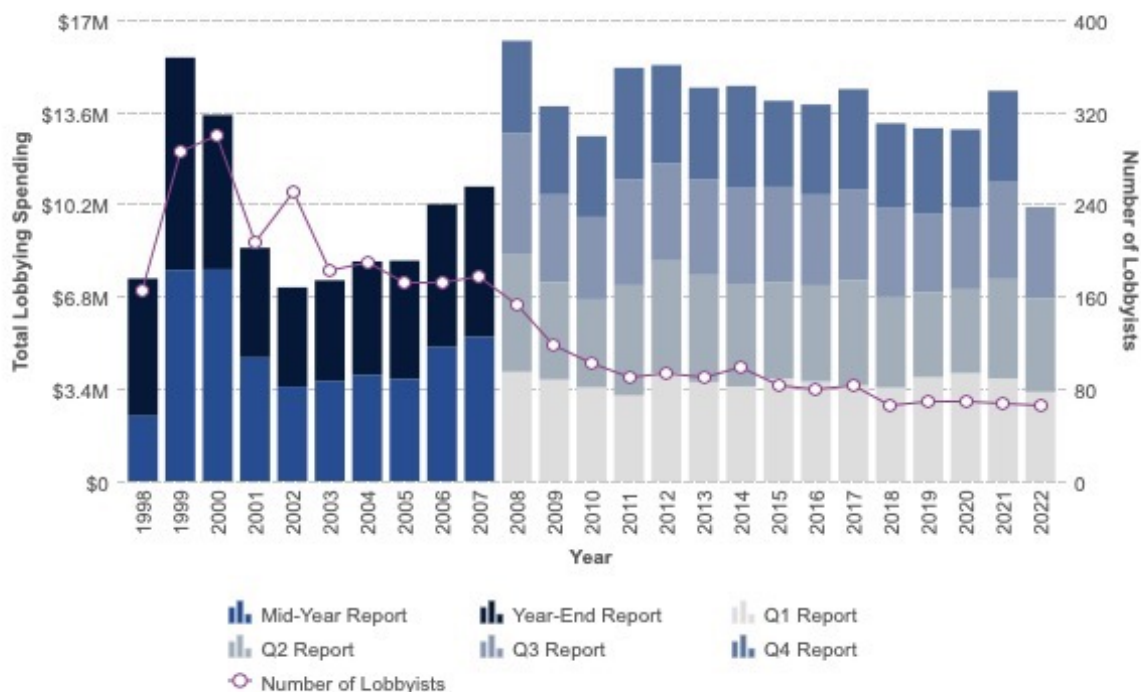
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Figure 2: Lobbying for Raytheon Technologies (source: Open Secrets)

¹²⁵ “Client Profile: Raytheon Co.” Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2019&id=D000000175>.

¹²⁶ “Client Profile: Raytheon Technologies” Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2020&id=D000072615>

Raytheon's lobbying is relatively lower than the rest of the companies that will be researched in this thesis. The graph below shows that Lockheed Martin has spent an average of \$14 million lobbying annually for the last 15 years. Lockheed Martin produces aircraft, radar systems, drones, and even components for spacecraft for the domestic military and foreign states. The company is most famous for F-35 and F-16 planes on a global level and produces Trident II D5 submarine-launched ballistic missiles for the United States and United Kingdom's nuclear arsenals.



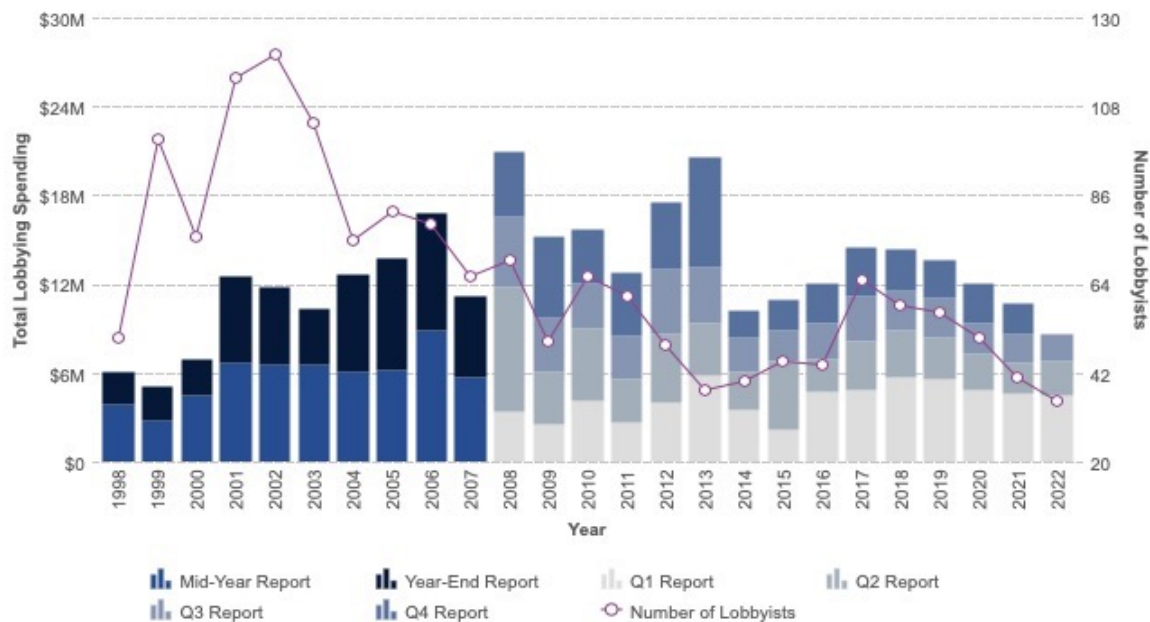
127

Figure 3: Lobbying by Lockheed Martin Corporation (Open Secrets)

In 2013 Northrop Grumman spent \$20,590,000 on lobbying. The company is known for drones, warplanes, aircraft components, and radar systems. Though these amounts of lobbying spending sound enormous to an average citizen, these are a lot less compared to the

¹²⁷ "Client Profile: Lockheed Martin" Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000104>

worth of contracts they get from the governments. A single submarine costs at least a billion, making them highly profitable, even after these companies contribute money to the political campaigns of Congress members or the research programs of think tanks.¹²⁸ They don't only sell weapons to their own country but often to the Middle East, Asia, and Europe.



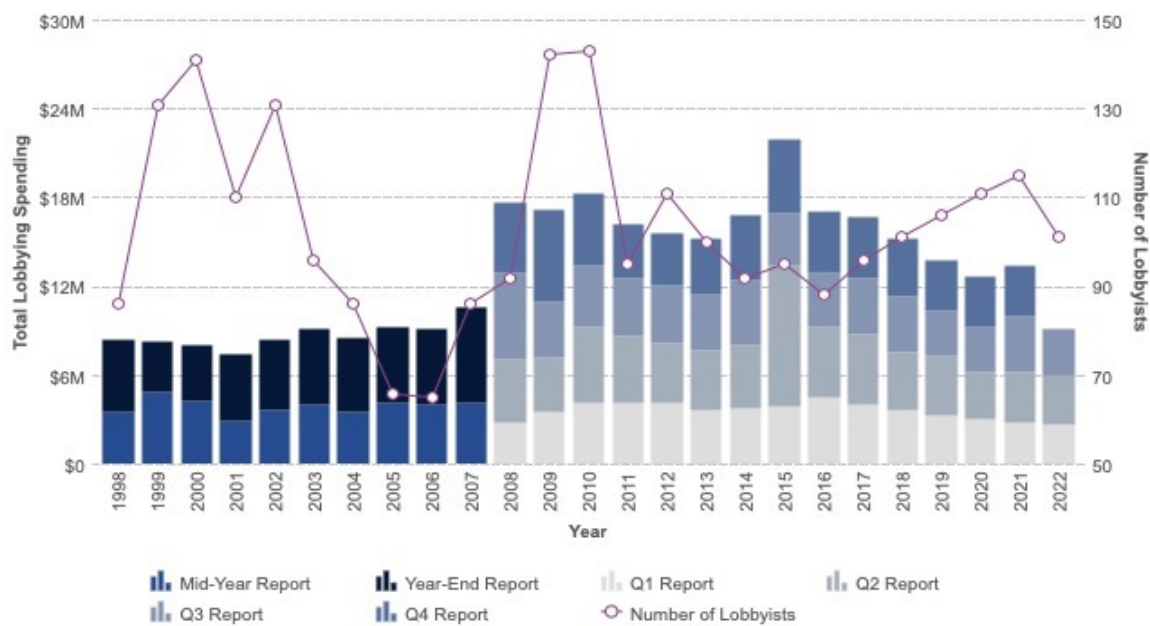
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Figure 4: Lobbying by Northrop Grumman (Open Secrets)

The annual lobbying expenses amounted to \$15,298,000 for Boeing between 2013-2021. The company, which makes the Minuteman III InterContinental ballistic missiles of the US, spent \$22 million in 2015 alone. According to OpenSecrets data, the amount decreased to \$9,190,000 in 2022. Boeing is also known for its passenger aircraft but made \$28 billion in arms sales in 2015. Its arms sales amount to around 35 percent of total sales. The profit margin from arms sales is estimated to be approximately 10 percent.

¹²⁸ "The Costs of Replacing Trident." Campaign for Nuclear Disarmament, n.d. <https://cnduk.org/wp-content/uploads/2018/02/Costs-2016-web.pdf>.

¹²⁹ "Client Profile: Northrop Grumman" Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000170>



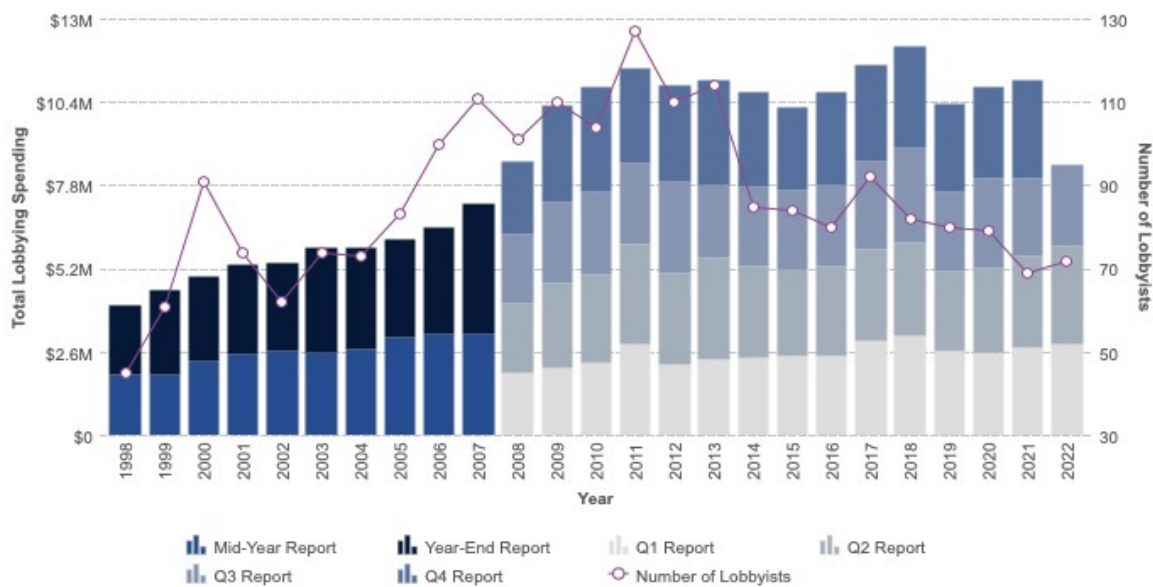
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Figure 5: Lobbying by Boeing (Open Secrets)

The last defense company that will be researched in this thesis is General Dynamics, which manufactures the M1A Abrams tank, the primary battle tank used by the US military. The company spends an average of \$10 million for lobbying annually, though only one M1 Abrams tank costs around \$9 billion with all the support equipment, technology, software, and training in a complete package. On the other hand, it seems like the contributions are working. According to the Financial Times data, 54 percent of the Pentagon budget went to defense contractors in 2021.¹³¹ Defense companies in the United States can only directly sell their products and services to the Pentagon. This is because foreign sales of defense products and services need to be approved by Congress before they can take place.

¹³⁰ “Client Profile: Boeing Co” Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000100>

¹³¹ Chavez, Steff, Alexandra Heal, Ian Bott, Sam Joiner, Sam Learner, and Veronika Samborska. “How Arming Ukraine Is Stretching the US Defence Industry.” *Financial Times*, January 31, 2023. <https://ig.ft.com/us-defence-industry/>.



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Figure 6: Lobbying by General Dynamics (Open Secrets)

ii. Lobbying in the United States

In the theoretical section, I identified several ways of lobbying. Within the case of the United States, these ways can only happen by abiding by the relevant laws. According to US law, lobbying is conducted between the government agency and the client.¹³³ The Lobbying Disclosure Act (LDA) defines the client as "any person or entity that employs or retains another person for financial or other compensation to conduct lobbying activities on behalf of that person or entity."¹³⁴ This Act was signed by the Clinton administration in 1995 to set a legal framework governing the companies' lobbying activities and to ensure public disclosure.¹³⁵ Accordingly, to be considered a lobbyist, a person must spend at least twenty percent of their time lobbying activities on behalf of the community.

¹³² "Client Profile: General Dynamics" Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000165>

¹³³ Definitions: Lobbying Disclosure Act. U. S. Senate. https://www.senate.gov/legislative/Lobbying/Lobby_Disclosure_Act/3_Definitions.html.

¹³⁴ Ibid.

¹³⁵ Public Law 104-65-Dec. 19, 1995. U.S. House of Representatives. <https://lobbyingdisclosure.house.gov/lda.pdf>

Moreover, this Act requires all companies to provide annual reports to the Clerk of the House and Secretary of the Senate, indicating the name of the lobbyists and expenditure spent on lobbying. In the United States, every company that contributes to a lawmaker has to disclose the amount and the name of the lawmaker, as stipulated in the Lobbying Disclosure Act. The Federal Election Commission lists the individual contributions companies give to lawmakers.¹³⁶

The most often used method by defense companies is to contribute to the lawmakers in Congress. House and Senate Armed Services Committees are critical players in this regard for the defense contractors. This is because the committee members draft the National Defense Authorization Act, which decides on the budget allocated for strategic forces and specific procurement issues suggested by the officials in the Department of Defense throughout the process. The contractors donate money to lawmakers in these committees with the expectation of getting a contract in favor of them. Receiving donations from company PACs is legal in the United States as long as the companies disclose the amount of donations and to whom they donate. For example, 89 members out of 113 in the House Armed Services Committee (HASC) received money from Raytheon between 2015-2021. Similarly, 36 out of 43 received money from Raytheon in the Senate Armed Services Committee (SASC) during the same period. HASC and SASC draft the US defense budget every year.

An example of defense company contributions to politicians is the Democrat Representative Elaine Luria. Luria, a US Navy veteran, defeated her rival in Virginia with 51 percent in the 2018 elections and started her congressional duty in 2019. Luria had become the vice chair in the House Armed Services Committee's 117th Congress (2021-2022). She was a part of the Democrat pledge "No Corporate Money" in the 2018 elections, where she promised to take no PAC money with the other 155 candidates who signed the pledge then. In her speech in the electoral campaign, she says that "I can tell you that a key tenet in my campaign is that I am not accepting any corporate PAC contributions. Not from prescription drug companies, not from oil companies, not from health care companies, not from private prisons, not from anyone who can influence my vote when I go to Washington."¹³⁷ However, when she started her congressional career after being elected with a false promise, she first received \$1000

¹³⁶ Individual Contributions, Federal Election Commission. <https://www.fec.gov/data/receipts/individual-contributions/>

¹³⁷ *Virginia 2nd Congressional District House Debate Scott Taylor vs Elaine Luria Oct 23, 2018*. Washington D.C.: YouTube, 2018. <https://www.youtube.com/watch?v=43SjD7bfBjo&t=1235s>.

worthy of contribution from Raytheon on 11 November 2019.¹³⁸ Not only from Raytheon, but she also received money from BAE Systems, Boeing, General Dynamics, and Rolls-Royce.¹³⁹ After receiving significant contributions valued at over \$34000, Luria voted against an amendment to reduce the Pentagon budget by 10 percent in the summer of 2020.¹⁴⁰

Revolving door is the second most common and effective method of lobbying in the US military-industrial complex. In 2016 alone, the top 20 defense companies in the US hired 645 retired former government employees and 90 percent of them have become lobbyists for the company.¹⁴¹ More than 50 people who are currently employed in Raytheon before served in the Department of Defense, armed services committees, or critical positions on US military and defense policy.

A prominent example of the revolving door is the current US Defense Secretary, Lloyd Austin. Austin was the chief of staff of the army between 2012-2013 and then became the commander of CENTCOM. After retiring in 2016, he joined the board of United Technologies Corporation (UTC), which later merged with Raytheon, one of the top five contractors of DoD, in 2020. President Joe Biden has appointed Austin as Defense Secretary in 2021, while he had not cut its ties with Raytheon. In 2021, Raytheon won a \$16 billion contract in total, a considerable amount and increase compared to former years. A \$2 billion Long Range Standoff Weapon (LRSO) contract was also given to Raytheon during Austin's term. After several allegations on Austin's integrity in awarding contracts, he was asked to recuse himself from Raytheon's board. Austin replied as he would recuse himself for not more than a year and added that the public has no reason to question his impartiality.¹⁴²

Department of Defense is rife with examples of revolving door. The report conducted by the Project on Government Oversight (POGO) provides that there are at least 100 US Army, Navy, Marine Corps, and Air Force officials who later switched to Pentagon contractors after

¹³⁸ "Individual Contributions." Federal Election Commission of the United States, n.d.

https://www.fec.gov/data/receipts/individual-contributions/?committee_id=C00664375&contributor_employer=raytheon.

¹³⁹ Moore, David. "Former PAC Rejector Elaine Luria Is Now Taking Checks From Raytheon and Rolls-Royce." *Brick House*, February 9, 2021. <https://thebrick.house/former-pac-rejector-elaine-luria-is-now-taking-checks-from-raytheon-and-rolls-royce/>.

¹⁴⁰ Ibid.

¹⁴¹ Smithberger, Mandy. "Brass Parachutes: The Problem of the Pentagon Revolving Door." Project on Government Oversight, November 5, 2018. <https://www.pogo.org/report/2018/11/brass-parachutes>.

¹⁴² Beinart, Matthew. "Austin Extends Recusal From Raytheon-Related Decisions For 4 Years, Won't Seek Defense Firm Job After Service." *Defense Daily*, January 20, 2021. <https://www.defensedaily.com/austin-extends-recusal-raytheon-related-decisions-4-years-wont-seek-defense-firm-job-service/pentagon/>.

retirement.¹⁴³ The Pentagon decides the acquisitions, but there is no clear body of who is negotiating an acquisition. Some officials are only charged with negotiating, however, an official working on a related weapon program to the acquisition can also have a seat at the table. Often, if a Pentagon employee is guaranteed future employment at a defense contractor, s/he tends to favor that company in allocating the contracts.

An example is Principal Deputy Under Secretary of the Air Force Darleen Druyun, who oversaw acquisitions between 1993-2002. The audit office at Pentagon noticed a disarray in weapon contracts which resulted in an “irregular and abnormal acquisition process where it may not be in the best interest of the US government.” It was later revealed that she was promised future employment at Boeing along with her son-in-law.¹⁴⁴

Noticing improper contracting and wasting Pentagon resources, former President Barack Obama issued a decision that lobbyists could not take up a position for two years in one of the government agencies that they lobbied for during their time with the company. It is more common for government officials to switch to a defense contractor after employment, as the government often does not prefer hiring people with defense company backgrounds, but there are exceptions. Soon after, Obama granted a waiver to Deputy Secretary of Defense William Lynn, who worked as a Raytheon lobbyist less than two years before he joined the Pentagon. In 2008, Congress was requested to create a database to observe and track ethical opinions and interpretations of those who are involved in the revolving door of the National Defense Authorization Act. Though the database was materialized, it was never made public.

Another common lobbying method is to contribute to the think tanks and research centers in the universities. According to a news article from 2020, the top 50 think tanks in the United States received \$1 billion from government and defense contractors, mainly Raytheon, Northrop Grumman, Lockheed Martin, Airbus and Boeing. Think tanks include the Atlantic Council, the Brookings Institution, the Council on Foreign Relations and the Stimson Center. One example is Roger Zakheim, who argues the necessity of more lavish military spending for new weapons in his study at the American Enterprise Institute, considering his past

¹⁴³ Smithberger, Mandy. “Brass Parachutes: The Problem of the Pentagon Revolving Door.” Project on Government Oversight, November 5, 2018. <https://www.pogo.org/report/2018/11/brass-parachutes>.

¹⁴⁴ Ibid.

employment as a lobbyist for Northrop Grumman and BAE Systems.¹⁴⁵ Another example of such a think tank is the Heritage Foundation. Recently, the Heritage Foundation published a lengthy article about why the United States needs the Long-Range Standoff Weapon (LRSO), which costs the US government \$2 billion.¹⁴⁶ In the article, the Heritage Foundation provides reasons for the necessity of having a robust nuclear deterrence, such as the deteriorating relations with Russia and China and the possibility of a threat coming from them. Raytheon, who contracted the US government on Long-Range Standoff Weapon, is one of the long-time funders of the Heritage Foundation.

To sum, I covered numerous domestic lobbying strategies in this section of my research, concentrating on the defense sector. It begins by outlining how lobbying in the United States must abide by pertinent legislation, especially the Lobbying Disclosure Act (LDA), which was passed in 1995. Making financial donations to lawmakers, especially those who sit on the House and Senate Armed Services Committees, is a typical strategy used by military industries. These donations are made with the intention of gaining defense contracts and influencing legislators. Another efficient way for lobbying is the "revolving door" phenomenon, in which former government personnel work as lobbyists for defense contractors. I also brought up the custom of making donations to think tanks and research institutes, pointing out that considerable sums of money are given to these organizations by significant defense contractors.

Therefore, defense companies play a crucial role in defense acquisition by supplying essential products and services, competing for contracts, influencing policy decisions, and collaborating with government stakeholders. Their involvement significantly impacts the defense capabilities and readiness of the US nuclear arsenal. Upon discussing the qualitative findings, the next section will address the results of my correlation analysis.

¹⁴⁵ Eric Lipton, Nicholas Confessore and Brooke Williams, "Think tank scholar or corporate consultant? It depends on the day". 8 August 2016. <https://www.adn.com/nation-world/2016/08/08/think-tank-scholar-or-corporate-consultant-it-depends-on-the-day/>

¹⁴⁶ Geller, Petty-Jane. "LRSO: Why America Needs the Nuclear Long-Range Standoff Weapon." Heritage Foundation, February 5, 2021. <https://www.heritage.org/defense/commentary/lrso-why-america-needs-the-nuclear-long-range-standoff-weapon>

II. Quantitative Findings

1. Correlation Analysis

Between 2000 and 2010, the US government opted to pursue a mild modernization program by focusing more on its non-strategic weapons, such as F-16, F-22, and Patriots, and regularly life-extending its Trident D5 SLBMs and strategic bombers. Especially after the Cold War, the number of ICBMs decreased from 430 to 400. However, the US government recently decided to replace some of its existing nuclear weapons systems with entirely new ones rather than simply upgrading or modernizing the current systems. This decision was driven by several factors, including concerns about the age and reliability of the existing systems and the need to maintain a credible nuclear deterrent in an increasingly complex and uncertain security environment. The lobbying spending of defense companies also increased significantly after 2008, as well as the intense competition between companies to obtain contracts.

One advantage of replacing existing nuclear weapons systems with completely new ones is that the new ones can significantly increase capability and performance. For example, the new Columbia-class submarines, which will replace the Ohio-class submarines, are expected to have greater stealth, endurance, and firepower than their predecessors. Similarly, the new Sentinel ICBMs, which will replace the Minuteman ICBMs, are expected to have improved accuracy, range, and reliability. However, there are also some significant costs associated with developing and deploying entirely new nuclear weapons systems. These include the direct costs of research, development, and production and the costs associated with operating and maintaining the new systems over their lifespan. These costs can be significantly higher than those associated with upgrading or modernizing existing systems. Even if the government allocates money solely for the Research and Development phase for new weapons but not to any defense company, it significantly affects the defense budget.

Based on my analysis, all five companies positively correlate with the number of contracts they were awarded between 2000 and 2020. The correlation coefficient between Lockheed Martin's number of contracts from the Department of Defense (DoD) between 2000 and 2020 and its lobbying spending during the same period is 0.680. This positive correlation indicates

a moderate positive relationship between the two variables. The P-value for Lockheed Martin (0.0006942) is extremely significant, which proves that as Lockheed Martin's lobbying spending increases, the number of contracts it receives from the DoD also tends to increase.

Correlation Coefficient	1st correlation	2nd correlation
Lockheed Martin	0.680	0.559
Raytheon	0.448	0.088
Northrop Grumman	0.298	0.056
General Dynamics	0.368	0.272
Boeing	0.421	-0.34

Figure 7: Correlation Results

The correlation coefficient between General Dynamic's number of contracts from the Department of Defense and its lobbying spending from 2000 to 2020 is 0.368. This coefficient indicates a weak positive correlation between the two variables, suggesting some tendency for the number of contracts received by General Dynamics from the Department of Defense to increase as lobbying spending increases over the same period. However, the relationship is not very strong as the P-value is not significant at the 0.05 level. Similarly, the correlation coefficient between Boeing's number of contracts from the Department of Defense and its lobbying spending is 0.421. This coefficient also shows a moderate positive correlation between the two variables, indicating that there may be a tendency for Boeing's Department of Defense contract count to rise in tandem with rising lobbying expenditures over the same period. The P-value for Boeing is 0.056, which is on the threshold, but not significant.

The correlation coefficient between Northrop Grumman's number of contracts from the Department of Defense on nuclear modernization and its lobbying spending is 0.298. This coefficient shows a marginally positive correlation between the two variables, indicating that there may be a slight propensity for Northrop Grumman's contract count to rise as lobbying expenditures rise during the same period. Lastly, based on the correlation analysis conducted between Raytheon's number of contracts from the Department of Defense and its lobbying spending between 2000 and 2020, there was a positive correlation of 0.448 observed. This result suggests that as Raytheon's lobbying spending increased over time, there was also an increase in the number of contracts awarded by the Department of Defense to Raytheon for nuclear modernization. Though the relationship for Northrop Grumman is not significant due to the P-value (0.1885), the correlation coefficient is significant for Raytheon (0.04).

In the second part of my analysis, I run correlations between the amount of money each company received in the contracts each year and the amount of money spent on lobbying. Based on my analysis, there appears to be a strong positive correlation between the amount of money Lockheed Martin received in defense contracts and the amount of money it spent on lobbying between 2000-2020, with a correlation coefficient of 0.559. This finding suggests that as Lockheed Martin's lobbying expenditures increased, so did the amount of money it received in defense contracts. This positive correlation can be attributed to the company's efforts to influence government decision-making and policies that favor its interests. The P-value (0.0084) also shows that the correlation coefficient is very significant for Lockheed Martin. This finding is consistent with the previous analysis that has demonstrated the influence of lobbying on government procurement decisions.

A correlation coefficient of 0.088 shows that Raytheon's expenditure on lobbying and the amount of money it received in defense contracts between 2000 and 2020 are weakly positively correlated. According to this research, there may be a connection between Raytheon's lobbying expenses and defense contracts; however, it may not be as substantial as in the case of Lockheed Martin. The correlation coefficient is not significant for Raytheon due to the P-value (0.7043). For General Dynamics, the correlation coefficient is 0.272, a moderate positive correlation. This result suggests a statistically significant relationship between lobbying expenditures and defense contracts for General Dynamics. This may be due to the company's efforts to influence government decision-making and policies that favor its interests in the defense sector. However, the P-value (0.2370) shows that the correlation coefficient is insignificant for General Dynamics.

The correlation analysis conducted for 2000-2020 between the amount of money received by Northrop Grumman in defense contracts and the amount of money spent on lobbying yielded a correlation coefficient of 0.056. This coefficient indicates a weak positive correlation between the two variables, suggesting that there may be some association between the amount of money spent on lobbying and the amount received in defense contracts. Still, the strength of the relationship is limited, and the coefficient is not significant (0.8071).

Lastly, the amount of money Boeing received in defense contracts and the amount of money it spent on lobbying were analyzed for a correlation, and the results showed a correlation

coefficient of -0.34. This coefficient suggests a moderately negative association between the two variables, indicating a drop in the amount of money Boeing got from defense contracts as its lobbying expenses rose. The possible reasons for that could be the government's loss of trust in Boeing contracts and investigations on its management in the last years. The P-value is 0.131 for Boeing, which means the result is not statistically significant.

To conclude the quantitative analysis, the US government focused on updating its non-strategic weapons and extending the life of current systems between 2000 and 2010. However, a recent choice to completely replace nuclear weapons systems was made due to worries about aging and dependability. While this choice increases capability, the costs are higher. Spending on lobbying by the defense industry has also increased, as has competition for contracts. Companies like Lockheed Martin and Raytheon have a positive correlation between the amount they spend on lobbying and the number of contracts they get, suggesting that more lobbying generally leads to more contracts. But the association is less strong for General Dynamics, Northrop Grumman, and Boeing. Additionally, the data reveals a significant positive association between lobbying expenditures and the sums earned from defense contracts for Lockheed Martin and Boeing.

In the next section, I will explain motivations of nuclear modernization other than lobbying, which are the security model, prestige model and technological determinism.

III. Alternative Explanations

The theoretical section puts forward four motivations for modernization. The life span of missiles and nuclear weapons is the ultimate factor that makes it necessary for a state to modernize its weapon capacities. The state can buy a completely new weapon, increase the number in the stockpile by purchasing more, extend the weapon's life by maintaining the same qualities, make improvements to the weapon's technical features, or replace it with the exact one. Many factors come into play during the decision-making process, and lobbying is one of them.

I included the life span in the technological determinism model. Within technological determinism, countries aim to keep their weapons at the most advanced version by updating and improving them constantly. In the case of nuclear warheads, the plutonium, uranium, and

tritium have a specific life span. Plutonium is produced through pit production in the National Nuclear Security Administration (NNSA) in the United States. There is a standard formula used in pit production.

Imagine that a state makes x pits/year starting 2029 when all 4000 pits in the stockpile are already 40 years old.¹⁴⁷ In the year 2029 plus several years (A), there will be y number of pits that are considered "young" and have not yet reached 40 years of age. The remaining pits in the stockpile will be $(4000 - y)$ and will have aged by 40 plus A years. The values of y and $(4000 - y)$ depend on how many pits are produced each year and how many years have passed since 2029.

In $(2029+A)$, y would be young, and $(4000-y)$ would be $(40+A)$ years old.

It takes 160 years $(4000/x)$ to replace them all. The last ones are 200 years old. The first replaced ones would then be 160 years old. At 80 years, it would take 50 years to replace 4000 pits (80×50) . The oldest would be 90 before being replaced. To illustrate, the US Department of Defense outlined its aim to produce no fewer than 80 pits per year in the 2018 Nuclear Posture Review: 30 per year beginning in 2026 in Los Alamos National Laboratory; 50 pits per year starting in 2030 in the Savannah River Site.

Weapons-grade Plutonium (Pu-239) also ages periodically.¹⁴⁸ Pu-239 decays by emitting the alpha particles, meaning the Helium-4 nucleus. Therefore:



Energetic alpha disrupts the surrounding material, then combines with two electrons to become a helium atom (a gas). In 100 years:

- About 0.3 percent of Pu atoms turn into $\{\text{He} + \text{U}\}$
- Each kg of Pu ($\sim 60 \text{ cm}^3$) creates ~ 250 standard cm^3 of He gas. Every Pu atom has been displaced multiple times.

¹⁴⁷ "Plutonium Pit Production." National Nuclear Security Administration, n.d.
<https://www.energy.gov/nnsa/plutonium-pit-production>.

¹⁴⁸ "Plutonium." World Nuclear Association, April 2021.

Tritium (Hydrogen-3) is the other vital element that needs to be replaced periodically, as it is also perishable.¹⁴⁹ It is currently used by five states: The US, Russia, China, France, and the United Kingdom. Provided that explosion happens if splitting atoms in a chain reaction, tritium helps create a more efficient chain reaction by using less fuel and more quickly. The trigger is more effective in an explosion when a tritium-deuterium fusion reaction is ignited.¹⁵⁰ Therefore, it boosts the yield of a fission weapon. Unlike plutonium, tritium distinguishes itself by aging quickly; it transforms itself into a form of helium at a rate of about 5.5 percent a year. Eventually, it decays by a half-life of 12.3 years; half decays every 12.3 years. Therefore, a nuclear warhead that utilizes plutonium pits and tritium for a boosted blast capability must be replaced and updated periodically.

Similarly, nuclear delivery vehicles such as missiles or submarines must be updated regularly, which I explored in this thesis. The improvements in the vehicles' capacities are up to the government. For instance, on average, Minuteman III ICBMs produced by Boeing have a life span of 10 years.¹⁵¹ Likewise, Trident II D5 submarines have undergone a life-extension program (LE) for the last 20 years. Nevertheless, the rate at which states modernize their nuclear arsenals is not constant over time, which indicates that factors other than technology come into play. During the Cold War, the pace of nuclear modernization in the US and the Soviet Union differed. While the US nuclear modernization peaked around the early 1960s until the mid-1970s,¹⁵² USSR's modernization peaked by the early 1980s, and the trend continued until the 1990s.¹⁵³

On the other hand, lobbying is not the sole reason for nuclear modernization. Along with other reasons I explained in the theoretical section, lobbying is another influential factor in this process. In this thesis, I aimed to explore the lobbying factor. The security model is the second reason I put forward in the above section. Again, the nuclear modernization program

¹⁴⁹ Kelley, Robert E. "Starve Nuclear Weapons to Death with a Tritium Freeze." *SIPRI*, August 28, 2020. <https://sipri.org/commentary/topical-backgrounder/2020/starve-nuclear-weapons-death-tritium-freeze>.

¹⁵⁰ "Tritium's Role in Powering a Bomb." *The New York Times*, October 9, 1988. <https://www.nytimes.com/1988/10/09/us/tritium-s-role-in-powering-a-bomb.html>.

¹⁵¹ "Minuteman III." Center for Strategic and International Studies Missile Defense Project, August 2, 2021. <https://missilethreat.csis.org/missile/minuteman-iii/>.

¹⁵² Kristensen, Hans M. "Declassified: US Nuclear Weapons At Sea." *Federation of American Scientists*, February 3, 2016. <https://fas.org/blogs/security/2016/02/nuclear-weapons-at-sea/>.

¹⁵³ "Russia's Nuclear Weapons: Doctrine, Forces, and Modernization." Congressional Research Service, August 5, 2019. https://www.everycrsreport.com/files/20190805_R45861_c843684e32a395ff9de5cf7c6a17bf61835d29c1.html#Content.

of the United States during the early Cold War is a prime example of this model. The United States heavily invested in its nuclear weapon capabilities in the 1960s to curb the USSR threat. However, countries may fail to react to potential challengers or choose to modernize their arsenals when no security threats are on the horizon. In the case of France's 2010 nuclear modernization program, there was no immediate or apparent threat to France's security at the time.¹⁵⁴

The third reason is the prestige model. Modernizing nuclear weapons for prestige reasons may also create tensions and instability, as it may trigger arms races and fuel rivalries among countries. One example of a prestige-hungry country that had not modernized its nuclear arsenal until 2021 is China. While China is a nuclear-armed state, it has historically pursued a minimalist nuclear strategy focused on maintaining a credible deterrent with a limited number of nuclear weapons. China has only recently begun to modernize its nuclear arsenal, and this has been driven primarily by concerns about the modernization efforts of other nuclear-armed states, particularly the United States.

The three other reasons for updating nuclear weapons—technological determinism, security concerns, and prestige—were thus underlined in this section. The lifespan of nuclear weapons components, such as plutonium and tritium, necessitates periodic replacement. Countries are constantly updating and enhancing their weaponry to maintain their advanced status. Security considerations prompt modernization efforts in response to perceived threats, even without immediate dangers. Nuclear modernization may also be fueled by the need for status, which could spark rivalries and an arms race. The role of lobbying in nuclear modernization is acknowledged but not viewed as the sole reason. Different countries have varying rates of modernization, demonstrating the impact of variables other than technology.

¹⁵⁴ Millis, Claire. "Nuclear Weapons at a Glance: France." House of Commons, July 28, 2022. <https://researchbriefings.files.parliament.uk/documents/CBP-9074/CBP-9074.pdf>.

Conclusion

In this thesis, I test my hypothesis that the more defense companies spend on lobbying, the more the US government engages in nuclear modernization. This study looks at the lobbying activities of the five biggest defense companies in the United States between 2000 and 2020 and explores the influence of the military-industrial complex on nuclear weapons during those years. I introduce lobbying as a factor influencing nuclear weapon modernization in the United States, along with other elements: The security model, prestige model, and technological determinism. It does not challenge others but aims to prove that lobbying also affects US nuclear weapon policy.

On the other hand, even though I adopt the defensive realist perspective in my outlook to the US military capabilities, this thesis argues that defensive realist theory does not incorporate internal factors influencing a country's position compared to others in the international system. Under the current geopolitical atmosphere, military capability constitutes a significant element in how other states perceive a great power and treat accordingly. However, a great power's place in the system is not only determined by the material capabilities of other states, which are considered external, but also domestic factors can play a crucial role how others treat a great power.

Nuclear weapons are associated with a powerful military, signifying great power in the system. A powerful military naturally requires a high military budget. A significant portion of the US defense budget goes to maintaining and acquiring new nuclear weapons, which have never been used since 1945. The US government believes that all acquisitions and costs serve the purpose of keeping US nuclear deterrence safe and secure. Over the last few years, many non-governmental actors have stepped into the deterrence debate and convinced policymakers to give up nuclear weapons and pursue disarmament. In this thesis, I argued that defense companies are non-governmental actors that have an influence on US nuclear deterrence policy. Company contributions to the lawmakers, think tanks, universities, and revolving door show that these companies have used and are aiming to use the "threat card" for a long while. As the sole actors that profit from any war in the world by selling more weapons, they aim to keep their businesses on track and alive through lobbying.

My first statistical analysis shows that all five companies' lobbying spendings positively correlate with the number of modernization contracts they received from the US government

between 2000 – 2020. In my second analysis, all companies except Boeing again positively correlate. Remarkably, the correlation coefficients for Lockheed Martin, which is the biggest defense company with the most profitable contracts among others, are highly positive by being more than 0,5 in both cases. The positive correlation between defense lobbying and nuclear modernization suggests that there may be significant pressure from defense companies to maintain and expand the US nuclear arsenal. This relationship between defense lobbying and nuclear modernization creates a “military-industrial complex” in which the interests of the defense industry become closely intertwined with those of the government, potentially at the expense of other priorities such as nuclear disarmament. This could make achieving nuclear disarmament goals more challenging, as powerful interests may be invested in maintaining the status quo.

I. Limitations

This study had certain limitations during research. The data on the websites of the House of Representatives and Senate on the Lobbying Disclosure Act is not available prior to the year 2011. Data for 2011 and 2012 were also numbered and only partially reported for some quarters.¹⁵⁵ Therefore, to work with proper data, I referred to an NGO source which is deemed reliable, instead of an official source.

As mentioned in the lobbying section, though the FEC and LDA disclose the amount, they don't reveal the individuals that lobbyists meet. If a lobbyist talks to one senator, this is indicated as the “Senate” in the LDA form. Even if the lobbyist meets the President on special access, it is stated as the “Executive Office of the President.” Thus, there are limitations in investigating how lobbying impacts different decision-makers in the US.

II. Future Studies

This study has opened vast possibilities for future research topics. The first possible future research idea is to look at only nuclear-related bills and the voting patterns of lawmakers who consistently receive money from defense companies. Specific key lawmakers (like a former armed services committee chair) can be picked, and their voting patterns can be tracked in

¹⁵⁵ “Lobbying Disclosures”, Clerk of the House of Representative, n.d.
[https://disclosurespreview.house.gov/?index=%22lobbying-disclosures%22&size=10&sort=\[{%22_score%22:true},{%22field%22:%22registrant.name%22,%22order%22:%22asc%22}\]](https://disclosurespreview.house.gov/?index=%22lobbying-disclosures%22&size=10&sort=[{%22_score%22:true},{%22field%22:%22registrant.name%22,%22order%22:%22asc%22}])

line with the money that lawmaker receives every year. By analyzing voting patterns on nuclear-related bills, future research could identify whether lawmakers who receive more money from defense companies are more likely to vote in favor of bills that increase funding for nuclear weapons and related technologies. This could shed light on the extent to which defense lobbying is influencing US nuclear policy. Similarly, by focusing on a specific key lawmaker, researchers could track their voting patterns over time and see whether there is a correlation between the money they receive from defense companies and their votes on nuclear-related issues. This could provide a more nuanced understanding of the role of individual lawmakers in shaping nuclear policy and the extent to which defense lobbying influences critical decisions.

Such a study would be significant because it could help uncover potential conflicts of interest or undue influence in policymaking. By identifying voting behavior patterns associated with lobbying and campaign finance, researchers could help promote transparency and accountability in government decision-making and highlight areas where reforms might be needed.

Secondly, how lobbying differs for conventional and nuclear weapons is also another future research topic. This question can be studied because conventional and nuclear weapons serve very different strategic purposes and have different effects on international relations and global security. Therefore, it is essential to understand how lobbying efforts may differ for these two types of weapons, as this can provide important insights into the underlying political and economic factors that shape defense policy.

Moreover, the influence of defense lobbying on conventional and nuclear weapons may have different implications for democracy, accountability, and national security. By studying these differences, researchers can gain a more nuanced understanding of the potential risks and benefits of defense lobbying for these different types of weapons. Lastly, understanding the differences in lobbying for conventional and nuclear weapons can also provide valuable insights into the broader dynamics of the defense industry, including the roles played by different stakeholders such as defense contractors, defense policy experts, and government officials.

REFERENCES

- “Client Profile: Boeing Co” Open Secrets, n.d. <https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000100>
- “Client Profile: General Dynamics” Open Secrets, n.d.
<https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000165>
- “Client Profile: Lockheed Martin” Open Secrets, n.d.
<https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000104>
- “Client Profile: Northrop Grumman” Open Secrets, n.d.
<https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2022&id=D000000170>
- “Client Profile: Raytheon Co.” Open Secrets, n.d.
<https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2019&id=D000000175>.
- “Client Profile: Raytheon Technologies” Open Secrets, n.d.
<https://www.opensecrets.org/federal-lobbying/clients/summary?cycle=2020&id=D000072615>
- “Individual Contributions.” Federal Election Commission of the United States, n.d.
https://www.fec.gov/data/receipts/individual-contributions/?committee_id=C00664375&contributor_employer=raytheon.
- “Minuteman III.” Center for Strategic and International Studies Missile Defense Project, August 2, 2021. <https://missilethreat.csis.org/missile/minuteman-iii/>.
- “Plutonium Pit Production.” National Nuclear Security Administration, n.d.
<https://www.energy.gov/nnsa/plutonium-pit-production>.

“Plutonium.” World Nuclear Association, April 2021.

“Plutonium.” World Nuclear Association, April 2021. <https://world-nuclear.org/information-library/nuclear-fuel-cycle/fuel-recycling/plutonium.aspx>.

“Projected Costs of U.S. Nuclear Forces, 2021 to 2030.” Congressional Budget Office, May 2021. <https://www.cbo.gov/publication/57240>.

“Russia’s Nuclear Weapons: Doctrine, Forces, and Modernization.” Congressional Research Service, August 5, 2019.
https://www.everycrsreport.com/files/20190805_R45861_c843684e32a395ff9de5cf7c6a17bf61835d29c1.html#Content.

“Summary of Findings,” Costs of War, Watson Institute International and Public Affairs, Brown University.
<https://watson.brown.edu/costsofwar/papers/summary>

“Sustainable Defense: More Security Less Spending.” Sustainable Defense Task Force. Washington D.C.: Center for International Policy, June 2019. p. 3.
<https://comw.org/pda/fulltext/1906%20SustainableDefenseTaskForce%20report.pdf>.

“The Costs of Replacing Trident.” Campaign for Nuclear Disarmament, n.d.
<https://cnduk.org/wp-content/uploads/2018/02/Costs-2016-web.pdf>.

“Tritium’s Role in Powering a Bomb.” *The New York Times*, October 9, 1988.
<https://www.nytimes.com/1988/10/09/us/tritium-s-role-in-powering-a-bomb.html>

Acheson, Ray. “Modernization of Nuclear Weapons: Aspiring to ‘Indefinite Retention’?” *Bulletin of the Atomic Scientists* 68, no. 5 (September 1, 2012), p. 89. <https://doi.org/10.1177/0096340212459038>.

Adams, Gordon, 1941-. *The Politics of Defense Contracting: The Iron Triangle / Gordon Adams ; [Charts, Lillian Bogeinsky]*. Accessed from <https://nla.gov.au/nla.cat-vn375870>. New Brunswick, [N.J.]: Transaction Books, 1982, p. 110.

Aizenberg, Ellis, and Marcel Hanegraaff. "Is Politics under Increasing Corporate Sway? A Longitudinal Study on the Drivers of Corporate Access." *West European Politics* 43, no. 1 (January 2, 2020), p. 187. <https://doi.org/10.1080/01402382.2019.1603849>.

Alexandra Marksteiner et al., "The SIPRI Top 100 Arms-Producing and Military Services Companies, 2020" (Stockholm International Peace Research Institute, December 2021), <https://doi.org/10.55163/WDQZ7897>.

Allison, Graham. *Essence of Decision: Explaining Cuban Missile Crisis*. Boston: Little, Brown and Company, 1971, p. 5.

Barbara Boland, "Top 50 U.S. Think Tanks Receive Over \$1B From Gov, Defense Contractors," *The American Conservative*, October 14, 2020, <https://www.theamericanconservative.com/articles/swamp-report-top-50-u-s-think-tanks-receive-over-1b-from-gov-defense-contractors/>

Baylis, John, James Wirtz, Eliot Cohen and Colin Gray. "Strategy in the Contemporary World." (Oxford University Press, 2003): "Technology and Warfare", pp. 121-136.

Beinart, Matthew. "Austin Extends Recusal From Raytheon-Related Decisions For 4 Years, Won't Seek Defense Firm Job After Service." *Defense Daily*, January 20, 2021. <https://www.defensedaily.com/austin-extends-recusal-raytheon-related-decisions-4-years-wont-seek-defense-firm-job-service/pentagon/>.

Brunton, Bruce G. "Institutional Origins of the Military-Industrial Complex." *Journal of Economic Issues* 22, no. 2 (1988): p. 599. <http://www.jstor.org/stable/4226018>.

Carlson, John. "Is the NPT Still Relevant? – How to Progress the NPT's Disarmament Provisions." *Journal for Peace and Nuclear Disarmament* 2, no. 1 (January 2, 2019), p. 103. <https://doi.org/10.1080/25751654.2019.1611187>.

Chavez, Steff, Alexandra Heal, Ian Bott, Sam Joiner, Sam Learner, and Veronika Samborska. "How Arming Ukraine Is Stretching the US Defence Industry." *Financial Times*, January 31, 2023. <https://ig.ft.com/us-defence-industry/>.

Contracts for Nov. 5, 2020. U.S. Department of Defense.
<https://www.defense.gov/Newsroom/Contracts/Contract/Article/2406922/>

Cortright, David. "At the Crossroads: A Nuclear Reckoning." Presented at the Alva Myrdal Centre for Nuclear Disarmament Annual Conference, Uppsala, Sweden, June 15, 2023.

Davenport, Kelsey, Daryl G. Kimball, and Kingston Reif. "Nuclear Weapons: Who Has What at a Glance." *Arms Control Association*, January 2022.
<https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat>

Definitions: Lobbying Disclosure Act. U. S. Senate.
https://www.senate.gov/legislative/Lobbying/Lobby_Disclosure_Act/3_Definitions.html.

Dodge, Michaela. "Nuclear Modernization: Best Bang for Our Bucks." *Strategic Studies Quarterly* 11, no. 3 (2017), p. 69.
<http://www.jstor.org/stable/26271604>.

Dodge, Michaela. "Nuclear Modernization: Best Bang for Our Bucks." *Strategic Studies Quarterly* 11, no. 3 (2017), p. 69.
<http://www.jstor.org/stable/26271604>.

Doyle, Thomas. "A Moral Argument for the Mass Defection of Non-Nuclear-Weapon States from the Nuclear Nonproliferation Treaty Regime." *Global Governance* 23, no. 1, (2017), p. 19.

Drutman, Lee. "How and Why Corporations Lobby." In *The Business of America Is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*. Oxford: Oxford University Press, 2015.

Drutman, Lee. *The Business of America Is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*, 2015.

Dunlap, Charles J. "The Military-Industrial Complex." *Daedalus* 140, no. 3 (2011): p. 140. <http://www.jstor.org/stable/23047354>.

Egeland, Kjølsv, and Benoît Pelopidas. "No Such Thing as a Free Donation? Research Funding and Conflicts of Interest in Nuclear Weapons Policy Analysis." *International Relations* 1, no. 23 (December 22, 2022). <https://doi.org/10.1177/00471178221140000>.

Eric Lipton, Nicholas Confessore and Brooke Williams, "Think tank scholar or corporate consultant? It depends on the day". 8 August 2016. <https://www.adn.com/nation-world/2016/08/08/think-tank-scholar-or-corporate-consultant-it-depends-on-the-day/>

Ettinger, Aaron. "Neoliberalism and the Rise of the Private Military Industry." *International Journal* 66, no. 3 (2011): 743–64. <http://www.jstor.org/stable/23104379>.

Ford, Christopher. "Nuclear Disarmament, Nonproliferation, and the 'Credibility Thesis.'" *Hudson Institute*, September 2009, p. 10. <https://www.files.ethz.ch/isn/108566/Nuclear%20DisarmamentCF909.pdf>.

Gardner, John W. "Forward." In *Campaign Money: Reform and Reality in the States*. New York, NY: Free Press, 1976.

Geller, Petty-Jane. "LRSO: Why America Needs the Nuclear Long-Range Standoff Weapon." Heritage Foundation, February 5, 2021.

<https://www.heritage.org/defense/commentary/lrso-why-america-needs-the-nuclear-long-range-standoff-weapon>

Gheorghe, Eliza. "Proliferation and the Logic of the Nuclear Market." *International Security* 43, no. 4 (April 1, 2019): 88–127.

https://doi.org/10.1162/isec_a_00344.

Giorno, Taylor. "Federal Lobbying Topped \$3 Billion through Third Quarter for the First Time Ever." *Open Secrets*, October 26, 2022.

<https://www.opensecrets.org/news/2022/10/federal-lobbying-topped-3-billion-through-third-quarter-for-the-first-time-ever/>.

Global Offices. BAE Systems. <https://www.baesystems.com/en/cybersecurity/about-us/global-offices>

Gordon Adams 1941-, *The Politics of Defense Contracting: The Iron Triangle* / Gordon Adams; [Charts, Lillian Bogeinsky], p. 116. <https://nla.gov.au/nla.cat-vn375870> (New Brunswick, [N.J.]: Transaction Books, 1982).

Hall, Madison. "One of the Largest Defense Contractors in the Nation Donated to Nearly 150 Members of Congress as They Debated Ukraine Military Aid." *Business Insider*, n.d. <https://www.businessinsider.com/defense-contractor-lockheed-martin-spending-congress-contributions-campaign-2022-5>.

Hartung, William. "Profits of War: Corporate Beneficiaries of the Post-9/11 Pentagon Spending Surge." *Center for International Policy*, September 13, 2021, p. 1. https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Profits%20of%20War_Hartung_Costs%20of%20War_Sept%2013%2C%202021.pdf

Harvard Business Review. "Raytheon CEO Gregory Hayes: How Ukraine Has Highlighted Gaps in US Defense Technologies," March 25, 2022.

<https://hbr.org/2022/03/raytheon-ceo-gregory-hayes-how-ukraine-has-highlighted-gaps-in-us-defense-technologies>.

Hyung Kim, Jin. "Is Your Playing Field Unleveled? U.S. Defense Contracts and Foreign Firm Lobbying." *Strategic Management Journal*, August 12, 2019, p. 1913. <https://doi.org/10.1002/smj.3061>.

Individual Contributions, Federal Election Commission.

<https://www.fec.gov/data/receipts/individual-contributions/>

Jonathan M. Karpoff, D. Scott Lee, and Valaria P. Vondra, "Defense Procurement Fraud, Penalties, and Contractor Influence," *Journal of Political Economy* 107, no. 4 (1999), pp. 809–42, <https://doi.org/10.1086/250080>

Jordi Calvo Rufanges, "The Arms Industry Lobby in Europe." *American Behavioral Scientist* 60, no. 3 (March 2016), pp. 305–20. <https://doi.org/10.1177/0002764215613406>.

Jordi Calvo Rufanges, "The Arms Industry Lobby in Europe." *American Behavioral Scientist* 60, no. 3 (March 2016), p. 307. <https://doi.org/10.1177/0002764215613406>.

Kelley, Robert E. "Starve Nuclear Weapons to Death with a Tritium Freeze." *SIPRI*, August 28, 2020. <https://sipri.org/commentary/topical-background/2020/starve-nuclear-weapons-death-tritium-freeze>.

Knopf, Jeffrey W. "Nuclear Disarmament and Nonproliferation: Examining the Linkage Argument." *International Security* 37, no. 3 (2012), p. 104.

Kone, Aminata M. 2013. *The Military-Industrial Complex in the United States: Evolution and Expansion from World War II to the War on Terror*. *Inquiries Journal/Student Pulse* 5 (08), <http://www.inquiriesjournal.com/a?id=749>

Korda, Matt. "Influence of the Defense Industry on US National Security Strategy." *Russia Matters*, November 12, 2021.
<https://russiamatters.org/analysis/influence-defense-industry-us-national-security-strategy>.

Kristensen, Hans M. "Declassified: US Nuclear Weapons At Sea." *Federation of American Scientists*, February 3, 2016.
<https://fas.org/blogs/security/2016/02/nuclear-weapons-at-sea/>.

Kristensen, Hans M., and Matt Korda. "United States Nuclear Weapons, 2023." *Bulletin of the Atomic Scientists* 79, no. 1 (January 2, 2023): 28–52.
<https://doi.org/10.1080/00963402.2022.2156686>.

Kristensen, Hans M., and Robert S. Norris. "Slowing Nuclear Weapon Reductions and Endless Nuclear Weapon Modernizations: A Challenge to the NPT." *Bulletin of the Atomic Scientists* 70, no. 4 (July 1, 2014), p. 106.
<https://doi.org/10.1177/0096340214540062>.

Kroenig, Matthew. "How to Approach Nuclear Modernization?" *Bulletin of the Atomic Scientists* 71, no. 3 (January 1, 2015), p. 17.
<https://doi.org/10.1177/0096340215581356>.

Kroenig, Matthew. "The Case for the US ICBM Force." *Strategic Studies Quarterly* 12, no. 3 (2018), p. 60.

Kurc, Caglar, and Sibel Oktay. "Taking Production Relations Seriously: The Role of Defence Firms in Armaments Cooperation." *European Security* 27, no. 4 (October 2, 2018), p. 469.

Leadership and Corporate Governance: Political Disclosures. Lockheed Martin.
<https://www.lockheedmartin.com/en-us/who-we-are/leadership-governance/board-of-directors/political-disclosures.html>.

Libowitz, Jordan, and Linnaea Honl-Stuenkel. "Mark Esper, Former Raytheon Weapons Lobbyist, Is in Charge of the Pentagon." *Citizens for Ethics*, January 13, 2020. <https://www.citizensforethics.org/reports-investigations/crew-investigations/mark-esper-raytheon-weapons-lobbyist/>

Lockheed Martin Headquarters and Office Locations. <https://craft.co/lockheed-martin/locations?page=2>

Millis, Claire. "Nuclear Weapons at a Glance: France." House of Commons, July 28, 2022. <https://researchbriefings.files.parliament.uk/documents/CBP-9074/CBP-9074.pdf>.

Moore, David. "Former PAC Rejector Elaine Luria Is Now Taking Checks From Raytheon and Rolls-Royce." Brick House, February 9, 2021. <https://thebrick.house/former-pac-rejector-elaine-luria-is-now-taking-checks-from-raytheon-and-rolls-royce/>.

Müller, Harald. "Between Power and Justice: Current Problems and Perspectives of the NPT Regime." *Strategic Analysis* 34, no. 2 (April 1, 2010), p. 191. <https://doi.org/10.1080/09700160903542740>.

Nester, William R. "Weapons and Spaceships: The Military-Industrial Complex." In *American Industrial Policy: Free or Managed Markets?*, edited by William R. Nester, p. 137. London: Palgrave Macmillan UK, 1997. https://doi.org/10.1007/978-1-349-25568-9_5.

Nye, Joseph. *Nuclear Ethics*. New York: The Free Press, 1988.

Onea, Tudor A. *The Grand Strategies of Great Powers*. 1st Edition. London: Routledge, 2020. <https://doi.org/10.4324/9781315268378>.

Oudot, Jean-Michel. "Performance and Risks in the Defense Procurement Sector." *Journal of Public Policy* 30, no. 2 (2010), pp. 203. doi:10.1017/S0143814X10000073.

Perlo-Freeman, Sam. "The Opportunity Cost of World Military Spending." *Stockholm International Peace Research Institution*, April 5, 2016.

<https://www.sipri.org/commentary/blog/2016/opportunity-cost-world-military-spending>.

Public Activities. Raytheon Technologies. <https://www.rtx.com/our-company/corporate-governance/public-activities>.

Public Law 104-65-Dec. 19, 1995. U.S. House of Representatives.
<https://lobbyingdisclosure.house.gov/lda.pdf>

Raytheon Technologies CEO to present at Barclays Industrial Select Conference.
<https://www.rtx.com/news/news-center/2021/02/09/raytheon-technologies-ceo-to-present-at-barclays-industrial-select-conference>

Rogerson, William P. "Chapter 12 Incentive Models of the Defense Procurement Process." In *Handbook of Defense Economics*, 1, pp. 309–46. Elsevier, 1995.
[https://doi.org/10.1016/S1574-0013\(05\)80014-6](https://doi.org/10.1016/S1574-0013(05)80014-6).

Rufanges, Jordi Calvo. "The Arms Industry Lobby in Europe." *American Behavioral Scientist* 60, no. 3 (March 2016), p. 314.
<https://doi.org/10.1177/0002764215613406>.

Sabbagh, Dan. "Cap on Trident Nuclear Warhead Stockpile to Rise by More than 40%." *Guardian*, March 15, 2021. <https://www.theguardian.com/uk-news/2021/mar/15/cap-on-trident-nuclear-warhead-stockpile-to-rise-by-more-than-40>.

Schuler, Douglas A., Kathleen Rehbein, and Roxy D. Cramer. "Pursuing Strategic Advantage through Political Means: A Multivariate Approach." *The Academy of Management Journal* 45, no. 4 (2002), p. 660.
<https://doi.org/10.2307/3069303>.

Selling, Niels. "What to Lobby on? Explaining Why Large American Firms Lobby on the Same or Different Issues." *Business and Politics* 22, no. 3 (2020), p. 450. <https://doi.org/10.1017/bap.2019.24>.

Smithberger, Mandy. "Brass Parachutes: The Problem of the Pentagon Revolving Door." Project on Government Oversight, November 5, 2018. p. 9 <https://www.pogo.org/report/2018/11/brass-parachutes>

Snyder, Jack. *Myths of Empire: Domestic Politics and International Ambition*. Cornell University Press, 1991. <http://www.jstor.org/stable/10.7591/j.ctt32b48h>.

Tannenwald, Nina. "Justice and Fairness in the Nuclear Nonproliferation Regime." *Ethics & International Affairs* 27, no. 3 (2013): 299–317. <https://doi.org/10.1017/S0892679413000221>

Tannenwald, Nina. "Justice and Fairness in the Nuclear Nonproliferation Regime." *Ethics & International Affairs* 27, no. 3 (2013): 299–317. <https://doi.org/10.1017/S0892679413000221>.

Thakur, Ramesh, Jane Boulden, and Thomas G. Weiss. "Can the NPT Regime Be Fixed or Should It Be Abandoned?" *Dialogue on Globalization* 40 (October 2008), p. 15. <http://library.fes.de/pdf-files/iez/global/05760.pdf>.

The Importance of the Nuclear Triad. The U.S. Department of Defense. <https://media.defense.gov/2020/Nov/24/2002541293/-1/-1/1/FACTSHEET-THE-IMPORTANCE-OF-MODERNIZING-THE-NUCLEAR-TRIAD.PDF>

Tincher, Douglas. "Myanmar Nonproliferation Dialogue: Missile Safety & Operability Considerations." Savannah River National Laboratory, NNSA, December 2014. https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/attachments/141204_TincherPresentation.pdf

Transparency Register. European Commission. https://ec.europa.eu/info/about-european-commission/service-standards-and-principles/transparency/transparency-register_en

Tripathi, Micky. "PAC Contributions and Defense Contracting." *Business and Politics* 2, no. 1 (2000), p. 54. <https://doi.org/10.2202/1469-3569.1003>.

Virginia 2nd Congressional District House Debate Scott Taylor vs Elaine Luria Oct 23, 2018. Washington D.C.: YouTube, 2018. <https://www.youtube.com/watch?v=43SjD7bfBjo&t=1235s>.

Wallach, Omri. "Which Countries Have the Most Nuclear Weapons?" *Visual Capitalist*, September 30, 2021. <https://www.visualcapitalist.com/which-countries-have-the-most-nuclear-weapons/>.

Waltz, Kenneth N. "Realist Thought and Neorealist Theory." *Journal of International Affairs* 44, no. 1 (1990): 21–37. <http://www.jstor.org/stable/24357222>.

Waltz, Kenneth N. "The Spread of Nuclear Weapons: More May Be Better." *The Adelphi Papers* 21, no. 171 (September 1, 1981): 1–31. <https://doi.org/10.1080/05679328108457394>.

Zakaria, Fareed. Review of *Realism and Domestic Politics: A Review Essay*, by Jack Snyder. *International Security* 17, no. 1 (1992): 177–98. <https://doi.org/10.2307/2539162>.

Zhang, Yan, and Haiyang Li. "Innovation Search of New Ventures in a Technology Cluster: The Role of Ties with Service Intermediaries." *Strategic Management Journal* 31, no. 1, p. 93. (September 2009). <https://doi.org/10.1002/smj.806>.